

REVIEW OF RADIOTHERAPY SERVICES VICTORIA

A Report to
Department of Human Services, Victoria

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OVERVIEW AND RECOMMENDATIONS

Background

The Victorian Department of Human Services (DHS) has initiated this Review to provide the Government with an analysis of options for future development of radiotherapy services. ACIL Consulting Pty Ltd (ACIL) was commissioned by the DHS to undertake the Review. This report outlines options for the development of radiotherapy services in Victoria and makes recommendations based on a consideration of the social costs and benefits (which are broader than the clinical costs and benefits) of these options.

Following the terms of reference for the Review, the report addresses the features of demand for and supply of radiotherapy services, outlining the factors that influence these. This then underpins an analysis of costs, both operating and capital, and the role of the private sector consistent with the Government's policy. Throughout these analyses, there is recurrent reference to, and examination of, issues concerned with cancer patient access to, and awareness of, treatment options which incorporate radiotherapy. These matters are central to the determination of appropriate strategies for further developing radiotherapy facilities in Victoria.

Against this background, options for the future development of radiotherapy are then presented, and analysed in terms of their costs and benefits, and trade-offs between competing objectives. The implications of these options have been explored to provide a framework for future decisions.

ACIL has examined the current availability and utilisation of radiation oncology services in Victoria, within the context of other oncology services and other elements of the acute health care system; these relationships prove critical to both the appropriate strategies and the assessment of the cost effectiveness of a significant increase in the utilisation of radiotherapy services. The Review has been based on extensive consultations with the range of stakeholders — health care professionals, government agencies and 'consumers' of the services — on submissions received through a public submission process and on detailed analysis of data drawn from a wide range of sources.

This Review builds on previous planning studies and reports in Victoria, notably the Lovell Inquiry in 1985, and the Cancer (Radiotherapy) Services Strategic Plan in 1990. More recently, the Australian Health Technology Advisory Committee (AHTAC) summarised the present knowledge of the key issues in the field of radiotherapy as they apply to Australia. Their report ("Beam & Isotope Radiotherapy", December 1996) contained several key recommendations to improve radiotherapy services in Australia, that have proved fundamental to this Review, notably that radiation oncology be organised through networks of services that provide coordinated, comprehensive care in multimodal settings, and that efforts are made to decentralise services to enhance access for consumers.

The Review was conducted in a four-stages — data collection, consultation, data analysis, and the development of recommendations and conclusions. The Review Advisory Committee, convened by the DHS to advise on in the conduct of the Review and to provide feedback on the work as it developed, proved an invaluable source of information and insight throughout the review. However, the conclusions and recommendations remain those of ACIL.

Statistical data and information have been obtained from key sources, such as the DHS, the Anti Cancer Council of Victoria (ACCV), the Commonwealth Health Insurance Commission (HIC), and service providers in Victoria. Consultation occurred with individual key

informants, and through a public submission process. Submissions to the Review, and the results of analysis then formed the basis of a stakeholder workshop, in which key issues and options for future development were discussed in an open forum. Following the workshop, key conclusions and recommendations have been developed and are outlined in this report.

Working through the issues involved in the further development of radiotherapy services in Victoria requires addressing a range of complex trade-offs whose outcomes are heavily dependent on the value systems brought to bear. These include trade-offs between costs to the providers and costs to patients; between accessibility and use of clinically desirable treatments and the quality with which these treatments are delivered; between prescription and choice; between costs to the Victorian Government and costs to the Federal Government; between rapid deployment of probably more valuable treatment systems but with real risks needing to be managed and a slower, safer roll-out but possibly at the expense of some current patients and the overall costs of the health care system.

Under these circumstances there is no uniquely ‘best’ strategy. What is needed is a policy *process* which ensures progress towards outcomes which would be widely viewed as representing real improvement and which sensibly manages the risks involved; this requires that judgments be made and that those judgments be defensible — but not that they be beyond debate, nor the application different value systems. It also requires that the medium and longer term recommendations not be set in concrete because the process needs to be able to learn from the experience gained with implementing the initial recommendations. In effect, the recommendations, and the reasoning underpinning them, will need to be revisited over time.

Accordingly, ACIL has placed considerable emphasis on setting out the trail of information, analysis, judgment and logic which underpins the recommendations it has ultimately made. It is hoped that this will allow open assessment of the process used and the conclusions reached, that it will facilitate the implementation of a set of changes which will ensure improved outcomes over the next several years and that it will allow the flexibility to adapt to changing information.

This Overview is, deliberately, a fairly detailed document in its own right because of ACIL’s judgment that the review process, and the reasoning on which the conclusions are based, needs to be well understood as well as the recommendations if the subsequent policy process is to deliver the best outcomes. In fact, this Overview is more than just a summary of the conclusions developed in the report. It is deliberately structured to bring together the various conclusions and lines of argument — from a complex array of policy and data analyses — to present them as coherently as possible. This drawing together of the different lines argument in this way produces insights which are not explicitly highlighted in the main body of this report but which are as important to our final recommendations as the individual arguments.

Key Arguments and Conclusions

Based on information received and analyses undertaken during this Review, ACIL has developed the following arguments and broad conclusions:

Support for the AHTAC Report’s position on clinically appropriate utilisation rates

- There is no basis for departing from the recent conclusion of the Australian Health Technology Advisory Committee (AHTAC, 1996) that, averaged across cancers, approximately 50 to 55 per cent of cancer patients would, *from a clinical perspective*, benefit from a treatment regimen which incorporates radiation oncology.

- This compares with current rates of utilisation in Victoria of the order of 42 per cent. In non-metropolitan areas, this rate is somewhat less, and estimated to be as low as 30 to 35%.
- It is noted that current clinical trends, and emerging US experience, suggest that the assessment of the *clinically optimal* rate of treatment will probably rise over the next decade, with up to 60 per cent of new cancers expected to be recommended for radiotherapy within 10 years.
- At the same time, both direct (though here far from definitive) and indirect evidence is presented which suggests that medical oncologists, surgeons and primary referrers currently believe that rates significantly below AHTAC levels are probably more appropriate — and this is seen as a significant impediment to increased utilisation.

Access costs

- Access to radiation oncology services has several dimensions and there are grounds for concern with all of these:
 - Two major factors which influence access are, firstly, the ease/cost with which these services can be obtained and, secondly, the extent to which both the referrers and the patients have sufficient, balanced information on which to base a decision as to an appropriate treatment regimen.

Based on the information examined, it is almost certain that both factors contribute to the gap between the AHTAC guidelines and current levels of utilisation in Victoria. What is not so clear (and this has important policy implications) is the relative importance of the two factors.

- There are significant social and financial costs associated with the use of less accessible services and these are not, in general, fully compensated for by existing support arrangements.

These costs can include some or all of lost time, direct travel and accommodation costs, child-care costs, pain and discomfort associated with travel, lost earnings (either of the patient or supporting family members) and removal from established family and community support.

These costs can be functions of distance/travel times but also of time-of-day and day-of-week access to facilities which can especially influence costs such as child-care and lost earnings.

Given the nature and duration of some radiotherapy treatments, especially non-palliative treatments, just the financial component of these costs could amount, in some cases, to several hundred, or even thousand, dollars, to which needs to be added the ‘value’ of the non-financial components.

These costs need to be weighed against the costs of alternative treatments, such as more extensive surgery, but it is clear that there are many circumstances in which radiotherapy treatments would face a significant social cost penalty compared to some alternatives.

- These costs tend to be greater for individuals located at a distance from a centre suitable for delivering the necessary treatment, and in particular for individuals

located in rural areas. This can be due to a combination of longer travel times, the likelihood of greater accommodation costs or less acceptable accommodation arrangements (proximity to family etc), and possibly less flexibility to arrange child care, to take leave of absence from work (especially from farms) etc.

However, even within metropolitan Melbourne, both travel times and the wider opportunity costs of using these services can be large. Patients who live in the fast growing, outer suburbs, particularly in the Outer West and Outer South-East represent a substantial proportion of total demand and face travel costs and time costs which can be significant.

The nature of these costs must also be considered relative to the costs of alternative treatments, because of the nature of the treatment regimen, including the common need for several treatments at a specialised facility.

Given the larger population mass in Melbourne, it may well be that the aggregate access costs within Melbourne are comparable to those outside of Melbourne, even though the per patient costs would be lower within Melbourne.

- Access to real choice as to treatment options is likely to have social value in its own right, allowing individuals to better tailor treatment options to their needs and preferences and to experience a greater sense of control. Real choice is also dependent on both information and availability of services.

Treatment efficacy

- There are, in many cases, significant social costs associated with the non-use of these treatments where their use is clinically indicated.
 - Typically, these involve a significant quality of life component (such as disfigurement, pain and suffering, risk of recurrence etc) and a small component involving survival prospects — in most cases, the alternative treatments offer comparable reductions in risk of death due to the cancer, though some studies are suggesting more significant survival impacts.

Even in the case of palliative care, some studies and anecdotal evidence indicate quite significant quality of life benefits in relation to cancers such as lung cancer.

- Quantification of these costs in ‘dollar’ terms is both controversial and constrained by available information. The confounding issue, alluded to earlier, between deterrence due to access costs and deterrence due to poor information makes it difficult to extract broadly based figures from historical patterns of choice, while the emotional sensitivity of the issues would work against valuation through direct survey methods.
- It is likely that patients who are deterred from the use of radiotherapy by the access costs attach a lower value to the perceived differential in expected treatment outcomes than do those who are not deterred — ie, any estimate of the average social cost differential between two treatment regimens would overstate the effective cost, due to the natural selection processes involved.

- Consistent and recurrent information provided in submissions, in the consultations and in the workshop, while largely anecdotal, did clearly reflect the view that these social cost differentials are, in some cases at least, far from negligible.

Commonly cited were the cases of informed women, particularly in rural areas, choosing a mastectomy in preference to a lumpectomy and adjunct radiotherapy because of the perceived access costs.

Separating necessary from unnecessary access costs

- This said, access costs are real, and are for some time likely to remain higher for some radiation oncology treatments than for alternative treatment regimens with comparable survival profiles.
 - In these circumstances, *some 'under-utilisation' in the sense of average utilisation rates below clinically optimal standards is likely to be perfectly rational and appropriate for consumers;*

While equalising access costs as perceived by all potential users of the service, even if practical, would almost certainly not represent the best use of scarce health sector funds.

ie, it is to be expected, and not interpreted as an indicator of system failure, that actual rates of utilisation will fall below current clinically optimal levels.
 - A key issue is whether all of the access costs are necessary costs, or whether strategies can be implemented to reduce either the real or the perceived access costs to favour a more appropriate level of utilisation — possibly still below the AHTAC level.
 - Clearly it is possible to redistribute some of the costs, particularly the financial costs; policies such as VIPTAS already have a significant redistributive effect.

Victorian Government policy

- A number of highly relevant policy objectives for Victorian acute health services are identified in the 1996 *Metropolitan Healthcare Services Plan*, including:
 - providing greater access to services closer to where people live;
 - examining opportunities for private sector involvement; and
 - developing models of service delivery which are cost-effective and maintain quality standards.

Radiation oncology within a comprehensive cancer service

- Oncology services comprise cancer surgery, radiation oncology, medical oncology and haemoncology. Palliative care is also an essential component of care for many cancer patients. Many patients require combined modality treatment.
 - There is wide agreement that each discipline should be part of a comprehensive cancer service, with close interaction between disciplines. In many areas of Australia, the lack of an integrated service has led to a situation where the modality

used for a treatment for a particular type of cancer will often depend on the point of entry to the system.

- The care of the cancer patient requires access to a wide range of specialties. A comprehensive service requires the development of special groups with expertise in treating cancer in special anatomical sites such as breast, colon, neuro-endocrine, and head and neck.
 - Full facilities for supportive care, tertiary pharmacy services, pain relief, rehabilitation and psychiatric assistance are also needed both within the hospital and community.

Expansion pressures and broad options

- Demographic and epidemiological trends indicate that there will be a need to treat significantly more cancer patients in coming years. This is just to sustain current levels of access and use.
 - Indicatively, by 2006 the number of new cancers in Victoria will have risen approximately 22 per cent:
 - Of this total of 22 per cent, most is due to the population growth and aging. About 8 per cent is due to the simple numerical increase in population growth, while 9 per cent is due to the increase in relative incidence due to the aging of the population. The remaining increase in incidence of about 5 per cent is due to several other individually minor factors, such as the impact of HIV/AIDS related cancers.
- More difficult to predict is the change in the proportion of cancers whose treatment includes radiotherapy.
 - This proportion will be a *creation of the policy environment* as much as it is something to which the policy environment needs to respond.

Any policy changes which reduce access costs or which alter consumer information or referral practice in a way which favours radiotherapy, can be expected to add to the demand for services.

- Given stated Victorian Government policy in relation to improving access, the implications of the conclusions and recommendations of the final AHTAC report, the evidence of the costs of underutilisation considered in this review (and the associated evidence that use of increased radiotherapy is unlikely to add to and may reduce whole of life treatment costs for cancers), ACIL has concluded that the policy environment both should and will contribute to a growth in utilisation rates.
 - ACIL remains of the view that, taking into account unavoidable access costs, it is to be expected that actual utilisation rates will remain below *then current* assessments of clinically optimal utilisation rates;
 - But ACIL recognises also that the assessed clinically optimal utilisation rate may well rise significantly over the next ten years.
 - And has concluded that a year 2006 demand level in the AHTAC range of 50 to 55 per cent is reasonable and realistic for planning purposes.

It will be a policy decision as to whether this demand is fully met or not (the earlier ‘chicken and egg’ argument aside).

There may be real resource limits (professional/technical) on the rate at which utilisation can be expanded, though recommendations are made for addressing and monitoring these.

However, assuming current AHTAC utilisation rates are to be met, this implies that the above increase in cancer cases of 22 per cent would translate into an increase in the number of radiotherapy treatments of between 45 and 60 per cent (combined growth in incidence plus increased uptake/utilisation), perhaps slightly reduced by a small trend towards fewer attendances per course of treatment.

This increase in utilisation can also be interpreted as between 2,500 and 3,000 cancer patients each year receiving a clinically preferred cancer treatment involving radiotherapy rather than the alternative treatments which would currently be chosen.

- These demand projections can be broken down into estimates of the regional demand for local treatment, given an assumption regarding the extent to which there is a ‘leakage’ of demand out of the local region and towards a major metropolitan facility — due either to the referral of complex cases or the personal choice of patients.
 - ACIL has assumed that leakage rate could be as high as 40 per cent, but this is likely to vary regionally and over time (with important policy implications discussed later) and is at present necessarily subject to considerable error. Analysis of leakage rates, and the consequent impact on the optimal distribution of capacity have been identified and discussed with reference to existing services.

It is clear from views expressed to ACIL that a proportion of the population is likely to rate treatment at a major metropolitan facility as, in some sense, ‘better’ than that provided by a smaller local unit and would be prepared to face some additional costs to receive such treatment. This form of leakage may decline over time if the smaller units deliver a high quality service and this is documented and communicated through programs to monitor the quality of outcomes and through information provided to potential consumers and referrers.

Furthermore, for some people in some parts of the defined regions, transport to inner Melbourne, or family support or accommodation in inner Melbourne, may be easier than with a regional centre, even one which is geographically closer.

At the same time, the experience of several of the clinicians advising ACIL in this study would support a much lower leakage rate — of the order of 5 to 10 per cent. These assessments may be biased downwards to the extent that they are based on experience with those patients who first present at a regional centre — it is difficult for clinicians operating in peripheral centres to assess with accuracy the numbers of patients from their natural catchment who never present at the facility — but they certainly support the view that there is considerable conservatism built into the 40 per cent figure.

Reflecting this range of views, ACIL has developed its analyses of machine demand based on a range of leakage rates between 10 per cent and 40 per cent.

The lower figures certainly increase the demand estimates in the regions (and lower the estimates of demand in central Melbourne) but do not alter the overall picture sufficiently to have a major impact on the immediate recommendations.

Estimates of machine requirements using a 40 per cent leakage rate are viewed as conservative, but amenable to adjustment as actual levels of leakage are observed. If observed leakage rates are much lower, and ACIL accepts that this is likely to prove the case, then this would underpin a more rapid roll-out over time, may justify the location of one or more machines in locations initially assessed as unlikely to justify the investment and would accelerate the relative decline in demand for treatment delivery in inner Melbourne.

- Further ‘medium scenario’ assumptions (discussed in more detail in the report) of a 50 per cent average utilisation rate and a capacity of 400 to 450 new patients per linear accelerator give an estimated total ‘demand’ of around 26 Linear Accelerators by 2006. Examination of the relative regional demand — expressed as the number linear accelerators — illustrates the catchment areas most likely to support a service through local demand:

Of course, machines do not come in fractional sizes but there is some scope for varying machine throughput and the above figures, rounded down, give some indication (probably conservative using the 40 per cent leakage rate) of the number of units for which a viable level of demand *might* be achievable over the next ten years or so.

Major centres, including metropolitan and Geelong may continue to service levels of demand above these levels by drawing from a wider area.

Geographic distribution of medium scenario (notional distribution of 26 machines)

Region	Share of demand	Rate of metropolitan referral		
		40%	25%	10%
Barwon-South	6.3%	1.4	1.6	1.9
Gippsland	4.8%	1.0	1.2	1.4
Grampians	3.6%	0.8	1.0	1.1
Hume	5.3%	1.0	1.2	1.4
Loddon Mallee	5.4%	1.2	1.4	1.6
Metro Eastern	20.8%	4.4	4.3	5.1
Metro Northern	14.4%	3.0	2.9	3.5
Metro Southern	26.1%	4.9	4.7	5.6
Metro Western	13.3%	2.2	2.2	2.6
<i>Metro referrals*</i>	na	6.0	5.5	1.7

*: Note that these figures do not take into account the ‘lumpiness’ of the machines which is likely to result in greater demand for machines in inner Melbourne. See the discussion in the text.

Source: ACIL Calculations

Of these regions, Hume could expect demand up to 70% greater than indicated because of the adjacent NSW catchment (ie. 1.7 machines based on the 40 per cent leakage rate, approaching viability for a 2 machine unit — a quite plausible leakage rate of no more than 25 per cent would push the figure up to 2 machines).

The assumed leakage rate has significant implications for the number of treatments being delivered by the major centres in inner Melbourne — and for the associated number of machines. Ignoring the lumpiness of the machines would suggest machine numbers ranging from 6.2 down to 1.7, depending on the level of referral. In practice, fewer machines are likely to be installed in the regions because of the problems of lumpiness, and this suggests demand for an additional 2 to 4 machines across these major centres.

The above figures could vary considerably in future analysis — any strategies adopted in the short term which alter ease and cost of access will produce better information on which further analyses can be based — and should therefore be used as a guide, and not necessarily a constraint for future development.

- More generally, an increase in the number of treatments will require some mix of: new facilities; expansion of existing facilities; and increased utilisation of existing facilities.

Expanded operating hours

- Increased utilisation of existing facilities through extended hours of operation appears quite feasible from a technical perspective.
 - Extended operating hours are already common in some Victorian facilities, while facilities in other States, notably Queensland, offer models for further extension in a manner which could be expected to contain costs.
 - From a financial perspective, reduced capital costs per patient need to be weighed against increased operating costs per patient. The latter are heavily dependent on the nature of the roster arrangements, on wage and salary agreements and on the extent of the ancillary services required.

The cost relativities are heavily dependent on the assumptions made regarding the services which need to be available and the associated staffing. There is some scope for scheduling patients, depending on the severity of their condition and other risk factors, so as to reduce the staffing required during at least some of the extended hours operations

Based on the available information, it seems unlikely that there need be any significant increase in provider cost per treatment (relative to expanding facilities) and there may be scope for reduction. Benchmarking undertaken by ACIL (based on approaches used in recent NSW modelling but adapted to incorporate our cost data) suggests scope for extending hours with little impact on provider cost per treatment — the base case model delivered a cost reduction of 3 per cent. Scheduling of patients to allow some reductions in the level of support services during the extended hours could deliver further cost reductions provided that throughput is achieved.

The main factors influencing this analysis relate to the trade-off between savings made through more effective use of capital against cost premiums associated with labour costs. Most of the labour cost premium could be expected to affect radiation therapists, medical staff, and some administrative staff.

Importantly, however, this expanded utilisation can be expected to lower patient access costs (for a minority of patients) if it delivers a better geographic spread of extended hours access — and, with this and the associated increase in utilisation rates, would probably also lower the costs associated with other forms of cancer therapy. Therefore, even if the extended hours involved a modest provider cost increase, this might still be cost effective.

- Differential *rates* of throughput, particularly the relatively higher throughput of private facilities in Victoria, point to some scope for increased utilisation of existing facilities even within standard hours.
 - 3 machine private sector facilities in Victoria currently average in excess of 700 patients per year, in comparison with a public sector figure of around 500.
 - However, care is needed in recognising that the teaching and research loads, and the more complex cases, handled through the public facilities necessarily entail some reduction in throughput and need not reflect lower efficiency. By international standards, throughput figures for both the public and the private sector in Victoria are high.

New and expanded facilities

- Superficially at least, the creation of new facilities, well spread geographically, represents the most direct way of reducing the distance-based access costs discussed earlier.
 - Both costs per treatment and concerns with the quality of treatment enter as significant complications.
- There is considerable ‘lumpiness’ in the character of radiation oncology facilities. The costs of establishing, staffing and running these facilities, coupled with the desirability of having these facilities in proximity to other treatment modalities, greatly restricts the practical distribution of facilities in Victoria well into the future.
 - The extent of this lumpiness is, however, significantly influenced by the minimum number of units located within a facility.

The AHTAC (1996) report recommended in favour of a minimum of 2. On this basis, and referring back to above table, it is possible that Victoria could justify no more than one facility outside of Melbourne — that being at Albury/Wodonga, and possibly not for some years — without subsidies to non-metropolitan facilities to cover low rates of capital utilisation.

- It is important that decisions on this minimum number of units not be based simply on provider costs and clinical outcomes in respect of patients *treated* — though both are of central importance.
 - Of at least equal importance, in terms of delivering the best *social* outcomes, are consumer costs. This involves the access costs incurred by those treated, and the

costs of potentially inferior clinical outcomes for patients who are deterred from incorporating radiation oncology into their treatment regimen, because of the access costs they would face.

- This does mean that it *could* be appropriate to allow, and even encourage, single unit facilities which significantly reduce access costs even if it were likely that the quality of treatment might be somewhat less than that which could be obtained through a larger facility. Of course the facility would still need to deliver better quality of life outcomes and/or survival outcomes than alternative lower cost treatments if the net social benefits, including clinical outcomes, are to outweigh the costs.

Single machine facilities

- Single machine facilities, even in non-metropolitan locations, are not inherently inferior to larger facilities but do involve additional risks that need to be managed. Legitimate concerns arise principally in relation to: staffing; maintenance; establishment and operating costs; expertise; reduced scope for subspecialisation; possibly distorted incentives in favour of treating rather than on-referring patients who would benefit significantly from the facilities of a larger centre; training and research; and system reliability. In practice, they are also likely to be less comprehensively equipped.
 - Based on US experience and an analysis of financial incentives, ACIL believes that a stand-alone single machine facility, which is not subject to quality assurance arrangements consistent with sound clinical practice, including criteria for referring complex cases to another facility, could pose unacceptably high levels of risk in respect of both patient outcomes and long-term financial viability.
- After very careful consideration of a range of arguments, ACIL is inclined to the view that a single machine facility, provided it incorporates appropriate safeguards, including a strict quality assurance program, almost certainly based around strong professional linkages back into one or more major facilities, *could* deliver radiation oncology services which are both more accessible and of comparable quality, for patients within a reasonably broad band of clinical indications.
 - This conclusion is not definitive, but ACIL does consider that, with appropriate safeguards, the risks involved in ‘testing’ this model of service delivery would be modest in relation to the potential benefits should the model prove viable.
 - ACIL is not asserting that there would be no loss of quality for patients receiving radiotherapy treatment. As with regional surgery, reduced scope for subspecialisation does probably entail some loss of clinical excellence. However, within a broad and important class of relatively standard treatment regimens and/or relatively common cancers, this loss is likely to be small absolutely and small in relation to the costs associated with patients foregoing radiotherapy treatment because of the access costs they face in going to a facility with subspecialisation.

In effect, many patients could achieve better clinical outcomes while consultation, treatment design and referral protocols could still ensure high standards of clinical practice across all patients. The net effect seems likely to be a significant improvement in the quality of treatment of cancer patients.
 - ACIL has stopped short of indicating that strong professional linkages to one or more major facilities should be an absolute requirement, but it seems most unlikely

that acceptable levels of quality assurance and staffing would be achieved and reliably maintained *cost effectively* without some such linkages.

ACIL is aware that there are strong views within the industry that such linkages are essential. However, ACIL is reluctant to recommend what would amount to regulating away the opportunity for a proposal, which incorporates an alternative quality assurance system, possibly incorporating in innovative use of new technologies and/or staffing arrangements, to be given a fair hearing. ACIL's position would entail a clear onus of proof on such a proponent to establish, to funding agencies (Commonwealth and State) the adequacy of the proposed alternative arrangements.

However, ACIL believes that any initial trial of a non-metropolitan single machine facility should be based on strong professional linkages to at least one major centre. Otherwise, there would be risks of confounding information on the inherent capacity of such units to deliver an adequate quality of service with information relating to the particular quality assurance regime — and this could diminish the general value of the trial.

Minimum equipment levels for such a facility to function sensibly in relation to a major centre would, with current technologies, include one dual modality machine, one simulator, a mould room and a simple planning computer.

Training and research

- While it seems likely satisfactory quality standards for such facilities will require professional linkages back into larger facilities, and this would facilitate the conduct of research activities within the smaller facilities, ACIL is not convinced that a strong commitment to training and research should be a *requirement* imposed on such facilities.
 - ACIL accepts that research offers a proven and valuable means of maintaining the currency of skills as well as developing improved treatments.
 - It is not clear that other methods, including staff rotation and the use of regular teleconferencing with counterparts in a larger facility, could not underpin an alternative strategy for ensuring currency of skills.
 - A sound quality assurance program would need to address the question of continuing access to competitive skills and it may well be that providing access to research activities will prove an important, and cost effective, element in such programs.
- The nature of funding arrangements, and in particular the disparity in funding between public and private facilities and the way in which items such as training and research are funded, do produce significant distortions which could hamper a sound market-based roll-out of suitable services.

Staffing/workforce

- Quite independently of whether single machine units proceed or not, and even whether utilisation rates rise to the levels assumed here or not, the growth in the number of cancer cases over the next 10 to 15 years is likely to place significant strains on numbers of skilled personnel, including (but not restricted to) radiation oncologists, radiation therapists and physicists.

- Accommodating, and even encouraging, increased utilisation will add to these pressures, increasing demands for additional qualified staff by a figure comparable to the forecast growth (between 45 and 60%) in demand.
- Analogous pressures will arise throughout Australia and in many other countries, limiting the scope for (or adding to the cost of) recruiting from elsewhere. These same external factors probably mean that the costs posed by this increase in demand for skilled personnel cannot be avoided by choosing not to expand services — if remuneration improves in other States, then there will either be an exodus of skilled professionals from Victoria or Victorian remuneration will need also to improve..
- It seems highly desirable that these trends are well understood by the education sector and technically oriented students — they should auger well for future employment opportunities and may well imply some growth in earnings relative to other sectors.
- Nonetheless, they may ultimately constrain the rate of growth in utilisation, while a significant shortage may compromise the commercial viability of non-metropolitan single machine units in particular.
- ACIL notes that there is no formal training structure for physicists and that this may work against any rapid response. Again this would seem an issue best addressed in the first instance at the national level.
 - Radiation physics is a key area of skill and one which is, essentially, a distinct career option for physicists. It may well be that the training needs for these skills are best met through a model more akin to a registrar model, with some academic support; it takes approximately 3 years to train a physicist.

Provider cost considerations

- Simply maintaining current levels of utilisation necessarily entails significantly increased costs in radiotherapy.
 - An indicative 22 per cent increase in new cancer cases by 2006 is likely to have a roughly proportional impact on radiotherapy.

The 1996 annual equivalent cost of radiotherapy, inclusive of capital and an equivalent return on investment to allow comparability between the public and private sectors, is estimated to have been \$58.7 million.

With the maintenance of current utilisation rates (42%), this is likely to rise by about \$13 million.

Expanded utilisation to around 50 per cent would add a further \$15 million to these costs.

These estimates are reasonably robust under the range of options available for dealing with increased treatments, though clearly single machine facilities in rural areas will entail higher *direct* costs than other facilities.

- Importantly, these are *gross* provider cost increases. There are likely to be important offsets, notably through lower costs associated with other treatments, especially if there is any resultant improvement in relapse rates.

- While ACIL was unable to access enough data to develop good estimates of this offset effect, it is likely to be reasonably large.

The increased costs attributable to increased radiotherapy utilisation will account for only 4 per cent of estimated total cancer therapy costs in 2006 but will mean that approximately 10 per cent more cancer patients will be receiving a clinically preferred treatment, with fewer adverse side effects, reduced pharmaceuticals costs, reduced surgical demands and possibly lower rates of relapse.

A number of studies suggest scope for net provider savings, though this would seem less likely with single machine units, where higher costs per treatment will arise.

- To help in the consideration of different models of service delivery, benchmark capital and operating costs were developed for one and two machine facilities, plus the marginal costs of adding an additional machine.
 - Inclusive of an equivalent after tax return on investment (to allow comparability between public and private sectors) the annual costs *per machine* were calculated as \$3.27 million, \$2.82 million and \$2.40 million respectively.

This implies a provider cost penalty, per patient treated, of the order of around a sixth for a single machine facility relative to a 2 machine facility, and about a third for a single machine unit compared to expanding an existing facility.

As an indication only, and based on probably conservative throughput rates of 500 patients annually, the per patient treatment cost differentials for a single machine are \$900 relative to a 2 machine facility and \$1,740 relative to an expanded existing facility.

Apart from the consumer benefits of better access and utilisation, installation of one or more regional single machine units would generate at least partial offsets for these higher provider costs through reduced VIPTAS costs — estimated to be of the order of \$1,000 per patient affected.

Cost benefit assessment

- In considering all the evidence, ACIL concluded that:
 - Responding to growth in demand, in part, through extended hours of operation in a broad geographic spread of facilities is almost certainly cost effective, with little impact on radiotherapy provider costs per patient treated, but a very likely significant access cost benefit to a subset of patients, and a very likely significant reduction in the provider costs of other forms of cancer therapy.
 - Some additional increase in utilisation rates will almost certainly be cost effective. The ‘optimal’ level of increase is unclear but the earlier arguments regarding the benefits to consumers, the provider offsets from other areas of cancer therapy, the small share of cancer treatment costs attributable to increased radiotherapy utilisation and the likelihood that clinical best practice will move to higher utilisation rates than current AHTAC levels have led ACIL to the *in balance* judgment that moving to the current AHTAC levels over the next 10 years, if feasible in view of specialist staffing constraints, will probably be cost effective.

- While single machine units do involve higher per patient costs than multiple machine sites, if quality standards can be achieved they could contribute significantly to improved access and utilisation in the areas which currently face the highest access costs per patient.

With potential additional offsets through reduced VIPTAS costs, it is certainly possible that they could be very cost effective and the chances of then entailing large net costs seems very remote.

Funding constraints and consumer equity

- The private sector has shown a willingness and ability to invest in new facilities within Metropolitan Melbourne and to cover their costs through a user premium — for which there is an expressed willingness to pay.
 - Based on current private sector service provision, the average additional payment for a course of radiotherapy is around \$750, however for some patients, this would run to several thousand dollars. In many instances, this co-payment may be partially covered by private health insurance.
- This has produced a clear cost differential between public and private facilities, but in a context where public facilities are, nominally at least, located not far away, so that concerns with consumer equity appear not to have been marked.
 - Given our assessment of access costs even within Melbourne, there may well be some equity concerns associated with the cost of accessing these facilities by patients, but the fact remains that the roll-out of these facilities has benefited a lot of people and, directly at least, worked to the disadvantage of none. The costs of any user premium are typically small in relation to other access costs (though possibly more visible).
- Equity concerns could become more prominent if facilities are introduced to rural areas with a significant user premium.
 - Again, no one is made worse off by introducing new choices, but outpatient comparisons with metropolitan public treatment choices are likely to be more pronounced.
 - This may involve pressures to either contain the size of the private premiums or to secure outpatient public sector facilities as part of any contract.

Public/private sector balance

- Traditionally, radiotherapy services have been provided by the public sector and this remains, and for the foreseeable future is likely to remain, largely the case.
 - There has, however, been significant growth in private sector provision in recent years to the point where it is fair to say that there is a level of active competition to provide new facilities, strong commercial incentives to improve facility throughput and some disruption to traditional ‘orderly planning’ of service delivery.
 - EMROC is now the second largest provider of radiotherapy services in the State.
- Patient outgoings aside, radiotherapy is a treatment which is well suited to private sector provision, subject to adequate management of the multi-modal character of cancer

treatment.

- From a Victorian Government perspective, there are significantly different financial implications involved in the choice between public and private facilities because of the basis on which Commonwealth payments are made.
 - The funding of private facilities entails the Commonwealth in meeting a higher proportion of the costs of expanding facilities than is the case with public facilities.
 - From the point of view of the Victorian Government, the Department of Health and Community Services and the Victorian community, these arrangements involve real (though not necessarily permanent) incentives because of the scope they provide for directing scarce State financial resources towards meeting other social demands.
- This said, demand for private facilities is necessarily influenced by socio-economic and demographic status of the local communities, including age profile, levels of income, rates of unemployment and levels of private health insurance cover.
 - In some areas, provision of private facilities only can be expected to leave significant barriers to local access by a sizeable proportion of the community (those unable or unwilling to cover the co-payment costs) and this in turn can be expected to discourage utilisation of radiotherapy services, with associated costs to cancer patients.
 - An example of this, with particular relevance to short term policy decisions, is the Western suburbs of Melbourne. Here there is undoubtedly demand to support better access to private services, and this is evident in the proposals to locate a facility at Footscray. However, the socio-demographic profile changes rapidly as you move away from Footscray and there remains a contentious issue as to whether a public facility at Sunshine, as well as or instead of the one at Footscray, would be appropriate.
- These matters strongly suggest that consideration needs to be given to a strategy for parallel development of public and private facilities (or, more generally, regional facilities to treat public patients as well as private patients) in some areas at least, while recognising that there will be a tendency for the first facility built to constrain the viability, viable size or viable timing of any subsequent facilities.
 - There is a key question then as to the extent to which the whole system is centrally planned, as has tended to be the case historically, or whether the public sector seeks essentially to ensure that gaps in appropriate service provision not met by the private sector are filled as cost effectively as possible.
 - These gaps are present, and some are likely to remain so — though this does not preclude government from contracting private providers to fill at least some of these gaps. They stem from the above socio-demographic matters, from the incentives for consumers and providers embodied in the Medicare system and other grants, from the regulation applied to private insurance and from the nature of some, particularly rare, cancer conditions. In this last case, the treatment costs for these patients is likely to be significantly greater than the average.
- Reflecting Victorian Government policy, broader developments in the public policy debate nationally and internationally, a recognition that public funds in the health sector are under severe pressure, the above Commonwealth/State funding realities and the reality that there are few instruments available to the Victorian Government to prevent,

where State subsidies are not being sought, private investment from proceeding (and usually faster than would be achievable for public sector investment), ACIL leans towards the latter approach.

- This does not, however, preclude a proactive role for the Department in negotiating with prospective private sector investors to ensure a more cost effective delivery of the full package of radiotherapy services to all patients and the maintenance of adequate quality standards across the spectrum of cancer treatments.
- This may include providing access for private facilities adjacent to public hospital facilities, contracting for the delivery of treatment to public patients, calling for expressions of interest for joint public/private engagement in the delivery of services etc. It might involve collaboration between the considerable expertise in radiotherapy located in the public sector and the access to finance and commercial skills, including in the running of clinics, located in the private sector to mount joint bids to provide packages of services. It may involve mutually beneficial contracts with the private sector for a period, while regional demand is growing, with public sector facilities being deferred — reducing the effective cost per treatment and freeing funds in the short term for deployment elsewhere.
- However, if the objective is to deliver a package of services of specified standard and accessibility across the community, at least cost to Government, this suggests as a starting point that the location of private facilities at or near to where the commercial viability of these services, excluding any State Government subsidies, is maximised may well be most sensible. There are circumstances in which this may not be the case, but careful consideration would need to be given to the reasons for encouraging a transfer to a location where access to private sector funds (equity, private health insurance and co-payment) would be significantly reduced.
- As a general proposition, ACIL is of the view that the private sector is best placed to assess where this commercial viability would be maximised — and to accept the risks of miscalculating.
- If the benefits of public and private sector interaction, and more generally from competition in ideas and delivery systems, are to be maximised, it is important that there be real contestability and that the institutional arrangements ensure that the Victorian community derives an appropriate share of the cost savings as well as the gross benefits of system improvements.
 - ACIL has included a number of recommendations directed at ensuring that contestability is ensured in several markets, including the delivery of ‘hub services’, and to secure the ability of DHS to negotiate arrangements which deliver better outcomes to the community as a whole.
 - Most of the competition policy issues which arise here are broader than the delivery of radiation oncology services, and will be better addressed in a broader setting. ACIL is aware that DHS has recently announced a major ‘big picture’ review of the policy and regulatory framework for the delivery of health services in Victoria, and it would be appropriate that some of these matters be revisited in that setting.

‘Hub and Spoke’ Considerations and the Role of Major Centres

- The historical development of radiotherapy services, driven by then present constraints of technology and policy, has resulted in most radiotherapy facilities and expertise being

- located in a small number of centres.
- This has facilitated the development of expertise, subspecialisation, research and training capabilities of a high order. This represents an investment of great value to the Victorian community.
- In contrast to all other major facilities, the Peter MacCallum Cancer Institute is not part of a general hospital. There is a widely, though not universally, held view that this is not the ideal model for such a facility and it is probably fair to say that such a facility would not now be built even if there were a need for another major facility offering these services. Whether this justifies now abandoning the facility or transferring it to a general hospital campus is another matter.
 - PMCI is the only facility with strong established linkages between basic sciences and clinical research, is held in very high regard nationally and internally and has a ‘brand name’ which may prove of considerable strategic (and even commercial) importance in underpinning the provision of quality distributed radiotherapy services.
 - Furthermore, PMCI is the closest approximation in Australia to the international concept of a categorical comprehensive cancer centre — such as the Memorial Sloan-Kettering Cancer Center in the USA, the Royal Marsden Hospital/Institute for Cancer Research in the UK and the Institut Gustav Roussy in France.
 - The major Victorian facilities have already developed a stronger role in relation to provision of radiotherapy services — consultation, design and treatment — away from these centres. Most prominent here is are the strong links between the PMCI main campus and the Moorabin and Box Hill facilities.
 - If, in line with ACIL’s recommendations below, Government policy moves to provide for much greater decentralisation of radiotherapy services, then this can be expected to imply a different — and critical — role for these facilities.
 - There is going to be growing demand for strong professional linkages from the smaller facilities back to one or more major facility to provide quality assurance, referral capabilities, the handling of complex cases, R&D and training — and reputation to underpin the commercial viability of the smaller facilities, and their capacity to attract and deliver quality services to their communities.
 - It seems likely that these arrangements will encourage greater separation of consultation and treatment planning services from treatment delivery services. Subspecialisation consultation services provided by the major facility may involve either or both of the running of clinics at the smaller facilities and the greater use of telemedicine, with telemedicine expected to become increasingly cost competitive.
 - The end result is likely to be a shift in the mix of services provided from the major facilities — involving an increase in consultation and treatment planning services relative to treatment delivery, and in increase in treatments which are relatively complex/rare and call on subspeciality expertise. Even the consultation services, especially of a telemedicine kind, can be expected to be more heavily weighted towards the more complex/rarer end of the spectrum. Where feasible, and especially in relation to treatment planning, these changes should not cut across the maintenance of continuity of care.

- ACIL’s modelling suggests that, even with increased utilisation of radiotherapy services by an increasing number of cancer patients, the effects of greater distribution of cancer services will be to reduce the absolute, as well as relative, level of actual treatments delivered in central Melbourne. However, those treatments which are delivered will call on significant subspecialisation and may well stand to gain most from having access to the most recent technologies.
- These developments will imply significant challenges for these facilities, but an effective response to these challenges will be critical to the success of any decentralisation strategy.
 - The best model or models of co-operation between these facilities and smaller regional facilities is not yet clear. It is important that there be adequate scope and incentives to develop a range of models from which the most satisfactory arrangements can be allowed to emerge.
 - These considerations are, in ACIL’s opinion, compelling reasons for ensuring that all of the present facilities are in a position to respond effectively and creatively, to the emerging opportunities.
 - Included here is the requirement that these facilities sustain, in the short term at least, the critical mass and resources needed to sustain subspecialisation, training and research of a high order. In time, the withdrawal from these main facilities of many of the less complex/rare treatments may mean that these attributes can be maintained with fewer machines than might currently be necessary but it is critical that any such contraction be driven by reductions in demand.

Recommendations

As a result of the analysis undertaken, ACIL has concluded that a highly prescriptive radiation oncology strategy would be a serious mistake, in that it would not provide the flexibility to respond effectively to new information as it emerges, it would diminish the role of both the private sector and competitive tendering processes to identify new opportunities and directions and it would almost certainly imply that the Victorian Government would need to accept a significantly higher proportion of the costs associated with providing the services and facilities needed to meet growing demand for radiation oncology services. This is likely to reduce the value of the services delivered and to constrain options for improving service delivery elsewhere in the health system.

In broad terms, ACIL has concluded in favour of, and recommends, a strategy which is designed to cater for, and encourage, increased demand for radiation oncology services. Key planks of this strategy should include:

- Commitment to wider distribution of accessible (in terms of location and hours of operation) radiation oncology services, including consultation, treatment planning and treatment delivery (but not necessarily integrated within the one facility), to reduce consumer costs. This would occur across Melbourne and, subject to the successful undertaking of a proposed trial of a single machine facility outside of metropolitan Melbourne, in a number of rural locations.
- A significantly changed role for the major tertiary centres, with them increasing their consultation and planning services relative to their treatment services; focusing their treatment services more heavily on patients in whom multidisciplinary disease management and/or technical aspects of radiotherapy are complex; and playing a crucial leadership role in respect of research, training and quality assurance across the system as

a whole. Major regional facilities, such as Geelong, might also expand these non-treatment services, but not at the expense of delivering comprehensive treatment services. Given these changes, it is not considered appropriate to build treatment services on the Royal Melbourne campus, but there may be scope for this campus to deliver specialised hub services in conjunction with one of the major tertiary centres.

- Increased emphasis on delivering balanced information to cancer patients and referrers on which to base decisions as to treatment regimen.
- Strategies to address a likely major constraint on the ability to grow capacity rapidly — numbers of skilled personnel.
- Development of an active policy of the Government seeking to engage both public and private service providers, actual or prospective, to ensure the cost effective delivery of the needed services.
 - This will commonly involve competitive processes and there are specific recommendations to ensure that the Government retains strategic options to underpin its negotiating position and to ensure gaps in service provision can be addressed cost effectively.
 - As a general proposition in relation to new service delivery, the primary role of Government should be one of complementing and influencing the decisions of private service providers, rather than of crowding them out — but this does not preclude commitment to public facilities which would detract from the commercial viability of private investments if this is the most cost effective way of ensuring adequate access to services for public patients.
- A conservative approach to the initial roll-out of services to ensure adequate control of the risks associated with inadequate throughput or pressures on quality standards, but the use of monitoring and reassessment processes to allow adaptation to the additional information generated.

More specifically, the following recommendations are made:

Utilisation rates for planning purposes

- 1) That DHS accept radiotherapy utilisation rates of 50-55 per cent as reasonable for the purposes of 10-year planning, subject to monitoring the success of strategies to ensure an adequate supply of skilled professionals.
 - That it be accepted that these rates are unlikely to prove too low, in terms of appropriate medium term planning targets which take into account the range of social costs, but that resource constraints may prevent them from being achieved in this time period.

Balanced information

- 2) That DHS liaise with the various colleges to encourage the development of a strategy, possibly based around the release of both the final AHTAC report and this review, designed to improve the information available to both referrers and patients when addressing treatment choices — in order to encourage utilisation rates closer to the ‘socially optimal’ level.

Service delivery structures

- 3) That DHS endorse the progressive expansion of radiotherapy services using a broadly defined ‘hub and spoke’ configuration. New developments should complement existing local cancer services, in addition to forming part of a larger Statewide network based around major providers.
- This will almost certainly involve multiple hubs and should not preclude the possibility that some hubs would consist of more than one campus or that some spokes could mature to the point where they begin to offer hub services, on their own or complementing those of their former hubs.
 - The precise nature of these hub services should be driven, principally, by the demand from the peripheral centres to satisfy appropriate quality standards — rather than being heavily prescribed. However, it is envisaged that a total hub will need to demonstrate the capability to manage all degrees of patient care, to have a complement of radiotherapy equipment for all but experimental treatments and, to have documented quality assurance and peer review programs in place and of a form suited to extension to peripheral facilities. It is likely also that most hubs would have active programs for registrar training and clinical research.

Refocusing of major tertiary centres

- 4) Underpinning this, the existing major tertiary centres (possibly including an expanded Geelong facility) should be encouraged to develop their capacities to compete for and deliver ‘hub services’ in the form of consultation and planning services running out to the spokes, probably incorporating clinics and increased use of telemedicine; delivery of quality, subspecialisation treatment services in respect of complex/rare conditions to patients referred from the spokes; quality assurance across the configuration; and leadership in R&D and training.
- It should be recognised that most of these capabilities are already established and that there may well be steadily reducing demand for these providers to deliver more routine radiotherapy treatments, so the issue is more one of commitment and incentive than of significantly expanded aggregate resources, but their will be co-ordination, communication and service delivery costs to be covered.
 - Active competition to provide cost effective hub services is seen as desirable and feasible.
 - Reflecting the value and desirability of consumer and referrer choice, decisions as to the number and type of machines installed at the main campuses, and the extent to which they continue to provide less complex treatments which might reasonably be provided away from these centres, should be demand driven — ie, based on achieved throughput rather than imposed.

Priorities for regional metropolitan facilities

- 5) That, based on analysis of likely trends and numbers of accelerators already installed, short term priorities for increasing machine availability within Melbourne should be Metropolitan Western, followed by Metropolitan Southern and Metropolitan Eastern, although the demand for additional machines is likely to be strongest for Metropolitan Southern.

- It is not expected that additional machines will be needed in inner Melbourne for some time (though there are needs for replacement, discussed below) and there is sufficient spare capacity for Metropolitan Northern at Austin Hospital to allow development there for it to be treated as a medium-term priority.
 - Given the nature of the development options in these three regions, it is feasible to look to expansion in capacity in all three regions simultaneously and this is recommended.
- 6) The Metropolitan Western catchment appears suited to supporting two machines, largely independently of the assumptions regarding leakage rates, but with a low leakage rate suggesting that it will approach capacity to support 3 machines over the next several years. Options for location essentially reduce to — Footscray, where there is an advanced proposal to install one machine into a 2-bunker design in the near future — and the Sunshine Hospital campus.
- Given the very different socio-demographic profiles found across the region, a purely private facility at Footscray is unlikely to offer acceptable access for the region for all patients.
 - It is recommended that DHS recognise and secure Sunshine as a strategic option by including a 2-bunker facility in the design footprint, with a medium-term time horizon of 4 years for the first machine to be operational there, conditional on the outcome of the following processes.
 - It is further recommended that DHS enter into negotiations with EMROC and with other parties who express an interest, to secure cost effective access to radiotherapy services in the region for public patients. Options include a negotiated CSO arrangement for public services to be provided out of Footscray, a public facility to be installed at Sunshine or the location of a private facility, with a contract to deliver public services, on the Sunshine campus.
 - ACIL considers it likely, even given the recommended commitment to Sunshine as a strategic option, that one machine will be commissioned at Footscray and that the key issue will then be the location and management of the second machine in the medium term. This is sensibly approached through competitive negotiation, preferably commencing before the decision on Footscray is irreversibly taken and including options which do not involve its proceeding. Assuming one machine has been installed at Footscray, and a second bunker is in place, pure provider cost considerations would tend to favour expansion at Footscray but a range of other factors would need to be addressed in the negotiations. Low leakage rates and strong growth in demand may make a two machine facility at Sunshine attractive.
 - If development is to proceed at Sunshine, it should involve a strategic alliance with at least one supplier of hub services, and this should again be negotiated competitively.
- 7) In the short term, it is recommended that the needs of Metropolitan Southern be addressed through an expansion in facilities at Moorabin. Moorabin currently has 2 machines, and the analysis suggests that the catchment could support 4 to 5 machines in the medium term.
- The priority should be to add one more machine at Moorabin but to do so in a manner which secures cost effective options for further expansion.

- Recognising that adding a machine to Moorabin will require redevelopment of the site, consideration should be given, in considering redevelopment options, to scope for adding at least one further machine in the medium term. This might include longer term development of Moorabbin as a tertiary radiotherapy facility providing Brachytherapy and enhanced sub-specialisation, but this would need to be subject to satisfactory resolution of the issues associated with satisfactory provision of in-patient support services.
 - In the medium term, a fresh, additional site in Metropolitan Southern could be expected to further reduce access costs and to be consistent with projected demand. This option would probably be best addressed proactively by DHS in calling (once demand trends are apparent) for expressions of interest as to site and facilities, subject to the competitive pressures from other bidders and the option of expanding the facilities at Moorabin.
- 8) With the facilities at Ringwood and Box Hill, Metropolitan Eastern currently have two machines, while the projections suggest medium term demand for 4 to 5 machines. Short term expansion by one machine, with a view to adding one to two additional machines in the medium term, appears sensible and is recommended:
- It is recommended that DHS secure an option for influencing at least the medium term development of services in this region by ensuring that, if the Knox hospital is to include comprehensive cancer care, provision be made in the footprint for the Knox for a two bunker facility.
 - It is further recommended that DHS enter into negotiations with the service providers at both Ringwood and Box Hill with a view to ensuring cost effective access to services by public patients. Options to be considered are essentially the same in form as have been specified for Metropolitan Western.
 - ACIL considers it likely that the short-term outcome of this will be the provision of an additional machine at Ringwood, which is likely to be cost effective in delivering one more machine, but a much wider set of options arises to deal with further growth in facilities in the medium term if two additional machines are needed.
 - ACIL considers that the Eastern suburbs would be overprovided if services were located at PMCI, Box Hill, Ringwood and Knox. Options could include the negotiated relocation of the Box Hill facility to Knox as part of a medium term expansion in the number of machines.
- 9) It is recommended that DHS give serious consideration to the proposal to expand Geelong to a three machine facility, with the inclusion of Brachytherapy.
- This would provide a valuable expansion in the range of services available in this region and might underpin the medium-term development of Geelong as a tertiary facility with increased subspecialisation and as a useful provider of hub services, perhaps focusing principally on its wider region.
 - The short term viability of this strategy would, however, be dependent on (and should be a factor in) any decision on a suitable site for trialing a non-metropolitan single machine facility, as recommended below. It would make less sense if Ballarat were the chosen site.

Non-metropolitan

- 10) That DHS seek to reach agreement with the Commonwealth as to a set of quality assurance criteria to be met by a single machine unit in order that it qualify for Commonwealth funding during a period of evaluation of the long term role of single machine units; it is expected that the agreed criteria would incorporate the main criteria set out in Section 3.4 of the main body of this report.
- 11) Subject to this agreement, that DHS agree to facilitate actively one, and possibly two trials of such a facility as follows:
- That DHS endorse the proposal to establish a single machine facility at Albury or Wodonga, recognising that such a unit is likely to grow to the two-machine size in the medium term. ACIL understands that the proposal may be modified to include two machines from the start by incorporating an older as a back-up unit; this would clearly constitute a more limited trial but is likely still to yield valuable insights given that the second machine would not normally be operating.
 - This facility could be part of a ‘hub and spoke’ arrangement with either a Melbourne or Sydney radiotherapy unit, depending on subsequent negotiations between Victoria, NSW, and the Commonwealth; in view of the unusual geography of the site, consideration could even be given to alternative models involving formal links to both Melbourne and Sydney facilities. In practice, the natural referral linkages will probably favour a relationship with one of the Melbourne hubs.
 - That DHS commit to a second trial of a single machine facility, at a site outside of metropolitan Melbourne which is unlikely in the foreseeable future to grow beyond single machine size, with the choice of a site for the trial to be based on:
 - Potential demand for the service;
 - Demonstrated links to local comprehensive cancer services and metropolitan radiotherapy services;
 - Demonstrated quality assurance program;
 - Overall cost and risk (to Government and the community as a whole), especially in the event that maintenance of a service of adequate quality proves difficult or costly;
 - Risk of adverse distributional impacts to existing services; and
 - Readiness to proceed.
 - That, based on these criteria, DHS identify LaTrobe, Bendigo and Ballarat as potential sites and enter into negotiations, based on the same criteria, to determine a preferred provider. Based on first principles, and *specifically in the context of the trial of a strategy which is as yet unproven*, ACIL considers that the LaTrobe option would probably provide the best outcome, based particularly on the implications for the aggregate reduction in community costs across the State, sensible management of the associated risks, and the potential strategic benefits from an expansion of Geelong along the lines indicated above. However, other factors, particularly readiness to proceed, could tilt the decision in favour of one of the other options.

Longer term monitoring and strategy

12) That no prescriptive decisions be taken regarding further facilities beyond those recommended here.

- Instead, that DHS should commit to a process of constructive co-operation with prospective public and private sector participants to identify further prospects based on the principles set out above.
- This process should reflect competition policy principles and should emphasis and encourage ‘smart solutions’ which better manage the trade-offs involved and which represent a cost effective means of improving access and both clinical and consumer outcomes.
- This process may well involve a call for expressions of interest, following the initial results of the single machine unit trials, for additional facilities which will most cost effectively further advance the principles set out in this review.
- ACIL expects the outcome of these processes to be progressively improved access to both consultation services and treatment facilities, with the majority of metropolitan developments taking the form of either further expansion of existing facilities or the establishment of new facilities with reasonable prospects for growing to at least 2-machine size.
- The pattern in rural areas will be heavily dependent on the results of the single machine trials and the further development of other supportive technologies, such as telemedicine, and improved referrer and patient information.

13) That DHS set in train processes for monitoring both leakage rates and changes in demand for treatment delivery, with particular reference to inner Melbourne as a basis for deciding if there is need for a change in the number of machines located at the major tertiary centres.

- As the other recommendations are implemented, there may be some contraction in demand sufficient to justify a reduction in the number of machines.
- It is important that, until such a reduction arises, the critical mass of these institutions be retained so that their evolution as providers of hub services is not constrained — and to ensure adequate capability to deal with the growth in demand while these other changes are occurring.
- It is recommended that there be a commitment to ensuring that these major tertiary centres have access to technologies of a high order, even to the point of consider transferring aging but functional machines from these centres to the other facilities, and replacing them with more modern equipment if technological developments which would be best assessed within the hub environment should warrant this. This should not, however, be used as a basis for locating inferior equipment, in the sense of being less suited to the services being delivered, in the peripheral centres.
- In this context, it is recommended that a strategic approach be adopted to the replacement of equipment. The fact that there are machines needing replacement, and that there will be growth in the number of machines needed in Victoria over the next several years, means that the risk, to the health system as a whole, in replacing any machines approaching the end of their economic lives, even if there

are questions as to the number of machines which will be needed at a particular site in the medium term, will involve relatively low risk to the system as a whole.

- While ACIL does not see its brief as extending to a detailed replacement strategy for existing machines, we are aware of specific and pressing concerns with respect to the older machines at PMCI. In this context we note that it appears that at least three, and possibly more, dual energy machines at PMCI will be needed in the near future and for some time to come. In the short term, ACIL sees risks in not retaining (with appropriate replacement) the full 5 machines, given current demand levels and continuing demand growth, inevitable lags in introducing new facilities and the need to sustain and even build PMCI's (and the Alfred's) role as a supplier of high end hub services through subspecialisation, research, training and professional leadership. In the medium term if there is a decline in treatment demand in inner Melbourne, it will probably be felt most strongly at PMCI and justification for the reallocation of one or two machines seems likely, but not inevitable.

Securing skills

14) That DHS work with the relevant professional bodies and educational institutions to ensure that the implications, for future demand for radiotherapy professionals (including physicists), of the trends as developed in this report are fully understood and are communicated to students considering training options. Furthermore, consideration should be given to the appropriateness of developing more formal training arrangements for radiation physicists.

- It is further recommended that, where sensible for managing risks to DHS and the Victorian community, DHS build into any contracts with new facilities a specific component of the quality plan for ensuring/managing — for the life of the contract — future access to suitably trained personnel; this might be done through on-site training, through a staff rotation arrangement with an established centre with a strong training function, through a budgeted willingness to meet the market in recruitment or through a range of other measures.
- DHS should also monitor trends in availability in case there is a need to consider more explicit strategies to meet future needs. ACIL does not, however, recommend that DHS enter into explicit funding arrangements at this time.

Funding conflicts

15) That DHS note that the options available for cost effective progress in the treatment of cancer are seriously constrained by the conflicting incentives inherent in the present funding arrangements, both within Victoria and between the Commonwealth and Victoria.

- While problems have been identified with specific payment schedules, most of these distortions are as a result of policies which are not specific to radiation oncology and which would be better addressed at a higher level.
 - It is likely that reducing these distortions could yield very considerable consumer benefits.
- The analyses undertaken in this review have incorporated some adjustments for these distortions in examining questions of cost effectiveness.

16) That DHS note that, while it is not expected that implementation of these recommendations will entail significant increases in the total public sector cost per cancer patient treated, there are significant implications for the form of these costs and these will need to be accommodated within any funding model.

- There are likely to be significant reductions in VIPTAS funds requirements and in non-radiotherapy provider costs; expanded availability of private facilities may transfer some costs from public facilities to patients and their insurers.
- There will be an increase in both the number of radiotherapy treatments and (probably) the average provider cost of delivery — representing a transfer of access costs from patients to providers.
- Greater use of extended hours of operation will increase operating costs relative to capital costs at some facilities.
- The provision of appropriate hub services is likely to require investments in information and communication systems and their on-going operation.

1. BACKGROUND TO THE REVIEW

1.1 Objectives of the Review

The key elements of the Review were: to identify a range of alternative models for the delivery of radiotherapy services; to recommend, with justification, a proposed model of radiotherapy services including the number, type and location of service sites in metropolitan and regional Victoria; a market analysis; information on the configuration and functional requirements of service sites in the context of: a strategic planning framework for the future delivery of radiotherapy services in Victoria; assessment of capital requirements and options for the role of the private sector and the relationships with the public sector in the provision of ambulatory radiotherapy services; and cost estimates of implementation of the proposed system.

1.2 The Review Team

While the review was led by ACIL Consulting Pty Ltd (ACIL, previously ACIL Economics and Policy Pty Ltd), the review team included specialist clinical expertise through Dr Michael Poulsen from the Queensland Radium Institute (QRI) and specialist expertise in Victorian Health Sector financial accounts through Pollard Partners.

1.3 Approach to the Review

The Review was conducted in a four-stage process of data collection, consultation, data analysis, and the development of recommendations and conclusions.

- *The data collection phase*, which informed the consultation phase, consisted of key document scans — an overview of international and the numerous national research reports and clinical literature. Data were obtained from the Department of Human Services (DHS), Victoria and from the Anti Cancer Council Victoria (ACCV) on: population forecasts; relevant epidemiology; service utilisation; from the Health Insurance Commission (HIC) on utilisation of Medicare, and service profiles developed by the consultants. This information was supplemented by quantitative and qualitative information from experts in the field; other service providers; key planning informants from DHS; peak consumer group representatives; interstate clinicians; academics and Commonwealth authorities associated with the approval and technical licensing of radiotherapy services.
- *The consultation process* for the Review was conducted using key informant interviews, site visits to all metropolitan and regional radiotherapy services, with

the exception of Box Hill and Ringwood, and telephone interviews with consumer representatives.

- A pivotal component of the consultation process was the public invitation to provide *submissions* to this Review. Thirty six written submissions from the public and private sector providers, rural and regional health services, consumer and other interest groups were received.
- A *stakeholder workshop* provided essential input and an opportunity for some of the diverse interest groups to put forward key areas of concern and discuss options for future service delivery.
- Regular meetings and input from *the Review Advisory Committee* provided the consultants with valuable information and a broad and considered range of perspectives from major service providers, and experts in the field

For complete list of review participants see Appendix B.

1.4 Victorian Health Services

The Victorian health services have undergone substantial restructuring in recent years. In October 1996, the Government released *A Healthier Future*, a plan for metropolitan health care services, representing a major commitment to health services in Victoria. A capital injection of over \$900m is envisaged to provide an infrastructure base to service a growing and rapidly changing profile of health service demand. While the commitments to metropolitan health services represent the major part of the Government's commitment, regional and rural centres will also be targeted for strategic investments and the development of health services. This Review represents an examination of the requirements for radiotherapy services within this development program, and outlines the strategies that will form the basis for development of radiotherapy services in Victoria over the coming decade.

Victoria commenced a process of strategic planning for future acute health services with "*Victoria's Health to 2050*" in January 1995. The approach in this document reflected the Government's view that health services would require substantial change over the coming decades. A range of factors has been, and will become, important drivers of change in health services delivery, and the Government policy sought to establish a framework from which the development of health services could be effectively achieved.

Given the rapid development of a wide range of new technologies, and changes in clinical practice in response to this, a flexible and innovative approach to health services planning and development was thought to be essential. Equally important was a view that health services

were not only expanding in their scope, but also becoming less invasive for the patient and more easily delivered on a day only or ambulatory basis. In some cases, services are also becoming much less expensive for the same clinical outcomes due to new technology, but in other cases, highly sophisticated technology and high cost drugs are driving up the real cost of services.

The formation of the Health Care Networks in metropolitan Melbourne and the release of the “*Metropolitan Healthcare Services Plan*” in October 1996 sets down the principles for development in the provision of acute health services. This highlights the policies of providing greater access to services closer to where people live, examining opportunities for private sector involvement, and developing models of service delivery which are cost-effective and maintain quality standards.

1.5 Current Policy Directions in Victorian Health Services

The Victorian Government’s response to the trends and future requirements of an effective health service encompasses strategies affecting clinical, resourcing and management issues. The Government’s approach to the management of public health services in recent years has been to delineate the roles and responsibilities of the Government, the Department of Human Services (DHS), and public providers as “*Funder*”, “*Purchaser*”, and “*Provider*”, respectively. This is intended to enable an independent and “arm’s length” policy of management and resourcing.

An objective of this policy approach is to promote best practice and achieve optimal and cost-effective outcomes through the application of competitive principles across public sector providers, and between the public and private sectors. Such an approach is not only consistent with commitments by State and Commonwealth Governments in respect of Competition Policy, but also one in which benefits of efficiency, enhanced access for consumers and the development of innovative models of service delivery may be achieved. There was evidence of the application of these principles in the services involved in this Review. In radiotherapy, for example, the capital demands of the service can at times limit the pace with which Governments can respond to community needs, but where appropriate incentives exist, the private sector can respond rapidly to development opportunities.

An important feature of competitive models is also that they can deliver fresh ideas as to better ways of delivering services, or alternative ways which provide greater choice and allow consumers to better match service with needs and preferences. Again, the experience suggests that all these elements have been present to an extent, though the inherent ‘lumpiness’ of radiotherapy facility investments has probably limited these effects somewhat. In practice,

choice is being widely exercised in respect of cancer treatment regimen, and the choice between regimens which include radiotherapy, and those which do not, was of particular interest to this review.

1.6 Radiotherapy and Cancer Services

Radiotherapy services are the focus of this Review. However, as will become clear, the whole range of cancer therapies, including medical and surgical oncology, palliative care, public education, primary care, screening, detection and diagnosis are all affected. This Review focuses primarily on the acute phase of cancer services, and in particular the relationship between radiotherapy and the other principal cancer therapies — medical oncology and chemotherapy, and surgical oncology.

Cancer remains one of the major causes of mortality and morbidity in developed countries, and one whose incidence will continue to grow with the aging of the population. It is anticipated that there will be a continued and rapid growth in the demand for services.

Radiotherapy is increasingly used as part of a multi-modal approach to cancer therapy, in which clinical outcomes can be enhanced through the coordinated application of two or more therapeutic interventions. The delivery of these services is dependent on effective liaison across services, and between the public and private sector. Cancer services and radiotherapy represent a prime example of many of the key issues that confront health service development into the next century.

Radiotherapy, or Radiation Oncology has been an important therapy for cancer patients for many years. Morgan (1996) describes the history of radiotherapy from early developments, up to the 1950s when the first megavoltage machines were introduced in Australia, claiming that Government inaction has been a primary reason for the failure to match the trends in utilisation seen in other developed countries. This failure, it is alleged, is based on a mistaken belief that radiotherapy is expensive and not cost-effective.. While this Review supports a view that radiotherapy is cost-effective and beneficial, the mixed system of funding, and the provision of a capital financing component through the Commonwealth could clearly have contributed to a complex process and delays in the approval and development of new services

Oncology services comprise cancer surgery, radiation oncology, medical oncology and haemoncology. Palliative care is also an essential component of care for many cancer patients. Many patients require combined modality treatment. While this Review will focus primarily on radiation oncology and radiotherapy services, there is wide agreement that each discipline should be part of a comprehensive cancer service, with close interaction between disciplines. In many areas of Australia, the lack of an integrated service has led to a situation where the

modality used for a treatment for a particular type of cancer will often depend on the point of entry to the system.

The care of the cancer patient requires access to a wide range of specialties. A comprehensive service requires the development of special groups with expertise in treating cancer in special anatomical sites such as breast, colon, neuro-endocrine, and head and neck. Full facilities for supportive care, tertiary pharmacy services, pain relief, rehabilitation and psychiatric assistance are also needed both within the hospital and community.

As an anti-tumour therapy, radiation oncology is concerned with the delivery of ionising radiation, x-rays or gamma rays and electrons. There are three possible radiation techniques. External irradiation consists of tumour treatment by radioactive beams produced by a generator of x-rays, gamma rays or electrons. Intracavity and interstitial irradiation (brachytherapy) involve the placement of radioactive material in the form of needles, tubes, wires or seeds directly within or in contact with the tumour.

1.7 Previous Reviews of Radiotherapy Services

The most recent major report on Radiotherapy in Australia, by the Australian Health Technology Advisory Committee (AHTAC) summarised the present knowledge of the key issues in the field of radiotherapy. Their report (“Beam & Isotope Radiotherapy”, Draft — December 1996), highlights the 42 reports and inquiries into radiation oncology services over the past 15 years. However, despite the number of these reports, the need for ongoing Review of this rapidly developing service remains.

AHTAC’s draft report summarised the recurring recommendations that have appeared in many of the reports and inquiries over recent years. These include that radiation oncology be organised around a comprehensive model of cancer treatment, that ensures concentration of expertise, maintenance of quality and efficient use of capital. However, the recommendations also highlight the low rate of referrals for radiotherapy in Australia and suggest that substantial numbers of patients have less than optimal access to services. The reasons for this low rate are complex, but are influenced by current shortfalls in trained radiation oncologists and support staff such as medical physicists. Greater education of the medical workforce in general was also thought to be necessary.

In Victoria, the most recent Review of radiotherapy services was in 1990, and resulted in the re-development of the Peter MacCallum Cancer Institute, and the progressive expansion of services in Geelong, and other centres. More recently, a 1994 Review of the requirements for radiotherapy undertaken by consultants, Diagnosis Pty Ltd, identified contemporary standards for staffing and configurations of radiation oncology services.

One of the major criticisms of previous reviews of radiotherapy services has been the relative failure to consider radiotherapy as one of a number of critical components of an overall comprehensive cancer services. While most of the reviews have addressed this issue to some degree, there is a recognition, which ACIL endorses, that reviewing radiotherapy, or any other cancer therapy in isolation is not only a flawed approach, but may tend to work against further integration of cancer services at local and State-wide levels, to the detriment of cancer patients. While this does not appear to be a significant factor in Victoria at present, ACIL has sought to consider radiotherapy in a wider context, and to develop strategies which reinforce links across all cancer services, including primary non-acute health care.

2. MARKET ANALYSIS

This section is designed to set the groundwork for an assessment of current and prospective patterns of radiotherapy utilisation. It summarises service demand, incidence, service treatment trends, forecasted demand, other service costs information gained from the literature, data sources and wide ranging consultation.

2.1 Demand

The realised demand for radiotherapy services is the logical outcome of a set of complex interactions involving a range of factors including, but not restricted to:

- Population and its age and sex profile — and other factors which result in differential cancer risks;
- The range of available treatment options and perceptions — by both clinical referrers and patients — of their relative efficacies and risks in respect of both survival profiles and quality of life effects (including pain, disfigurement, side effects and restrictions on future lifestyle choices);
- Availability of treatment facilities and any associated issues such as waiting times;
- The nature of the information and advice, and importantly the options, provided by the primary referrer, further influenced by the information available to the patient from other sources; and
- The patient's and the patient's family's assessment of the relative costs of the different treatment options including some or all of lost time, direct uncompensated travel and accommodation costs, child-care costs, pain and discomfort associated with travel, lost earnings (by self or family member) and removal from family support.

Clearly there is considerable scope, in this mix of factors, for realised demand to differ from, and probably fall short of, a theoretically optimal level of utilisation from a purely clinical perspective which might be endorsed by experts in the field. This is particularly true given (as is discussed later) the trend towards a clinical preference for increased utilisation of radiation therapy as part of a multimodal cancer treatment — the scope for referrers and consumers being ‘out of date’ is increased while there might also be constraints introduced through the availability of facilities.

However, it is important to recognise also that a *clinically optimal rate of treatment* need not equate with a *socially optimal* one. It can be perfectly rational to choose an alternative treatment which is somewhat less than ideal from a clinical perspective if it allows significant other costs to be avoided. It is important then to distinguish between informed demand and poorly informed demand and to examine the extent to which the costs in accessing the clinically preferred treatment are necessarily as high as they are, or could reasonably be altered in a way which improves social outcomes.

Radiotherapy services, and indeed most cancer services, receive a range of subsidies directed at reducing the out-of-pocket costs faced by patients undergoing treatment. These subsidies for services, including the Medicare rebate, and travel subsidies provided by the State Government, vary considerably depending on whether or not the service provided is through the private sector, or the public sector, and the distance the patient lives from the service. At present, for a course of radiotherapy, rural and regional patients (and their carers) normally require access to accommodation in Melbourne or Geelong for extended periods of time (up to several weeks). Even for public patients, this entails often substantial out-of-pocket costs.

Out-of-pocket costs are also a factor for private patients. In this case, the price to the consumer is not just the time and cost of travel and receiving treatment but also the out of pocket cost of any fees and charges not covered by Medicare or insurance. A conclusion that must therefore be reached, is that a “market” exists for radiotherapy, and indeed all services for which consumers are willing to pay. The impact of direct and indirect costs, as experienced by the consumer, is a significant driver of demand. These costs are a fundamental consideration in determining the potential viability of proposed new services, and importantly in the overall cost-benefit analysis of alternative options for services development. The established experience with private facilities provides an indicator of a significant willingness to pay a premium in order to gain the benefits of either easier/lower cost access or a perception of better treatment.

The current capacity and distribution of units providing radiotherapy services is documented more extensively in the next Section (Configuration and Functional Requirements). For the purposes of the demand analysis, a critical factor is the extent to which patients from different

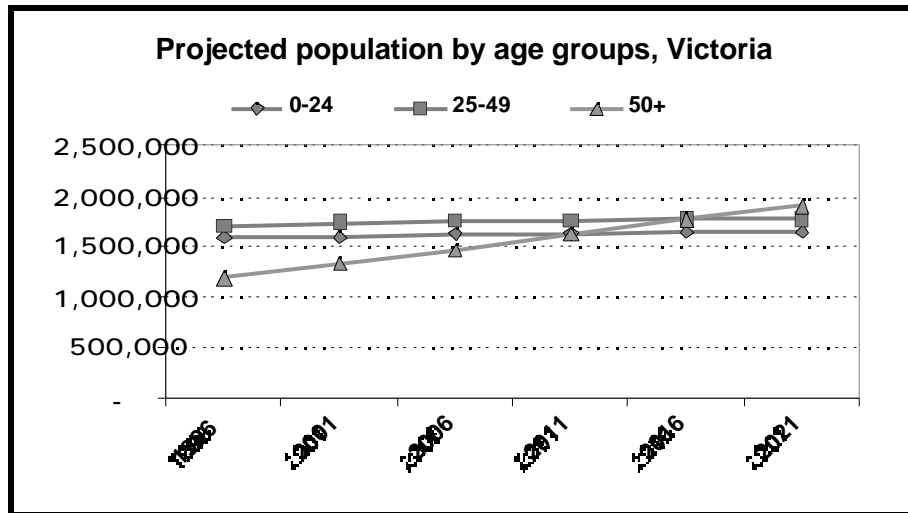
catchments (regions/networks) utilise different facilities. Propensity to move to other regions for treatment influences both the case for considering a wider distribution of radiotherapy facilities, even if this involves some increased costs, and the likely viability of new facilities planned around regional demand. It can also provide some pointers to the value of improved access.

Accordingly, ACIL has directed considerable attention at estimating current demand by region and at examining likely growth in demand under various scenarios. Demand has been analysed by collating available information on the utilisation of radiotherapy services, and also other major cancer therapies delivered on an inpatient basis. This has been sourced to the region of residence of the patient. This consists of the data provided by the Health Insurance Commission relating to items under the Medicare Benefits Schedule (MBS) for which a rebate is paid, and an extract of the Victorian Inpatient Minimum Dataset (VIMD). A measure of the cost, or value, of these services can be calculated by reference to the rebates paid by the Health Insurance Commission, and the funding provided through the Victorian Inpatient casemix funding model (as outlined in the 1997/98 Policy and Funding Guidelines).

The population of Victoria is forecast to grow from 4.49 million persons in 1996 to 5.03 million persons in 2011. More significant when examining potential demand for cancer services, is the fact that the growth in the over 50 population — the group which is most susceptible to cancers — is much greater than other age groups. While the population in total will increase by around 12% in the fifteen years from 1996, the over 50 population is estimated to increase by 37% in the same period.

The incidence of cancer in Australia now exceeds 3,000 new cases/year/million population. The AHTAC (1996) report provides a basis for inferring a rate of increase in cancer incidence attributable to factors other than the changing age profile — essentially environmental factors, the flow through of HIV/AIDS related cancers and improved detection. This factor was estimated to be about 0.5 per cent per annum, which is modest in relation to the population and age factors, and has very little policy implication over the next ten years, but has, nonetheless, been incorporated in the trend analyses.

Figure 2.1 Population Growth in Victoria



Source: DHS, 1997

Based on current incidence of new cancers by sex and five year age groups, the incidence by age and sex cohorts has been calculated and applied to the projected population of the health regions of Victoria. The catchments within the metropolitan area have been delineated according to the Health Care Network catchments as used by the DHS in August 1997.

Trends in cancer incidence in Victoria

The expected incidence of new cancers in each region/network can be determined by standardising against the average State-wide incidence. This has been done by summing the product of projected population within each region/network by the Victorian incidence of new cancers by age and sex groupings. Comparing this result with the actual incidence as recorded by the Anti-Cancer Council of Victoria (ACCV) gives an indication as to which geographic regions have higher or lower than expected rates of cancer. Similarly, the incidence of specific cancers can be compared across regions. Of interest to radiotherapy are some of the major cancers: lung, prostate and breast, which account for 10.3%, 13.2% and 12.5% respectively of all cancers.

Across all cancers, the Hume Region (Victorian catchment only) and the Metro Southern and Metro Western catchment areas have above average incidence compared with the expected incidence calculated using State-wide average incidences by age and sex groups. Of these the Metro Western catchment area, with 20% higher than expected incidence, has the highest relative incidence, with Metro Southern and Hume being 8% and 5% higher respectively. In terms of absolute demand, the metro catchments are substantially greater than the rural and regional areas. Even the Northern and Eastern network catchment areas, which have a lower than expected incidence of cancer, have much greater absolute demand than the regional

catchments. However, an understanding of the relative demand, rather than the total population is important in identifying specific service needs.

In respect of the major cancer sites, the three relatively high incidence catchments are also represented. Of significance perhaps is the very high incidence of lung cancer in the Western Network, at 36% above the State-wide expected incidence. The Hume region also has a markedly high incidence in terms of prostate cancer, 29% above the State-wide incidence. The metro Southern area has the highest relative incidence of breast cancer (+13%), and second to Hume for prostate cancer (+16%). A further result which has some relevance is the Gippsland Region, which while being 5% below the State-wide incidence for all cancers, is 14% above for lung cancer.

This pattern of departures from State averages was tested and found to be statistically significant. The relevance to the current study lies in the fact that these differential patterns have been carried through the trend analyses on which planning recommendations are based.

2.2 Utilisation of Radiotherapy services

Access and utilisation

‘Under-utilisation’ of radiation oncology in Australia — in the sense of utilisation rates below the levels judged to be clinically optimal — has been acknowledged to exist in previous reports. The average referral rate reported by AHTAC for Australia in 1995 was 38.9%, which is low by international standards and relative to the AHTAC position of 50-55% (AHTAC, 1996, p49). There are multiple reasons for this, including the range of demand factors set out earlier. Again, it may well be socially optimal to have utilisation rates below these AHTAC levels; that utilisation rates are low by international standards may be a better pointer to inappropriate underutilisation, though even here demographic considerations make strong conclusions hard to draw.

Low rates of referral for radiotherapy in rural Australia are considered to be factor in Australia’s ‘sub-optimal’ treatment rate (Denham J., 1995). Even here, though, there is a question of the extent to which the low rates of referral reflect a realistic assessment of high costs of access, and need not necessarily be distorting utilisation patterns severely.

Historically, radiotherapy services in Victoria have operated using a centralised model of service delivery, based around major facilities located close to the centre of Melbourne. While this has served Victoria well in terms of quality of care for those treated, it has been criticised for the limits this model places on patient access. This has meant that there have been

significant numbers of patients who have been denied the benefits of radiotherapy and this has proved impossible to quantify.

The categories of patients most likely to be denied treatment are those who would benefit from radiation as an adjunct to surgery, or where a more radical surgical alternative exists — eg., a mastectomy is performed in place of a lumpectomy and adjunct radiotherapy. Radiation used to relieve symptoms may also be denied if other alternatives exist. Since the last Victorian radiotherapy review (1990), restrictions on access within and close to Melbourne has been partly addressed with the development of centres at Moorabbin, Box Hill and Geelong. The service demand in all of these centres has quickly reached capacity, and waiting periods for some patients are also reported, confirming that there is a strong demand in these areas.

The experience with these developments has largely been one of increasing the total number of patients incorporating radiotherapy in their treatment regimens and, at best, slowing the growth in demand for services at the major tertiary centres. This is not surprising given the strong growth in the number of cancer occurring in the population across this period. It does not indicate that a more concerted roll out of facilities away from the centre of Melbourne would not reduce demand there in the long run.

Based just on first principles, it is reasonable to expect that provision of improved, in the sense of lower perceived cost, access to radiotherapy services can be expected to result in increased utilisation. The experience with the new facilities, and especially the evidence that they resulted in increased service utilisation within their catchments, provides empirical support for this where access is improved by locating facilities closer to patients. What is not so clear is the extent to which increased utilisation could have been achieved through other means — such as programs to increase referrer and patient awareness of the benefits and of the subsidies available for remote access, through increases to these subsidies, through the provision of more or better accommodation near the central facilities or through wider access to out of hours facilities. These matters are discussed further below.

Location issues

There are two major competing factors in considering the issue of where radiotherapy services should be located.

1. **Quality of service:** This is traditionally associated with large city-based academic institutes in tertiary hospitals. A high level of expertise is allowed to develop through sub-specialisation. This results in carers developing very high levels of knowledge and awareness of their disease process and the limitations of the treatment. Sub-

specialisation can only occur if there is a critical mass of staff and high numbers of patients.

2. Access: Large academic institutes located in the centre of large cities, have proved to be not particularly accessible to large sections of the community. These centres have to be situated in areas where they will attract the greatest supply and unfortunately this tends to be in the centre of large cities. Anecdotal evidence from consumers gathered in the course of this Review confirm the reluctance of certain classes of patients to travel and be absent from the home and work for radiotherapy treatment.

A major challenge in radiotherapy service development is to examine which model of service delivery allows both of these factors to be addressed.

Rural and regional priorities

In the submissions to the Review there was substantial support for radiotherapy services in Albury/Wodonga for a one or two machine unit. It was further agreed that services should be geographically integrated, combining radiotherapy; chemotherapy; surgery; mammography and palliative care facilities to provide care in a multi-disciplinary, multi-modal setting. In addition to direct service in the area, the facility would ideally have access to suitable carer accommodation, as a high percentage of the proposed catchment would be travelling distances for treatment.

Submissions from rural and regional areas indicated that the fragmentation of current referral trends, leads to difficulty in the management of patient care, as some patients are referred to Sydney or Melbourne or Canberra. Medical practitioners in the area are not provided with adequate patient follow-up reports to enable a more cohesive form of care. Concern was expressed that patient assistance schemes for rural patients still leave patients financially out of pocket.

In keeping with strong arguments for decentralisation, it was asserted that rural centres should be developed with sufficient expertise to treat more common cancers. They should have ties back to a comprehensive integrated cancer centre for more specialised care.

The lower national and local rates of radiotherapy treatment compared to overseas levels attracted considerable comment. It was argued that lower utilisation rates both nationally and in Victoria relate to:

- a lack of understanding of its effectiveness compared with other treatments;
- insufficient medical education at undergraduate and postgraduate levels;

- lack of knowledge about the effectiveness of radiotherapy; and
- poorer access to services for patients living outside metropolitan areas.

Consumer issues

Consumer concerns and equity in access to services attracted considerable comment across nearly all submissions to the Review. In addition, consumer issues are included in each of the summary sections below. Most submissions affirmed the view that information regarding the value of radiotherapy in enhancing quality of life of patients with cancer, should be widely disseminated to both consumers and providers.

Up to date provider education on radiotherapy diagnosis, treatment and prognosis was seen as essential. It was firmly argued in the majority of submissions that the availability of family accommodation near the treating facility is critical to rural access. Rural patients in Victoria were reported to be disadvantaged in access to radiotherapy services. The issues of age; personal support systems; transport and accommodation and 'rurality' are described as key factors to be considered in the likely use of radiotherapy facilities.

The ability to provide a range of integrated cancer care services, including radiotherapy services, under the one umbrella has been a major demand of oncologists and consumers across rural and metropolitan consumers.

It was reported in one submission that patients accessing radiotherapy from just two regions outside metro Melbourne incur a cost to the State of up to \$1.2 million annually in VIPTAS. (This estimate is probably overstated as the total VIPTAS outlays for the whole State are \$2.8 million.) This is discussed in more detail Chapter 5. Daily or weekly travel, accommodation, meals and loss of earnings also result in substantial out of pocket costs to patients and carers.

The submissions indicated that the number of patients undergoing radiotherapy from country areas is less than city dwellers, possibly between 5-10% fewer. This was reported to be the case in three rural regions, where patients have to travel to Melbourne or Geelong for therapy. Of considerable concern in two submissions, and in subsequent consultation throughout the review, were reports that patients have chosen more radical surgery eg., mastectomy, as opposed to the clinically preferable lumpectomy and radiotherapy, rather than go to Melbourne for radiotherapy. This trend was not refuted by examination of regional variation in rates of surgical procedures of the breast for malignancy; however the results were not clear cut. Subsequent advice from a number of clinicians suggests that breast cancer patients probably receive an atypically thorough briefing as to the treatment alternatives compared to many other cancers where the referrers are themselves often less well informed.

Almost all the submissions emphasised that the provision of radiotherapy within an integrated acute hospital setting is more conducive to quality continuity of care. Patient and carer access to a range of ancillary services was emphasised as essential to providing quality of care and best treatment outcomes. Such services were cited as specialist nursing; dietary; psychosocial care; rehabilitation and palliative care are also routinely required and must be coordinated.

2.3 Trends in Treatment

The role of radiotherapy in oncology is constantly evolving but undoubtedly it will have a strong and secure place in oncological management well into the next century. All of the common malignancies (lung, breast, prostate, gastrointestinal, skin) have high radiotherapy utilisation rates and it is expected that this will continue.

Some changes in treatment regimens are expected and these should all be evidence-based and aimed at improving cure rates, reducing toxicity, improving quality of life or improving cost efficiency. Studies of this type are currently being done in Australia and this may have an impact on cost. However, this may be offset by savings down the line — eg, in reduced relapse rates, loss of work, reduced admissions and need for terminal care. The following outlines some other trends which are apparent.

More multimodal therapy

Expert opinion indicates that radiation will be combined more with other modalities of treatment such as surgery, chemotherapy and hormonal therapy. One of the most important trends has been in the use of synchronous chemo-radiotherapy that has become common place in the treatment of head and neck cancers and gastrointestinal cancers. These changes have been evidence-based and resulted in improvements in patient outcomes. An important implication from this is that radiation oncology services must continue to be located in the framework of a comprehensive cancer care unit.

Different dose fractionation schemes:

Alternate dose fractionation schemes are continuing to be explored with a view to improving the therapeutic ratio between normal cell kill and cancer kill. These strategies have included delivering multiple treatments per day (hyperfractionated and accelerated radiotherapy), smaller doses per fraction or higher total doses of treatment. Most of these protocols will result in more episodes of care during the treatment course.

New indications for radiation

It is highly likely that radiotherapy will have new applications which may lie outside the may not be in the area of oncology. For instance, intraluminal radiotherapy is being trialed after angioplasty in coronary artery stenosis to reduce the incidence of re-stenosis. Radiation has also been used to treat macular degeneration of the eye. These are both common benign conditions that if shown to benefit from radiation, will place increased demand on radiation facilities. It is unlikely though, that the major application of radiation will be non-oncological.

Loss of traditional indications

Conversely, as other treatment modalities improve it is likely that there will be some loss of the traditional radiotherapy treatment domains. For example, chemotherapeutic advances have meant that real alternatives to radiation exist in some conditions e.g. the management of Hodgkins Disease and Germ Cell Tumours.

As the number of radical prostatectomies rise, the *proportionate* need for radiotherapy may also reduce. However, in a constantly changing environment, we are now seeing brachytherapy being used, in Sydney, Melbourne and Perth, as an alternative to a radical prostatectomy — currently at high provider cost but with distinct patient advantages. In addition, the prevalence of PSA screening has so far prevented any decline in prostate radiotherapy.

New Radiation Technologies

The roles of new technologies is still to be defined. Stereotactic radiotherapy for instance, has well defined applications in uncommon conditions such as arteriovenous malformations of the brain. However, in addition to this application, it has potential use in some of the more common conditions seen in oncological practice such as cerebral metastases. If these are shown to produce real benefits, then access to these technologies will be important.

Interfacing with new technologies

Gene therapies hold much promise in the treatment of malignant disease. There are over 100 approved protocols for various forms of human gene therapy and this is doubling annually at current rates (Kearney B, 1996). However uncertainty remains as to how radiation oncology will interface with these new technologies.

Competition between specialties

There is evidence that there will be increasing inter-specialty rivalry to treat certain conditions. This may be argued on the basis of improved survival rates, cost effectiveness, casemix or improved quality of life. In order to meet this competition head on, the specialty will need to argue its case on sound evidence. Adequate statistical and data management support for this will be essential.

Telemedicine

Telemedicine uses interactive video telecommunication to provide service from a distance. This is another technology that will be used increasingly Australia. At this stage it is in its infancy and its cost effectiveness has yet to be determined. A common application is in the transfer of radiological images and distance consultations. This has potential applications for remote radiotherapy planning as well as in the assessment of new and old cases. Other potential uses are in the assessment of pain and nutritional status, and for facilitating support groups as well as in service education for staff. There are significant capital and transmission costs involved. The role of telemedicine in oncology was reported by Doolittle's research from the University of Kansas. A cost analysis was performed and flying in oncological support was about 10% more expensive than telemedicine. Further work is being carried out evaluating patient preference. (Doolittle G.,1997.)

It is clear that the costs of high quality telecommunications systems are falling rapidly, while affording scope for both improved quality and speed — and this will almost certainly imply that telemedicine will become relatively more cost competitive over the next few years. ACIL believes that there will be a growing role for this technology and that it will significantly enhance the scope for providing more accessible high quality radiation oncology services.

2.4 Forecast new cancers and utilisation of radiotherapy

Demand is based on the projected population, combined with an expected incidence rate, giving the number of new cancers expected per year. Of these, about half can be expected to be referred for radiotherapy services if current recommended *clinical* guidelines are to be achieved. AHTAC recommended 50% to 55% as a planning guideline, however the actual referral rates have been seen to vary depending on many factors, in particular geographic access and other factors that impose direct and opportunity costs to consumers.

The referral rate is also likely to increase over time, as the efficacy of radiotherapy becomes more widely known. A rate of 60% is now accepted as being clinically appropriate by some

commentators in the US (Buhle, 1997). A survey conducted for a previous Review, indicated differences in the opinions of clinicians regarding the appropriate referral rates for particular types of cancer. Radiation oncologists tended to view a higher rate of referral as clinically appropriate, in comparison to medical oncologists, and both were generally higher than surgeons.

Table 2.1 Proportion of cancers potentially treatable with radiotherapy

		Radiation Oncologists	Medical Oncologists	Surgeons
Bowel	<i>Colon</i>	15%	5%	19%
	<i>Rectum</i>	69%	55%	33%
Lung		78%	47%	45%
Breast		75%	52%	34%
Prostate		78%	57%	43%

Source: Survey of ten oncologists and surgeons regarding optimal treatment, (Diagnosis Pty Ltd, 1994)

Based on the projected population for Victoria, the total number of new cancers per year, and per region/network are shown in the table below. For each new patient, there is also a reasonably predictable retreatment rate (between 15 and 25 %, depending on the type of cancer). Assuming that 20% of patients will be affected, an estimate of the total number of patients that could potentially be referred for radiotherapy can be determined.

For reasons developed further below (Section 2.6), ACIL has concluded that the AHTAC recommendations for clinically optimal rates of treatment provide reasonable planning targets for socially appropriate rates of treatment looking out eight to ten years. This reflects the existing evidence relating to growth in demand as access is being improved, the likelihood that the clinically optimal rate will be revised upwards and specific recommendations for improving the information and support systems on which patient choice and referrals are based. It is for this reason that these rates are used in Table 2.3.

Table 2.2 Forecast incidence of Cancer, Victoria

	2006	2011
<i>Barwon-South</i>	1,752	1,893
<i>Gippsland</i>	1,347	1,484
<i>Grampians</i>	1,014	1,108
<i>Hume</i>	1,480	1,663
<i>Loddon Mallee</i>	1,498	1,658
<i>Metro Eastern</i>	4,659	4,975
<i>Metro Northern</i>	3,222	3,493
<i>Metro Southern</i>	5,846	6,250
<i>Metro Western</i>	2,969	3,316
Victoria	25,792	27,852

Source: ACIL, ACCV, DHS

Table 2.3 Forecast Referrals for Radiotherapy, 2006

	50%	55%
<i>Barwon-South</i>	876	964
<i>Gippsland</i>	674	741
<i>Grampians</i>	507	558
<i>Hume</i>	740	814
<i>Loddon Mallee</i>	749	824
<i>Metro Eastern</i>	2,329	2,562
<i>Metro Northern</i>	1,611	1,772
<i>Metro Southern</i>	2,923	3,215
<i>Metro Western</i>	1,484	1,633
Victoria	12,896	14,186

Source: ACIL, ACCV, DHS

2.5 Operating capacity

The number of patients that can be treated depends on the number of fractions for each course of treatment, the average time per fraction, and the total operating hours of the linear accelerator. The average number of fractions per patient has been reported (AHTAC, 1996) as between 17 and 19; however in submissions and consultations as part of this review suggest a current figure of between 15.5 and 16.5. This average, however is sharply divided between courses for primarily curative intent, and palliative intent.

Palliative courses normally involve a small number of fractions over one or two days, while curative treatments involve a treatment schedule of several weeks (normally between 5 and 7 weeks). Recent trends, including data provided to this Review, have shown a moderate decrease in the length of treatment schedules, however this was almost exclusively confined to

palliative treatments (Stevens & Firth, 1997). This could represent some modest reduction in the utilisation of machines, but is unlikely to be significant. The authors conclude that any reduction resulting from hypofractionation for palliation may be offset by trends to use hyperfractionation for curative treatments.

For this Review, average throughput measures have been adapted from those indicated by the AHTAC report (Beam and Isotope Radiotherapy, 1996, Appendix 4, p110). One set of assumptions used were 234 working days/year; 4.1 attendances per hour (eight hour working day); 19 attendances per course and a 20% re-treatment rate (NSW, 1993). This equates to 7,675 attendances, or 404 courses. The final set of assumptions used were based on 8,280 attendances per year (which is equivalent to an 8.5 to 9 hour working day), or 487 courses and 390 new cases per year. For the purposes of this Review, a figure of 16 attendances per course of treatment has been adopted, consistent with data provided to the Review. In addition, variants that assume longer hours of operation, and greater overall throughput have also been tested, again consistent with actual data provided by existing service providers in Victoria.

While these figures have been used in most of the calculations to date, it is clear that the theoretical throughput per machine could be increased if increased operating hours were adopted. This would entail increased cost (though not necessarily cost per treatment) — a factor which is discussed in more detail in subsequent sections, however there appears no reason to limit the operating hours of radiotherapy units to the above figures. Existing services at times operate until 8 or 9 PM at night, and on Saturdays to cater for backlogs and contingencies, and in other States (see Box 1) such practices are sometimes normal (although this is not universal).

Importantly, these alternatives demonstrate that flexibility exists which could allow increased use of existing capacity, and therefore mitigate against the need for additional units. However, if schedules such as this are to be adopted, a number of changes to operating procedures and employment conditions would likely be required, possibly including negotiating shift arrangements, increasing scheduled maintenance and downtime, and developing guidelines and criteria for the types of patients which may or may not be treated at certain times.

ACIL is attracted towards the possibility of extending the availability of longer operations, though it seems unlikely that this approach would reduce significantly the average provider costs of treatments. The fact that, after 20 years, QRI still does not know whether there are cost economies or not suggests that any cost differential is likely to be small. Both ACIL benchmarking, discussed later, and some Australian and overseas studies, do suggest scope for small cost advantages for providers from extended hours of operation relative to adding additional machines to an established facility.

ACIL is of the view that, if there is no large provider cost penalty, then the patient benefits almost certainly mean that these arrangements are cost effective. This would, of course, be particularly true if the extended access increased utilisation. If this were done, it would limit the rate of increase in numbers of machines needed, especially the rate of growth in the number of machines at the larger established facilities.

Box 1: Operation of Late Shifts at QRI

An extended day has been worked at QRI for over 25 years. The motivation for this was to try to meet the demand for radiation services with the limited number of machines available. It was not used as a method of reducing costs. In 1974, the radiation therapists became ‘shift workers’. This made it more attractive to sell the concept of an extended day to staff. Being a shift worker meant:

- a late shift allowance;
- double time for overtime vs time and a half;
- a *paid* half hour lunch break;
- 38 hour week (on 19 day month).
- The late shift allows 12 shifts on 9 linear accelerators. The day shift runs from 8am to 4pm and the evening shift from 1pm to 9pm. Demand on the evening shift is always less — typically 20 patients as opposed to 32. Offsetting this cost factor is the fact that lower staffing levels are used. The evening shift involves machine radiation therapists and a nurse. Clerical staff and wardsmen are not rostered on, and medical staff and engineers are on call but not on site.

The prime advantages appear to be:

- patients have a choice in treatment times, with associated lower access costs for a significant number (though the majority still come during the day);
- greater spread of the capital costs (but it is not claimed to lower overall *provider* costs — this is an open question);
- provision of a half shift provides a solution to the problem of a machine being booked to capacity.

There are some disadvantages:

- demand falls off after 8pm;
- patients for the evening shift need to be screened as there are fewer support services;
- there is less flexibility in the event of a machine breakdown;
- there is an overlap period, but this is used for in-service education and administrative duties;
- patients are still required to come during the day on occasions to see the doctor (usually once per week).

ACIL is aware that some clinicians hold very strong views about minimum configurations and staffing requirements for operating after hours services. A point of contention is the question of whether a doctor should be required on site. QRI operates without such a requirement (though one is always on call), apparently with few difficulties, though this policy is undoubtedly supported by the policy of screening patients for after hours treatments. Some centres reduce the allocation of radiation therapists to two per machine, which would appear to be in conflict with the policy of their college — QRI has always used three radiation therapists per machine. If there is evidence that services of an appropriate standard could be provided to selected patients with a lower quota, it would seem best to seek to negotiate a recognition of this in the college’s policy.

2.6 Model for Forecasting Demand

Forecast demand for radiotherapy has been modelled using two factors, medium term referral rates of 50 to 55 per cent, and throughput in terms of total patients per year per machine. These factors have been selected because they represent the variables with the least degree of certainty. The population forecasts, and the incidence of cancer are considerably more reliable, and not anticipated to change significantly.

It is important to recognise that demand is not something that will be generated exogenously. Utilisation rates of 50 to 55 per cent within the next 10 years will almost certainly only arise if access is significantly improved; probably also a change in the typical patterns of referral, to better reflect the clinical perspective set out in the AHTAC Report, will be needed. In effect, the realised 'demand' will in part be a creation of accessible services and better information regarding the value of those services.

ACIL remains of the view that, for a long time to come, utilisation rates below clinically optimal levels will be appropriate across Victoria for the reasons set out earlier. However, ACIL also believes that the assessment of clinically optimal levels of utilisation is likely to increase in coming years, reflecting the trends discussed earlier. If this assessment is coupled with an explicit set of initiatives, in line with current Victorian health policy, directed at reducing access costs and raising community as well as referrer awareness of the benefits of radiotherapy, then, utilisation rates by 2006, and more certainly 2011, which fall within *current* AHTAC clinically optimal levels seem plausible and offer a reasonable basis for planning. Note that this assessment is dependent on strong growth in utilisation by patients within Melbourne as well as in non-metropolitan areas.

The potential throughput per machine also appears to be capable of substantial variation. At present, the private sector operating three machines appears capable of greater than 700 patients per year, while on average, public sector units operate at around 500 patients per year. The current average throughput per machine (public and private sector services) is estimated at 540. The forecast has been tested at 500, 550, and 650 patients per year to reflect a marginal increase on current utilisation for a medium scenario, and a higher level should throughput levels approach that of the current private sector throughput. A lower figure may be expected if rural single machine units (if developed) fail to attract a maximum capacity, in which they would operate at less than 500 patients per year (as do some public units at present).

In citing figures on patient throughput, it is important that considerable care be used if they are to be interpreted as indicators of productivity or efficiency¹. ACIL’s demand analysis is based on realised rates of throughput and reasonable variation in these and does not require any assumptions as to efficiency, except in the later context of scope for extended hours of operation increasing capital efficiency. It should be recognised that, by international standards, the throughput figures for both the private and public sectors in Victoria are high. According to the standards of the American College of Radiology, the annual average caseload for a linear accelerator operated seven hours per day should be about 300 — based on 5 simple treatments per hour with appropriate adjustment for complexity and a 10 per cent time allocation for maintenance. ACIL has received no indications that the higher rates of throughput in Victoria have compromised patient outcomes.

The terms of reference for this Review require the development of low, medium and high projections. These could be done by using low, medium and high population projections, however, it could be more useful to generate these estimates by using the medium population projections and adjusting the sensitivity of the incidence rates, the rate of utilisation of radiotherapy and other factors which depend on the service. The tables below show the estimates for total requirements (for total linear accelerators), and the proportion of this demand, which should arise from each of the Regions and Network catchment areas in Victoria. The trends seen in the incidence of cancer across Victoria have been incorporated into the forecast demand projections at Regional level, by the use of an index representing the actual to expected incidence.

Table 2.4 Forecast Mv machine supply, 2006

Referral rate	Total patients / year /machine		
	500	550	650
50%	28	26	22
55%	31	28	24
Low	(650/yr; 55%)		24
Medium	(550/yr; 50%)		26
High	(500/yr; 50%; 550/yr; 55%)		28

Source: ACIL estimates

¹ A series of recent studies by Delaney et al. (1997a, b and c) discuss more appropriate measures of productivity.

Table 2.5 Geographic distribution of medium scenario (notional distribution of 26 machines)

Region	Share of demand	Rate of metropolitan referral		
		40%	25%	10%
Barwon-South	6.3%	1.4	1.6	1.9
Gippsland	4.8%	1.0	1.2	1.4
Grampians	3.6%	0.8	1.0	1.1
Hume	5.3%	1.0	1.2	1.4
Loddon Mallee	5.4%	1.2	1.4	1.6
Metro Eastern	20.8%	4.4	4.3	5.1
Metro Northern	14.4%	3.0	2.9	3.5
Metro Southern	26.1%	4.9	4.7	5.6
Metro Western	13.3%	2.2	2.2	2.6
<i>Metro referrals*</i>		6.0	5.5	1.7

*: Note that these figures do not take into account the 'lumpiness' of the machines which is likely to result in greater demand for machines in inner Melbourne. See the discussion in the text.

Source: ACIL Calculations

Of course, in interpreting the above table it is necessary to recognise that machines themselves do not come in fractional sizes. The table is sensibly viewed as an indicator of demand only. If Loddon Mallee can, in theory, support 1.2 machines, then it is unlikely to make sense to install 2 machines, though this would certainly suggest that a higher throughput might be sought and, for this, the option of extended hours may offer a sensible solution. Alternatively, a higher rate of metropolitan referral or a lower rate of utilisation would follow.

The range of assumed rates of metropolitan referral does not have major ramifications for the number of machines indicated for the different regions. Relative the conservative 40 per cent figure used as the benchmark, it seems likely that Metropolitan South could support an additional machine. This may also be true of Metropolitan East, but this is less likely in the above time frame.

The most dramatic (and important from a policy perspective) implication of these different assumptions lies in the implied number of machines needed in inner Melbourne to deal with the complex referrals. Nominally, the lowest rate of referral implies a dramatic reduction in the number of machines needed. Importantly however, the lumpiness of the machines needs to be taken into account here.

For example, the figure of 1.7 machines, associated with a 10 per cent rate of metropolitan referral, would only arise if there were 2.6 machines in Metropolitan Western, 5.6 machines in Metropolitan Southern etc. If the lumpiness of the machines were to mean only 2, 5 etc

machines were installed in these regions, and all other cases were referred to inner Melbourne for treatment, then the figure of 1.7 machines would rise to 5.9 machines. Similarly, with a nominal referral rate of 40 per cent, the appropriate figure for inner Melbourne could be closer to 8.9 machines. The reality is likely to lie below these figures, with some regions installing additional machines before the demand has fully grown to meet throughput capacity, with scope for some referrals being to other centres (such as Geelong) and with lower rates of utilisation likely as a result of the lumpiness and the fact that access costs are therefore somewhat higher.

A key conclusion does stand, however — more extensive provision of treatment facilities within catchments can be expected to result in a significant reduction in demand for treatments from within the major facilities in inner Melbourne. There is necessarily considerable uncertainty as to the extent of this reduction. However, as is discussed in more detail later, a feature of this process would also be to shift strongly the nature of the treatments being undertaken in inner Melbourne towards to the more complex end of the spectrum and towards the rarer forms of cancer where subspecialisation is of greatest value.

Summary of findings:

- Demand is a function of inter-related factors of population growth, increasing incidence of cancer and the factors driving utilisation of radiotherapy.
- Without any change in utilisation rates, population growth will add 8.3% to total demand, the effect of ageing of the population 9.2% and other increases in incidence about 5% — for a total increase of about 22 per cent by 2006.
- Treatment trends are continually evolving, with an apparent reduction in attendances/course (down from an estimated 17/course in AHTAC’s 1996 report to about 16 based on data collected in this report).
- The utilisation of Radiotherapy in Victoria is currently around 42%. An increase to the AHTAC recommended level of 50 to 55% is considered likely given that clinicians will increasingly adopt radiotherapy as primary or adjunctive therapy, and US indications that 60 % may be appropriate.
- Other changes in clinical practice will affect the utilisation of radiotherapy, such as the loss of traditional indications, and the development of new therapies, including non-oncological cases. The advent of new technologies and therapies will have an impact on radiotherapy, however the potential magnitude of this is not clear.

- Forecasting demand (of cases to be treated, and number of linear accelerators) has been undertaken by considering the impact of the major factors influencing demand — population growth and incidence of cancer. However the major areas of possible variation exist in the utilisation or uptake of radiotherapy, and the throughput per machine.

Key recommendations:

- Planning for Radiotherapy services be on the basis of between 13,000 and 14,000 new patients per year in 2006.
- These estimates of demand not be set as targets but as indications of likely demand, consistent with *current* AHTAC guidelines, apparent trends overseas and a deliberate policy of improving both access and information.
- Planning should also take into consideration potential increase in throughput, which could allow for increases in utilisation without increases in capacity.

3. SERVICE CONFIGURATION AND FUNCTIONAL REQUIREMENTS

This chapter outlines the equipment configuration in terms of treatment and planning and ancillary equipment for both major and ancillary sites. It includes detail of current supply; models of service delivery; factors considered in choosing options; criteria and standards; current and optimal throughput rates; staffing; the associated services; and organisational arrangements. This section also describes the current and future role and relationships of the private and the public sector.

3.1 Current Supply of Radiotherapy Services

Radiotherapy services are currently supplied by 5 separate providers, 4 of which are public and one (EMROC) which is private:

1. Peter MacCallum Cancer Institute (PMCI) servicing Inner Eastern Network and Moorabbin and Box Hill.
2. East Melbourne Radiation Oncology Group (EMROC) servicing the Inner Eastern Network and Ringwood.
3. William Buckland Centre (Alfred Hospital) servicing Inner Eastern Network.
4. Andrew Love Cancer Centre at Geelong.
5. Austin and Repatriation Medical Centre providing the North Eastern Cancer Service.

Operational and staffing features

Radiotherapy services currently operating in Victoria provide services to around 10,300 patients per year (Megavoltage linear accelerators). At retreatment rates of 20%, this equates to around 8,600 patients, or around 41.8% of total new cancer cases diagnosed. The staffing profiles of the units are outlined in Table 3.1 below, with estimated throughput and throughput per staffing category in Table 3.2.

Table 3.1 Estimated staffing levels of existing radiotherapy services

	EMROC	PMCI	ALFRED	AUSTIN	GEELONG	TOTAL
Rad Oncologists	6	20.3	4	3.1	3	36
Registrars		10	2	0.5	0.5	13
Rad Therapists	23	91	20.6	14	14.2	169
Physicists	4	9	3.6	3	2	22

Source: ACIL, IEHCN, NEHCN, Geelong Hospital

Table 3.2 Estimated throughput levels

Activity/throughput levels	EMROC	PMCI	ALFRED	AUSTIN	GEELONG	TOTAL
Patients/yr	2,300	5,114*	1,073*	856*	990	10,333
Patients/RadOncologist	383	252	268	276	330	287
Patients/RadTherapist	100	56	52	61	70	61
Patients/Physicist	575	568	297	285	495	470

* estimated from total attendances

Source: ACIL, IEHCN, NEHCN, Geelong Hospital

3.1.2 Equipment

The tables below summarise the details of the distribution of radiation oncology equipment in Victoria.

Table 3.3 Current Equipment and technology in Victorian radiotherapy services

Equipment	EMROC	PMCI	ALFRED	AUSTIN	GEELONG	TOTAL
Dual	2	4	2	2	2	12
Single	1	5	1			7
SXRT		2	1	1		3
DXRT		1		1		2
Cobalt		1				2
Brachy	3	3	3	3		

Abbreviations

Dual = dual energy linear accelerator
 Single = single energy linear accelerator
 SXRT = superficial radiotherapy
 DXRT = Deep X ray therapy
 Brachy = brachytherapy
 Rad Onc = radiation oncologist
 Rad Ther = radiation therapist

The Peter MacCallum Institute (PMCI)

The PMCI is clearly the largest centre, with over 5,000 new cancer patients per year. The radiotherapy department is comprehensively equipped and includes brachytherapy, stereotactic radiotherapy and PET scanning. Although its staffing may appear disproportionately large, this needs to be interpreted in the context of its being the major provider of research (both clinical and laboratory) as well as educational programs. There is also a high level of sub-specialisation, with multi-disciplinary clinics that are time consuming and decrease throughput. In addition many staff are expected to be off site at Moorabbin and Box Hill and this introduces constraints on time management.

EMROC

EMROC is the second largest provider of radiation oncology services in the state. The number of cases per year per radiation oncologist is the highest (383 compared with the state average of 287). However, EMROC is purely a treatment facility with no involvement in research or registrar training. Private practice allows for a very efficient processing of patients, but this is rarely done in a multi-disciplinary clinic because there is no benefit for this in the MBS schedule. It is also interesting to note the high number of new patients per year per radiation therapist at EMROC (100 compared to State average of 61). This may in part be related to the selection of cases and undoubtedly also reflects EMROC's treatment specialisation — but may also be a pointer to scope for improving throughput efficiency at other sites.

William Buckland Centre

The William Buckland Radiotherapy Centre at the Alfred is the third largest provider of services and is fully equipped with a full range of equipment including low and high dose rate brachytherapy and stereotactic. This explains fairly low number of new patients per physicist because much of its equipment requires a lot of physics back up. Staffing levels for radiation oncologists and radiation therapists are close to the state averages.

Alfred is a major tertiary centre, offering a comprehensive range of treatments and training, and with significant involvement in trials. There is an apparently common perception that, compared to PMCI, it offers patients a more personalised service, with greater continuity of care.

The Austin Hospital

The Austin Hospital treats around 850 patients per year and it is acknowledged that it is under-utilised at present. The department is well equipped with dual energy machines as well as

brachytherapy, superficial therapy and deep X ray therapy. It would appear that all levels of staff have room for improvement in throughput. The role of the Austin site has changed rapidly in recent years with a transition from a repatriation facility operated by the Department of Veteran's Affairs, to a general community health service. This transition will continue as the proportion of veterans within the Austin's caseload declines and more demand from the local catchment is met.

The Andrew Love Cancer Centre

The Andrew Love Cancer Centre at the Geelong Hospital treats almost 1,000 cases per year and has only 2 linear accelerators that are at the level of capacity indicated by the AHTAC report. The average numbers of cases/year for all professional staff categories is the highest amongst the public units. Geelong does not provide brachytherapy or other specialised treatments such as stereotactic radiosurgery which drive up costs.

3.2 Broad Models of Service Delivery

There are several broad classes of options for the supply of radiotherapy services that will be discussed in detail to highlight the advantages and disadvantages of each.

Centralised model

This model allows the development of large institutions with a high level of subspecialisation. Quality systems and protocols are easier to develop and standardise, as are professional development and continuing education. These centres are able to treat all conditions, even rare problems, and this allows the development of high levels of expertise in all areas which can be linked to improved outcomes. Higher levels of throughput may allow economies of scale and other benefits. These large departments traditionally have been in the city centres which is not always geographically accessible for large numbers of the population and may have deterred treatment in some cases where it was considered appropriate. Accessibility can be partially overcome by the provision of accommodation on site; however, this will not address the problem of loss of income by the patient.

De-centralised model

This model allows the delivery of radiotherapy services to more peripheral regional hospitals. The prime advantage of this is accessibility to patients. This has to be balanced against the risks of losing sub-specialisation; intellectual stagnation and the difficulties that occur in attracting staff. Rare and complicated conditions may need to be referred on to larger centres. The nature and extent of such referral will, and should be, influenced by the equipment levels and the skills

of the staff appointed to the peripheral centres. In some cases, these will allow for the treatment of most patients. The most likely areas of transferral would be those involving complicated treatment requiring brachytherapy or intensive combined treatments. This would tend to include paediatrics, gynae brachytherapy and head and neck cancers.

Patterns of Care studies in the USA (see Box 2) have raised concerns about the quality of care and outcomes that occur from treatment in small decentralised departments which were often equipped with part-time oncologists and poor equipment.

Hub and spoke model

This type of option involves a trade-off between the advantages and disadvantages of centralised and de-centralised approaches, though it could well be viewed as offering the advantages of both while better managing the disadvantages. This has been a successful model in the operation of the Moorabbin and Box Hill campuses from PMCI.

The major benefit this model allows is the provision of a service in a smaller hospital that allows easier access for patients. The hub provides staff, educational programs, quality assurance and access to specialised clinics and equipment. Should a machine breakdown occur then there is backup present. This overcomes many of the problems that exist in the operation of small independent centres.

Problems can occur with the deployment of staff and from the consumer’s point of view there can be a lack of continuity in care as patients are transferred to different sub specialists. Due care must be taken to ensure that personnel are not isolated in terms of ongoing education. Telemedicine is a useful technology to be embraced in this model.

The link between the hub and spoke can be a tight one or a looser one in the form of an affiliation agreement, whereby the smaller centre agrees to adhere by the treatment and Quality Assurance protocols of the larger centre. It is even possible to envisage variants where the hub and spoke analogy becomes quite strained. One small unit could well establish relationships with more than one hub; an ‘association’ of small units could develop a Quality Assurance protocol, incorporating provisions which would probably require each member to have professional relationship with at least one ‘hub’ etc. From the other side, there is considerable scope, through funding arrangements (both Commonwealth and State) for governments to require that protocols be established, accepted and maintained.

Box 2: Patterns of Care

The Patterns of Care Study (PCS) was a series of reviews initiated in 1972 to evaluate the quality and demographics of clinical radiation therapy in the United States. It has demonstrated that there are significant benefits to be gained not only in survival but also in reduced treatment morbidity if modern

techniques and equipment are used (McKay). Reviews have been undertaken in a variety of tumour types including breast cancer (Solin), cervix and prostate (Diamond), rectum and sigmoid (Kline) and Hodgkins Disease (Hughes). Similar studies on patterns of care have been done in UK and Europe.

The common themes that emerge from these studies are :

- Part time practitioners had poor support, poor staging and poor follow up (Hanks)
- There is wide variation in technical delivery of radiation fields and doses (Solin)
- Discrepancies exist in planning practice (Kline)
- Many complications can be sourced to poor technique (Leibel)
- Well resourced and managed facilities achieved better outcomes, had more use of new techniques and were better integrated with other modalities.
- Use of brachytherapy improved the survival and local control in cancer of the cervix (Coia)
- Patterns of care are different in teaching versus non teaching hospitals (Basnett)
- Some evidence that university hospitals had better survival than general hospitals in certain common cancer types (Hakema). Not all studies have confirmed the benefit of specialised care but none has ever shown a disadvantage.
- Studies in paediatric and rare adult cancers show consistent advantages to the management of these cancers in specialist centres. (Stiller)
- Studies on gynaecological oncology show a survival advantage if managed by a gynae oncologist as opposed to a general surgeon (Kehoe). Similar evidence exists for other moderately common malignancies such as haematological cancers (Karjalainen, Parva)
- Data suggest that specialised care for common malignancies can increase long term survival by 5-10%.

3.3 Choosing Options for Future Service Delivery

A number of options described above exist in order to address the increase in demand which is both likely to occur and likely to be encouraged by these developments. These will need to be carefully phased in and care must be taken that existing centres are not compromised in terms of their routine capital replacement or, in the case of the hub and spoke model, their ability to supply 'hub services' to the increasing number of spokes. There will be instances where old machines will need to be replaced prior to the development of new departments.

Design issues — Integrated comprehensive cancer care centres

It was forcefully argued in three submissions to the Review from both public and private sectors that the current centralised arrangements for radiotherapy services contravene modern medical practice, in which multi-modality therapy is delivered by teams. It was firmly held that the integration of different treatment modalities within one diagnostic and care planning process provides a high degree of patient satisfaction, whilst providing better cancer care. It was argued that the provision of radiotherapy treatment and planning should be considered separately, as there are greater opportunities for decentralising radiotherapy treatment than for at least some aspects of planning.

The majority of submissions argued for a State-wide model of integrated comprehensive cancer care centres and cancer units. There was general endorsement that a comprehensive cancer centre's role should be to provide a comprehensive range of clinical services to patients, with referral links to tertiary centres for more complex treatment. Broader links with primary and non-acute services are also important to enhance options for both patients and their carers. This includes links with GPs, palliative care services and domiciliary providers.

Stand-alone services were seen as reducing the profile of radiotherapy within the health system and impeding the interaction of specialists in promoting optimal use of radiotherapy.

One public sector group argued that comprehensive cancer centres could develop specialised roles and increase the benefits from increased sub-specialisation. This could improve the development of enhanced clinical protocols for both common and rare or complex conditions. The benefits that could be achieved include both improved clinical outcomes, such as survival and quality of life, and improved allocative efficiencies across all cancer therapies.

ACIL notes that these arguments would be less convincing were the costs of delivering radiotherapy through comprehensive cancer facilities outside of Melbourne prohibitive because of the non-radiotherapy costs. Again it is important to recognise the costs to patients currently not using radiotherapy need to be taken into account, and this could then tilt the balance in favour of some compromise facility. In reality, this trade-off appears unnecessary, given the scope for locating radiotherapy units with an established hospital and for developing quality assurance and referral protocols to ensure that the benefits of a comprehensive facility are gained.

Options

Against this background, there is a range of broad strategies which could be considered as options for development and expansion of radiotherapy services. These strategies could be implemented independently or in combination, eg, expansion of services could involve the private sector in joint venture. In general terms, growth in demand and improved access and utilisation could be addressed through some combination of:

- **Extended hours of operation of existing/new units:** This would involve low capital costs but some increase in operating costs. The main advantage would lie in lower access costs and likely increased utilisation rates. To achieve this, a geographical spread of units offering extended hours would seem desirable.

- **Expansion of existing facilities:** This would usually involve a relatively low incremental cost, given that new units are needed, but would have only limited impact on access costs.
- **Re-location of current capacity:** This would involve a re-location of one or more linear accelerators from existing facilities to greenfield or other existing sites to provide a better distribution of access.
- **Single machine units (SMU):** This needs to be recognised as a fairly controversial option, except in respect of single metropolitan units operating as part of a tight hub and spoke model. AHTAC (1996) recommended that facilities have a minimum of two units. However, there is very limited scope for viably locating two unit facilities outside of Melbourne and the potential benefits of improved access and utilisation suggest that they deserve serious consideration, provided that adequate quality standards can be assured. ACIL believes that there is probably a valid role for such facilities, provided there are appropriate safeguards, probably involving close professional linkages with a larger centre. There is scope for trialing this model with relatively low risk and such a trial would logically precede any widespread implementation.
- **Increased involvement of the private sector:** This is clearly a rather different type of option, and could be used in conjunction with some mix of the preceding options. The potential advantages relate both to the possible scope for bringing forward investments (and achieving the benefits of improved access and utilisation) and for the wider range of ideas, approaches etc which may result in more effective ways of delivering some services.

In considering combinations of options, key considerations are the maintenance of adequate standards in respect of quality of care and of teaching and research. The former is clearly a concern at the level of the individual facility, the latter may be more an issue for the system as a whole.

3.4 Criteria and Standards for Services

Regardless of whether new departments were public or private, a range of criteria would need to be set to ensure that minimum standards were met in terms of: personnel; equipment; patient safety; personnel safety; continuing education; and quality improvement activities. The objective of establishing criteria and standards is to ensure the optimal mix of clinical and consumer *outcomes* and to enhance cost effectiveness and efficiency.

It seems unlikely that quality of care issues in relation to radiotherapy are ones the community would be happy to see left entirely to the marketplace. Radiotherapy is a complex, rapidly

changing field which involves life and death, as well as significant quality of life, concerns. The vast majority of consumers know little of the field and are likely to be poorly placed to assess many aspects of quality difference. Furthermore, many outcomes of a quality differential are more likely to be exhibited statistically than as clearly demonstrable cause and effect — limiting the scope for (or at least increasing the cost of) accountability through legal redress. Consumer decisions are likely to be heavily influenced by referrer attitudes and there is at least some evidence, cited earlier, that these cannot be relied upon to provide a totally balanced and informed assessment of the options. In the case of cancers, consumers may be disinclined to spend time ‘shopping around’ for a more informed referring physician, even if aware of a deficiency.

All of these considerations point to scope for, and even likelihood of, market failure. The US Patterns of Care studies referred to earlier also point to scope for a lightly regulated decentralised system to deliver poor outcomes. Such considerations suggest a role for government in setting standards, if these are not forthcoming from the profession.

In addition to these considerations, it was apparent from both submissions and consultations, that many stakeholders, including consumer representatives are concerned that there be a guarantee of minimal standards.

ACIL expects that there will be strong commercial incentives for any private investors in these facilities, particularly non-metropolitan single machine units, to be able to demonstrate good quality standards, especially to referrers. The commercial viability of these facilities will in most cases be dependent on the ability of the facility to capture a high proportion of all cases suited to treatment in such a facility. With the evidence that referrers currently probably underestimate the value of the treatment, and under-refer as a result, it would be dangerous commercially to risk an early judgment that the facility is not of an adequate standard.

This broad commonality of interest between service providers and consumers suggest that caution should be exercised before becoming too prescriptive as to how standards are to be achieved. If service providers are keen to achieve, and be seen to achieve, acceptable standards then ACIL would prefer a policy approach which seeks to harness these incentives. The role of government may be more one of guidance and approval than one of total prescription. ACIL believes the following principles make sense in developing any standards:

- As much as possible, requirements should relate to outcomes, rather than inputs (a principle which is strongly consistent with current Victorian health policy generally).

- Rather than prescribe that things be done in a particular way, it is better to specify the outcome being sought and to then negotiate over ways of determining if it is being achieved.
- In saying this, ACIL recognises that there are major difficulties in measuring quality and quality of life outcomes.
- If inputs are to be regulated, then they should correlate closely with the desired outcome. If the nature of the relationship is susceptible to changes over time, such as technological developments, then the input standards would need regular reassessment.
- Development of a set of procedures consistent with, and supporting, desired outcomes may be quite reasonable as a set of guidelines which would generally be accepted as proof of adequate quality delivery. This need not preclude the option of an alternative set of procedures being proposed for approval instead.

It is in the spirit of these principles that ACIL has drawn together the following items. They represent procedures that are likely to be part of most, if not all quality plans that would be acceptable to the community generally. However, ACIL does not believe that they should be prescribed. The option can be allowed for one or more proponents for a facility to argue that they have a smarter or more effective way of delivering adequate standards — but in doing so, the onus of proof might shift to the proponent.

It is also important to recognise that the central issue is one of *acceptable* standards, not *clinically optimal* standards — or, worded differently, the emphasis should ideally be on socially optimal standards, which take account of unavoidable access costs, utilisation rates, the value of choice and the opportunity cost of the resources involved — not just on clinically optimal standards. For the reasons discussed earlier, there is an almost unavoidable trade-off here unless very high levels of subsidy are to be considered.

If Victoria moves away from its centralised model, there will inevitably be loss of some scope for subspecialisation. Exactly the same problem arises with surgeons operating in regional hospitals. Even with the best equipment in the world, some loss of clinical excellence can be expected with a loss of subspecialisation. The impact on patient outcomes may well be very small in most cases, but not all. Where there is some impact, it may be minimised through both referral options and the use of more specialised consultative and planning services.

A key feature of any quality plan is likely to be the criteria for referring patients to another facility where either specialist equipment or the benefits of subspecialisation are likely to have a sufficiently large impact. However, in the case of many treatments, the loss in quality is likely

to be very small and to be outweighed by the benefits which flow from both lower access costs and increased utilisation.

Mechanisms to Address Standards for New Departments

The following criteria and mechanisms are suggested as forming the core of a set of guidelines consistent with achieving acceptable standards of outcome.

Equipment

The facility should be equipped with up to date machinery, appropriately calibrated and safe for therapeutic purposes. This would likely include dual energy linear accelerator(s), simulator, beam shaping devices and a simple planning computer. Brachytherapy would not be necessary but access through defined referral procedures would be essential. Consideration would need to be given to computer record systems particularly if patients were to be having treatment at a number of different centres, for both radiotherapy, other primary cancer therapies, and support and follow up services such as palliative care.

Patient Safety

Examples include :

- Systems of recording doses and independent checking of doses;
- Program to prevent mechanical injury by equipment;
- Adequate standards for calibration of machines to ensure correct dose delivery;
- Personnel safety;
- Radiation monitoring of staff;
- Appropriate shielding of rooms;
- Quality assurance programs for equipment;
- Health work place and safety issues; and
- Continuing education.

Continuing education involves medical staff, radiation therapists nursing and physics staff as well as referring doctors and lay people. This is an important issue not to be ignored if an increase in referral rates is to be achieved.

Quality improvement activities

The following activities should form an integral part of a quality improvement program. If problems are identified, then appropriate action can be taken and an evaluation of the actions can be undertaken.

Examples would include:

- Peer review chart round to see if documentation, field coverage and doses were adequate;
- Physics quality improvement;
- Incident reporting;
- Morbidity and mortality review;
- X-ray and pathology review;
- Patient satisfaction surveys.

Clinical Duties

Clinical protocols should relate to accepted objectives in the course of treatment for each individual patient, for example in the following steps.

- Clinical assessment of the patient;
- Determining the aim of treatment;
- Planning the treatment;
- Delivery of the radiation treatment;
- Evaluation during treatment;
- Follow up examinations.

Teaching

The public sector currently provides the support for in-service education and training. Given the overall public benefits of comprehensive and high quality education and training it is anticipated that the public sector will maintain an high level of involvement and support for professional education activities such as:

- There are established linkages with tertiary institutions;
- Collaborative arrangements with professional colleges (RACR; AIR, ACPSEM) with respect curriculum and training protocols and accreditation;
- Conjoint appointments between clinical and academic organisations.

Research

Cancer therapies are amongst the most rapidly developing and high tech areas of medicine. Research in this field requires commitment to high cost and capital intensive projects in the fields of cellular biology; biochemistry and biophysics. The government has a strong commitment to the advancement of the industry in an internationally competitive environment, and a commitment to research and development is considered integral to that strategy. Projects which support these research and development aims should be considered an important part of many, though not necessarily all, radiotherapy services. Examples include :

- multi-site randomised clinical trials investigating new and emerging technologies;
- evaluation of treatment regimes and protocols;
- health and quality of life outcome studies and consumer satisfaction;
- multi-disciplinary collaborative projects across modalities;
- continuing research into emerging disciplines such as gene therapy, where the potential benefits may be significant.

Summary of Findings:

- Current supply of services reveals considerable variation in throughput in terms of the number of patients treated per machine, per radiation oncologist, therapist and physicists. It would be presumptive to assume that the most efficient examples represent benchmarks for all services, however, scope for efficiencies appears to exist.
- These variations likely relate to differences in operating hours across units, with the private sector apparently achieving a reasonably higher throughput.
- Services are best operating within a model of comprehensive cancer care, offering the most appropriate clinical approach to individual patients.
- Radiotherapy services may achieve economies of scale and clinical enhancements through sub-specialisation, however this is usually at the expense of imposing significant access costs to consumers. A hub and spoke model provides centres of excellence with strong links to more accessible units, and offers a model that provides benefits on both fronts.
- Increase in demand, irrespective of whether met through increasing efficiency or expanded capacity, will require increases in the workforce supply of all professional disciplines.

Key recommendations:

- Services be delivered within a hub and spoke model, broadly defined to allow flexibility in developing appropriate linkages and providing improved access to outer urban and possibly rural communities whilst retaining the benefits of some economies of scale and opportunities for sub-specialisation.
- Standards and criteria be developed with a focus on clinical and consumer outcomes rather solely on inputs and processes. These should be developed on a collaborative basis with the Department, service providers, professional groups and consumers, and the Commonwealth.
- Staffing and workforce requirements be addressed through input from colleges on the basis of expected long term requirements.

4. SUMMARY OF COSTS AND FUNDING

This chapter outlines cost estimates both in terms of capital and recurrent costs based on current cost to Government for the implementation and operation of proposed radiotherapy services. Future developments have been costed with reference to benchmark capital and operating costs for single machine, 2 machine, and 3+ machine units. These costs have been based on data provided by public sector units; however, where appropriate private sector comparisons are discussed.

The essential differences between public sector and private services relate primarily to financing mechanisms and the private sector requirement to achieve a competitive return on investment. These factors can also be applied to public sector developments and in fact should be considered if comparisons are to be on competitively neutral basis. It is a mistake to view the private sector demand for a return on its investment as a cost which can be avoided through public sector service delivery — the cost simply arises in the form of an opportunity cost associated with the use of scarce funds. The public sector return might be non-financial in nature, but in this case it is appropriate to ask whether the same non-financial returns could be purchased from private providers.

4.1 Benchmark Operating Costs

Operating costs of existing units have been summarised where data were provided. These generally indicate that the overall cost per machine, or cost per service, are comparable, however, there are some differences in the mix of costs reported by the different units.

Table 4.1 Reported and estimated costs of current public sector services (\$M)

Cost category	average cost/lin acc.
Labour (incl. est. staff liabilities)	1.03
Non-labour direct costs	0.25
Support services	0.28
Corporate costs	0.21
Total	1.77

Source: Pollard Partners / ACIL

Based on the cost of existing services, and costs reported in submissions to the Review proposing specific developments, a model of operating costs for 1 and 2 machine units has been developed, including the marginal costs of expansion above a two-machine capacity. The detail of this cost model is shown in the table below.

Table 4.2 Benchmark operating costs

Recurrent Costs	1 machine site	2 machine site	Marginal costs, 3rd machine	Brachytherapy (Geelong estimate)
Direct Salaries	1,318,062	2,383,721	968,543	316,428
Direct Non Salary Costs	421,047	624,729	472,366	77,429
Associated Services Costs	374,214	748,429	299,936	
Corporate Costs	331,030	572,642	103,263	
TOTAL	2,444,353	4,329,521	1,844,108	393,857

Source: Pollard Partners / ACIL

4.2 Capital Requirements

The current value of capital stock for public radiotherapy units has been surveyed as part of this Review. A summary of the results of this survey for three sites is shown in Table 4.3 below. Total asset value represents the total based on purchase price for all items of equipment greater than \$20,000. Building and infrastructure represents an estimate of building & works for the specific unit, plus an apportionment of general

Table 4.3 Estimated value of capital stock, public facilities (\$M)

	Site 1	Site 2	Site 3
Total Asset Value	11.86	8.70	7.33

Source: Pollard Partners / ACIL

The benchmark capital costs for development have been estimated from submissions to the Review with indicative proposals, and other sources, including other surveys and studies currently or recently undertaken in other States (NSW). A summary of the benchmark capital cost estimates for a new (greenfield) development is outlined in Table 4.4.

Table 4.4 Benchmark Capital costs

Cost Category	1 machine site	2 machine site	Marginal costs, 3rd machine	Brachytherapy (Geelong estimate)
Capital costs - Building	\$2,635,000	\$3,859,500	\$3,640,000	(part of \$3.64m)
Capital costs - Equipment	\$3,194,000	\$5,532,000	\$2,230,000	452,000
TOTAL CAPITAL	\$5,829,000	\$9,391,500	\$5,870,000	\$452,000

Source: Pollard Partners / ACIL

4.3 Capital Cost Component and Capital Charge

The operating costs documented above represent only the direct recurrent and capital costs of providing the service. Inclusion of an annualised capital component enables the one-off capital

costs of buildings, infrastructure and major equipment to be incorporated into an annual cost, which facilitates easier comparison between options. Based on the proposals put forward in submissions, and other known benchmark costs for construction of infrastructure, a capital component for 1, 2 and 3+ machine units has been calculated. A range of methods is available to calculate this amount, depending on assumptions regarding the useful life of the equipment/buildings, and an appropriate discount rate. The method used has been to calculate an annual figure which, over a twenty year project life, has a net present value (NPV) equivalent to the total capital cost if incurred in year one (discount rate of 8% used). Buildings and infrastructure are deemed to have a twenty year life, linear accelerators and other major items ten years, and other equipment five years.

A further calculation that is necessary to establish a true “full cost” is the inclusion of an equivalent after tax return on investment. This method is also used to price public sector services for comparison with the private sector according to the principles of competitive neutrality. This is an important element of total costs which is sometimes ignored in benefit cost calculations, however ACIL considers it a legitimate and essential cost component to be incorporated. The table below shows the results of the calculations of the annual capital component, and the full “competitively neutral” cost” for 1, 2 and 3+ machine units.

Table 4.5 Benchmark annual full costs, inclusive of capital component and ROI

	1 machine	2 machine	marginal cost of additional machine
Operating costs	2.44	4.33	1.84
Annual capital costs	0.46	0.68	0.29
Equivalent after tax ROI	0.36	0.63	0.27
Total	3.27	5.63	2.40

Source: Pollard Partners / ACIL

Another way of looking at these figures is to observe that, inclusive of an equivalent after tax return on investment (to allow comparability between public and private sectors), the annual costs *per machine* are about \$3.27 million, \$2.82 million and \$2.40 million respectively. This implies a provider cost penalty, per patient treated, of the order of around a sixth for a single machine facility relative to a 2 machine facility, and about a third for a single machine unit compared to expanding an existing facility.

As an indication only, and based on probably conservative throughput rates of 500 patients annually, the per patient treatment cost differentials for a single machine are about \$900 relative to a 2 machine facility and \$1,740 relative to an expanded existing facility. Apart from the consumer benefits of better access and utilisation, installation of one or more regional single

machine units would generate at least partial offsets for these higher provider costs through reduced VIPTAS costs — estimated to be of the order of \$1,000 per patient affected.

4.4 Private Sector Comparisons

The total costs of providing current private sector services (EMROC) has not been reported, however, it is possible to infer the approximate equivalent cost in the private sector. The total Medicare revenue received by Victoria (\$7.4M) is distributed amongst public sector and private units. The total public sector revenues in 1996/97 were reported at \$3.4M. The Medicare revenue received by the private sector would therefore be around \$4M. Charges are normally raised at about 40% above the rebate level on average. The other revenue received by the private sector units would be Health Program Grants, at around \$1M. The total revenue for the private sector is then estimated to be equal to $\$4M + \$4M * 40\% + \$1M$, or around \$7M.

Given that some uncertainty exists as to the level of growth in Medicare revenues from 1996/97 to 1997/98, an equivalent annual figure (per machine) for the private sector would be between \$2.2M and \$2.7M. On that basis, it appears that the private sector costs are comparable to, but perhaps slightly less than the public sector “full costs” shown in the previous table.

4.5 Utilisation of Medicare (Health Insurance Commission (HIC))

The table below shows an extract of the record of Medicare benefits paid to medical practitioners in Victoria over the 12 years from 1983/84.

The total benefits received are a percentage of the schedule fee. This is 85% on an outpatient basis. Public hospitals bulk bill, so the patient requires no additional charge. Items delivered to an inpatient in a hospital are 75% of the scheduled fee, but the 25% balance is covered by private health insurance.

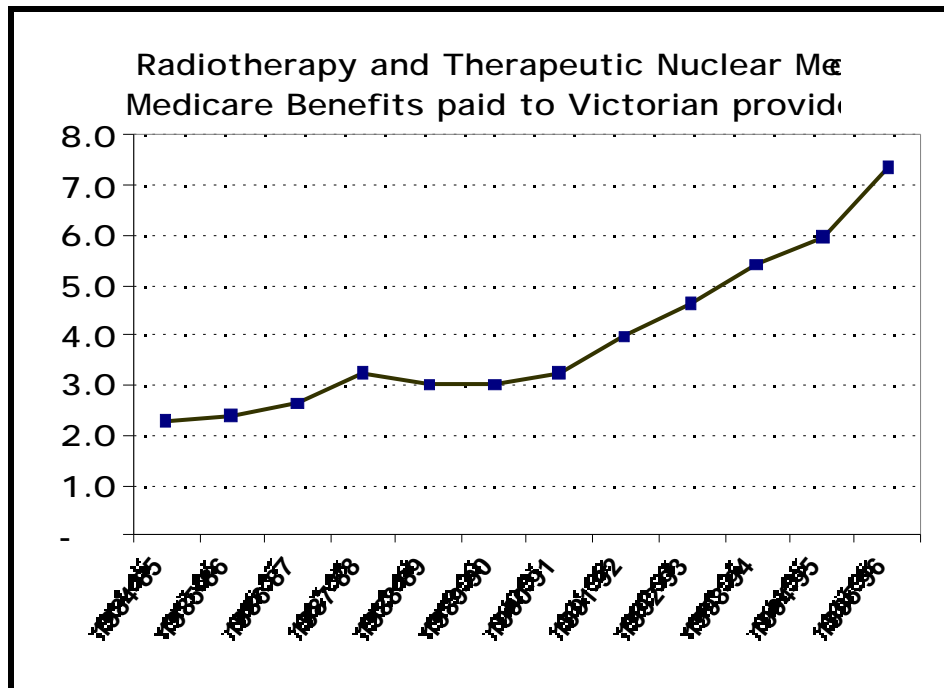
Across Australia, benefits to radiotherapy services have increased from just over \$8m in 1983/84 to over \$30m in 1995/96. However, compared to total Medicare benefits, radiotherapy is a relatively small part of a total now greater than \$6 billion. Radiotherapy has grown slightly faster than other benefit categories, increasing from around 0.035% of the total in 1983/84 to almost 0.05% in 1987/88.

Table 4.6: Medicare benefits paid, radiotherapy and therapeutic nuclear medicine, and total benefits (\$m)

YEAR	VICTORIA		AUSTRALIA	
	Radiotherapy	Total	Radiotherapy	Total
1984 - 85	2.27	553.40	8.06	2,279.91
1985 - 86	2.38	627.42	9.58	2,608.78
1986 - 87	2.64	685.76	11.66	2,881.81
1987 - 88	3.23	735.33	14.53	3,090.58
1988 - 89	2.99	808.98	14.19	3,394.59
1989 - 90	2.99	911.16	13.97	3,805.36
1990 - 91	3.26	1,019.58	15.45	4,238.36
1991 - 92	3.94	1,119.23	18.68	4,589.56
1992 - 93	4.63	1,245.50	20.20	5,018.10
1993 - 94	5.40	1,339.01	23.28	5,373.26
1994 - 95	5.97	1,423.89	27.11	5,696.69
1995 - 96	7.37	1,517.60	30.83	6,038.38

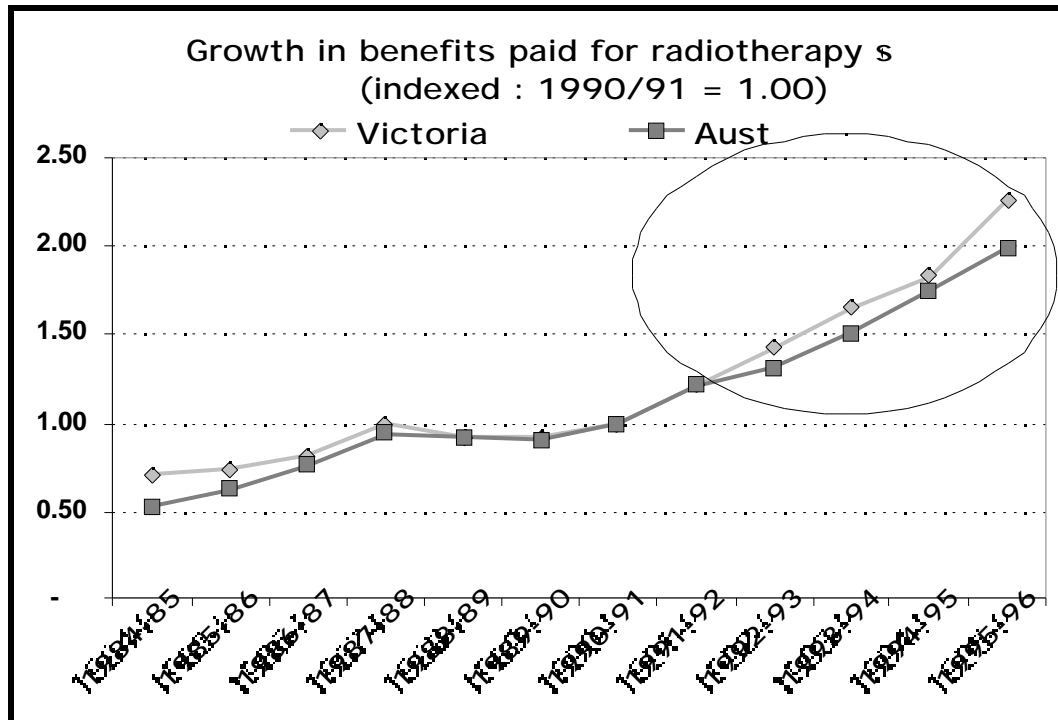
Source: Health Insurance Commission

Figure 4.1



Benefits paid to Victorian providers have shown a sharp increase in 1994/95 to 1995/96 over the growth seen in prior years. The area highlighted within the circle in Figure 4.2 below shows the Victorian trend departing from the overall national trend, which it followed fairly consistently over the previous seven years. Growth from 1994/95 to 1995/96 was 23.7%, the highest ever year to year growth seen in Victoria. Given that benefits were previously growing by around 10% per year, the increase of 23.7% represents an additional \$0.9M over the underlying trend growth.

Figure 4.2



The HIC data do not include some services, which are, or have been delivered to public patients. At present, a substantial proportion of services to patients in public units is billed to the Commonwealth, but some patients receive radiotherapy as an inpatient, and this is funded through the casemix funding system. The casemix funding system is also used to resource other cancer therapies.

The cost of these services has been measured using the weights and prices used in the casemix funding model. The total fixed and variable components for Radiotherapy in the public sector declined from over \$8M to less than \$0.4M from 1995/96 to 1996/97. The reasons for this decline are not clear, however detailed analysis of inpatient records reveals a number of patients coded to the radiotherapy DRGs who were not inpatients in a hospital in which radiotherapy was provided. The major providers of radiotherapy ie, the Peter MacCallum Institute (also through Box Hill and Moorabbin), Geelong, Austin Repatriation and Alfred hospitals, all recorded significant decreases in these inpatient radiotherapy DRGs from 1995/96 to 1996/97, however it is unlikely that this is only the result of the increase in bulk billing practices by public services.

By comparison, the same costs for chemotherapy increased from \$11.5M to \$13M in the public sector in the same period. The following table illustrates total estimated costs of inpatient radiotherapy and chemotherapy services for the public and private sector in recent

years (Public sector prices have been applied throughout, and the fixed component is based on the lowest amount, ie. \$749/WIES for major providers — Metro Networks and Geelong).

Table 4.7 Estimated inpatient costs (direct fixed and variable only), all Victorian hospitals

	1995	1996	1997
CHEMOTHERAPY	\$17,036,766	\$16,320,554	\$17,927,469
RADIOTHERAPY, AGE<50	\$772,096	\$977,501	\$218,522
RADIOTHERAPY, AGE>49	\$8,731,821	\$9,033,387	\$1,393,877

Source: DHS, ACIL

4.6 Other Cancer services

The cost of other cancer services can also be measured using the casemix weights and prices. DRGs have been categorised as to whether they represent primary cancer therapies – that is where cancer is the principle diagnosis and reason for admission, whether the diagnosis of cancer was possibly related to the principle reason for admission (eg. Surgical procedures where malignancy may or may not have been the primary cause of the admission), and other DRGs where the cancer diagnosis was not the principle reason for admission.

Table 4.8 Estimated inpatient costs (direct fixed and variable only), all Victorian hospitals

	1995	1996	1997
Cancer not principle Dx	\$57,058,008	\$59,661,062	\$63,307,775
Possible principle Dx	\$62,977,950	\$60,209,142	\$62,094,259
Cancer principle Dx	\$122,421,396	\$128,810,543	\$130,781,781

Source: DHS, ACIL

The total cost for all patients, in all hospitals in 1996/97 is estimated at \$248M.

4.7 Funding Issues

In submissions to the Review, State and Commonwealth funding inconsistencies attracted some comment. Service providers argued for funding models that are consistent, transparent and based on uniform and appropriate measures of resource consumption. Funding should be provided on benchmark performance and treatment outputs and not differentiated between inpatient and outpatient classifications.

Respondents argued that the financing of capital and recurrent costs needs to consistently identify the roles of both State and Commonwealth governments and so enable a consistent framework for other forms of revenue generation.

Both public and private submissions supported competitive options for the provision of radiotherapy services to public patients through the private sector in contractual arrangement eg., to fund leasing of equipment. It was argued that the cost of depreciation and a requirement to see a return on investment could be added to current State funding models. Essentially it was affirmed that the provision of public radiotherapy services through the private sector can only be competitive when anomalies in funding are addressed between the public and private sectors.

There was also support for the need to correct the inequity in the billing arrangements where some centres are allowed to bulk bill and some are not. In summary, it was argued that all radiation oncology centres should be extended the facility to bulk bill. One suggestion was for all public radiation oncology centres in Victoria to contribute into a central pool from the funds that they retain from bulk billing and from HPGs.

Revenue

Radiotherapy services in Victorian public facilities are currently funded through a number of mechanisms, including the casemix system of weighted prices by DRG for inpatient activity, and a per episode basis for outpatient services. In addition, revenue is obtained from the Commonwealth through billing of patients according to the MBS item charge. This revenue is complemented by Commonwealth Health Program Grant (HPG) funds that are also linked to the total of MBS items billed. The distribution of these funds varies across units, with some allocations largely retained by the hospital as a general facility fee, while at other sites, funding is allocated to a dedicated private practice fund, or other specific purposes. Table 4.9 shows a summary of revenue received by public sector units from Commonwealth sources

Table 4.9 Annual revenue to public facilities from Commonwealth sources (\$M)

	Site 1	Site 2	Site 3	Site 4
Medicare Revenue	0.11	1.45	0.53	1.35
Health Program Grants	0.70	0.45	0.27	0.41
Total	0.81	1.90	0.80	1.76

Source: Pollard Partners / ACIL

With the exception of the Peter MacCallum Institute, all of the units are also part of a larger general hospital service, and the mechanisms of budget allocation at clinical unit level can vary significantly between the units. Further differences arise when other external sources of

revenue are considered. Donations, grants, and miscellaneous allocations are all received in varying proportions to the activity and workload of the unit's. and while it is not the intention of this Review to examine these in detail, the end result is a perception that some units are more able to balance their revenue and expenditure on an ongoing basis, and therefore retain considerable flexibility to undertake additional activity, or deal with contingencies.

By virtue of the limitations and requirements of their overheads, cost structures, and the extent to which they can maximise (and retain) Commonwealth Medicare and HPG funds, public Radiotherapy units are not necessarily funded equitably on a net basis. That is, the net funds obtained per unit of equivalent throughput may differ. Comments from public sector units through consultation for this Review revealed a common understanding of these problems and a desire for a consistent and equitable approach to funding. In particular, anomalies in respect of the relative differences in bulk billing, capital funding and grants for teaching and research were thought to warrant substantial revision.

A major area of difficulty in reconciling the issues of public and private "equivalence" is the notion that the service is comprised of service delivery, and teaching and research components. There is some inconsistency here in that the private sector does not undertake any specific teaching and research function, although there would be some involvement. The argument that teaching and research is a necessary component of service delivery is difficult to maintain.

Funding Approaches

Approaches to funding of public sector health services is the subject of ongoing review. There has been a recent study (Wilson & Associates, 1996) of radiotherapy costs across all public units in order to establish appropriate unit costs. Because of concerns regarding the accuracy and appropriateness of the classification system, the prices used and the fact that this Review was under way, the model was not be implemented in 1997/98. The model was intended to eventually provide for a payment to each of the units based on throughput, measured through appropriately defined measures of the number of fields, dosimetry, simulation, and consultations.

In general, a system is desired (by service providers) which allows for accurate differentiation across service types and components, rather than what is seen as an arbitrary classification as inpatient or outpatient services, and inadequate classification of the components of radiotherapy services. The current Medicare Benefits Schedule is viewed as an appropriate classification system, but the current Commonwealth fee levels are thought to be much less than required to cover actual costs.

From the Department's perspective, the funding model should provide appropriate incentives for effective and efficient use of resources. An objective is also to allow, in the longer term, for funding to be provided to public or private sector units on a competitive basis. However, a concern exists that the services provided, and the manner in which services operate, are qualitatively different between the public and private sector, and that aspects of teaching, research and other public health activities impose costs on the public sector which are not comparably borne by the private sector.

Comments by providers, in submissions and in consultations, suggested that teaching and research activities are an integral part of the services, and not able to be separated out. However, this argument difficult to maintain given the current mode of operation of the private sector. There is, for example, little argument that the quality of the service provided by the private sector is any less than that of public units — simply that the case profile may be less complex. It is certainly the case that teaching and research is a necessary factor in the development of the service from a Statewide or National perspective, but it does not necessarily ring true that all patients and all services need be affected.

Under current circumstances, public providers have an understandable expectation that payments from the State include a premium to cover the additional costs of teaching and research. In order for a payment model to be developed which allows for neutrality across the public and private sectors, it would seem preferable to identify discrete components for service delivery, on a unit price basis, combined with specified funding for Registrar and other training posts, and defined grants for research activity. The basic philosophy should be one of recognising the incremental costs associated with the delivery of these additional services — while recognising that this will be done most efficiently by integrating aspects of these services into the clinical service delivery.

Summary of Findings:

- Current operating costs across public sector units reveal a reasonably high level of consistency, however comparison between the PMCI and other units appears difficult given its unique role. Detailed cost information from the PMCI was not able to be incorporated into results of this review. However a previous study concluded that PMCI's average unit cost was the lowest of all public sector units.
- Benchmark operational costs have been developed for one and two machine units, plus marginal costs of additional machines and Brachytherapy.
- Benchmark capital costs have been similarly developed, based on reported asset values, current information regarding building and infrastructure, and submissions to the Review in which preliminary costings were presented.
- The current level of Medicare benefits, and Health Program Grants (HPGs) paid to Victorian Radiotherapy providers has been analysed to assess levels of growth, and the extent to which public sector costs are underwritten by Commonwealth funds.
- The costs of other cancer therapies have been estimated through reference to the Inpatient data for patients with cancer diagnoses, and the current prices employed in the Victorian inpatient funding model.
- Comparisons between the cost of public sector services, and equivalent private sector services has been estimated through analysis of cost components from a range of sources, and used to illustrate the impact of inclusion of costs components for an annualised capital cost and equivalent return on investment.
- Approaches to funding have been the cause of concern by public sector providers, as current circumstances indicate inconsistencies that may disadvantage some public sector units.

Key recommendations:

- The Department continue to negotiate with the Commonwealth in relation to the approval and funding of radiotherapy units.
- Clear and consistent approaches to the raising of accounts through Medicare be developed, in particular the treatment of this revenue in the context of a State activity based funding model
- Examination of options in relation to the disposition of Commonwealth Medicare revenue from public units. This may not need to include pooling of the funds, as suggested, provided clear guidelines are given in respect of the disposition of Medicare revenue
- A structured approach to funding is recommended that allows for competitive neutrality between public and private sector units. This should include ongoing review of activity based funding models within the public sector, and the development of approaches which allow for the discrete allocation of funds across service delivery, teaching, research and other activities.
- This approach should be based on a clear and consistent classification of service components, developed in conjunction with providers.
- Teaching activities should be continue to be funded through specified registrar and other training positions as is currently the case. Funding for research should be considered within the context of the recent Inquiry into Medical and Public Health Research in Victoria.

5. COMPARING OPTIONS

The chapter provides an overview of a cost benefit analysis in respect of options for the provision of radiotherapy in Victoria, leading to a discussion, in the next section, of issues relevant to the development of service delivery options and the priorities for service development.

Cost-benefit analysis is a procedure for comparing alternative courses of action by reference to the net social benefits that they produce.² The alternative broad courses of action being evaluated in this study are:

1. Base Case: Investments to meet demand using existing radiotherapy technology and work rates, and using the existing centralised configuration.
2. Non-structural option: Investments to meet demand using existing technology, and using the existing centralised configuration, BUT increasing throughput by expanding operating hours. (This option can be combined with any of the other options, but for illustrative purposes is described against the Base Case).
3. Decentralised — Urban Only: Investments to meet demand using existing technology, and throughput rates, BUT and using a decentralised configuration, with new centres going into outer-suburban locations.
4. Decentralised — Regional: Investments to meet demand using existing technology, and work rates, BUT using a decentralised configuration, with new centres going into outer-suburban locations, and with the trial of single machine units outside the metropolitan area.

These alternatives are described in more detail in Section 5.2. They are necessarily somewhat stylised, but an analysis of them at this level is then used to help select and design specific options with strong prospects for delivering net benefits.

An in principle analysis of the main benefits and costs of the options is developed in the following table.³ The net social benefit criterion requires comparability of benefits and costs, using money values. Some components of costs and benefits, particularly in health areas, resist accurate valuation. These items, such as quality of patient life, are termed intangibles. In

² Pg. 1, Commonwealth Department of Finance, Handbook of Cost-benefit Analysis, 1991

³ After Pg. 30, Hollister et al, The National Supported Work Demonstration, University of Wisconsin Press, 1985

deciding whether to attempt to value intangibles, some logical criteria (Drummond, 1987) can be applied:

- Is it likely the gathering of more information will change the preferred option?
- Are the costs of gathering the information affordable (that is will the benefits of the data outweigh the costs of gathering them)?

If we take the first criterion, the priority is in determining the direction, then the magnitude of any impacts of the options compared to the Base Case. That is, at one extreme, if we could ascertain from the direction of impacts that a project was superior in all its components (higher benefit, lower cost) to all other alternatives, then no measurement of impact or valuation may be required. If this is not the case, we may be able to infer from the magnitude of impacts, that one option would have a higher net benefit.

The following table sets out the direction of the impacts of the above projects (positive or negative) using a net benefit criterion, but without measuring or valuing these impacts. The column marked “data sources”, identifies where the source of the impact information came from, and shows if impact magnitude or valuation information is available. The table allows a ready identification of where the key impacts are, and where likely trade-offs will arise. It allows a prioritisation of areas for valuation or inference of net benefit.

The table allows the distinguishing of social impacts (society as a whole, eg. Reduction in all radiotherapy related transport cost in Victoria) and private impacts (eg. Reduction in radiotherapy related transport cost to citizens). Private and social impacts diverge where there are externalities or transfers. For example, a reduction in transport subsidies (VIPTAS) because of regional radiotherapy, may increase (“+” in the table) private travel costs, as more people utilise radiotherapy and do some travel, where before similar patients would have done none. Overall then, social costs have increased, even though subsidies have fallen. Such divergence, may produce demand effects (reduced use of radiotherapy) not intended by the change in public policy, and are therefore important to identify. As well, the private costs, can be a measure of the minimum benefit of the service which they are accessing by travel.

Table 5.1 — Expected effects of Cost Benefit Analysis Components

Component	1 Base Case		2 Non-structural		3 Decentralised Urban		4 Decentralised Regional		Data Source
	Social	Private	Social	Private	Social	Private	Social	Private	
Benefits									
Output									
Lives Saved	0	0	0	0	0	0	+	+	L, W
Quality of Life	0	0	+	+	+	+	+	+	L, U, W
Costs									
Capital	0	0	-	0	+	0	+	0	M
Operation	0	0	+	0		0	+	0	M
Staffing	0	0	+	0	+	0	+	0	M
Consumables	0	0	0	0	+	0	+	0	M
Maintenance	0	0	-	0	+	0	+	0	M
Lost Client Time	0	0	+	+	-	-	-	-	L, W
Travel Costs	0	0	+	+	-	-	-	-	M
Subsidy	0	0	+	+	-	-	-	-	M

Note: The components have been classified according to whether they relate to health outputs (benefits) or to inputs to radiotherapy costs. Clearly, where costs are reduced by an option (ie. "-"), then the effect on net benefit will be positive.

Codes used for costs and benefits are positive (+) where the net impact compared to the base case is an increase, negative(-) where impact is a decrease, or zero (0).

Codes used for data sources are L — Medical literature, M — ACIL modeling, U — not measured, W — not valued.

For instance, the code L, U, W, implies that the literature was used to determine the direction of the impact, (eg, reduced deaths), but magnitude of this was not measured, nor was the outcome valued in dollar terms.

Using this framework, and the analysis developed elsewhere in the report, it is in our opinion likely that there are three main components that deliver significant increments to net benefit, and are therefore critical to decision making on the options. These are:

- Increased benefits from higher output: There are likely to be significant impacts from the greater utilisation of radiotherapy under Options 2-4 compared to the Base Case. This will deliver modest benefits in average length of patient life, but significant benefits in quality of life, based on the literature. However, these benefits are difficult to measure or value in a manner which lends itself to general acceptance.
- Reduced costs from increased capital productivity. Option 2 offers significant benefits over the Base Case by using capital more efficiently (ie, capital costs are lower than in the Base Case). Option 2 can be combined with Options 3 and 4 to provide similar efficiencies. However, from a provider perspective, these gains are likely to be largely offset by increased operating costs, as discussed below.
- Reduced travelling costs and lost time in regional areas with Options 3 and 4 (which also delivers increased benefits from higher utilisation rates in regional areas — ie. a subset of the benefits in the first dot point).

The following section discusses these three key components, and where possible assesses the magnitude and value of the likely trade-offs between these components, and all other components under the relevant option. This analysis leads to conclusions on net benefit.

5.1 Cost Benefit Analysis

The cost benefit analysis seeks to assess the overall costs and benefits of the options under consideration. Essentially, this focuses on three essential areas of examination:

Clinical Benefits through increased utilisation of radiotherapy

An increase in the level of utilisation of radiotherapy from the present levels of around 40% to between 50 and 55%. This equates to between 2,500 and 3,000 patients who would otherwise not have received radiotherapy. For these patients, improvements in quality of life, increased tissue conservation and reductions in adverse side effects should be realised. Improvements in overall survival may be achieved; however clinical trials indicate that this will be modest in most cases. Reduction in rates of recurrence, and reduced overall cost per case have also been reported, all of which point to genuine economic benefits, in addition to clinical benefits.

Box 3: Evidence of Clinical and Other Benefits of Radiotherapy

There is an extensive literature which documents the outcomes of cancers treated with radiation. Survival figures as well as the complications of treatment are available with very mature data. This has predominantly been collected from retrospective studies and by prospective trials. It is important to study survival figures in conjunction with toxicity data. Improvements in survival at the expense of toxicity and associated adverse risks may not represent real gains.

A full review of the benefits of radiotherapy is beyond the scope of this report, however some recent examples can be used to illustrate the benefits.

- The role of post-mastectomy radiotherapy in node positive breast cancer was examined by Overgaard (1997) who reported that the ten year survival improved from 45% (chemotherapy alone) to 54% (chemo plus radiotherapy).
- Ragaz (1997) reported the addition of radiotherapy to chemotherapy after mastectomy produced a 33% reduction in rate of recurrence, and a 29% reduction in mortality.
- The Swedish Rectal Cancer Trial (1997) showed that, in rectal carcinoma treatment, the addition of pre-operative radiotherapy reduced the local recurrence rate from 27% to 11% and improved survival from 48% to 58%. These benefits were achieved without any increase in operative complication rates.

Clearly survival is not the only endpoint of interest in cancer and in many cases differences are small and difficult to detect. Radiation is a local modality treatment and local tumour control is an important outcome. Differences in local control can occur without differences in survival. Endpoints need to be tailored to the disease type. In cancer of the anus, a useful measure of outcome is colostomy free survival. In cancer of the larynx, laryngectomy free survival can be used.

Patients are interested also in quality of life, not simply quantity. Improvements in quality of life have been demonstrated in advanced lung cancer even when survival times are short. Distressing symptoms of cough, blood in sputum and shortness of breath are reduced by palliative doses of radiotherapy (Lutz et al., 1997).

There is a limited amount of data available confirming that radiotherapy is cost-effective in terms of cost per procedures and cost per life year gained. AHTAC concluded that :

- The costs and cost-effectiveness of radiotherapy, surgery and chemotherapy in the treatment of cancer are not well documented.
- Costing methodologies vary significantly from study to study, and it is not possible to accurately compare the cost of radiotherapy with those of other modalities
- Costs of treatment vary considerably with site and stage of cancer. The available data on costs cover a limited proportion of available treatments.
- The evidence that is available, including some Australian studies, indicates that radiotherapy compares favourably with surgery and chemotherapy in terms of cost effectiveness. However this is not based on randomised controlled trials

In summary, the following points should be highlighted:

- There are many endpoints to measure the effect of radiotherapy apart from just survival
- There are many gaps to be filled in our knowledge about the cost-effectiveness of radiotherapy but the current evidence would suggest that it is highly beneficial to many patients and apparently cost-effective. The treatment has a low mortality and morbidity and is predominantly an outpatient treatment.
- The major component of costs relate to labour and non-labour recurrent costs, rather than capital costs
- Cost-effectiveness will vary according to the type of tumour as well as the type of radiation therapy.
- High quality radiotherapy will be frequently associated with an apparent lower global cost. Failure to cure the patient is an expensive penalty!

There is an extensive literature on the valuation of the risks associated with death and morbidity, such as the literature survey by Jones-Lee (1989). The problem is that it is contentious and different methods yield very different answers. Nonetheless, this literature does point consistently, and unsurprisingly, to a high expressed value for reductions in risks such as might be associated with increased utilisation.

Just drawing on the figures relating the value of a ‘statistical life’ — a risk weighted measure of people’s willingness to pay to reduce a risk — provides some calibration if it is accepted that increased utilisation would prevent some death. Figures on the ‘value’ of such avoidance are typically of the order of several hundred thousand dollars. Avoidance of even a handful of deaths each year would, on this basis, involve patient and family cost savings (in the broadest possible sense of costs) of the same order of magnitude as the estimated provider costs involved in increasing utilisation rates. This is despite the fact that quality of life benefits are given substantially greater weighting than the benefits of reduced mortality, in arguing the clinical case for increased utilisation.

These figures are indicative only. ACIL recognises that many would have a philosophical objection to even addressing these choices within a framework which appears to attach dollar values to human life (though in fact all it does is attach values to reductions in risk to life which is implicit in an array of everyday choices, including choices between flying and driving). It does, however, lend some support to ACIL’s view that non-pecuniary patient benefits, including quality of life (for families as well as patients) and reduction in risk of death, are likely to be substantial in relation to the extra costs of service provision, which are discussed further below.

Potential differences in the costs of alternative, and adjunctive services (eg. surgery, chemotherapy and palliation) as a result of radiotherapy provide one area of measurable benefits, but where quantification appears difficult to establish accurately with available data. Increasing the level of radiotherapy from 40% to 50% will result in changes to the overall treatment regimens for many patients.

The analysis of these costs, described previously, indicates that inpatient cancer services are costed at around \$250M annually for all cancer patients for all services, of which about \$120M is related to procedures and services where cancer is the principle diagnosis resulting in admission. Savings or productivity improvements that can be found within these costs may offset the cost of additional radiotherapy services. In all likelihood, any efficiencies would be directed toward other health services, rather than realised as cashable savings. Nevertheless, the value of these benefits could, in principle at least, be measured.

Based on the estimated total costs of all cancer therapies estimated in this Review, a model for the future growth of costs (in current dollar terms) can be constructed. This allows for examination of the relative contribution to expected cost increases from the growth in demand due to increasing population growth and the increasing incidence of cancer, and growth which would occur if the rate of utilisation of radiotherapy were to increase. In other words, this allows for the relative contribution of expanding utilisation to be compared with the total cost, and the real growth in costs which would likely occur in any event.

Table 5.2 shows a summary of these results. The relative contribution of expansion in utilisation of radiotherapy is modest — \$15 million compared to \$53.1 million anticipated growth across all therapies due to inherent demand growth.

Table 5.2 Annual equivalent cost — inclusive of capital & equivalent return on investment (\$M) (Public & Private; Inpatient & Outpatient)

	costs — 1996	Forecast growth in costs to 2006 due to :	
		increase in incidence of cancer	expanded utilisation (Radiotherapy only)
Radiotherapy	58.7	13.3	15.0
Chemo	23.7	5.3	
Surgery	70.6	16.0	
Other	81.9	18.5	
TOTAL	235.0	53.1	15.0

Source: ACIL / Pollard Partners

For the purposes of the cost benefit analysis, the key question then becomes — are savings/off-sets, and equivalent productivity gains, possible through slowing of growth in costs in other disciplines which equal or exceed \$15 million. As indicated, attempting to quantify an answer to this question is not possible at present, and may prove elusive in any event, given the rapid change in technology across all therapies, however, given these magnitudes, the small increase in overall costs as a result of expanding radiotherapy (to a 50-55% uptake rate) presents as a potentially effective (and at worst low risk), strategy, particularly when combined with the demonstrated clinical benefits, which in turn result in real economic benefits to consumers.

This may involve a reduction in the use of pharmaceuticals for some palliative cases, and reductions in medical and surgical procedures. However, it appears risky to necessarily infer that this would be the case for all patients. Some US studies point to higher overall costs in some cases, but where the clinical benefits appear to justify this. However, some patients may require fewer drugs, reduced hospital admissions and/or less complex surgery (eg. lumpectomy as opposed to mastectomy).

It appears conceivable that a lower average cost per case may be achieved for patients who gain access to radiotherapy where they would not have previously, but that quantifying this is difficult given the limitations of the information at hand. However, as an example, if up to 3,000 patients may be affected, savings or equivalent productivity gains of \$1000 per case would yield a total of \$3M. It seems unlikely that this form of offset, alone, would fully cover the increased cost of radiotherapy — but it is not necessary that this happen, given the other benefits involved; the emphasis throughout the review has reflected the likelihood that consumer benefits and access costs (including VIPTAS) would underpin the cost effectiveness of improved access if the case is to be made.

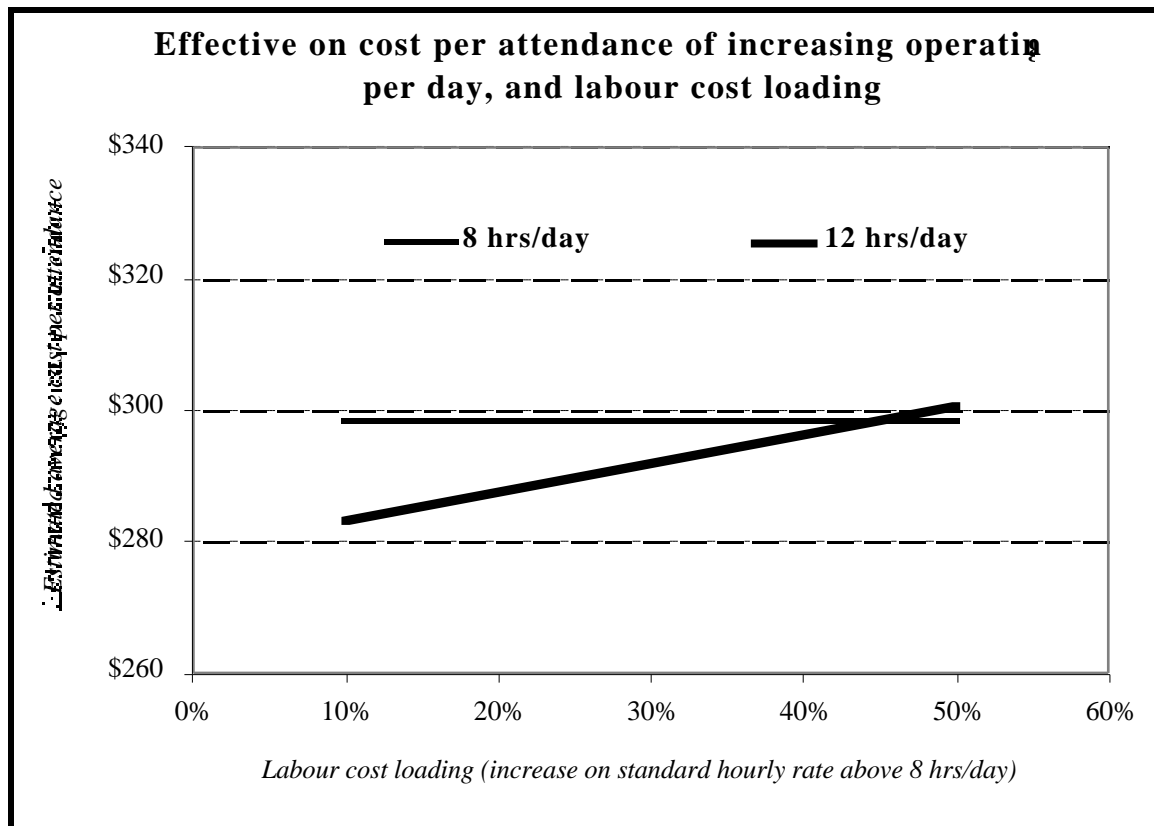
Lower costs through increasing productivity/throughput

It may be possible to reduce the costs of providing radiotherapy services by increasing the throughput of existing and new machines by using longer operating hours. Although overall costs will rise because of the increased utilisation of radiotherapy, (see Section 5.1.1), these costs for Option 2 may be lower than under the Base Case. If this were the case, we could infer from this that unit costs per radiotherapy service will be lower in all Options compared to not using longer operating hours.

Additional non-labour costs associated with increased hours should, to a reasonable approximation, increase directly in proportion to throughput, but labour costs are likely to require a loading to cover shift penalties and overtime. The capital cost component should remain more or less constant irrespective of the throughput, since maintenance, repairs and replacement of minor equipment are included in non-labour recurrent costs.

There may be some argument for applying a higher capital cost component as throughput increases, however this is not thought to be significant. Machine replacement is more often than not dictated by the availability of superior technology and more reliable equipment. More intensive use of the equipment may therefore not have a major impact on its replacement. Smith et al. (1994), noted in their study of economic efficiency in the expansion of radiotherapy services that only small differences in cost are associated with increases in the intensity with which capital is used. ACIL’s analysis reaches a similar conclusion, but also that the primary driver of costs is labour costs. Any loading that applies to these costs will have the most significant impact on unit throughput costs.

Chart 5.1.



The impact of increasing throughput on overall cost per attendance has been tested using the benchmark model of operating and capital costs. The capital cost is held constant, while the non-labour costs increase in proportion to the throughput. Labour costs are subject to a “loading” representing shift &/or overtime penalties. The labour cost impacts are likely to be experienced mainly through radiation therapists, which represent around 40% of total salary costs. Smith et al. (1994) describe this effect in their review of efficiency and capital usage in radiotherapy services. Their report considered the NSW context, in which overtime was paid at 1.5 times the normal rate, while in shift situations, a 10% loading applied across the whole shift when the shift extended into out-of-normal hours work. In Queensland, a similar shift loading is paid, however overtime is paid at double time, and overall, radiation therapists work a 19-day month.

Given the variation that exists in working conditions throughout Australia, it is not possible to make a definitive comment as to the impact on total costs of changing operating hours. However, ACIL considers that since shift and overtime loadings will primarily affect radiation therapists, and a small percentage of other staff, then only about 50% of total salary costs will be affected. If a 50% loading is applied to 50% of the staff, this is equivalent to a 25% loading on all salary costs. ACIL considers that this figure is a likely outcome, but one potentially

subject to some revision. The chart above shows the range from 10% to 50%, in which a 12-hour operating day results in lower average operating costs per attendance up to a threshold level of about 45%. Testing of the model results in a reduction in the cost per attendance decreasing from \$298 to \$290, a 2.9% reduction.

The scope for cost reduction will also be heavily dependent on the configuration of services available at the site where extended hours operations may be considered. Essentially, a relatively busy unit, operating at virtually maximum capacity on standards hours, as do some public units in Victoria, invariably encounters the need for occasional extra shifts to cater for backlogs, etc. A system of extended hours could provide opportunities for more effective scheduling of patients and could substantially increase net benefits to patients.

The key conclusion to be drawn from this analysis is not that there is scope for reducing provider costs through extended hours — the savings, if available, are likely to be small. The main point is that there is unlikely to be a large increase in costs per patient treated and that there may even be some scope for reduction — especially if, as was discussed earlier, treatments are scheduled so as to minimise support services during the extended hours.

Comparison of costs and benefits of regional single machine units

Differences in cost between single machine units as opposed to larger units (within the same overall capacity) have been estimated and outlined in the previous chapter. Comparing the costs of new developments of (for example) 8 additional machines using either a decentralised configuration, where up to 3 single machine units would operate, and a centralised configuration, involving expansion of existing units to 3 machines or more, can be undertaken without being specific as to where the new services are located, provided that it is assumed that the costs of any regional service will be largely similar. There appears no reason to suspect otherwise.

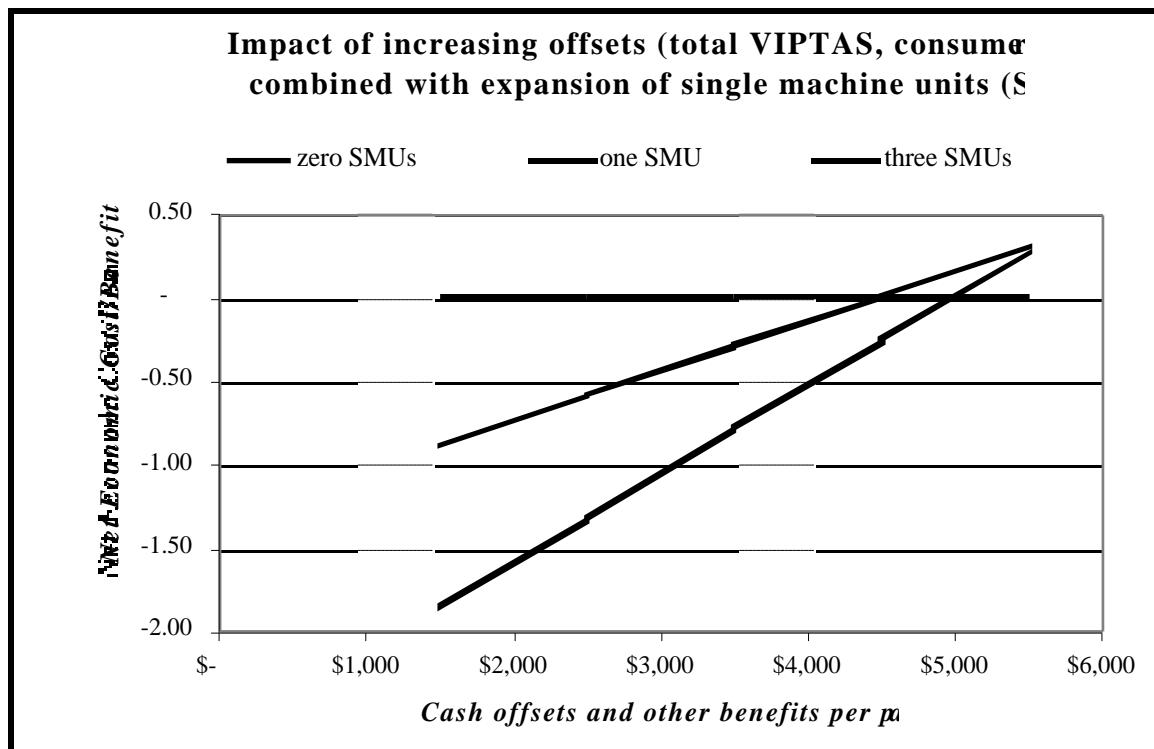
Differences between the level of travel subsidy (VIPTAS) associated with increased local provision could represent a direct cash offset for the Government. Current information is not sufficient to identify the precise cost to VIPTAS, however the total VIPTAS costs across the whole State is around \$2.8M. Submissions suggested a figure of about \$2,500 to \$3,000 per patient (from the Loddon-Mallee Region) with a total for radiotherapy of around \$1.2M. This figure appears extremely optimistic. However, even if VIPTAS is not covering anywhere near the full direct cost of travel and accommodation, much less lost time and absence from the home, this cost must be borne by either the consumer and/or other parties. Most Radiotherapy services require a stay of several weeks away from home. If the average of 16 attendances is

any guide, then patients (and friends or family) could be absent for three weeks or more. Even at a modest daily rate of around \$50, this adds up to about \$1,000 per person.

Also, if services were provided locally, this would not necessarily eliminate these costs, since some of the expected demand would still come from areas outside the 100 km limit required to qualify for VIPTAS. Assuming about half of the population of the regional catchments are in this situation, across all rural regions, this could affect between 700 and 1,000 patients. The resulting estimate in potential savings appears to offer at least partial offset to the increase in costs of providing services through single machine units.

The following chart illustrates the potential economic impact of increasing provision of services through single machine units in rural centres.

Chart 5.2



The model is based on an assumption that utilisation will reach 50%, and that half of the additional patients (who would not otherwise have received radiotherapy) will benefit through reduced travel and accommodation costs, reduced time to access services, and possible savings to the Government through reduced VIPTAS outlays. The chart shows the impact of increasing the total offsets, savings and other benefits from \$1,000 per patient to \$6,000 per patient. Current information suggests that potential VIPTAS savings will be of the order of \$1,000 per patient, however other benefits to the consumer may in fact be significant, given that VIPTAS does not cover the full cost of travel and accommodation, child minding, lost earnings

etc. In addition, for many patients accompanied by a family member or other carer, the cost is effectively doubled.

The advantage of the model above is to illustrate the threshold values, above which an option becomes economically beneficial. ACIL considers it reasonable to assume that economic benefits in terms of reduced Government and consumer outlays, and other non-cashable social benefits would be valued in the order of several thousand dollars per patient, however it is clearly difficult to accurately quantify this figure. The model shows that the average benefit would need to be about \$4,500 for one single machine unit to result in net economic benefits, and about \$5,000 for three single machine units to be beneficial. Also, the higher the value of the average benefit per patient, the more attractive three SMUs become.

The results outlined above seem to indicate that there may be sufficient benefits to justify expansion to regional single machine units in some cases, but that the exact magnitude of potential savings remains uncertain. Also, sufficient uncertainty remains as to warrant caution in any development process, and to rigorously evaluate the outcomes of any new development of rural units.

The estimated difference in the cost of service provision between a decentralised and centralised configuration is of the order of \$2.6M across eight additional machines. If the combined net benefits of reductions in VIPTAS, direct and indirect costs to consumers, and savings or productivity improvements in alternative therapies equal or exceed this figure, the development would be justified.

While a level of judgment is needed, ACIL is strongly inclined to the view that the net financial costs involved with these options are likely to be small — certainly well under \$2.6 million and it is at least conceivable that these costs could be more than offset by financial savings — in the form of reduced VIPTAS, reduced consumer and carer out of pockets and lost earnings, reduced provider costs for other cancer treatments etc. Under these circumstances, the benefits delivered to patients who incorporate radiotherapy into their treatment regimen, and who would otherwise not do so, seem almost certain to outweigh these costs — provided of course that the single machine service can be provided an quality maintained.

Similar considerations apply to the delivery of improved metropolitan services through single machine facilities, except that in this case rapid development to 2-machine size will commonly be feasible and VIPTAS offsets will not be relevant. However, the costs to patients and carers will remain.

Summary of Findings:

A Cost Benefit Analysis of options for expansion of radiotherapy services in Victoria has been undertaken which seeks to examine three major areas of concern :

Comparison of clinical benefits, and potential savings or productivity gains through increased utilisation of radiotherapy.

- Based on available data, it is not possible to quantify, in dollar terms, these potential savings or productivity gains. However the cost of expanding radiotherapy services (to 50 to 55% of all cancers), represent a small proportion of the total anticipated growth across all cancer therapies. Combined with the demonstrated clinical benefits available to patients, in terms of increased quality of life, reductions in adverse or toxic side-effects, and marginal, though positive improvements in survival and likely offsets in other treatment costs, ACIL concludes that there is strong justification for believing that the benefits of expanding radiotherapy outweigh the costs.

A Cost-Utility Analysis comparing cost per unit of throughput under a range of operating intensities (hours of operation per day)

- Variation in the hours of operation of radiotherapy services exists across existing units in both Victoria and other States. Because the cost of capital is more or less fixed per unit time, increasing the intensity of operation should allow for reductions in overall cost per unit throughput. Modelling undertaken by ACIL has concluded that this would be the case, depending on the relative increase in labour costs to cater for overtime, shift penalties and other factors. If this loading were less than 44% over current average hourly salary costs, then increasing intensity would result in net savings. This result is consistent with other studies. The main conclusion, however, is that provider cost per treatment appears to be not very sensitive to hours of operation, so that the improved patient benefits from better access are likely to make this strategy cost effective.

A Cost Benefit Analysis comparing the increased cost of single machine, rurally based units with potential savings in travel subsidies and consumer costs

- The costs of single machine units have been estimated to be around 20 to 25% higher per unit throughput than of multiple machine sites (inclusive of capital). Offsetting this cost are potential savings in current Government outlays through the VIPTAS. In addition, consumers would face reduced out-of-pocket costs. Quantifying this result relies on assumptions regarding the expected costs of travel and accommodation. At present, the available information is insufficient to make a definitive judgement, however the magnitude of any additional costs (associated with single machine, rurally based units) is not great in comparison to total costs. ACIL believes that there is a distinct possibility that benefits, appropriately and comprehensively measured, would balance or outweigh additional costs — possibly by a considerable margin after allowing for the benefits of increased utilisation — and believes a trial to further investigate this possibility is warranted.

6. SERVICE DEVELOPMENT STRATEGIES

As a result of the analysis undertaken, and the coherent assessment and balancing of these analyses as set out in the Overview, ACIL has concluded that a highly prescriptive radiation oncology strategy would be a serious mistake, in that it would not provide the flexibility to respond effectively to new information as it emerges, it would diminish the role of both the private sector and competitive tendering processes to identify new opportunities and directions and it would almost certainly imply that the Victorian Government would need to accept a significantly higher proportion of the costs associated with providing the services and facilities needed to meet growing demand for radiation oncology services. This is likely to reduce the value of the services delivered and to constrain options for improving service delivery elsewhere in the health system.

ACIL has concluded in favour of, and recommends, a strategy which is designed to cater for, and encourage, increased demand for radiation oncology services. Key planks of this strategy should include:

- Commitment to wider distribution of accessible (in terms of location and hours of operation) radiation oncology services, including consultation, treatment planning and treatment delivery (but not necessarily integrated within the one facility), to reduce consumer costs. This would occur across Melbourne and, subject to the successful undertaking of a proposed trial of a single machine facility outside of metropolitan Melbourne, in a number of rural locations.
- A significantly changed role for the major tertiary centres, with them increasing their consultation and planning services relative to their treatment services; focusing their treatment services more heavily on particularly complex or rare conditions where the benefits of subspecialisation are greatest; and playing a crucial leadership role in respect of research, training and quality assurance across the system as a whole. Major regional facilities, such as Geelong, might also expand these non-treatment services, but not at the expense of delivering comprehensive treatment services. Given these changes, it is not considered appropriate to build treatment services on the Royal Melbourne campus, but there may be scope for this campus to deliver specialised hub services in conjunction with one of the major tertiary centres.
- Increased emphasis on delivering balanced information to cancer patients and referrers on which to base decisions as to treatment regimen.
- Strategies to address a likely major constraint on the ability to grow capacity rapidly — numbers of skilled personnel.
- Development of an active policy of the Government seeking to engage both public and private service providers, actual or prospective, to ensure the cost effective delivery of the needed services.
 - This will commonly involve competitive processes and there are specific recommendations to ensure that the Government retains strategic options to

underpin its negotiating position and to ensure gaps in service provision can be addressed cost effectively.

- As a general proposition in relation to new service delivery, the primary role of Government should be one of complementing and influencing the decisions of private service providers, rather than of crowding them out — but this does not preclude commitment to public facilities which would detract from the commercial viability of private investments if this is the most cost effective way of ensuring adequate access to services for public patients.
- A conservative approach to the initial roll-out of services to ensure adequate control of the risks associated with inadequate throughput or pressures on quality standards, but the use of monitoring and reassessment processes to allow adaptation to the additional information generated.

The detailed recommendations are set out in the Overview and Recommendations section. Further background on particular aspects of those recommendations follows.

6.1 Public/private sector balance and contestability

Traditionally, radiotherapy services have been provided by the public sector and this remains, and for the foreseeable future is likely to remain, largely the case. There has, however, been significant growth in private sector provision in recent years to the point where it is fair to say that there is a level of active competition to provide new facilities, strong commercial incentives to improve facility throughput and some disruption to traditional ‘orderly planning’ of service delivery.

Patient outgoings aside, radiotherapy is a treatment which is well suited to private sector provision, subject to adequate management of the multi-modal character of cancer treatment and subject to sufficient safeguards to ensure that high costs are not incurred because cases ‘fall between the stools’..

From a Victorian Government perspective, there are significantly different financial implications involved in the choice between public and private facilities because of the basis on which Commonwealth payments are made. The funding of private facilities entails the Commonwealth in meeting a higher proportion of the costs of expanding facilities than is the case with public facilities.

From the point of view of the Victorian Government, the Department of Health and Community Services and the Victorian community, these incentives are real, though thought needs to be given to their sustainability. Failure to recognise the additional Commonwealth funding available if private facilities are provided involves a real opportunity cost in the form of either reduced services elsewhere or higher State taxes and charges (or debt).

This said, demand for private facilities is necessarily influenced by socio-economic and demographic status of the local communities, including age profile, levels of income, rates of unemployment and levels of private health insurance cover. In some areas, provision of private facilities *only* can be expected to leave significant barriers to local access by a sizeable proportion of the community (those unable or unwilling to cover the co-payment costs) and this in turn can be expected to discourage utilisation of radiotherapy services, with associated costs to cancer patients.

An example of this, with particular relevance to short term policy decisions, is the Western suburbs of Melbourne. Here there is undoubtedly demand to support better access to private services, and this is evident in the proposals to locate a facility at Footscray. However, the socio-demographic profile changes rapidly as you move away from Footscray and there remains a contentious issue as to whether a public facility at Sunshine, as well as or instead of the one at Footscray, would be appropriate.

These matters strongly suggest that consideration needs to be given to a strategy for parallel development of public and private facilities (or, more generally, regional facilities to treat public patients as well as private patients) in some areas at least, while recognising that there will be a tendency for the first facility built to constrain the viability, or viable size, of any subsequent facilities.

There is a key question then as to the extent to which the whole system is centrally planned, as has tended to be the case historically, or whether the public sector seeks essentially to ensure that gaps in appropriate service provision not met by the private sector are filled as cost effectively as possible. These gaps are present, and are likely to remain so — though this does not preclude government from contracting private providers to fill at least some of these gaps. They stem from the above socio-demographic matters, from the incentives for consumers and providers embodied in the Medicare system and other grants, from the regulation applied to private insurance and from the nature of some, particularly rare, cancer conditions.

Reflecting Victorian Government policy, broader developments in the public policy debate nationally and internationally, a recognition that public funds in the health sector are under severe pressure, the above Commonwealth/State funding realities and the reality that there are few instruments available to the Victorian Government to prevent, where State subsidies are not being sought, private investment from proceeding (and usually faster than would be achievable for public sector investment), ACIL leans towards the latter approach.

This does not, however, preclude a proactive role for the Department in negotiating with prospective private sector investors to ensure a more cost effective delivery of the full package

of radiotherapy services to all patients and the maintenance of adequate quality standards across the spectrum of cancer treatments. This may include providing access for private facilities adjacent to public hospital facilities, contracting for the delivery of treatment to public patients, calling for expressions of interest for joint public/private engagement in the delivery of services etc. It might involve collaboration between the considerable expertise in radiotherapy located in the public sector and the access to finance and commercial skills, including in the running of clinics, located in the private sector to mount joint bids to provide packages of services.. It may involve mutually beneficial contracts with the private sector for a period, while regional demand is growing, with public sector facilities being deferred — reducing the effective cost per treatment and freeing funds in the short term for deployment elsewhere.

However, if the objective is to deliver a package of services of specified standard and accessibility across the community, at least cost to Government, this suggests as a starting point that the location of private facilities at or near to where the commercial viability of these services, excluding any State Government subsidies, is maximised may well be most sensible. There are circumstances in which this may not be the case, but careful consideration would need to be given to the reasons for encouraging a transfer to a location where access to private sector funds (equity, private health insurance and co-payment) would be significantly reduced.

As a general proposition, ACIL is of the view that the private sector is best placed to assess where this commercial viability would be maximised — and to accept the provider risks of miscalculating. Given the nature of the services being provided, and the fact that the Victorian Government is likely to have entered into service provision contracts with some private suppliers, this leaves a legitimate area for government concern in relation to these risks, and on behalf of patients who might be disadvantaged should a facility fail. However, care should still be exercised in any choice to override this type of market expressed preference if the Government is seeking to contain its costs while delivering adequate services.

If the benefits of public and private sector interaction, and more generally from competition in ideas and delivery systems, are to be maximised, it is important that there be real contestability and that the institutional arrangements ensure that the Victorian community derives an appropriate share of the cost savings as well as the gross benefits of system improvements.

ACIL has developed a number of recommendations directed at ensuring that contestability is ensured in several markets, including the delivery of ‘hub services’, and to secure the ability of DHS to negotiate arrangements which deliver better outcomes to the community as a whole. However, most of the competition policy issues which arise here are broader than the delivery of radiation oncology services, and will be better addressed in a broader setting. ACIL is aware that DHS has recently announced a major ‘big picture’ review of the policy and regulatory

framework for the delivery of health services in Victoria, and it would be appropriate that some of these matters be revisited in that setting.

6.2 ‘Hub and Spoke’ Considerations and the Role of Major Centres

The historical development of radiotherapy services, driven by then present constraints of technology and policy, has resulted in most radiotherapy facilities and expertise being located in a small number of centres. This has facilitated the development of expertise, subspecialisation, research and training capabilities of a high order. This represents an investment of great value to the Victorian community.

In contrast to all other major facilities, the Peter MacCallum Cancer Institute is not part of a general hospital. There is a widely held view that this is not the ideal model for such a facility and it is probably fair to say that such a facility would not now be built even if there were a need for another major facility offering these services. Whether this justifies now abandoning the facility or transferring it to a general hospital campus is another matter.

PMCI is the only facility with strong established linkages between basic sciences and clinical research, is held in very high regard nationally and internally and has a ‘brand name’ which may prove of considerable strategic importance in underpinning the provision of quality distributed radiotherapy services. The tertiary facilities, especially PMCI, have already developed a stronger role in relation to provision of radiotherapy services — consultation, planning and treatment — away from these centres. Prominent here is are the strong links between the PMCI main campus and the Moorabin and Box Hill facilities.

If, in line with ACIL’s recommendations, Government policy moves to provide for much greater decentralisation of radiotherapy services, then this can be expected to imply a different — and critical — role for these facilities.

There is going to be growing demand for strong professional linkages from the smaller facilities back to one or more major facility to provide quality assurance, referral capabilities, the handling of complex cases, R&D and training — and reputation to underpin the commercial viability of the smaller facilities, and their capacity to attract and deliver quality services to their communities. It seems likely that these arrangements will encourage greater separation of consultation and treatment planning services from treatment delivery services. Subspecialisation consultation services provided by the major facility may involve either or both of the running of clinics at the smaller facilities and the greater use of telemedicine, with telemedicine expected to become increasingly cost competitive.

The end result is likely to be a shift in the mix of services provided from the major facilities — involving an increase in consultation and treatment planning services relative to treatment delivery, and in increase in treatments which are relatively complex/rare and call on subspeciality expertise. Even the consultation services, especially of a telemedicine kind, can be expected to be more heavily weighted towards the more complex/rarer end of the spectrum. ACIL’s modelling suggests that, even with increased utilisation of radiotherapy services by an increasing number of cancer patients, the effects of greater distribution of cancer services will be to reduce the absolute, as well as relative, level of actual treatments delivered in central Melbourne. However, those treatments which are delivered will call on significant subspecialisation and may well stand to gain most from having access to the most recent technologies.

These developments will imply significant challenges for these facilities, but an effective response to these challenges will be critical to the success of any decentralisation strategy. The best model or models of co-operation between these facilities and smaller regional facilities is not yet clear. It is important that there be adequate scope and incentives to develop a range of models from which the most satisfactory arrangements can be allowed to emerge.

These considerations are, in ACIL’s opinion, compelling reasons for ensuring that all of the present facilities are in a position to respond effectively and creatively, to the emerging opportunities. Included here is the requirement that these facilities sustain, in the short term at least, the critical mass and resources needed to sustain subspecialisation, training and research of a high order. In time, the withdrawal from these main facilities of many of the less complex/rare treatments may mean that these attributes can be maintained with fewer machines than might currently be necessary but it is critical that any such contraction be driven by reductions in demand.

6.3 Rural/Regional Developments

ACIL considers that there is merit in the long term development of regionally based services. However, based on the existing evidence presented regarding the cost of these proposals, some risk is thought to remain. It has yet to be established that the benchmark cost calculated as part of this Review, and the operational costs for SMUs put forward in proposals are accurate, since there is no currently operating model on which to base this conclusion. At least some in the private sector currently believe that it is not cost-effective to operate a single machine unit, particularly in rural areas, without the medium term prospect of moving to two machines.

On the other hand, the analyses set out above challenge this proposition in a fairly serious way — although they would still admit of the possibility that such facilities would not be

commercially viable given standard funding arrangements. While the provider costs are somewhat higher, there are substantial offsets to the financial costs — in Government and patient pockets, if not provider pockets — and the benefits are potentially very large. ACIL believes that the key issues to be determined are more one relating to the risks, in respect of quality assurance and standards of care, and the distribution of the net benefits. Nonetheless, significant effort is still needed to develop the system to support a remote single machine facility and this is seen as an essential part of the proposed trial.

The Albury/Wodonga proposals – while based on the long term development of a two machine site — may provide some insights into the operation of a rural/regional facility as a single machine unit. Ultimately, ACIL believes that the model could only be realistically tested through development of a site in rural Victoria, where the unit would operate as a single machine for a considerable period of time. For this purpose, the three sites to emerge from our review propose are Ballarat, Bendigo and LaTrobe.

All these sites would appear to have substantial scope for providing benefits to the communities in question — and it seems likely that a successful trial would, in time, lead to facilities at all these sites. The factors considered relevant to assessing the proposal to establish a single machine unit at either Ballarat, Bendigo or LaTrobe have been assessed by ACIL as :

- Potential demand for the service;
- Demonstrated links to local comprehensive cancer services and metropolitan radiotherapy services,
- Overall cost (to Government and the community as a whole),
- Risk of adverse distributional impacts to existing services,
- Readiness to proceed

In all cases (and in the two competing options for Albury/Wodonga) close links are proposed or in place with local comprehensive cancer services, and a major radiotherapy provider in Melbourne. On the question of cost, this Review has assumed that the establishment and operating costs of a single machine radiotherapy unit will be fairly consistent across all sites, however the Albury proposal assumes an eventual move to two machines and there have been suggestions that a second, older machine might be installed from the start.

In terms of the potential demand for services, ACIL’s modelling of likely demand in ten years was based on the catchment within the defined regional boundaries. Assuming 50% uptake, and up to 40% of demand continuing to be referred to Melbourne &/or Sydney, the data indicate that the Albury/Wodonga Region would support a two machine unit (with the inclusion

of the NSW catchment). Bendigo and Gippsland/LaTrobe would appear to have sufficient demand to support one machine (demand around 1.4 to 1.5 machines), while Ballarat appeared to have the lowest level of demand, with just one machine. Lower leakage rates raise these figures, but do not substantially alter their relativities.

It should also be noted that these demand projections assume that the AHTAC projections hold. As discussed in the report, there appear to be valid reasons for assuming that higher levels of patient throughput could be achieved, and that, rather than 400 to 500 patients per year, 500 to 600 patients may be treated, and if the current private sector throughput was equalled, over 700 patients per year. Further reductions in the average number of attendances per course of treatment will also serve to increase the theoretical potential throughput per linear accelerator, however this is thought to be a relatively minor impact. Given these factors, and assuming that the catchment areas are relatively “tight”, then Ballarat appears to hold greater risk of being substantially under-utilised.

The risks to existing services come about if a new service captures a significant level of demand that previously had gone to the existing unit. In the case of the private sector proposals in Albury (and Footscray in Melbourne), this is expected, and a reason for expansion. The private sector group anticipates capturing additional demand through the provision of more readily accessible services, while reasoning that the long term viability of their current services will not be affected significantly.

Existing public sector providers may be affected by new service developments. In most cases, the PMCI will almost certainly be affected, since it draws its catchment from across the State. The PMCI is the major referral point for patients from Gippsland, Bendigo and the Loddon-Mallee Region, and to a lesser extent, Albury/Wodonga. The Geelong Unit now provides a very high level of local self-sufficiency, in addition to being the primary referral point for patients from Ballarat, Warrnambool, and areas further west. The William Buckland Unit at the Alfred Hospital primarily draws its catchment from metropolitan Melbourne, and the Southern and Eastern areas in particular.

The NEHCN’s unit at Heidelberg primarily provides to a local catchment, although some patients are referred from the immediate rural north, and a small number from Bendigo. The satellite services operating through the PMCI, at Moorabbin and Box Hill provide for local catchments, and in the case of Moorabbin, in particular, experience regular demands in excess of what can often be provided during normal operating hours. Waiting lists are common, as is the practice of working after hours and Saturdays in order to clear backlogs.

In the case of Bendigo and Ballarat, any service development in either could be expected to draw patients from the other catchment. In addition, a unit from Ballarat would result in many patients who might otherwise be treated at Geelong being treated locally. While this may have significant benefits for these patients, it would have a substantial impact on Geelong, and could result in loss of revenue. On its own, and subject to delivering substantial patient benefits, this need not be a major source of concern. However, such a development would almost certainly involve deferral of further development at Geelong, including the introduction of brachytherapy treatment services to the catchment and the possible development of a new tertiary centre.

From a strategic perspective, a facility at Ballarat would have a lesser impact on aggregate utilisation rates than would a facility at either of the other two options, and most prominently LaTrobe. This would arise both from the lower assessment of throughput and from the higher proportion of that throughput likely to be drawn from existing providers — rather than through increased utilisation.

In the case of Albury/Wodonga, and Gippsland/LaTrobe, a local service development would not impact on any of the surrounding catchments, and would primarily only affect existing services at the PCMI, and EMROC.

The Rural region most likely to support a radiotherapy service, Albury/Wodonga, has two proposals on the table by private developers. The Commonwealth is considering these proposals, and awaiting advice from the respective State Governments as to whether the developments conform the Statewide planning framework. NSW has no plans in its five year strategy to establish either public or private services in Albury, however, the Minister has indicated his support in principle for the proposal to establish a service by the Mercy Hospital, Albury, in conjunction with the Public Albury Base Hospital.

The alternative proposal, in Wodonga, proposes a green field site development that would comprise a comprehensive cancer service, with initially one, then eventually two linear accelerators. The proposal involves the development of a 30 bed private hospital, including medical oncology and surgery services. The major concern expressed by some stakeholders in relation to this proposal is the potential lack of access for public patients.

ACIL considers that both of these proposals have merit in terms of establishing a regionally based oncology service. Both demonstrate a commitment to provide services through a comprehensive cancer centre, in which the radiotherapy services will be a part of a strong metropolitan based service (EMROC in the case of the Wodonga proposal, and Sydney based units in the case of Albury) that has an established track record in providing high quality care through its network of services.

While a private facility would entail additional out-of-pocket costs for consumers, neither the NSW or Victorian Government have made any commitment to the provision of funding for public patients, and should funding for the Albury unit be contingent on this, then the development of any unit at Albury may well be delayed. On the other hand, the proposed development in Wodonga is not contingent on any State government funding for public patients, and is planned to proceed immediately Commonwealth approval is gained — which is unlikely to be automatically granted unless 2 machines are involved. On balance, ACIL considers that the extent of private sector interest can allow for the timely expansion of services at minimal risk and cost to government. Of the two competing options, ACIL recommends Victorian endorsement to the proposal which can demonstrate the most rapid development program, provided cost to Government is minimised or avoided

The development of the LaTrobe Regional Hospital through Australian Hospital Care Ltd (AHCL) could provide an opportunity for private involvement in the provision of a regional radiotherapy service. However, while some interest exists, a number of issues remain to be addressed. Firstly, if the unit were a private sector development, the Government has not made any specific commitment for the treating of public outpatients, since the contract is primarily one for the provision of services to public inpatients. Secondly, there have been no detailed discussions with a potential “Hub” unit that could provide the necessary logistical, clinical and academic support for a single machine unit in LaTrobe.

Nevertheless, these issues appear to require only more detailed examination in conjunction with AHCL, and a major radiotherapy provider. Two options appear feasible. The first would involve AHCL developing the service, and contracting the necessary expertise to ensure that the unit could operate within a well defined clinical role providing appropriate services to the local catchment, with proper linkages and referral mechanisms for more complex cases, and to ensure that service quality and issues of professional development and research imperatives were addressed. In this case, ACHL remains the owner and operator of the services.

A second alternative may be for ACHL, as part of its contractual obligation to the Government, tender for expressions of interest by an external provider to operate a single machine “spoke” within the LaTrobe hospital. In this case, issues of quality, professional development, and research requirements are automatically addressed, given that the contracting provider would be linked to a major service. The contracting provider would most probably retain ownership and license of the machine, and ACHL provide infrastructure and support on a lease basis or similar. In both cases, it would appear necessary for the Government, through the DHS, to be involved in the process, to be satisfied that the arrangements are consistent with the overall strategic development objectives as outlined elsewhere in this report.

A proposal to establish radiotherapy services in Victoria has been put forward by the Bendigo Health Care Group (BHCG), and supported by many local health service providers and interest groups. The submission from Bendigo identified a number of options that in their opinion merited consideration. This included public services operated by the BHCG, or where an external group (eg. PMCI, EMROC, etc.) provide the services on a contractual basis. The services could be either public or private, or have capacity to provide services to both.

While the submission identifies many significant benefits of such a proposal, as has been discussed generically and specifically throughout this report, the submission nevertheless points to the significant cost involved, and the fact that details of a funding arrangement are yet to be determined. As is the case with the LaTrobe options, any proposal to develop radiotherapy services in Bendigo would require significant involvement by the DHS, and a major radiotherapy provider.

The Ballarat Health Service, in conjunction with the St John of God Hospital, Ballarat submitted a proposal for a joint venture in which the radiotherapy service would be located in the St John of God Hospital site, but provide access to public patients through an agreed arrangement. This would involve the establishment of a new corporate entity to establish and operate the service. It is recognised that the service could not operate as an isolated stand-alone unit, and the involvement of Geelong as a ‘hub’ for the unit is proposed. Geelong believes that a third machine to expand the Andrew Love Centre at Geelong is more cost-effective (and has been conditionally recommended by ACIL), but consider the only other appropriate option to be the establishment of a unit at Ballarat.

Approximately \$0.6m has been raised toward the project and is in a trust account. Further details of capital and ongoing funding are yet to be determined, however, it is anticipated that public funding would be required. Justification for the Ballarat unit rests on an assumed catchment that includes most of the Loddon-Mallee Region.

Of the three proposals, only Ballarat has advanced to the stage of determining a specific proposal in relation to ownership and management. In addition, some funds have been raised toward the unit. However, the required funding falls considerably short of the necessary up-front capital input, and the issue of ongoing costs remains unaddressed

It has been pointed out that, were a unit to be established in Ballarat, it would likely attract part of the Loddon-Mallee catchment. However, the extent to which this would occur appears to be somewhat overstated by the submission, since it is likely that access for much of the Loddon-Mallee and North West Victoria would be just as convenient, if not more so in Melbourne, particularly if a service was established in the outer west at Sunshine.

Ballarat would create a much more significant impact on the demand for services through the Geelong unit, than for example a single machine at Bendigo, and it should be pointed out that a unit at Bendigo, more centrally positioned than Ballarat, would likely retain much more of this North West catchment, in addition to attracting patients from the Grampians.

Despite the well expressed claims by the regional centres for local provision of radiotherapy services, it should be noted that the viability of such a service and the extent to which issues of quality and effective links with a Melbourne based provider remain to be tested. On that basis, ACIL considers the least risk option obviously to be Albury/Wodonga. It is considered appropriate to proceed to a stage of testing the model in another centre, and of these, the relative risk appears to be least with Bendigo and/or LaTrobe, with LaTrobe probably representing both the least risk and the greatest scope for lifting aggregate utilisation. However, it is also the least prepared to proceed.

In these circumstances, as recommended, a negotiated choice from among the three contenders, using the earlier criteria and taking into account the issues raised here, seems most sensible. Given the potential benefits should the single machine trial prove successful, delays in establishing the trial would themselves involve significant costs.

References

Data

The following data have been obtained and used in formulating estimates of demand, costs of services provision, and analysis of costs and benefits.

- Population Projections to 2021 by SLA and Victorian Health Regions and Metropolitan Networks, age and sex
- Victorian Inpatient Minimum Dataset (extract)
- Statistical and financial profiles of Units
- Medicare data
- Previous reports (AHTAC, Diagnosis PTY LTD, NSW Health etc.) containing statistical information and trends on cancer incidence and treatment

Previous Reviews and reports on radiotherapy

A Healthier Future — A Plan for Metropolitan Health Care Services, (Victorian Department of Health & Human Services, 1996)

Beam and Isotope Radiotherapy, (AHTAC / NHMRC, 1996)

Cancer (Radiotherapy) Services Strategic Plan (Health Department Victoria, March 1990)

Implementation of the Payment Model for outpatient Radiation Therapy Services (RH Wilson & Associates for the Victorian Department of Health and Human Services, December 1996)

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APPENDIX A: MEMBERS OF THE ADVISORY COMMITTEE

Prof.	G. Clunie	Dean Faculty of Medicine & Health Sciences	The University of Melbourne
Prof.	A. Langlands		Westmead Hospital
Dr	J. Morris	Chief Executive Officer	Peter MacCallum Cancer Institute
Dr	M. Stanford	Chief Executive Officer	North Eastern Metropolitan Health Care Network
Mr	J. Drew	Chief Physicist	Westmead Hospital
Ms	M. Bulmer	Radiation Therapist	Geelong Hospital
Dr	J. Scarlett	Medical Oncologist	Oncology Suite, LaTrobe Regional Hospital
Dr	D. Ball	Radiation Oncologist	East Melbourne Radiation Oncology Centre
Prof.	R. Porter	Dean of Medicine	Faculty of Medicine
Prof.	M. Ashby	Monash Medical Centre	Mc Culloch House
Dr	G. Richardson	Director Medical Oncology	Monash Medical Centre
Prof.	R. Fox	Director of Clinical Oncology & Haematology	Royal Melbourne Hospital
Dr	J. White	Chief of Acute Health Services	Western Health Care Network
Dr	M. Walsh	Chief Executive Officer	Alfred Hospital
Prof.	L. Peters	Director Division of Radiation Oncology	Peter MacCallum Cancer Institute
Mrs	J. Smylie	Head of Radiotherapy	Peter MacCallum Cancer Institute
Dr	D. Brumley	Clinical Director Palliative Care	'Gandarra', Queens Elizabeth Centre, Ballarat
Ms	S. Harvey	Executive Director	Clinical & Nursing Resources, Austin & Repat. Health Centre
Prof.	M. Quinn	Director of Oncology	Professorial Unit. Royal Women's Hospital
Dr	V. Ganju	Medical Oncologist	C/- Beleura Consulting Suites

APPENDIX B: SUBMISSIONS RECEIVED

- Albury Wodonga Oncology Centre
- Cancer Awareness and Empowerment Group
- Central West Gippsland Division of General Practice
- East Melbourne Radiation Oncology Centre
- LaTrobe Regional Hospital
- East Gippsland Hospital
- Monash Medical Centre
- Monash University - School of Medicine
- North Eastern Network
- Southern Health Care Network
- Royal Talbert Rehabilitation Centre
- Wodonga District Hospital
- Cabrini Hospital
- Department of Human Services
- Ballarat Health Services
- Mornington Peninsula Shire Council
- Inner and Eastern Health Care Network
- The Geelong Hospital
- Royal College of Nursing Australia
- Western Melbourne Division of General Practice
- LaTrobe Regional Hospital (Moe Campus)
- Central Bayside Division of General Practice
- Department of Social Work, Physiotherapy and Occupational Therapy (Frankston)
- Australian Institute of Radiography
- Beleura Consulting Suites (Dr Vinod Ganju)
- Mercy Hospital (Albury)
- Peninsula Specialist Centre
- Radiation Oncology Centre (Austin)
- Ringwood Private Hospital

- St Vincent's Radiation Oncology
- Stanlake Private Hospital
- Western health Care Network
- Hamilton Base Hospital
- North Eastern Health Care Network
- Peninsula Health Care Network
- The Victorian Health Care Association Limited

APPENDIX C: OVERVIEW OF SELECTED SUBMISSIONS

C1. PUBLIC SERVICES

C1.1 Western Health Care Network (WHCN).

This service represents 5 public sector provider hospitals in western suburbs of metro Melbourne.

Demand for cancer services and radiotherapy:

The WHCN has approximately 0.8 million people and estimates a demand of 2,500 new cancer patients per year for radiotherapy, which includes referring outer centres. The submission also describes a need for 4-6 radiotherapy machines in the WHCN.

Supply and configuration of radio therapy technology:

Whilst cancer surgery is well developed in its provider hospitals, a lack of radiotherapy unit has meant that planning and delivery of multi-modality therapy has not been possible. All cancer patients requiring radiotherapy are referred out of the area.

Consumer issues:

The current centralised arrangements for radiotherapy services is described as contravening modern medical practice, in which multi-modality therapy is delivered by teams and this denies WHCNC patients equable access to services.

Options for radiotherapy services:

Services in Victoria should be in accord with the 'Plan for Metropolitan Health Care Services' (October 1996). Relatively smaller free standing units should be developed geographically located in the WHCN, in conjunction other collocated multi-modality therapies. Specifically, the submission suggests four machines in the WHCN, with two machines located in each of the two districts in the network.

Major issues and recommendations:

Services in Victoria should be in accord with the 'Plan for Metropolitan Health Care Services' (October 1996).

Present centralised services provide services in a centre lacking other modalities of treatment. This has meant that patients referred from the WHCN are denied equable access to optimum multi-modality care.

Evidence suggests a resultant under-utilisation of radiotherapy.

C1.2 THE ANDREW LOVE CANCER CENTRE AT THE GEELONG HOSPITAL

Demand for cancer services and radiotherapy:

The centre services a population of 550,000 in the southern and western districts, extending to the South Australian border, the central highlands, the Wimmera, the North-east and parts of Werribee. The service has two machines and treats 741 new cases per year with 318 re-treatment cases (a total of 1,059 compared 990 reported elsewhere in this Review). The estimated growth in overall demand is 2.1% per year, however there remains some under-utilisation of the service particularly in prostate and bladder cancer.

Supply and configuration of radio therapy technology:

The Andrew Love Cancer Centre is an integrated cancer service comprising radiation oncology, surgical and medical oncology, malignant haematology and palliative care. The two-machine unit has under- and post-graduate programs and a shared care program with the Geelong Division of General Practice. The unit is also active in research. There is significant activity in head and neck cancer, with less in prostate and colorectal cancers. Patients attend Melbourne for brachytherapy treatment.

Consumer issues:

The service has addressed factors that influence patterns of care and referral by increasing patient access to local transport and accommodation. However, a bus service could be developed for the Werribee district. The submission stressed the need for continued development of services along the Geelong catchment area and the need to maintain some degree of decentralised expertise in the area.

Options for radiotherapy services:

The submission focuses on a favoured option for the further development at the Geelong Hospital site at a cost of \$5.2 million. This development would entail a 3-machine facility and a brachytherapy service (a further linear accelerator.)

A second option is the development of a satellite service at Ballarat managed by Geelong hospital. This less favoured option would incur higher capital and recurrent costs. Some of the other reported difficulties with this second option, estimated to cost 7.9 million relates to: - recruitment; maintenance of standards; the need to install additional planning and simulation equipment at Ballarat, plus unavoidable expenses in infrastructure at the parent unit in Geelong.

Major issues and recommendations:

The further development of radiotherapy should be at the Geelong Hospital site.

There should be continued development of decentralised services along the Geelong catchment; the southern and western areas of Victoria and the need to maintain some degree of decentralised expertise in the area.

An equitable and appropriate funding model for all units in Victoria is needed.

C1.3 LODDON/MALLEE REGIONAL OFFICE / RADIOTHERAPY CONSULTATIVE COMMITTEE

This service extends to the NSW border and across to the South Australian border with Bendigo as the principal services centre. It has two major hospitals - the Bendigo Hospital (191 public beds) and Mt Alvernia Hospital (138 private acute beds). The Population is 283,704.

The submission has been endorsed by the Regional Director; the Hospice and Palliative Care Advisory Committee; the Bendigo Health Care Group; and the Mount Alvernia Mercy Hospital.

Demand for cancer services and radiotherapy:

Based on State figures, it is estimated that 365-425 patients from the two areas access radiotherapy outside the region. The population is aging at a substantial rate and is also comparatively poor with the median income for Bendigo at 10% below the Australian average. The aging population projections for 1996-2011 are described as 50-59 years 51.4%, 60-69 years 41.9%; 70-84 years 31.9% 85+ 67.8%. The submission also indicates that the Bendigo Health Care Group (BHCG) has hospice and palliative care services and a number of these patients are described as being potential beneficiaries from palliative radiotherapy.

Supply and configuration of radio therapy technology:

Currently there is no radiotherapy unit in the area. At present many cases that may require both surgical and radiotherapy are referred to Melbourne.

Consumer issues:

The patients in the catchment area are reported to be disadvantaged in access to radiotherapy services. The issues of age; personal support systems; transport and accommodation and 'rurality' are described as key factors to be considered in the likely use of radiotherapy facilities.

The submission indicates that the number of patients undergoing radiotherapy from country areas is less than city dwellers, possibly between 5-10% fewer. This is the case in this region where patients have to travel to Melbourne or Geelong for therapy. The submission also

reports that patients have chosen more radical surgery e.g., mastectomy, as opposed to the clinically preferable lumpectomy and radiotherapy, rather than go to Melbourne for radiotherapy.

An estimated 365-425 patients access radiotherapy from the two regions which incurs a cost to the State of up to \$1.2 million annually in VPTAS, which is estimated to be overstated as outlined elsewhere in this Report.

Options for radiotherapy services:

It is proposed that the Bendigo Health Care Group own and operate radiotherapy units as a public entity supported by Health Program Grants. Either the BHCG or Mt Alvernia Hospital (private) would provide the services sub-contracted to a major Melbourne provider, eg PMCI.

It is suggested that at least one radiotherapy unit should be developed in Bendigo by 2000. The submission considers two options for catchment areas for proposed Bendigo-based services. One linear accelerator would be fully utilised for option one catchment area i.e., the Loddon-Mallee region, plus the portion of the western part of the Hume region together with the western section of the NSW Riverina stretching from Deniliquin to Wentworth. Option two catchment would cover a smaller sector comprising only the Loddon-Mallee region and western Riverina and function at around 80% capacity initially. The Bendigo Health Care group has the capacity to develop low cost patient accommodation and transport support to and from selected centres.

Major issues and recommendations:

It is considered that there is sufficient current and prospective patient load given the current and projected aging profile of the population to justify at least one radiotherapy unit in Bendigo by 2000. This would be done through sub-contractual arrangements from a major provider in Melbourne and enhancements to low cost accommodation and patient transport from selected centres.

With the current arrangements it is estimated that 5-10% fewer eligible patients have the benefit of radiotherapy.

Savings arising from reduced expenditure on the VPTAS scheme could be used to defray the operating costs of such a development.

C1.4 Inner & Eastern Health Network

Supply and configuration of radio therapy technology:

The Inner & Eastern Health Care Network includes 10 major health services and 3 affiliated services. Services are provided in over 50 locations for a population of 1.2 million people in the inner and eastern metropolitan area.

The Peter MacCallum Cancer Institute (PMCI), as part of network, provides over half of the public radiotherapy services in Victoria. It has strengths in all sub-specialties of cancer treatment and conducts two satellite radiotherapy facilities at Box Hill and Moorabbin and country clinics at Frankston, Mulgrave, Wangaratta, Traralgon and Bendigo. The William Buckland Centre at the Alfred Hospital, is a medium sized academic radiotherapy department. It provides sub-specialty and consultancy services to country centres.

Demand for cancer services and radiotherapy:

In the period 1993-94 to 2001, demand for oncology & radiotherapy services is anticipated to increase by 9%. Werribee is described as expecting to experience the greatest increase in demand followed by Cranbourne, Keilor and Whittlesea.

Consumer issues:

The network recognises that the concentration of radiotherapy services in the inner Eastern Melbourne suburbs has diminished access to services. It recognises that patients living in the West, South and outer East of Melbourne also have poor access to radiotherapy services.

The submission emphasised that information regarding the value of radiotherapy in enhancing quality of life in patients with cancer should be widely disseminated to both consumers and providers. The network emphasised the need for provider education on radiotherapy diagnosis, treatment and prognosis.

Options for radiotherapy services & key recommendations:

This review should implement the key recommendations of the AHTAC Report as they relate to Victoria

The provision of radiotherapy treatment and planning should be considered separately, as there are greater opportunities for decentralising radiotherapy treatment than for planning.

Recommended continuation of public services

- Austin & Repatriation Medical Centre
- Box Hill Hospital
- Geelong Hospital
- Peter MacCallum Cancer institute

- Monash Medical Centre

Additional recommended metropolitan services to outer suburban areas

- Western Metropolitan Region (Sunshine)
- Eastern Metropolitan Region (Knox)
- Northern Metropolitan (Epping)
- Southern Metropolitan Region (Mornington Peninsula)
- The Alfred

Additional recommended services in the non-metropolitan areas:

- Loddon-Mallee (Bendigo)
- Hume (Albury/Wodonga or Shepparton)
- Gippsland (Traralgon)
- Central Highlands (Ballarat)

General recommendations

- The Network emphasised the need for provider education on radiotherapy diagnosis, treatment and prognosis.
- The Network supports the development of decentralised services in accordance with the minimum service level configuration specified by AHTAC and the RACR.
- The Network also proposes to further strengthen the role of the Peter MacCallum Institute in integrated cancer care through close association with surgical oncology, medical oncology and clinical haematology programs at St. Vincent's Hospital.
- The Network proposes that its role is to influence the clinical planning framework, rather than to directly provide or manage decentralised services.
- Data on incidence of cancer should be used to identify the priorities for location of additional machines. On that basis, Ballarat warrants a lower priority than other regional centres.

Best practice

- The network supports a multi disciplinary approach and ability to sub-specialise within the individual cancer disciplines.
- Treatment protocols be readily available to all practitioners.

Funding

- Funding should not be differentiated between inpatient and outpatient classification
- The financing for capital and recurrent costs needs to consistently identify the roles of both the State and Commonwealth governments and so enable a consistent framework for other forms of revenue generation.
- Reliable funding for data management should be a priority.

C1.5 NORTH EASTERN HEALTH CARE NETWORK (NEHCN)

NEHCN provides services to the North-east of Melbourne and for veterans throughout Victoria. The network currently comprises 7 public hospitals and incorporates the radiotherapy centre, medical oncology, haematology, palliative care, the Ludwig Institute for Cancer Research and the Austin Research Institute.

Demand for cancer services and radiotherapy:

It is estimated that 2,721 people per annum will require radiotherapy services by 201E1. At 400 new cases per machine per annum, this would indicate a need for 7 linear accelerators. Currently, between 80-90% receiving radiotherapy services at A&RMC are from the NEHCN's catchment.

Supply and configuration of radio therapy technology:

The NECS currently operates two machines with full range of supporting infrastructure and a Brachytherapy service.

Consumer issues:

The submission emphasises that the provision of radiotherapy within an integrated acute hospital setting is more conducive to quality continuity of care. This is supported by a range of ancillary services such as specialist nursing, dietary, psychosocial care. Rehabilitation and palliative care are also routinely required which must be coordinated.

The integration of different treatment modalities within one diagnostic and care planning process provides a high degree of patient satisfaction whilst providing optimal cancer care.

Isolated satellite radiotherapy "spokes" offer no advantage of sub-specialisation and the use of staff on rotation after hours and emergency care is not available. The availability of family accommodation near the treating facility is critical to rural access.

Options for radiotherapy services & key issues and recommendations:

Integrated comprehensive cancer care centres

A Statewide model of integrated comprehensive cancer care centres and cancer units would appear to be an optimal model for Victoria. A comprehensive cancer centre role should be to provide a comprehensive range of clinical services to patients and their carers; work with GPs; as well as domiciliary providers; perform clinical trials; educate medical, nursing and allied health staff and perform pathology and research.

In addition, it is desirable for routine exposure of medical staff to integrated radiotherapy services within the acute hospital environment, with strong links with general practitioners, surgeons, community based providers.

Stand alone services reduce the profile of radiotherapy within the health system and impede the interaction of specialists in promoting optimal use of radiotherapy .

Each comprehensive cancer centre could develop a leadership role in a particular aspect of cancer management or specialised function. This would ensure that consistent approaches are adopted and appropriate referral mechanisms exist for rare or complex conditions.

The NEHCN supports the development of principal centres to deal with all forms of cancer, coordinate education and research functions and to develop best practice protocols.

Rural centres should be developed with sufficient expertise to treat more common cancers. They should have links back to a comprehensive integrated cancer centre for more specialised care such as radiotherapy.

PMCI role

For cancer care, there is a need to have some concentration of specialist expertise for care of complex conditions. This expertise for all aspects of cancer management is not currently available within one facility or network. While PMCI has a strong radiotherapy function, it lacks comprehensive surgical and some other support services. Therefore it is proposed that each comprehensive cancer centre could take a leadership role in a key cancer specialty and act as principal centre for that area.

While NEHCN acknowledges the leadership role of PMCI in radiotherapy service and its potential to develop as a principal centre, this role does not need to extend to a management role which would stifle efficiencies and reduce innovation.

Funding arrangements

State and Commonwealth funding arrangement inconsistencies need to be addressed.

Funding as much as possible should be based on treatment output rather than split across inpatient and outpatient funding models. Guidelines to identify which services are included with this funding should be developed.

All radiation oncology centres in Victoria contribute into a central pool of the funds that they retain from bulk billing and from their HIC Grants. All radiation oncology centres be extended the facility to bulk bill.

Options for the provision of radiotherapy services to public patients through the private sector in contractual arrangements e.g., to fund leasing of equipment from the private sector may be seen as a competitive option. However, the cost of depreciation and need to see a return on investment needs to be added to current state funding models.

C2. PRIVATE SERVICES

C2.1 EAST MELBOURNE RADIATION ONCOLOGY CENTRE (EMROC)

EMROC is the second largest radiotherapy service in the State and is comprised of a partnership of 8 radiation oncologists. It provides radiotherapy at two sites the East Melbourne and Ringwood Centres.

Demand for cancer services and radiotherapy:

The Centres see 2,300 new cancer cases and provides 36,000 treatments per year.

Supply and configuration of radio therapy technology:

The Centre also does complex external beam treatment techniques, except for stereotactic, pulsed or high dose rate brachytherapy. At both sites there is a full range of oncology treatment available. Both hospitals have on site medical oncology services e.g., surgical oncology and ancillary services such as social work; physiotherapy and occupational therapy.

Consumer issues:

The Centres have well established networks of surgeons, medical and radiation oncologists in all cancer sub-specialties. These are not always uniformly offered in combined modality clinics.

Options for radiotherapy services:

- The Albury /Wodonga region would be the only regional area which could justify the establishment of a new radiotherapy centre.
- The full development of Ringwood Radiotherapy Centre in the provision of high quality radiotherapy services to the outer eastern suburbs should be considered rather than another service in the same demographic region e.g., the Knox.

Major Issues and recommendations:

- The provision of radiotherapy services in Victoria has been badly handled.
- The Health Department's planning report means that PMCI, EMROC, and the Alfred Hospitals had eleven machines situated well away from the geographical centres of population.
- Radiotherapy services should only be provided to remote and rural areas where:
 - there is sufficient catchment population to supply an adequate number of cancer cases approx. 450 new cases; and
 - there is existing oncology infrastructure to supplement a radiotherapy facility.
- The more high-powered technologies, research etc. should be concentrated in the main centres and funding should be along those lines, rather than as service providers.
- Institutes such as PMCI should play a vital role in developing, refining and gaining experience in new high cost technological and fostering academic oncology and research.
- By taking advantage of advanced planning and simulation techniques, satellite services could deliver treatment in exactly the same way as if it were on site at the larger centre.
- Radiotherapy providers should refer more difficult /complex cases requiring treatment technologies available only at a central tertiary academic institute.
- The conduct of clinical trials should be on multi-centre basis, using both private and public radiotherapy facilities.

C2.2 RINGWOOD PRIVATE HOSPITAL

This centre services the outer eastern region of Melbourne. It is located in a 50-bed hospital in the eastern suburb of Ringwood and is a satellite of the main east Melbourne site. It has a specialist Oncology Unit, including Day Therapy and Radiotherapy Unit and is run in partnership with the East Melbourne Radiation Oncology Centre.

Demand for cancer services and radiotherapy:

The service is currently providing 8,500 treatments per annum to both private and public patients. The number of aged persons 60 years and over is estimated by the year 2011 to increase to 10,000. Further east this number is expected to increase to 20,000 which would strongly support the need for decentralised cancer services in the Ringwood area.

Supply and configuration of radio therapy technology:

Radiotherapy is provided by East Melbourne Radiation Oncology Centre. Stage two of its development plan will include a 2 machine fully equipped stand-alone radiotherapy department, rather than function as a satellite of the Eastern Melbourne Centre. This development is on hold due to the possibility of a two-machine radiotherapy unit being established at the proposed new Knox Public Hospital. This proposed service is described as potentially serving the same population, and will lead to duplication of services.

The service has 7 medical oncologists and 6 radiation oncologists providing expertise in a wide range of cancers. Other services at the hospital include two new operating theatres; a day surgery unit; medical surgical wards; a radiology department; pathology; nuclear medicine; allied health services. Its strengths are in three major treatment modalities for cancer surgery, chemotherapy and radiotherapy. It provides palliative care with an emphasis on home care.

Options for radiotherapy services:

A specialist oncology department could essentially be situated at Maroondah. This would eliminate the need to duplicate services in the proposed new Knox Public Hospital development.

There is a need for decentralised cancer service in the Ringwood area. Given the major investment already undertaken at Ringwood and the plans for expansion of the existing services, there are potential synergies which would be of benefit to the Victorian government with associated decreased capital costs and operational efficiencies

Major issues and recommendations:

- There is a need for decentralised cancer service in the Ringwood area.
- A specialist oncology department could essentially be situated at Maroondah.
- This proposed new Knox hospital service is not supported.

C2.3 Mercy Hospital, Albury

The Mercy Hospital in Albury already proposes the establishment of radiotherapy service in Albury. In addition this hospital proposes to strengthen its role in community and inpatient

aged care, rehabilitation and palliative care services. The catchment population is 481,122, which comprises the population of Albury, plus the populations of the Murrumbidgee and 50% of the population within a 2-300 km radius.

Demand for cancer services and radiotherapy:

The defined catchment area is a 200kms radius around Albury. It is estimated that newly diagnosed cases are likely to increase from current projection of 1,584 cases to 1,800 by the year 2000.

Supply and configuration of radio therapy technology:

There are no local radiotherapy services. Current service provision is fragmented with radiotherapy services supplied outside the region, chemotherapy at the Albury Hospital, palliative care at the Mercy Hospital and surgical services at variety of centres.

Consumer issues:

Concern was expressed that people within the Albury region have long suffered isolation from radiotherapy services. This, it is emphasised, is in spite of the Lovell Report (1985) recommending radiotherapy services in the Albury region.

The submission stressed that at both a national and local level the rates of radiotherapy treatment are well below overseas rates. The explanation for lower utilisation rates at a national level is believed to apply equally to regional centres like Albury. Some issues relate to: a lack of understanding of its effectiveness compared to other treatments; insufficient medical education at undergraduate and postgraduate levels; lack of knowledge about the effectiveness of radiotherapy; and poorer access to services for patients living outside metropolitan areas.

Further issues highlighted were that the restrictions and inflexibility of the regulations of the Patient Accommodation and Transfer Schemes (PATS) indicate overall funding inadequacies. Daily or weekly travel, accommodation, meals and loss of earnings result in substantial out of pocket costs to patients and carers, especially as most PATS are based on single treatment and not on repeated visits.

Options for radiotherapy services:

Based on the recent AHTAC working paper recommendations of 404 new patients per linear accelerator, the population projection supports the future implementation of 2 machines.

Geographically integrated services need to be developed combining radiotherapy; chemotherapy; surgery; mammography and palliative care services in the area.

The Mercy Hospital could provide suitable support accommodation in the current nursing home facility.

Key issues and recommendations:

There is a need for radiotherapy services in Albury with a 2-machine unit. Services should be geographically integrated, combining radiotherapy; chemotherapy; surgery; mammography and palliative care facilities. This would provide care in multi-disciplinary, multi-modal setting. In addition to direct service in the area, the facility would ideally have access to suitable carer accommodation, as a high percentage of the proposed catchment would be travelling distances for treatment.

The fragmentation of current referral trends also leads to difficulty in the management of patient care, as some patients are referred to Sydney or Melbourne or Canberra.

Medical practitioners in the area are not provided with adequate patient follow-up reports to enable a more cohesive form of care.

Patient assistance schemes for rural patients still leaves the patient financially out of pocket.

C2.4 St. Frances Xavier Cabrini Hospital

The Cabrini Hospital is a private facility in Malvern that provides a full range of oncology services including surgical and medical oncology.

Demand for cancer services and radiotherapy:

Radiotherapy services at Cabrini Hospital would ensure continuity of care for over 5,000 cancer related surgical separations and 7,000 chemotherapy separations. These patients are currently treated at the William Buckland Centre.

Supply and configuration of radio therapy technology:

No radio therapy services are provided at Cabrini Hospital. The Alfred Hospital provides radiotherapy for the majority of the Cabrini Hospital patients.

Consumer issues:

Access to radiotherapy services is described as a significant concern for patients and families, community and clinicians. The ability to provide these services under the one umbrella has been a major demand of oncologists and consumers.

Options for radiotherapy services:

A number of options have been described for the Cabrini Hospital catchment area. One is that the Cabrini Hospital provide an on site service to full capacity i.e., four linear accelerators and becomes a tertiary referral service for private and potentially for public patients requiring radiotherapy.

A second, and the more favoured option, is that the Cabrini Hospital start with one machine with expansion to two, linking in to the Alfred or Freemasons Hospitals for technical and specialist support.

Key issues and recommendations:

Cabrini Hospital starts with one machine with expansion to two, linking in to the Alfred or Freemasons Hospitals for technical and specialist support.

The Cabrini Hospital becomes a tertiary referral service for private and potentially public patients requiring radiotherapy with a full capacity of four linear accelerators.

C2.5 St. John of God Hospital / Ballarat Health Services

Ballarat is a city of 83,000 and is the focus for delivery of medical services in western Victoria. It has an area population of 250,000. The Ballarat Health Service is the largest health service provider in regional Victoria, with 1,067 acute, sub-acute and extended care beds. The St. John of God Hospital, Ballarat has 224 beds and is the largest private hospital.

Demand for cancer services and radiotherapy:

Ballarat is the major referral centre for the Grampians Health Region from South-western and the Loddon-Mallee region. It has a resident population of 475,000 with projections of 510,00 by 2006 to 2016. The estimated new patients requiring services at the Ballarat radiotherapy centre would be 493 in 96, 577 in 2006 and 693 in 2016. It is also estimated that the population 65+ will increase from 108,967 in 1996 to 182,150 in 2016. There is also an unsatisfied demand for radiotherapy palliative treatment. The demand of Western Victoria can no longer be easily sustained by the Geelong service.

Supply and configuration of radio therapy technology:

Ballarat Health Services have offered radiation Oncology for many years supported by Geelong services. The East Melbourne radiotherapy service conducts a private radiotherapy clinic attached to St. John of God Hospital. There are currently two specialist oncologists resident and practicing in Ballarat in a group practice.

Consumer issues:

The community is inadequately provided with radiotherapy services. The concentration of radiotherapy resources in the inner eastern regions of Melbourne is described as inequitable.

Options for radiotherapy services:

A service is located on the site of St. John of God Hospital on land leased from the hospital.

Capital cost, maintenance and purchasing agreements could be funded jointly by the St. John of God and Ballarat hospitals.

The unit would be initially run with one machine unit with room for a second machine, which would be needed 18-24 months after commissioning.

Major issues and recommendations:

Ballarat is the prime location for a regional service to be established which would be developed and run in partnership between the public and private sectors.

The demand for the Western Victoria can no longer be easily sustained by the Geelong service.

St. John of God Hospital Ballarat currently holds funds in trust from a public appeal for radiation oncology services. The Minister granted conditional license for the provision of radiation oncology services in 199E2.

An integrated oncology service would be an extension of the program already in place in the other specialties.

A shared training position with a Melbourne facility would be feasible

The establishment of a service in Ballarat requires the redistribution of resources in the public sector, principally from Geelong Hospital, which currently treats a large number of patients from the region.

Overview

The submissions represent a broad cross section of service providers. Four of the submissions represented area service networks; three were joint submissions representing a proposed partnership between a private provider and a public regional service, and two were from private facilities. In addition one submission was from a metropolitan public facility and another came from an individual radiation oncologist working in both private and public sector radiotherapy services.

Many of submissions made reference to statewide issues and matters of overall radiotherapy service policy, planning and service provision. The focus for most respondents however, was on presenting argument and insights about their own current radiotherapy service arrangements and their forecast needs.

Common themes:

Submissions to this Review repeat many planning imperatives and recommendations of the 42 reports, inquiries and recommendations on radiation oncology services undertaken nationally since 198E2. Many recurring recommendations contained in the submissions, echo the most recent major National inquiry i.e., the AHTAC report on Beam and Isotope Therapy (1996). The common recurring recommendations in this Review and the 1996 AHTAC report were:

- That patients are best served by a network of integrated facilities which provide care in multi disciplinary; multi modality setting;
- Strong linkages between the public and private sectors should be established and supported to facilitate quality assurance activities, education opportunities and maximise efficiency opportunities
- Current radiotherapy facilities should be expanded progressively to allow for the continued growth in the need for radiotherapy services;
- Evidence based best practice guidelines for the use of radiotherapy in the management of cancer should be developed;
- Particular attention should be placed on increasing access and referral rates to radiotherapy of people living in rural and remote areas;

- Quality of life issues and consumer perspectives should be acknowledged as highly significant indicators in the assessment of outcome of treatment .

Consumer issues

Consumer concerns and equity in access to services attracted considerable comment across nearly all submissions. In addition consumer issues are included in each of the summary sections below. Most submissions affirmed the view that information regarding the value of radiotherapy in enhancing quality of life in patients with cancer, should be widely disseminated to both consumers and providers. Up to date provider education on radiotherapy diagnosis, treatment and prognosis was seen as essential.

It was firmly argued in the majority of submissions that the availability of family accommodation near the treating facility is critical to rural access. Rural patients in Victoria are reported to be disadvantaged in access to radiotherapy services. The issues of age; personal support systems; transport and accommodation and 'rurality' are described as key factors to be considered in the likely use of radiotherapy facilities.

The ability to provide a range of integrated cancer care services, including radiotherapy services under the one umbrella has been a major demand of oncologists and consumers across rural and metropolitan consumers.

It was reported that patients accessing radiotherapy from just two regions outside metro Melbourne incurs a cost to the State of up to \$E1.2 million annually in VIPTAS. Daily or weekly travel, accommodation, meals and loss of earnings also result in substantial out of pocket costs to patients and carers.

The submissions indicated that the number of patients undergoing radiotherapy from country areas is less than city dwellers, possibly between 5-10% fewer. This is endorsed in number of national reports and was reported to be the case in three rural regions where patients have to travel to Melbourne or Geelong for therapy. Of considerable concern in two submissions were reports that patients have chosen more radical surgery e.g., mastectomy, as opposed to the clinically preferable lumpectomy and radiotherapy, rather than go to Melbourne for radiotherapy.

Almost all the submissions emphasised that the provision of radiotherapy within an integrated acute hospital setting is more conducive to quality continuity of care. Patient and carer access to a range of ancillary services was emphasised as essential to providing quality of care and best treatment outcomes. Such services were cited as specialist nursing; dietary; psychosocial care; rehabilitation and palliative care are also routinely required and must be coordinated.

Service design issues - Integrated comprehensive cancer care centres

It was forcefully argued in three submissions from both public and private sectors that the current centralised arrangements for radiotherapy services contravene modern medical practice, in which multi-modality therapy is delivered by teams. It was firmly held that the integration of different treatment modalities within one diagnostic and care planning process provides a high degree of patient satisfaction, whilst providing optimal cancer care.

It was agreed that the provision of radiotherapy treatment and planning should be considered separately, as there are greater opportunities for decentralising radiotherapy treatment than for planning.

The majority of submissions affirmed a statewide model of integrated comprehensive cancer care centres and cancer units as an optimal model for Victoria. There was general endorsement

that a comprehensive cancer centre's role should be to provide a comprehensive range of clinical services to patients, with referral links to tertiary centres for more complex treatment. Broader links with primary and non-acute services are also important to enhance options for both patients and their carers. This includes links with GPs, palliative care services and domiciliary providers.

Stand-alone services were seen as reducing the profile of radiotherapy within the health system and impeding the interaction of specialists in promoting optimal use of radiotherapy.

One public sector group argued that comprehensive cancer centres could develop specialised roles and increase the benefits from increased sub-specialisation. This would enhance the development of enhanced clinical protocols for both common and rare or complex conditions. The benefits that could be achieved include both improved clinical outcomes, such as survival and quality of life, and improved allocative efficiencies across all cancer therapies.

Rural and regional priorities

There was substantial support for radiotherapy services in Albury/Wodonga for a one or two machine unit. It was further agreed that services should be geographically integrated, combining radiotherapy; chemotherapy; surgery; mammography and palliative care facilities. This would provide care in multi-disciplinary, multi-modal setting. In addition to direct service in the area, the facility would ideally have access to suitable carer accommodation, as a high percentage of the proposed catchment would be travelling distances for treatment.

Submissions from rural and regional areas indicated that the fragmentation of current referral trends leads to difficulty in the management of patient care, as some patients are referred to Sydney or Melbourne or Canberra. Medical practitioners in the area are not provided with adequate patient follow-up reports to enable a more cohesive form of care. Concern was expressed that patient assistance schemes for rural patients still leave patients financially out of pocket.

In keeping with strong arguments for decentralisation, it was asserted that rural centres should be developed with sufficient expertise to treat more common cancers. They should have ties back to a comprehensive integrated cancer centre for more specialised care.

The lower national and local rates of radiotherapy treatment compared to overseas levels attracted considerable comment. It was argued that lower utilisation rates both nationally and in Victoria relate to:- a lack of understanding of its effectiveness compared with other treatments; insufficient medical education at undergraduate and postgraduate levels; lack of knowledge about the effectiveness of radiotherapy; and poorer access to services for patients living outside metropolitan areas.

Funding issues

State and Commonwealth funding inconsistencies attracted some comment. Service providers argued for funding models that are consistent, transparent and based on uniform and appropriate measures of resource consumption. Funding should be provided on benchmark performance and treatment outputs and not differentiated between inpatient and outpatient classifications.

Respondents argued that the financing of capital and recurrent costs needs to consistently identify the roles of both State and Commonwealth governments and so enable a consistent framework for other forms of revenue generation.

Both public and private submissions supported competitive options for the provision of radiotherapy services to public patients through the private sector in contractual arrangements e.g., to fund leasing of equipment. It was argued that the cost of depreciation and a requirement to see a return on investment could be added to current State funding models. Essentially it was affirmed that the provision of public radiotherapy services through the private sector, can only be competitive when anomalies in funding are addressed between the public and private sectors.

There was also support for the need to correct the inequity in the billing arrangements where some centres are allowed to bulk bill and some are not. In summary, all radiation oncology centres should be extended the facility to bulk bill. One suggestion was for all public radiation oncology centres in Victoria to contribute into a central pool from the funds that they retain from bulk billing and from HPGs.

Priorities for Geographic Locations:

The current concentration of radiotherapy services in the inner Eastern Melbourne suburbs was noted as resulting in diminished access to services. There was almost universal support for the development of decentralised services in accordance with the minimum service configuration specified by AHTAC.

Further it was consistently argued that these services be developed with strong affiliations with the state's leading centres to take advantage of shared training positions and treatment planning facilities. There was consensus that services should be collocated in hospitals providing medical and surgical oncology and an appropriate range of ancillary support services.

Areas of conflict

Before proceeding with the summary of the submission's proposed radiotherapy site developments, it is necessary to point out some areas of contention. The priorities for the location of expanded radiotherapy services were the main, and obviously the most significant area of contention in the submissions.

Some conflicting opinions involved the location of non-metropolitan centres,. Proposals were advanced for rural services in a number of Victorian regional centres, while other submissions maintained that SMUs should not be considered an option. The possibility of a service in the Albury/Wodonga region was more broadly supported, with some claims that it could support a two machine unit.

It was also argued that the AHTAC projections to the year 2000, are based on questionable data, in that the average number of attendances per course was overestimated. It was also asserted that the report did not examine in sufficient detail, the current body of opinion that argues that many radiotherapy courses could be shortened. Both of these comments, if true, may reduce an estimate of demand.

The proposed new Knox Hospital service, whilst well supported by one major metropolitan network, was generally not well supported due to the perceived duplication of current services delivered by the Ringwood centre.

Finally, the role of the PMCI attracted much comment. While most services acknowledged the leadership role of PMCI in radiotherapy service and its potential to develop as a principal centre, it was contested that this role should not need to extend to a management role which would stifle efficiencies and reduce innovation.

Consensus was however achieved on the suggestion that the PMCI should play a vital role in developing, refining and gaining experience in new high cost technology and academic research.

Policy and planning imperatives

It was generally agreed that the provision of radiotherapy services in Victoria has been badly handled. A key example of poor planning was cited in the 'Plan for Metropolitan Health Care Services' (October 1996) which essentially meant that the PMCI, EMROC, and the Alfred Hospitals had eleven machines situated well away from the geographical centres of population.

There was general endorsement for the further development of integrated comprehensive cancer care centres and cancer units as an optimal model for Victoria. Other suggested policy imperatives related mainly to best practice issues. Key issues were:

- Stand alone services reduce the profile of radiotherapy within the health system and impede the interaction of specialists in promoting optimal use of radiotherapy .
- There is a need to have some concentration of specialist expertise for care of complex conditions. Comprehensive cancer centres could further develop subspecialisation within a multi-disciplinary approach.
- The more high-powered technologies, research etc. should be concentrated in the main centres and funding should be along those lines, rather than as service providers.
- Radiotherapy services should only be provided to remote and rural areas where there is sufficient catchment population to supply an adequate number of cancer cases approx. 450 new cases; and where there is existing oncology infrastructure to supplement a radiotherapy facility.
- Treatment protocols be readily available to all practitioners.
- Satellite services should deliver comparable treatment to larger centres, by taking advantage of advanced planning and simulation techniques.
- Reliable data management should be priority.
- The conduct of clinical trails should be on multi-centre basis, using both private and public radiotherapy facilities.

APPENDIX D: CANCER INCIDENCE IN VICTORIA BY SITE, 1993

	<i>0-14 years</i>	<i>Adult</i>	<i>Total</i>
<i>Bowel</i>	1	2,619	2,620
<i>Prostate</i>	-	2,609	2,609
<i>Breast</i>	-	2,186	2,186
<i>Lung & Larynx</i>	-	1,980	1,980
<i>Skin</i>	1	1,250	1,251
<i>Other & ill defined sites</i>	24	1,007	1,031
<i>Bladder</i>	-	829	829
<i>Non-Hodgkins lymphoma</i>	10	724	734
<i>Liver, Gallbladder & Pancreas</i>	2	631	633
<i>Stomach & small intestine</i>	-	530	530
<i>Leukaemia</i>	44	394	438
<i>Other female reproductive</i>	1	413	414
<i>Kidney</i>	6	401	407
<i>Lip, mouth & tongue</i>	-	371	371
<i>CNS</i>	26	336	362
<i>Bone & connective tissue</i>	10	287	297
<i>Ovary</i>	-	283	283
<i>Oesophagus</i>	-	250	250
<i>Cervix</i>	-	249	249
<i>Multiple Myeloma</i>	-	199	199
<i>Pharynx & Nasal Cavities</i>	-	161	161
<i>Testis & Penis</i>	2	153	155
<i>Hodgkins Disease</i>	5	94	99
<i>All Tumors</i>	132	17,956	18,088

Source : ACCV

APPENDIX E — Analysis of Regional cancer incidence (1992-1994 inclusive) by major site
 (expected cancers based on Statewide standardised incidence by age and sex)

		<i>Barwon-South</i>	<i>Gipps-land</i>	<i>Gramp-ians</i>	<i>Hume</i>	<i>Loddon Mallee</i>	<i>Metro Eastern</i>	<i>Metro Northern</i>	<i>Metro Southern</i>	<i>Metro Western</i>	<i>Total</i>
<i>Bowel Cancer</i>	Exp	661	463	393	447	555	1,717	1,148	1,917	765	8,066
	Act	645	506	381	470	504	1,633	1,044	2,018	865	8,066
	Ratio	0.98	1.09 *	0.97	1.05	0.91 *	0.95 *	0.91 *	1.05 *	1.13 *	1.00
<i>Breast Cancer</i>	Exp	540	386	326	380	459	1,505	1,014	1,600	697	6,906
	Act	498	336	269	381	378	1,538	950	1,814	742	6,906
	Ratio	0.92	0.87 *	0.82 *	1.00	0.82 *	1.02	0.94 *	1.13 *	1.06	1.00
<i>Lung Cancer</i>	Exp	467	328	276	315	391	1,198	807	1,339	536	5,657
	Act	433	374	279	356	327	918	850	1,390	730	5,657
	Ratio	0.93	1.14 *	1.01	1.13 *	0.84 *	0.77 *	1.05	1.04	1.36 *	1.00
<i>Prostate Cancer</i>	Exp	612	426	359	405	509	1,518	1,021	1,756	670	7,277
	Act	464	344	276	524	456	1,530	900	2,038	745	7,277
	Ratio	0.76 *	0.81 *	0.77 *	1.29 *	0.90 *	1.01	0.88 *	1.16 *	1.11 *	1.00

		<i>Barwon-South</i>	<i>Gippsland</i>	<i>Grampians</i>	<i>Hume</i>	<i>Loddon Mallee</i>	<i>Metro Eastern</i>	<i>Metro Northern</i>	<i>Metro Southern</i>	<i>Metro Western</i>	<i>Total</i>
<i>Major sites (Sub-total of above)</i>	Exp	2,279	1,603	1,354	1,547	1,915	5,939	3,989	6,611	2,668	27,906
	Act	2,040	1,560	1,205	1,731	1,665	5,619	3,744	7,260	3,082	27,906
	Ratio	0.90 *	0.97	0.89 *	1.12 *	0.87 *	0.95 *	0.94 *	1.10 *	1.16 *	1.00
<i>Other Cancers</i>	Exp	2,214	1,550	1,324	1,505	1,859	5,660	3,898	6,507	2,681	27,199
	Act	2,057	1,448	1,150	1,488	1,726	5,321	3,800	6,890	3,319	27,199
	Ratio	0.93 *	0.93 *	0.87 *	0.99	0.93 *	0.94 *	0.97	1.06 *	1.24 *	1.00
<i>All Cancers</i>	Exp	4,493	3,153	2,679	3,051	3,774	11,599	7,888	13,118	5,349	55,105
	Act	4,097	3,008	2,355	3,219	3,391	10,940	7,544	14,150	6,401	55,105
	Ratio	0.91 *	0.95 *	0.88 *	1.05 *	0.90 *	0.94 *	0.96 *	1.08 *	1.20 *	
<i>% of all cancers</i>											
<i>Bowel</i>		15.7%	16.8%	16.2%	14.6%	14.9%	14.9%	13.8%	14.3%	13.5%	14.6%
<i>Breast</i>		12.2%	11.2%	11.4%	11.8%	11.1%	14.1%	12.6%	12.8%	11.6%	12.5%
<i>Lung</i>		10.6%	12.4%	11.8%	11.1%	9.6%	8.4%	11.3%	9.8%	11.4%	10.3%
<i>Prostate</i>		11.3%	11.4%	11.7%	16.3%	13.4%	14.0%	11.9%	14.4%	11.6%	13.2%

* actual incidence outside of 95% confidence interval for regional proportion of Statewide total incidence