A new ambulatory classification and funding model for radiation oncology: Non-admitted patients in Victorian hospitals

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Abstract

The Victorian Department of Human Services has developed a classification and funding model for non-admitted radiation oncology patients. Agencies were previously funded on an historical cost input basis. For 1996–97, payments were made according to the new Non-admitted Radiation Oncology Classification System and include four key components. Fixed grants are based on Weighted Radiation Therapy Services targets for megavoltage courses, planning procedures (dosimetry and simulation) and consultations. The additional throughput pool covers additional Weighted Radiation Therapy Services once targets are reached, with access conditional on the utilisation of a minimum number of megavoltage fields by each hospital. Block grants cover specialised treatments, such as brachytherapy, allied health payments and other support services. Compensation grants were available to bring payments up to the level of the previous year. There is potential to provide incentives to promote best practice in Australia through linking appropriate practice to funding models. Key Australian and international developments should be monitored, including economic evaluation

studies, classification and funding models, and the deliberations of the American College of Radiology, the American Society for Therapeutic Radiology and Oncology, the Trans-Tasman Radiation Oncology Group and the Council of Oncology Societies of Australia. National impact on clinical practice guidelines in Australia can be achieved through the Quality of Care and Health Outcomes Committee of the National Health and Medical Research Council.

Introduction

Radiotherapy services provided to inpatients in Victoria are reimbursed as part of the casemix funding arrangements introduced in public hospitals from 1 July 1993. Specialist and general services in outpatient departments play an important role in health care, including an interface between inpatient and community care. During 1996–97, casemix-based funding for non-admitted patients was introduced through the new Victorian Ambulatory Classification System. It is based on patient/clinic data in 43 clinical categories as identified in two studies of the Development of Resource Weights for Non-admitted Patients. The previous historically based outpatient funding arrangement had become increasingly inequitable due to its historical basis and changes in service organisation. It took no account of the wide variation between hospitals in the volume and mix of non-admitted patient services provided.

The Victorian Ambulatory Classification System was based on a commissioned study which developed relative resource weights for ambulatory services, including accident and emergency, by service categories and clinical specialty to reflect the different resource use associated with these services. The study excluded a costing of radiotherapy services.

In a separate exercise, the Victorian Department of Human Services has developed a classification and funding model for radiation oncology non-admitted patients. This paper discusses the new Victorian Non-admitted Radiation Oncology Classification System and the associated funding model. It covers the advantages and disadvantages of other related classification systems in Australia, the United States and the United Kingdom. Internationally, and in Australia, there is pressure on governments, hospitals and physicians to encourage cost-effective clinical practice patterns for radiation oncology treatment. The final section of the paper highlights the development of outcomes-based protocols in radiotherapy and the potential to link appropriate practice to funding models. As an interim step, it provides a review of some international and Australian evaluations of the effectiveness of radiation oncology treatment. It emphasises the need for economic evaluation studies to facilitate the development of clinical practice guidelines.

Radiation oncology: Non-admitted patient funding model for 1996–97

A system for defining and measuring the work undertaken by hospitals for non-admitted radiation oncology patients has been developed for the Alfred Health Care Group, Geelong Hospital, Peter MacCallum Cancer Institute and the Austin Repatriation Medical Centre by the department with assistance from the hospitals. Hospital costs were based on a study commissioned by the department.

Agencies were previously funded on an historical cost input basis. Most were funded as specified grants, with one funded through the outpatient non-admitted grants. In future years, all hospitals will be paid a standard rate for the key components of radiation oncology. For 1996–97, payments were made according to the new Non-admitted Radiation Oncology Classification System, but a compensation grant was also paid so that each hospital was no worse off than in 1995–96.

The payment model for 1996–97 was phased in using shadow funding and includes four key components.

- *Fixed grants* based on Weighted Radiation Therapy Services (WRTS) targets. WRTS include megavoltage courses, planning procedures (dosimetry and simulation) and consultations.
- *Additional throughput pool* to cover additional WRTS once targets are reached. Access is also conditional on utilisation of a *minimum* number of megavoltage fields by each hospital.
- *Block grants* including specified grants for specialised treatments, allied health payments and other support services.
- *Compensation grants* to bring payments up to the level of the previous year.

Fixed grants

The Victorian Department of Human Services opted for a payment system based on a high level of unbundling (or disaggregation) of the fixed grant, after reviewing options of bundled and unbundled payments, and payments based on the Medical Benefits Schedule (MBS) and actual hospital costs.

The large variation in the number and frequency of planning procedures (dosimetry and simulation) within each *megavoltage* field band justified unbundling the procedures from the average price of courses within each field band. The seven megavoltage field bands are based on the number of fields, including 1–5, 6–20, 21–40, 41–60, 61–90, 91–120 and 121+. The methodology accommodates the wide variety of approaches to service delivery across hospitals.

The data reporting requirements are largely based on the MBS. Payments for the fixed grants are essentially based on the product of the WRTS and the unit price. The relative resource weights were derived from the average across all hospitals.

The unit price was benchmarked on the second most efficient hospital for overall service components. The model included the preliminary price per service activity unit of $104, which leaves the second most efficient hospital in a cost neutral position. The costs include each centre's salaries and wages, expenses and hospital overhead costs. Each hospital is given a target number of megavoltage fields, dosimetry, simulation courses and consultations based on 1995–96 utilisation called Weighted Radiation Therapy Services.

Funding outputs for megavoltage services at benchmark rates yield significant efficiencies. Using the benchmark of the second most efficient hospital realised potential savings of around $1.5 million or 9 per cent. The lowest cost service was 6 per cent below the benchmark chosen and the highest cost over 50 per cent above benchmark. For a hospital to obtain its total allocated unit payments it must satisfy two conditions. Firstly, it must undertake the total target number of WRTS activities for dosimetry, simulation, megavoltage courses and consultations. Secondly, it must undertake the target number of megavoltage fields for each hospital. The base target for each hospital for WRTS is based on 1995–96 throughput volumes, and summing the product of weights by the number of services across components. The use of resource weights enables adjustment for complexity of treatment and planning.

Additional throughput pool

This will be funded on the basis of megavoltage courses rather than on disaggregated individual components such as dosimetry, simulation and consultations.

A rolled up unit price of $231 has been set for this bundled component. This unit price represents a variable rate including salaries, wages and cost centre expenses, but excludes fixed overhead costs. The additional throughput pool will allow for a growth of 3 per cent, less 1.5 per cent productivity. The targets will be analysed annually because of the small growth pool.

Block grants

The system of payment through WRTS is supplemented by block grants, involving specified grants for more specialised, lower volume services such as brachytherapy, stereotactic radiosurgery and X-rays, patient accommodation and transport, and allied health services.

The period 1996–97 was the first year of implementation of the Non-admitted Radiation Oncology Classification System. As a transition year, it is too early to undertake a full-scale evaluation of the system; compensation grants were available to bring payments up to the level of the previous year. We turn now to a discussion of the advantages and disadvantages of other related classification systems in Australia, the United States and the United Kingdom.

Other developments in Australia

ICD-10

In July 1998 Australia will move to new disease and procedure classification systems for morbidity coding. It will be an Australian-modified version of the international ICD-10 (ICD-10-AM). The procedure classification is to be derived from the Commonwealth MBS, with the National Coding Centre responsible for its development. The system will be based on site, procedure type, approach and prostheses, and is called MBS–Extended (MBS-E). Its structure will be hierarchical, with the primary axis the anatomical site, and the secondary axis the type of procedure. Each MBS-E concept will be mapped back to an ICD-9-CM code to ensure the appropriate Australian National Diagnosis Related Group (AN-DRG) grouping. Radiation oncology procedures are grouped into five broad categories: external beam therapy (superficial, orthovoltage, megavoltage and stereotactic), brachytherapy using sealed sources, unsealed radioactive source (isotopes), mould room services and computerised planning (simulation and dosimetry) (National Coding Centre 1996; Roberts 1996). The Victorian Non-admitted Radiation Oncology Classification System is based on the MBS and has the capacity to easily link into ICD-10 developments and related classification systems in 1998 and beyond.

Ambulatory classification systems

There are several types of ambulatory classification systems. Key approaches involve visit-based systems and longitudinal systems classifying a series of visits, perhaps occurring over a fixed period or during an episode of illness. Further distinctions can be made between classifications based on either procedure or clinic type or a combination of these. The Commonwealth has considered 14 classification systems, most international systems. Some of these are discussed below.

Developmental Ambulatory Classification System

The Commonwealth's Casemix Development Program is developing a nationally consistent ambulatory casemix classification system called the Developmental Ambulatory Classification System (DACS), primarily for payment purposes. It uses Major Diagnostic Categories (MDCs) as its primary assignment variable, to form an Ambulatory Major Diagnostic Category (AMDC) with three DACS classes split on the basis of visit type – new, repeat or procedure. Data items specified during late 1995 include AMDC, visit type, staff type, operation room procedure, disposition (status of client at departure), triage, postcode, service contact date, establishment identifier, date of birth, sex, rehabilitation, Aboriginality, person identifier, MDC, and whether an interpreter is required.

There is a list of acceptable DACS ambulatory procedures, based on the exclusion list for day surgery. This list does not appear to include MBS items for radiation oncology. However, this list and other data items are under current development. The development of DACS could benefit from careful analysis of the MBS items included in the Victorian Non-admitted Radiation Oncology Classification System.

DACS includes AMDC 24 (Specific Treatment Modality), which includes DACS 24.03 (Radiotherapy Visit). Also, Post-AMDC includes DACS 25.04 (Stand Alone Diagnostic). The DACS pilot data include data items of time by staff type. Under allied health, there is no specific inclusion for radiation therapists (Antioch, Walsh & Anderson et al. 1996).

Australian Ambulatory Classification

The Australian Ambulatory Classification (AAC) has separate paediatric and adult components, with 78 and 121 classes respectively. It depends heavily on clinic type for assignment although some assignments are also made on the basis of diagnosis and, in emergency departments, on procedures. Allied health and diagnostic services form part of the classification but day-only surgery does not. The unit of classification is the visit to a health care professional and associated service at any single site in the hospital.

Movement of a patient to an imaging or pathology department constitutes a separate unit.

Radiation oncology is an exception; this visit includes activities relating to treatment planning and documentation, even though the patient may not present. Outpatient clinics include AAC 84 (Radiation Oncology – consultation), 85 (Radiation Oncology – radiological supervision and interpretation), 86 (Radiation Oncology – therapeutic radiology planning and device construction) and 87 (Radiation Oncology – radiation therapy). They also cover various diagnostic services such as radiographic examination of urinary tract, alimentary tract and with opaque or contrast media (AAC 115–118).

South Australian classification

This classification system is currently using a classification with 11 classes which are service types, including accident and emergency, allied health, medical obstetrics and gynaecology, paediatrics, psychiatry, surgical, radiology, radiotherapy, group and dental (Commonwealth Department of Human Services and Health 1995).

International developments: Ambulatory classification systems

United Kingdom

Healthcare Resource Groups for teletherapy and brachytherapy are based on fractions (sessions) and complexity. Teletherapy is another term used to refer to megavoltage therapy. The teletherapy treatment is classified according to complexity of the treatment and number of fractions used. Teletherapy is divided into six complexity classes, involving superficial (< 160kv), simple, simple plus simulation, complex, complex plus CT plus planning and technical support. Fractions are in five bands, including 0–3, 4–12, 13–23, 24+ and hyperfraction. Brachytherapy groups are defined according to either a high or low dose rate within three broad groups including live source, manual afterloading and mechanical afterloading. Whether an anaesthetic is used is another classification criterion. Outpatient and inpatient admission are separately identified for unsealed sources (Antioch, Walsh & Anderson et al. 1996).

United States

Current Procedural Terminology

This is a systematic listing and coding of procedures and services. Listings for radiation oncology procedures provide for teletherapy and brachytherapy and include initial consultation, clinical treatment planning, simulation, medical radiation physics, dosimetry, treatment devices, special services, and treatment management procedures.

The listings include normal follow-up care during the course of the treatment and for three months following its completion. Some radiation oncology procedure codes are determined according to the levels of complexity involved.

The complexity levels are simple, intermediate and complex. These levels for 'clinical treatment planning' are defined as follows (American Medical Association 1994).

Simple:	Planning requiring single treatment area of interest encompassed in a single port or simple parallel opposed ports with simple or no blocking.
Intermediate:	Planning requiring three or more converging ports, two separate treatment areas, multiple blocks, or special time dose constraints.
Complex:	Planning requiring highly complex blocking, custom shielding blocks, tangential ports, special wedges or compensators, three or more separate treatment areas, rotational or special beam considerations, combination of therapeutic modalities.

Ambulatory Visit Groups

The Ambulatory Visit Groups (AVG) system was the first of the ambulatory classifications constructed through iterative use of clinical and statistical appraisals. It used ICD and Current Procedural Terminology. The latter was incorporated because it was used for medical service billing for most ambulatory encounters. The AVG system only classifies single visits to doctors but *excludes* encounters with allied health care professionals and radiologists, anaesthetists and pathologists. The 19 Major Ambulatory Diagnostic Categories (MADCs) relate primarily to body system and/or medical specialty. The minimum input data include diagnosis, procedures, age, sex, patient status, supplementary reasons for visit and visit disposition (whether urgently admitted).

MADC 17 for malignancy includes, inter alia, AVG 1740 (Procedure, Radiation Therapy – set up), 1741 (Procedure, Radiation Therapy, Clinical Treatment Management) and 1742 (Procedure, Radiation Therapy, Clinical Brachytherapy). There are several lower level special cases falling principally within MADC 17. Here reassignments to other body system MADCs occur where a procedure, such as a biopsy, has its resource use determined by the body system involved rather than the malignancy. A major criticism of the AVG classification is its failure to classify encounters with non-doctor health care professionals. The system has also failed to take any account of secondary diagnoses and hence severity.

Ambulatory Patient Groups

The Ambulatory Patient Groups (APG) system was intended to address criticisms made of the AVG system and was designed as a payment system to cover day-only surgery units, emergency departments and outpatient clinics. APGs include measures of severity and ambulatory patients requiring ancillary services. They capture resource variation for drugs, supplies, ancillary tests, equipment, room and time requirements. Minimum data requirements are virtually the same as those for the AVG system but there is also the presence/absence of doctor included. The presence or absence of a significant procedure is used as the first splitting variable. Significant procedures are next broken down into various body systems which are then subdivided primarily on criteria defined by the CPT 4 codes into the APG system. The non-significant procedure classes are 'medical' and 'ancillary only'. The highest tier of the medical partition is based on the etiology of the problem that was the reason for the visit, for example, malignancy.

Ancillary services are first classified into classes such as radiology and chemotherapy and then directly into APGs. The radiology group includes APG 344 (Radiation Therapy). There are also incidental procedures including APG 475 (Radiological Supervision and Interpretation Only) and APG 478 (Therapeutic Radiology Planning and Device Construction). Medical APGs include malignancy for haematology, prostrate, lung, skin and 'other'. The APG system tends towards day-only procedures, which is not comprehensive enough for broad application across Australia. Unlike the AVG system, the APG system contains no apparent limitation on the diagnosis/procedure relationship (Commonwealth Department of Human Services and Health 1995).

Comparison of models

A key advantage of the Non-admitted Radiation Oncology Classification System is its basis on the MBS, with easy capacity to link in with ICD-10 developments in 1998. It facilitates a precise funding method, given its high precision in capturing utilisation for planning procedures, consultations and megavoltage treatment in the fixed grants and adjustments through cost weights. Inappropriate utilisation can be capped through targets used to access the additional throughput pool. Unit price has been benchmarked on the second most efficient hospital. Specialised complex treatments such as brachytherapy and stereotactic radiosurgery are separately classified and funded through block grants. In this way, Victorian centres performing complex and time-consuming treatments are not compromised.

The DACS system includes fewer radiation oncology MBS items, with radiotherapy visit included in 'stand alone diagnostic'. Categories under the AAC seem very broad, covering radiation oncology consultation; radiological supervision and interpretation; planning and device construction and therapy. The AVG system only classifies single visits to doctors but excludes encounters with allied health care professionals and radiologists, which is a major drawback.

It also ignores the secondary diagnosis and severity. APGs cover radiation therapy, radiological supervision and interpretation and planning device construction. Their advantage over AVGs is that they contain no apparent limitation on the diagnosis/procedure relationship.

Healthcare Resource Groups in the United Kingdom focus on megavoltage and brachytherapy, split into bands based on the number of fractions, and further adjusted for complexity. The complexity classes for megavoltage treatment in the United Kingdom use simulation and CT planning as classification parameters. The Non-admitted Radiation Oncology Classification System does not include planning procedures as splitting variables for the megavoltage treatment; only using the number of megavoltage fields to determine seven different bands. In the United Kingdom system, brachytherapy uses splitting criteria based on dose rate for the three groups – live source, manual/mechanical afterloading and use of anaesthetics. In Victoria the system of payment through WRTS is supplemented by additional block grants, which separately cover complex procedures like brachytherapy. The United Kingdom approach for brachytherapy may be instructive in the longer term when refinements to the Non-admitted Radiation Oncology Classification System are considered.

Finally, we discuss mechanisms to link appropriate practice to funding models, consider the need for economic evaluation studies and review some international and Australian effectiveness studies of radiation oncology treatment.

Funding models for cost-effectiveness: Lessons from the United States

Internationally, and in Australia, there is pressure on governments, hospitals and physicians to encourage cost-effective clinical practice patterns. This involves the development and application of both clinical practice guidelines and managed care (Walsh & Antioch 1995a, 1995b). Cost-effectiveness studies of technology should facilitate this process. A cost-effective research agenda can be achieved by prioritising potential technology assessment studies and extrapolating results between countries, with a sharp focus on government agenda (Antioch, Selby Smith & Hailey 1995).

Radiation oncology is a high growth area across the globe, involving growth in cost, manpower and complexity of practice resulting from sophisticated technology used for patient assessment, planning, treatment delivery and verification (Peters 1994; Hussey et al. 1996). However, technology may be exploited for competitive advantage rather than demonstrated benefit (Peters 1994). Economic analyses will increasingly be used as a means of evaluating radiation therapy (Hayman, Weeks & Mauch 1996).

Practice patterns for radiation oncology treatment should be modified where more cost-effective alternatives exist. Outcome and not process should be more important in deciding among treatment options. These changes will permit the development of guidelines for appropriate use of radiation therapy (Peters 1994).

Clinical outcomes in radiation oncology are captured through measures of Quality Adjusted Life Years of Survival and Quality Time Without Symptoms or Toxicity. Patients' subjective judgements concerning the relative importance of survival versus quality of life are excluded from the utility concept, which is problematic (Peters 1995). Similar limitations occur for utility measures used in economic evaluations of screening for colorectal cancer where 'worried well' individuals with false positive faecal occult blood test results (for colorectal cancer) may suffer a decline in health status. Such subjective judgements are not usually captured in the analyses (Antioch, Walsh & Selby Smith 1996). Economic evaluations of prostate cancer screening through Prostate Specific Antigen blood tests are also limited by the same problem (Antioch, Selby Smith & Brook, in press).

A recent Canadian survey of oncologists found that 41 per cent of respondents indicated that length of survival is more important to patients than quality of life. However, the majority felt that quality of life can, and should, be measured from the patient's perspective. Only 50 per cent indicated that currently available quality of life information is useful in clinical practice (Bezjak et al. 1997).

Thankfully, indications and practice standards have been promulgated for various procedures in the United States, such as stereotactic radiosurgery. These have been promulgated in a joint effort of the American Society for Therapeutic Radiology and Oncology and the American Society of Neurological Surgeons (Larson et al. 1993).

Further, the United States Radiation Therapy Oncology Group has stimulated radiation oncologists to become increasingly involved in prospective clinical trials. Trials conducted by the group have had a major beneficial influence on the practice of radiation oncology in the United States and have done much to promote quality control. Benchmarks have been established for conventional treatment against which new therapeutic strategies can be measured. However, only a few of these prospective randomised trials have redefined the standard of care for a major disease. For example, the superiority of combined chemoradiotherapy over radiotherapy alone has been established for unresectable oesophageal cancer (Herskovic et al. 1992).

The appropriate dose fractionation for the curative treatment of head and neck cancer is a simple yet unresolved significant issue for radiation oncology. The Radiation Therapy Oncology Group is currently conducting a comparative study of four different fractionation schedules. An important and challenging issue is determining mechanisms to link the results of good clinical trials to clinical practice, since training and institutional policy tend to impact rather than comparative clinical studies (Peters 1994). Improving the development and implementation of clinical practice guidelines for a broad range of hospital procedures is an area that the National Health and Medical Research Council is considering through its Quality of Care and Health Outcomes Committee (Antioch, Butler & Walsh 1996). The committee could be encouraged to include radiation oncology procedures on its agenda.

Peters (1994) notes that the ideal guideline is one that is evidence-based, and defines the floor of appropriate treatment and a ceiling above which treatment is wasteful. This is being tackled by the joint work of the American College of Radiology and the American Society for Therapeutic Radiology and Oncology. The effective implementation of guidelines will be affected by utilisation review processes to monitor compliance with established guidelines (Peters 1994).

In Australia the Trans-Tasman Radiation Oncology Group and the Council of Oncology Societies of Australia also encourage best practice. There have been some Australian treatment outcome studies that could provide the foundation for possible economic evaluation studies in the longer term. O'Brien (1996) of the Newcastle Mater Hospital, New South Wales, reviewed the literature on tumour recurrence or treatment sequelae following radiotherapy for larynx cancer. He found that 50 per cent of patients with severe oedema or necrosis following radiotherapy for larynx cancer will have recurrence.

Less than 10 per cent of all larynges removed will be histologically negative when persistent or recurrent tumour is suspected clinically or indicated by biopsy following radiotherapy.

Retrospective Australian reviews of treatment effectiveness have been undertaken. Christie and Tiver (1996) studied the effect of radiotherapy for melanotic freckles and found that radiotherapy is safe and effective, provided doses of 44 Gy in 11 fractions or more are given. A study by Christie, Cahill and Barton (1996) of primary bone lymphoma (osteolymphoma) treated with radical radiotherapy supported the use of the therapy alone, using doses of 45–50 Gy. The inclusion of the whole bone or regional nodes in the irradiated volume did not appear to improve results. The survival of patients with biliary tract carcinoma treated with iridium-192 brachytherapy was studied by Leung, Guiney and Das (1996), who found that the median survival was 23 months and that 61 per cent of patients survived one year. They concluded that it is a safe and effective treatment for biliary tract carcinoma but a comparison between surgery and stenting would have been useful. The relatively high cost of brachytherapy should be carefully analysed (Leung, Guiney & Das 1996).

Barton and colleagues (1996) undertook a major review of Australasian studies for Stage I and IIA Infradiaphragmatic Hodgkin's Disease treated solely by irradiation. Ten radiation oncology centres from within Australia and New Zealand were surveyed for patient, tumour and treatment variables. They found that staging laparotomy does not appear to be indicated. The rate of control in Infradiaphragmatic Hodgkin's Disease could be improved by avoiding involved field irradiation or by aggressive therapy with total nodal irradiation or combined modality chemo-irradiation in Stage II disease.

Conclusion

There is potential to provide incentives to promote best practice in Australia and elsewhere through linking appropriate practice to funding models. Economic evaluation studies should be encouraged to identify best practice. There will be great benefit in carefully monitoring several international developments in radiation oncology, cost-effectiveness studies, classification and funding models and the deliberations of the American College of Radiology and the American Society for Therapeutic Radiology and Oncology in developing clinical practice guidelines. National impact can be further achieved through the Quality of Care and Health Outcomes Committee, associated medical associations, the Trans-Tasman Radiation Oncology Group and the Council of Oncology Societies of Australia.

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