

# **DETAILED REVIEW OF FUNDING FOR DIAGNOSTIC IMAGING SERVICES**

**RESPONSE TO DISCUSSION PAPER**

MAY 2010









## Table of Contents

---

1. Executive Summary .....	3
2. ADIA Recommendations .....	7
3. A Fairer Funding Model for Patients from 2011-12 .....	11
4. Diagnostic Imaging Funding Saves Lives.....	12
5. The Review in Perspective .....	14
6. Access Economics - 2008 Study of the Costs of Diagnostic Imaging.....	16
7. Access Economics - 2010 Study of the Costs of Diagnostic Imaging.....	17
8. UBS Equity Research - Data on Industry Returns.....	19
9. Key Issues for the Review .....	20
Attachment 1 Diagnostic Imaging Modalities.....	24
Attachment 2 The Importance of Quality Diagnostic Imaging – The Patient’s Perspective .....	27
References.....	36



## 1. Executive Summary

ADIA calls on the Government to adequately fund patient access to quality diagnostic imaging services (DI) in comprehensive practices. Patients and their treating doctors need to have confidence in the network of DI comprehensive practices that provide DI services.

- ❖ ADIA represents comprehensive radiology practices located in hospitals and in communities across Australia. There are around 600 comprehensive practices located within 25km of 90% of Australia's population.
- ❖ Member practices and member groups offer a comprehensive range of medical and DI services to referrers and patients. These services (described in **Attachment 1**) encompass the following DI modalities:
  - General X-Ray;
  - Fluoroscopy;
  - Mammography;
  - DEXA (Bone Densitometry) scans;
  - Ultrasound services;
  - Multi-slice Computed Tomography (CT) scans;
  - Magnetic Resonance Imaging (MRI);
  - Nuclear Medicine; and
  - Position Emission Tomography (PET) services.
- ❖ On average every Australian visits a doctor about 6 or 7 time per year and is referred to a Radiologist for a DI service on 1 or 2 of these visits.
- ❖ Most DI services are required by patients while they are in the community and out of hospital. ADIA estimates that about 70% of DI services in Australia are provided under the Medicare arrangements and nearly 65% of these services are provided by

private and not for profit comprehensive practices co-located in hospitals, near specialist rooms and in the community<sup>1</sup>.

- ❖ Comprehensive practices employ a team of health professionals with expertise in the various DI modalities including radiographers, sonographers, nurses and nuclear medicine technicians. They assist the patients and ensure that the images taken meet the needs of the reporting Radiologist.
- ❖ With the exception of some of the satellite practices serving non-metro regions, these practices are generally supervised by one or more Radiologists who are specialist medical doctors with specific postgraduate training in performing and interpreting DI tests and interventional procedures.
- ❖ All DI services provided by a comprehensive practice incorporate a specialist medical report - a medical diagnosis or opinion of a Radiologist or a Nuclear Medicine Physician based on the images.
- ❖ Comprehensive practices are an **efficient** model for providing patients with access to the DI services they require as they:
  - offer a single investment in the equipment and infrastructure needed to provide a range of modalities (20% of cost including 4% for depreciation of imaging equipment);
  - have imaging equipment that is usually selected with the needs of the local community, referring doctors and their patients in mind;
  - employ the Radiologist, the health care team and practice staff required to ensure that patients have access to high quality, supervised services (59% of cost);
  - invest in the digital and other new technologies required to provide patients with the best tools for diagnosis and treatment;
  - have highly sophisticated modern computer networks, imaging and information systems and have expertise in these systems; and
  - are efficient in terms of overhead cost – in terms of rental, utilities, etc (21% of cost<sup>2</sup>).



- ❖ Referrers are able to refer their patients for the DI service they believe will lead to a confirmed diagnosis of the presenting symptoms or measure the progress of a treatment or condition. DI services are often used to “exclude” various possible conditions, for example, the referring doctor may believe that the patient has a minor ailment however needs to be sure because the symptoms are also consistent with a serious condition. Sometimes this leads to further investigation and a comprehensive practice makes this possible, efficient and convenient for the patient.
- ❖ Most DI services reveal a “normal” result, which inform the patient that they do not have, for example, a particular cancer, the bone is not broken, the abdominal pain is not due to gallstones or appendicitis, there is no blood clot, the joint pain is not due to arthritis, there is no sign of pneumonia or nerve root compression, or there is no cardiac disease. Radiologists interpret DI images to determine these normal findings which are key to patients being provided effective treatment by their GP or specialist.
- ❖ Fortunately only a small percentage of services are not “normal” and lead to the diagnosis of a condition that requires treatment. For these patients, early diagnosis is often the key to successful treatment of the condition. This is when the resources of a comprehensive practice are applied in earnest to look after the patient and to inform the referrer of the diagnosis. Often the Radiologist will call the referring doctor to discuss the diagnosis and following this consultation, additional DI services (e.g. an ultrasound guided biopsy in the case of a suspected breast cancer or a CT in the case of a fracture) may be requested to investigate the condition further. For some conditions this would be performed while the patient is in the practice. These work ups are resource intensive and can take several hours of investigation.
- ❖ Patients and referrers need to have confidence in comprehensive practices and know that they are being imaged with the right modality and that the Radiologist’s report and further investigation is effective in guiding further treatment.
- ❖ Australia’s network of comprehensive practices forms a significant part of the health care system – it is relied upon to work well, it determines the need for further care and assists in determining if treatment is working.

The 2009 Budget announcement to increase funding for bulk-billed DI services was a welcome injection of funding into the sector. It proved to be an essential lifeline to some practices which were about to close.

However, the fundamental problem – underfunding due to 10 years of neglect under the MoU arrangements, remains.

Though the Schedule could be improved, it is not a reason to radically change the system or for the Government to continue to underfund patient access to DI services. The cost of DI services in Australia is well below the cost of equivalent services overseas and this is well evidenced in the International Literature Review<sup>3</sup> commissioned by the Department of Health and Ageing. In Australia, patient rebates for DI services need to be increased and indexed if the current network of convenient, efficient and quality, ‘one-stop’ comprehensive practices is to be maintained.

## 2. ADIA Recommendations

**Quality DI services save lives and save money. Patients must be able to access affordable, timely and correct diagnosis through the most appropriate and quality DI service.**

### 1. MBS Fees (which form the basis of patient rebates) for DI Services to be increased

- ❖ The MBS fees for all DI services to be increased to reflect the cost of delivering quality DI services.
- ❖ To ensure that patient rebates remain relevant as new services become available and service costs change, ADIA supports retention of the current fee-for-service arrangements and the development of:
  - an appropriate methodology to determine MBS fees (which includes clearly defining the service which is being reimbursed);
  - an appropriate methodology to determine the cost effectiveness of a DI service; and
  - clinical indicators/restrictors to support appropriate referral for all DI services.

### 2. MBS Fees and Patient Rebates to be Indexed

- ❖ General fee increases (annual indexation) which apply to other specialist medical services should also be applied to specialist DI services.

### 3. Patient Rebates to be Equitable

- ❖ The bulk billing incentive should only apply to concession patients who should be eligible for rebates equal to 100% of the MBS schedule fee.
- ❖ Rebates for non-concession patients should remain at the current level - 85% of the MBS schedule fee.

#### **4. Patient Access to New MRI Licences**

- ❖ Patient access to MRI services to be improved with new licences for private comprehensive practices which meet eligibility criteria. These to include:
  - A service offering to patients of CT, ultrasound, x-ray, and mammography services; and
  - Attendance on site by least one radiologist for a minimum of 38 hours per week<sup>1</sup>.
- ❖ Transition arrangements for new licences and improved patient access to GP referred MRI services should be transparent and agreed with stakeholders.

#### **5. Improved Patient Outcomes with Limited GP Referral for MRI Services**

- ❖ Permit GP referral for MRI services for defined conditions, for example, brain (for suspected multiple sclerosis), spines (for acute back pain) and knees.
- ❖ Provide support for GPs to refer their patients to the most appropriate DI service through initiatives such as those of the National Prescribing Service.

#### **6. Patient Access to the most appropriate DI service**

- ❖ Government should promote patient access and usage of the most appropriate DI services through:
  - clinical indicators and restrictors;
  - referrer decision support;
  - radiologist on site supervision of patient services in comprehensive practices;
  - radiologist rights of test substitution where they believe a different test is clinically more appropriate;
  - additional funding for after hours and emergency DI services recognising the additional costs involved; and

---

<sup>1</sup> Exceptions to these criteria may be appropriate in some remote geographical locations

- support for comprehensive DI practices that offer referrers and patients the full range and choice of DI services.

## **7. Support for Patients to Access the Right Service**

- ❖ Radiologists, who are medical specialists, to be permitted to draw on their specialist knowledge and skill-base in DI and be able to substitute a referral for one investigation for a better investigation. In some cases, this might replace a requested CT with the MRI alternative.

## **8. Better Supervision of Comprehensive Practice**

- ❖ Clarify and enforce the current rules for professional supervision by a radiologist in comprehensive practices as required under the Medicare schedule.

## **9. Patient Access to PET/CT Services**

- ❖ Patients be able to access PET/CT services in a supervised comprehensive facility which offers, in addition to PET/CT:
  - Computed Tomography;
  - X-ray;
  - Diagnostic Ultrasound;
  - Medical Oncology; and
  - Radiation Oncology.
- ❖ MBS fees for all PET services to be increased to adequately cover the cost of the equipment.
- ❖ Arrangements to support an industry transition from PET to PET/CT.

## **10. Capital Costs and Capital Sensitivity**

- ❖ Government to abandon the capital sensitivity measure, as announced in the 2009 Federal Budget, and recognize that DI services are specialist medical services provide by a team of health professionals with the aid of digital imaging equipment and not vice versa.

## 11. A Single Source of Funding for all DI Services

- ❖ To address cost shifting and market distortions the Government should replace the mixed hospital and MBS funding model for DI services in public hospitals with an “opt in” model for each hospital to consider in the context of the needs and resources of the hospital and the local community.
  - **Hospital funding only (default option).** Under the default option, the hospital would be funded to provide its inpatient and public outpatient DI services under the hospital funding arrangements (which are currently under review). The hospital would not be eligible for MBS funding for any DI services.
  - **MBS only (opt in model).** Alternatively, if a hospital seeks to offer MBS funded private services as well as public services then it would be entitled to MBS funding for all patients (including inpatient services) so long as the services are provided by an independent radiology provider which commits to minimum service standards to the hospital. The funding for these hospitals would need to be adjusted recognising that DI services are already being paid for directly via the MBS.

## 12. Prohibited Practices and Joint Ventures

- ❖ Government should discourage referrers from having direct financial interests in DI practices (by way of joint venture or other arrangement) to which they refer patients and close the loophole in the Prohibited Practices legislation in respect of joint venture and shareholding arrangements.

### 3. A Fairer Funding Model for Patients from 2011-12

**If the Government was to pay the efficient cost of quality bulk billed DI services for all patients, it would require a lift in funding of around \$805M p.a.<sup>2</sup>.**

- ❖ Under ADIA's proposal the Government would pay the efficient cost for quality bulk billed services for concession patients only, which require a lift in funding of \$244M p.a.<sup>3</sup>.
- ❖ For non-concession patients, government would make services affordable (average gap of \$24 in place of current average gap of \$66) with an injection of a further \$294M p.a. Therefore, the total cost of ADIA's proposal is approximately \$538M p.a.<sup>4</sup>.
- ❖ ADIA appreciates that this represents a significant injection of funding however, the sector is operating at a very efficient level due to the pressures of competition and, if the Government had indexed DI services in line with other MBS services over the past 14 years, the additional cost per annum would be approximately \$830M p.a.

The Status Quo		
Cost of Service (based on 2011-12 projections <sup>iv</sup> )		\$162
MBS Schedule Fee		\$129
Patient Rebate	95% of MBS Fee for Bulk Billed Services	\$122
Patient Rebate	85% of MBS Fee for non-Bulk Billed Services	\$109
With Increased Funding		
Cost of Service (based on 2011-12 projections)		\$162
MBS Schedule Fee	Average increase of \$33 per service	\$162
Patient Rebate	100% of MBS Fee for Concession Patients	\$162
Patient Rebate	85% of MBS Fee for Non-Concession Patients	\$138

<sup>2</sup> Based on total number of DI services for 2008-09 and a rebate of \$162 per service for all patients

<sup>3</sup> Excluding services such as interventional procedures, fluoroscopic procedures and those provided after hours, due to the high cost of providing these services

<sup>4</sup> Based on Access Economics analysis of average bulk bill rate of 52% and average rebates

## 4. Diagnostic Imaging Funding Saves Lives

- ❖ Over the last 15 years, there has been a technology revolution in DI that has made radiology examinations essential in the management of all clinical episodes.
- ❖ Before the advent of DI, the diagnostic tools available were a hands-on clinical examination or exploratory surgery.
- ❖ These methods have now been replaced with DI modalities such as Ultrasound, CT, MRI, etc. – all of which are far more accurate and non-invasive. Diagnostic imaging is now used to triage most sick and injured patients. Exploratory surgery is now almost unheard of, and surgeons now know exactly what they are going to be dealing with in most operations due to the advancements and resolution of current DI technology.
- ❖ To illustrate the importance of DI services to patients today ADIA has prepared a table entitled: *The importance of quality DI – the patient's perspective* which is set out in **Attachment 2**.
- ❖ The table explains how DI services detect and diagnose health conditions that respond well to treatment. It highlights the importance of timely access to the right DI services and how correct diagnosis saves lives, keeps patients out of hospital and how underfunding puts lives at risk.
- ❖ For example:
  - DI services are used to diagnose most cancers and help patients beat or slow the growth of cancer through early detection and treatment;
  - For a newborn, the absence or lack of access to an ultrasound could mean a missed baby hip dysplasia. Without ultrasound and early detection such a condition is very painful, difficult and expensive to treat. Without early detection, the baby faces months and possibly years of distressingly invasive procedures to correct the condition;
  - A patient who presents with a suspected brain tumour needs urgent access to an MRI. Access to MRI services is essential to manage cancers appropriately.



- ❖ In a 2008 Report, The Value of Diagnostic Imaging, Access Economics reached the following conclusions:

*“The analysis demonstrates the substantial contribution that DI makes to health outcomes in Australia – in priority health areas such as preventing injuries (fractures), musculoskeletal disease (knee derangement), cardiovascular disease (AAA), cancer (of the breast), neurological disease (MS) and digestive disease (appendicitis).*

*Without these diagnostic techniques, a less optimal allocation of resources and health outcomes would be achieved. In the top two interventions above, health costs are higher and health outcomes worse without DI. In the other cases, Australians achieve better health outcomes very cost effectively as a result of DI.*

*Notably, all the DI interventions focus on prevention and early intervention, a policy priority in Australia. Many of the interventions analysed are already part of public health programs in Australia.*

*In conclusion, all the case studies demonstrate the value of DI services in cost effectively contributing to enhanced health outcomes in Australia.”<sup>iv</sup>*

**In short, the more the Government spends on appropriate imaging - potentially the more the Government saves in other areas of the health system.**

## 5. The Review in Perspective

### Background

- ❖ Between 1998 and 2008 Medicare expenditure on Radiology services was managed through capped MoU funding agreements between the Government, The Royal Australian and New Zealand College of Radiologists (RANZCR) and Australian Diagnostic Imaging Association (ADIA). The outcome of this arrangement was to keep patient rebates at their 1998 levels for 10 years.
- ❖ This was a particularly effective mechanism for containing government expenditure on DI. However, this cost containment came at the expense of patients' access to quality and affordable services and the viability of the industry.
- ❖ Over this period comprehensive practices have experienced relatively flat service and revenue growth which, when coupled with the non-indexation of fees, increasing costs and a growing shortage of radiologists and sonographers, has reduced practice viability. The sector has experienced practice closures and service closures in regions that could ill afford to lose their service.
- ❖ Against this background, and notwithstanding the freeze on rebates, the private DI sector has continued to provide patients access to services in the interests of patient care and medical professionalism.

### The Problems

- ❖ ADIA has outlined the problems it believes the DI sector is facing in the following Submissions made to the Government:
  - ADIA Submission to the Interdepartmental Committee on the Strategic Review of Future Funding Arrangements for Diagnostic Imaging and Pathology Services (November 2008);
  - *A New Funding Framework for Funding Diagnostic Imaging Services in Australia*, Access Economics (October 2008);
  - *The Value of Diagnostic Imaging*, Access Economics (March 2008);

- *Diagnostic Imaging Services — Looking Forward: Four pillars of policy for diagnostic imaging services*, endorsed by ADIA, The RANZCR and Australian Sonographers Association;
- *Investing in the Australian DI Sector (2007 Data)*, Independent Investment Analyst; and
- ADIA Submission to the National Health and Hospitals Reform Commission (NHHRC) (2008).

### **More Equitable Funding Arrangements are Overdue**

- ❖ ADIA believes the following structural changes are key to ensuring ongoing patient access to quality DI services:
  - Introduction of annual indexation of patient rebates for DI services;
  - An increase in patient rebates (especially for concession patients) to reflect the cost of services;
  - Improved patient access to MRI services with GPs having the right to refer for certain MRI services and funding for established MRI services that currently do not attract MBS funding;
  - A single source of government funding for all DI services (GP and specialist referred services as well as for hospital inpatients and hospital outpatients) to simplify the system for patients and to remove the inefficiencies and distortions caused by cost shifting; and
  - Improved enforcement measures to protect patients from poorly supervised services and inappropriate imaging.

## 6. Access Economics - 2008 Study of the Costs of Diagnostic Imaging

**In 2005-06 the average loss on Medicare exams was \$1.50 and 49.5% of sites were making losses on Medicare exams.**

*In 2005-2006, across all services covered by the Radiology MoU, average unit costs outweighed average per unit MBS revenue. The total cost per exam in 2005-2006 was \$115.70. Including Medicare fees and gap charges, the total revenue per exam was \$126.30.*

*However, focusing on those exams that were Medicare eligible, the average cost per exam was \$114.80, and the average revenue per exam was \$113.40 – a loss of \$1.40 per exam. Unit costs were higher than average MBS revenue at 49.5% of sites.*

*Some of the survey responses contributing to these estimates had more than one LSPN. At individual sites (i.e. when responses with more than one LSPN are removed from the analysis), the average loss on Medicare exams was \$1.50 and 49.5% of sites were making losses on Medicare exams.*

*Variation in unit costs across practices reflect differences in the efficiency with which practices are managed, service quality (e.g. longer vs. shorter time spent with patients) and the potential for economies of scale at sites with higher throughput<sup>vi</sup>.*

## 7. Access Economics - 2010 Study of the Costs of Diagnostic Imaging

**In 2008-09 the average loss on Medicare exams was \$33 (i.e. 23%) and 89% of practices were making losses on Medicare exams.**

**By 2011-12 the average loss on Medicare exams is estimated to be \$53 (i.e. 29%) and more than 89% of practices will be making losses on Medicare exams.**

*A survey of ADIA members was undertaken. Responses accounted for nearly 6.5 million services in 2008-09, of which 87% were Medicare-funded. The results reflect 76% of ADIA member practice sites, 50% of comprehensive practices<sup>5</sup>, more than one-third of Medicare (DIST) services and outlays in 2008-09, and approximately one third of Medicare eligible MRIs. All States and Territories were represented and all Australian Standard Geographic Classification (ASGC) remoteness regions. The results therefore provide a robust representation of comprehensive practices in Australia.*

*In 2008-09, average rebates did not cover average unit costs (including a market return on equity) for any modality. The survey showed that, if all Medicare services were bulk billed in 2008-09, Medicare rebates for Medicare services would not cover costs at the vast majority (89%) of practices. This is notwithstanding that unit costs were calculated based on total throughput, not just Medicare throughput, allowing the government to capture the benefits of economies of scale.*

*A bulk billing incentive payment was introduced in November 2009. Even if the incentive applied to all Medicare services, average rebates would not cover average unit costs and private practices would still need to charge gaps in order to remain viable.*

*For private sector DI providers to remain viable, the difference between average Medicare rebates and DI provider unit costs needs to be paid by patients. In 2008-09, the difference between private DI provider costs and Medicare rebates paid by*

---

<sup>5</sup> A comprehensive practice has at least three modalities.

*Australian patients would have been around \$360 million. By 2011-12, Australian patients will pay approximately \$540 million as the difference between private DI provider costs and average Medicare rebates (including the bulk billing incentive). This latter estimate is conservative because it does not incorporate the effect of population ageing.*

*The Government has indicated that the first chance for rebates to be increased will be in November 2011. Conservative projections of unit costs suggest that by 2011-12, the average rebate would be \$53 less than the average cost of each service provided. In order to close this gap, considerable growth in average rebates (49%) would be required.*

*Ideally, from 2011-12 onwards, the gap would be closed and rebates would be indexed to appropriately reflect increases in the cost of DI services from that point forward. However, this would require a revision of the Department's current flawed approach to indexation. The approach is neither transparent nor evidence-based, and applies a productivity offset which is excessively high.*

*Moreover, if a productivity offset is to be applied, productivity gains should be with the private sector by deducting only a proportion of any productivity improvements (not 100% as is currently the case).*

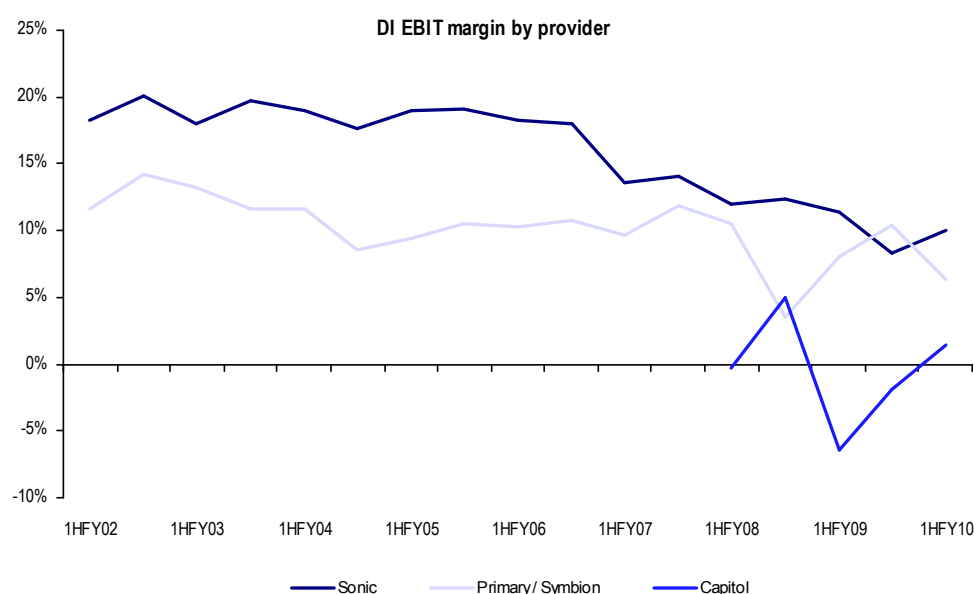
*Introduced in the context of underfunded diagnostic imaging services, the proposed capital sensitivity measure would only contribute further to the declining affordability of private DI services for patients. In addition, the selection of 50% is not consistent with the evidence for capital costs as a share of total costs and is punitive.*

*The survey findings imply that considerable additional pressure on the public system will emerge over time as more private practices cease bulk-billing or charge gaps and co-payments, or even withdraw from the sector, requiring the government to fund additional public radiology services or accept growing shortages and waiting lists.*

*Since the private sector provides 85% of Medicare-funded diagnostic imaging, the impact on the public system would be substantial. Unless the current funding gap is closed, and transparent, evidence-based and fair indexation systems introduced, private diagnostic imaging services will continue to decline, further exacerbating pressure on the public hospital system.*

## 8. UBS Equity Research - Data on Industry Returns

- ❖ Three providers of DI services are listed companies which publish their results – Sonic Healthcare, Primary Health and Capitol Health. Combined, these companies provide less than 30% of the DI services in Australia.
- ❖ UBS Equity Research published research reveals that the average earnings before interest and tax (EBIT) margin declined in the eight years to December 2009 by approximately 40% for the major publicly listed DI operators.
- ❖ On this basis, it is estimated that profit margins for the listed providers are negligible or possibly negative. Interest on borrowings and company taxation are deducted for the EBIT margin to determine the Net Profit.
- ❖ EBIT margin is important to retain and attract investment into a sector as it measures the direction of the business. When investors are paying a share price representing 15 times time annual earnings per share (15 years of forward earnings in theory), they need some assurance that the business is not declining to nothing. A declining margin (especially in a standalone business) will attract little investment.



## 9. Key Issues for the Review

### Adequacy of MBS Fees, Bulk Billing and Gaps

- ❖ Government funding of DI services has increased by \$7.75 or 7.4% on average per service in the period 2005 to 2009. Over the same period, patients are paying more with patient gaps increasing by \$18.91 or 39.6% on average per service.
- ❖ The recent Government initiative to increase funding for bulk-billed services was a welcome injection of funding into the sector. It proved to be an essential lifeline to some practices which were about to close.
- ❖ The Access Economics costing survey estimates that, on average, comprehensive practices bulk bill 52% of patients, with the remaining 48% of patients being charged an average gap of \$73 per service<sup>vii</sup>. This lower level of bulk billing by comprehensive practices is due to the high cost of providing a comprehensive quality DI service as evidenced by the Access Economics analysis.
- ❖ The current funding arrangements are promoting poor quality practice. There is significant pressure on comprehensive practices to bulk bill their services – from competitors (including the public sector) and from the recently introduced bulk billing incentive. Given nearly 90%<sup>viii</sup> of practices could not recover their costs and stay in business if they bulk billed all their services – this pressure promotes cost cutting in an already competitive market.

### Indexation of MBS Fees

- ❖ Most specialist MBS fees are annually adjusted on 1 November by between 2% and 2.5%. The DIST fees, however, were not indexed under the MoUs and are still not subject to indexation, resulting in a 14 year freeze on patient rebates for DI services.
- ❖ This has seen DI rebates per service fall, in real terms, between 20% and 40%<sup>ix</sup>.
- ❖ Access Economics concluded that: *“Comparisons (of the results of the two surveys) suggest cost increases in private radiology were similar to the average increases in total costs for both the health sector more broadly, and for hospital and medical*



*services specifically, and were also similar to the average increase in health sector labour costs.”<sup>x</sup>*

### **Impact of funding pressure on patients**

- ❖ This funding pressure is impacting patients:
  - Patient MBS rebates are too low to fund a quality DI service and this puts patients that can’t afford to pay for their services at risk – even with the 95% bulk billing incentive, a patient cannot pay the full cost of a quality service;
  - Comprehensive practices need to charge fees for services that are higher than the applicable MBS rebate and patients are therefore paying the difference. Some patients cannot afford to pay this difference; and
  - Some patients seek out a practice that offers lower cost DI services. These practices are providing services at fees well below the average cost of providing a quality service. This could be by reducing the level of radiologist supervision, allocating less time per procedure, or through investment in lower quality equipment and images.

**A key implication of reduced Government funding for DI services is the potential for service quality to be compromised. Faced with rebates that no longer cover costs, one rational response for private sector DI providers is to cut costs of providing services by, for example, using less expensive equipment and/or reducing the amount of professional time spent on each service. As some practices are forced to cut costs, the quality spectrum of DI services available to patients becomes more widely dispersed, compromising the original aim of Medicare to assure affordable patient access to medical services of uniform quality. Increasingly, two classes of patient emerge<sup>xi</sup>.**

### **Patient Access to MRI Services**

- ❖ Australia has a low level of patient access to MRI services compared with other OECD countries with 5.7 licensed units per million in 2009, compared to the OECD average of 11.
- ❖ MRI rebates are approximately 40% lower in real terms than 10 years ago.

- ❖ There are currently 64 unfunded MRI machines in Australia evidencing a patient need that is not being met by Medicare.

### Impact of funding pressure on investment

- ❖ The funding pressure being experienced by comprehensive practice is impacting investment in quality services and new technologies:
  - Private investment in DI infrastructure is falling; and
  - Some practices have closed, some services are no longer available in some areas and many DI practices are struggling to remain viable.

### Capital Costs and Capital Sensitivity

- ❖ The DI sector invested approximately \$470M in new equipment in 2009. Of this, nearly 65% (\$305M) was investment by the private sector<sup>xii</sup>.
- ❖ This investment is declining as practices struggle to make a return under the current funding arrangements and the announcement in 2009 of the Government's capital sensitivity measure has heightened this pressure.
- ❖ If the Government proceeds to introduce the capital sensitivity measure, patient rebates for DI services will be reduced by 50% when they are provided on equipment that has been fully depreciated. This would be punitive as the average annual cost of the equipment is much lower than 50% and is closer to 5% p.a. (refer table below)<sup>xiii</sup>.

#### Depreciation<sup>6</sup> of equipment as a % of total unit costs

	MRI	CT	Mam	X-Ray	SF	OPG	DSA	US	NM	Total
<b>Total depreciation</b>	10%	8%	6%	2%	8%	5%	5%	6%	6%	5%
<b>Depreciation of medical equipment</b>	8%	7%	5%	1%	7%	5%	3%	5%	5%	4%

- ❖ The impact of this measure needs further, careful consideration in the context of the Review.

<sup>6</sup> Depreciation (excluding the fit-out and non modality equipment such as furniture & fittings, laser imagers etc) expressed as a percentage of the overall cost of providing each modality.

### **Cost Shifting and Billing Complexity**

- ❖ Patients face significant confusion when seeking to access DI services. The complexity is simplified and outlined in ***Attachment 2***.
- ❖ The role of public hospitals in the provision of outpatient DI services has evolved. Some hospitals are now aggressively competing for outpatient services and for MBS funding.
- ❖ This should be a concern to the Government where it is distracting public sector resources away from servicing the needs of public inpatients and where a lack of competitive neutrality is leading to allocative inefficiency, that is, an inefficient allocation of the Government's health budget.

## **Attachment 1**

### **Diagnostic Imaging Modalities**

- ❖ Radiology procedures have become an essential tool in the diagnosis and management of clinical conditions. The following list provides general information about the different types of procedures carried out by ADIA members.

#### **General X-ray**

- ❖ An x-ray (or radiograph) is a type of picture produced by passing a very small amount of radiation through the body to expose a sensitive detector or film that is positioned on the other side. The image shows the internal structures including the bones and some of the soft tissues.

#### **Fluoroscopy**

- ❖ This procedure enables radiologists to view X-rays in real time on a television monitor. In most cases this involves the administration of a 'contrast' agent to outline the region of interest. The two most common fluoroscopic procedures are barium meal and barium enema. A Barium Meal is an examination of the upper part of the gastrointestinal tract, i.e. oesophagus, stomach and duodenum. A barium enema is an investigation of the large bowel.

#### **Mammography**

- ❖ A mammogram is a low dose x-ray that provides detailed images of the internal structure of the breast. Mammograms are used as a screening tool to detect early breast cancer in women without symptoms and to detect and diagnose breast disease in women experiencing symptoms such as a lump, pain or nipple discharge. Mammography plays a central part in early detection of breast cancers because it can show changes in the breast before a patient or doctor can feel them. Diagnostic mammography is also used to evaluate a breast lump or lumps.

#### **DEXA (Bone Densitometry) Scan**

- ❖ A DEXA (Dual Energy X-ray Absorptiometry) scan is a safe, painless and non-invasive examination used to measure the bone mineral content in various parts of the body (e.g. spine, hip and wrist). Bone densitometry is most often used to diagnose

osteoporosis, a condition that often affects women after menopause but may also be found in men. DEXA is also effective in tracking the effects of treatment for osteoporosis and other conditions that cause bone loss.

## **Ultrasound**

- ❖ Ultrasound is a widely used technique which produces detailed images of the body, using high frequency sound waves (much higher than human ears can hear) produced by a small hand held device known as an ultrasound probe (transducer). The reflected sound waves are detected by the probe and used to create an image which is displayed on the television screen of the ultrasound machine. The sound energy used is absorbed by the body as heat but there is no noticeable warming effect. There are no known harmful effects. It can be used to gain information about a variety of conditions, including pregnancy, gallstones and varicose veins. An ultrasound which shows blood flow may also be called Colour Flow Doppler or Duplex Scan. Ultrasound can be used to capture images of the pelvis and abdomen, the musculoskeletal system, breast abnormalities, the male reproduction system, the kidney, the thyroid, the gall bladder and pancreas, foetal development and many other indications.

## **Multi Slice CT Scan**

- ❖ A CT (Computed Tomography) scan uses special X-ray equipment to obtain image data from different angles around the body and then uses computer processing of that information to show a cross-section of the body, including bones and organs.

## **MRI**

- ❖ Magnetic Resonance Imaging uses a very powerful magnet and radio-frequency pulses to collect signals that are then processed by a computer to form an image of the body part. Images line up like slices from a loaf of bread. MRI gives a detailed view of the soft tissues of the body, for example, muscles, ligaments, brain tissue, discs and blood vessels. Some patients with cardiac pacemakers, cerebral aneurysm clips, vascular stents, infusion pumps, neurostimulators and cochlear implants cannot be scanned. Most metal implanted at surgery (e.g. hip and knee replacements and metal rods) is safe. MRI uses no radiation. The radio wave pulses are of similar

frequency to an fm radio. The powerful magnet does not have any known side effects.

## **Nuclear Medicine**

- ❖ Nuclear Medicine is an area of medicine that uses very small amounts of radioactive materials, or radiopharmaceuticals, to diagnose and sometimes treat disease. Radiopharmaceuticals are substances that are attracted to specific parts of the body. These substances emit gamma radiation that is detected by a gamma camera. This specialty is unique in the fact that it records information regarding organ function and structure, as opposed to x-ray, based on anatomy. Nuclear Medicine is usually able to detect conditions earlier than other tests due to its functional basis, therefore permitting earlier treatment. Nuclear Medicine offers procedures on bones and all major organs, for example: lungs, kidneys, heart and brain. The amount of radioactivity given in these procedures is very small, usually comparable to x-ray procedures.

## **PET**

- ❖ Positron Emission Tomography, also called PET imaging or a PET scan, is a powerful diagnostic examination that uses small amounts of radioactive material administered to the patient to help in the diagnosis of certain cancers, brain disorders and heart conditions. PET scans are very safe and there are no side effects from the radioactive substance.

## Attachment 2

### The Importance of Quality Diagnostic Imaging – The Patient’s Perspective

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
Ultrasound	Pregnancy/Obstetrics	<ul style="list-style-type: none"> <li>• Date pregnancies;</li> <li>• Locate pregnancies (detect potentially fatal ectopic pregnancies);</li> <li>• Detect foetal abnormalities;</li> <li>• Locate the placental position;</li> <li>• Monitor foetal growth &amp; well-being.</li> </ul>	Ultrasound is <u>absolutely essential</u> for managing a pregnancy.	<p>Without ultrasound, women risk very poor pregnancy outcomes. These can include undetected foetal abnormalities, problems with the placenta and risk of death to mother and child.</p> <p>Without ultrasound, doctors and hospitals face significant liability costs for children born with severe (and potentially unnecessary) life-long disabilities.</p>
	Many examples of <b>infection in the abdomen and pelvis</b> . A common one is Gallstones. Another is appendicitis.	<p>Detect gallstones, associated infection, dilated bile ducts and plan surgical technique.</p> <p>Diagnose appendicitis and whether there are complications. E.g. has it ruptured forming an abscess or spread throughout the abdomen, which are potentially lethal?</p> <p>Without ultrasound, the Surgeon must guess the cause of pain. He can’t plan surgery properly without knowing where to cut or what he’s aiming for. Can’t undertake key-hole surgery if unknown source of problems.</p>	<ul style="list-style-type: none"> <li>• Ultrasound helps to confirm the source of abdominal pain in the patient and what it is the surgeon needs to treat.</li> <li>• Ultrasound is <u>absolutely essential</u> for diagnosing and treating gallstones.</li> </ul>	<ul style="list-style-type: none"> <li>• Missed or incorrect diagnoses with resultant mortality or morbidity for the patient.</li> <li>• Surgeon at risk of being sued by patients for incorrect or missed diagnoses.</li> </ul>

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
	<b>Cancers in the abdomen</b> , e.g. Liver tumours where bowel cancer tends to spread.	Ultrasound is used to follow-up stability or growth of cancers, e.g. those that have spread to the liver.	Ultrasound is used to follow cancer progress, once the initial work-up has been done by CT. Ultrasound is easier and there is no radiation dose for this follow-up treatment.	Can't follow cancer progress and treat recurrences early.
	<b>Breast cancer</b>	Ultrasound used to guide biopsy of breast cancers. It is easier than using mammography to guide biopsy, if you can see a mass on ultrasound.	Doctors and specialists use ultrasound in preference to mammography in young patients with a lump or to monitor known masses or guide biopsy. This is because it's easier for patient and doctor (quicker, easier positioning, no breast compression) and no radiation dose.	If mammography is used instead of ultrasound, patients face a radiation dose.  If young patients don't have access to ultrasounds, there is a heightened chance doctors may miss their cancers which are often hidden in the dense tissue.
	<b>Paediatrics (children)</b>	In children, ultrasound is used on many body parts. One example, <u>ultrasound detects hip dysplasia in newborns</u> . This means hips can be treated with splints while the hips are soft (mainly cartilage). Follow improvement each week and this is easily done with ultrasound.	Ultrasound is widely used safely with children. A missed baby hip dysplasia is very painful, difficult, expensive and invasive to treat if left too late (beyond 12 weeks).	Dysplastic hips would not be recognised until late in the disease process with high ongoing morbidity and costs for treatment later in life.
	<b>Musculoskeletal</b> (e.g. Bursa, tendons, joints, soft tissues). A common example for use is tendon tears. Common one is rotator cuff tendon tears and bursitis in the shoulder due to bony spurs or trauma.	Musculoskeletal (e.g. Bursa, tendons, joints, soft tissues) damage is very common and debilitating.	Musculoskeletal damage can't diagnose or treat appropriately without images. If not diagnosed, long term damage and disability can be caused.	Shoulder rotator cuff tendon tears if left too late when they are fully torn and retracted, cannot be repaired. Ongoing morbidity and lack of function. Common in the workforce age population. Reduced productivity of workforce.



Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
	<b>Vascular</b> – veins and arteries. Most well known is deep vein thrombosis (DVT).	<ul style="list-style-type: none"> <li>Deep vein thrombosis is potentially lethal.</li> <li>Frequent air travelers and young mothers on the pill are all susceptible.</li> <li>Regular monitoring with ultrasound is required.</li> </ul>	<ul style="list-style-type: none"> <li>Can't diagnose DVT without ultrasound.</li> <li>Untreated DVT can send a blood clot to the brain or lung, triggering a stroke or death.</li> </ul>	<p>Ultrasound is used to identify musculoskeletal damage and treat it early with far less complications.</p> <p>Patients with DVT risks potential death if undiagnosed (via pulmonary embolus; thrombus breaks off and lodges in the lung). More invasive treatments (filter required to be inserted) if the thrombosis is found too late and is extensive. Less extensive thrombus is treated with medication only. Chronic venous insufficiency (includes varicose veins) with complications of poor peripheral circulation (e.g. poor wound healing) more likely if occlusive, extensive thrombosis occurs which damages the venous valves.</p>
<b>X-Ray</b>	<b>Arthritis – degenerative</b>	<p>Very common disease. Surgeons need an x-ray to plan their joint replacement surgery. (Timing, type of prosthesis, predict complications, etc.)</p> <p>X-ray provides the first line of investigation after a fall to look for hip fracture.</p>	<p>Quick, simple, easy method of establishing the degree, following progression and planning surgical treatment of osteoarthritis.</p> <p>X-rays are essential for early diagnosis and surgery.</p>	<p>No x-ray = no diagnosis, Doctors can't plan surgery or other treatments. Patients are left with reduced movement and chronic pain.</p> <p>Older people risk premature death if they don't have their hip fracture diagnosed and treated promptly.</p>
	<b>Fractures</b> – e.g. falls in the elderly.	Early diagnosis and appropriate treatment.	X-rays allow doctors to plan appropriate treatment and follow improvement.	No chest x-ray = no accurate diagnosis or guidance to aid antibiotic treatment regime and check progress.
	<b>Pneumonia</b>			

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
	<b>Heart failure</b>	X-ray allows accurate diagnosis and confidence that the correct drugs are being used to treat the correct condition, i.e. heart failure. Chest x-ray will exclude other causes of shortness of breath in the patient.	Diagnosis and appropriate treatment. Follow improvement.	No chest x-ray = no diagnosis, inaccurate treatment and possibly preventable death.
	<b>Lung cancer</b>	X-ray provides the easiest first line of investigation to look for lung cancer. In summary, x-rays often used to confirm that the clinician is treating the correct condition that is suspected clinically. X-rays can find unexpected things that change management for that patient. <i>E.g. It's not arthritis after all; it's a tumour in the adjacent bone!</i> <i>E.g. The patient isn't short of breath from their heart failure, they have a lung cancer!</i>	Chest x-ray is the first step in diagnosing lung cancer early.	Without x-ray - patients will miss an early diagnosis. Without x-ray, the cancer will be detected too late. It will be inoperable with poorer prognosis and higher mortality rate.
<b>Computed Tomography (CT)</b>	<b>Cancers – brain, chest, body, bones, neck, lymph nodes, paths of spread</b> (as broad examples)	Early diagnosis, accurate staging (how far has it spread?), appropriate treatment, monitor progress, diagnose complications, pick up recurrences early.	Detect cancer early while it's still curable. If left too late, then the cancer may grow around surrounding vital structures and cannot be surgically removed. CT essential for staging cancer spread and hence guiding appropriate treatment options	Early and accurate detection and diagnosis of cancers the only way a patient may survive. Cancers presenting at a late incurable stage = inappropriate staging and hence inappropriate management. E.g. Reach surgery without knowing it is inoperable without a CT first for staging.

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
	<b>Fractures</b>	Early diagnosis and treatment	Some fractures are very hard to see on plain x-rays. CT will pick up a scaphoid bone fracture in the wrist, for example.	Missed fractures. They don't heal properly and long term complications and remedial treatments. Preventable hospitalisation may result.
	<b>Biopsy and therapeutic guidance</b> – i.e. Get the needle tip in the right spot.	Accurate needle placement for biopsy of masses to determine whether they are cancers. Another example, accurate needle placement for injection of anti-inflammatory for management of back pain, for example.	Accurate needle tip placement.	Avoids surgical biopsy if we place a needle through the skin and use CT to guide needle tip to the spot to obtain tissue for pathology. Avoids surgery if steroid injection around nerve roots in the spine relieves symptoms.
	<b>Infections</b> and other collections such as haematomas (bleeds) – e.g. needed to find abscesses in the abdomen, chest, brain and elsewhere. CT is used to <b>guide drainage tubes</b> placed into the abscess to drain it non-surgically.	CT is very effective for locating the source of infection. Sometimes a patient merely has vague pain and a fever, or only a fever and you need to find the infection to know where/what/how to treat.	CT provides the best and quickest way to scan a large part of the body to find an infective source. Essential to guide placement of drainage tube and check for resolution and when to pull the tube out.	Without CT, doctors won't find the infection. The patient may become septic and go into shock and die. The treating physician will be sued if they don't organise a CT for such patients.

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
	<p><b>Spine</b></p> <p>Since patients are unable to obtain a Medicare rebate from GP referrals for MRI (better investigation for spinal conditions), GPs order a CT of the spine to diagnose the cause of back pain in all age groups.</p>	Diagnose cause of back pain. Good for looking at the bones (e.g. Tumours or fractures of vertebrae). Radiation dose compared to MRI.	Patients either need a CT or an MRI to diagnose disc lesions, spinal cord or nerve root compression (all very chronically painful conditions) and plan treatment.	If CT is not undertaken, there may be uncertainty as to cause of back pain and the patient may be treated for an incorrect condition. Critically, without a CT, the patient may miss a bone, spinal or soft tissue tumour.
	<b>Chronic lung disease</b>	Helps chest physicians to diagnose and manage patients with chronic lung diseases, such as interstitial lung disease.	CT guides physician treatment. Makes sure treatment is working. CT is used to identify recurrences.	Without CT, physicians are working in the dark not knowing exactly what they are treating and whether it's working. Risk of being sued if management is inappropriate or delayed.
	<b>Cardiac diseases</b>	CT is used to provide early and correct diagnosis of coronary artery disease.	The use of CTs allows the doctor to influence patient behaviour to take medication, etc. to improve coronary artery disease. A CT will indicate if there is a need for interventional procedures, if necessary.	Without a CT, coronary artery disease can go undiagnosed. If this happens, it is inevitable that the patient will eventually suffer a heart attack and possibly die from a treatable disease.
<b>Positron Emission Tomography</b>	<b>Skin cancer (melanoma)</b>	PET enables the early and accurate detection of disease and its extent. PET enables accurate treatment options offered to cancer patients.	PET often stops surgical oncologists cutting out tumours when the disease has spread beyond respectable limits.	Without PET, cancer patients do not have the ability to accurately choose the most cost-effective treatment option.

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
(PET)	<b>Lymphoma</b>	PET may offer patients the opportunity of being treated without the need for surgery.	PET stops radiation oncologists treating a lump when there are smaller deposits of tumour that also need treatment elsewhere in the body and these deposits are not identifiable by other imaging modalities.	Without access to PET, doctors are unable to accurately map out where on the patient to give radiation treatment. Doctors only find that smaller deposit elsewhere at a later time and have to subject the patient to another round of radiation therapy.
	<b>Lung cancers</b> and staging of many other cancers	CT can see the lymph nodes of cancers. However, it can only be used to diagnose a lymph node as abnormal (containing cancer cells) when it has increased in size or altered its internal texture (looks darker on the scan). PET can detect the abnormal cancerous lymph nodes while they are still “normal” looking in size and density on CT. PET detects the nodes with tumour that need to be included in the treatment zone, and which would otherwise have been ignored if a CT alone had been done.	Access to PET discourages medical oncologists from using drugs that are not working to shrink the cancer.	Without access to PET, oncologists would be unable to stop or foreshorten an expensive drug therapy regimen to treat a cancer. Without PET, doctors can’t see when the drug is not working. A cancer patient may be subject to unnecessary suffering or the wrong treatment.  PET enables doctors to stop treating cancers when they aren’t responding to treatment.  Prevents the aggressive treatment of patients with expensive and nasty drugs when they have a lump that is not a cancer.
<b>Mammography</b>	<b>Breast cancer</b>	<u>Early detection saves lives.</u> Appropriate treatment options offered to patients with cancer (assess extent of disease and type of surgery, radiation or drug therapy required). Mammography used to guide biopsies.	Mammography detects cancer when it is small and hasn’t spread = better rate of survival. Less morbidity associated with treatment if surgery is all that is required for a small cancer, rather than drugs and radiation therapy in addition to surgery.	Without access to affordable mammograms, patients would be detected later with breast cancer and their prognosis for recovery would be poor.

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
Magnetic Resonance Imaging (MRI)	<b>Brain cancers</b>	MRI allows for early detection, monitor progress, diagnosis of complications (e.g. After surgery).	<u>MRI is essential to manage cancers appropriately.</u>	Without MRI, patients face inappropriate or late diagnosis and treatment.
	<b>Multiple sclerosis</b>	MRI = early diagnosis and can allow doctors to exclude other causes for symptoms (e.g. Cancers). MRI means the patients' progress can be properly monitored and adjustment can be made to the type and length of treatment.	MRI is essential to help diagnose and manage MS. Doctors can't see early disease on CT. Patient symptoms are often intermittent or minor and overlooked unless easy access to MRI for diagnosis.	Missed or mis-diagnosis of MS can mean effective treatment is delivered too late.  MRI allows specialists to choose a non-ionising DI service.
	<b>Knees – cartilage and ligament tears.</b> Many other joints, too. Hips, shoulders, wrists, ankles, etc.	MRI enables patients' to receive appropriate diagnosis and management.	Only reliable way for orthopaedic surgeons to plan and manage the repair to their patient's knees.	Undiagnosed cartilage tears leads to ongoing morbidity. <u>Surgeons will often refuse to operate without MRI.</u>
	<b>Spine</b> – Disc protrusion and nerve impingement	MRI allows for the appropriate diagnosis and establish best management regime. Exclude other sinister cause for back pain, e.g. cancer in the bones of the spine.	MRI offers doctors the most effective way to accurately diagnose and manage disc and other soft tissue conditions relating to the spine.	Without access to affordable MRI, patients may undergo more invasive testing such as biopsy or surgery to diagnose the lesions.
	Accurately characterise body masses, e.g. <b>Adrenal tumours, liver lesions.</b>	Only MRI can diagnose with accuracy what some of these lesions in the liver and adrenal are (as examples).	Only modality which can diagnose these lesions.	Patients undergo less tailored operations
	<b>Cancer</b> – the extent of the disease in many body parts, e.g. Chest, neck, pelvis (cervix, uterine, prostate cancers), etc.	Accurate staging of disease spread.	Plan surgery accurately and remove as much tumour as possible or preserve as much normal tissue as possible.	Patients can receive timely treatment and know that the surgery is as accurate as possible. The trauma of losing unnecessary healthy tissue is lessened.

Modality	Patients who need services	Key Concern	Why Australians need this service	Risk of underfunding
Bone Densitometry (BMD)	Osteoporosis	Early diagnosis.	Osteoporosis leads to fractures if left untreated. (Spinal and hip fractures are common ones in the elderly).	Without BMD, patients can end up having fractures and the complications. This can lead to hospital admission, rather than simply treating osteoporosis by medication.

## References

---

- <sup>1</sup> Unpublished data, Department of Health and Ageing
- <sup>2</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)
- <sup>3</sup> ACIL Tasman, 2010, *Funding arrangements for diagnostic imaging services – An international literature review*,  
[www.health.gov.au/internet/main/publishing.nsf/Content/MBRTG-DI\\_Publications](http://www.health.gov.au/internet/main/publishing.nsf/Content/MBRTG-DI_Publications)
- <sup>iv</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)
- <sup>v</sup> Access Economics, 2008, *The value of diagnostic imaging*, [www.adia.asn.au](http://www.adia.asn.au)
- <sup>vi</sup> Access Economics, 2008, *The costs of diagnostic imaging for services covered by the Radiology MoU* (Unpublished)
- <sup>vii</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)
- <sup>viii</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)
- <sup>ix</sup> Access Economics, 2008, *A new framework for diagnostic imaging services in Australia (Unpublished)*
- <sup>x</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)
- <sup>xi</sup> Access Economics, 2008, *A new framework for diagnostic imaging services in Australia (Unpublished)*
- <sup>xii</sup> Unpublished industry data
- <sup>xiii</sup> Access Economics, 2010, *The costs of diagnostic imaging* (Unpublished)