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# Managing high value capital equipment in the NHS in England

# Summary

## Introduction

**1** In the past three years, NHS trusts in England have spent around £50 million annually on purchasing three specific types of high value capital equipment – Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scanners, used for diagnosis, and Linear Accelerator (linac) machines for cancer treatment. The current value of these three types of machines in the NHS is around £1 billion. The NHS in England employs around 2,200 consultant radiologists and 12,000 diagnostic radiographers, and a proportion of these will work with CT and MRI machines, but the proportion is not known. Around 500 consultant clinical oncologists, 2,100 therapeutic radiographers, and 1,150 physicists work with linac machines (**Figure 1**).

**2** Radiotherapy can be used both as a curative treatment for cancer and for palliative care. Half of cancer patients should receive radiotherapy as part of their treatment but its usage has been low in England compared to expected levels. The Department has taken successive approaches to increase access to radiotherapy treatment, most recently in its 2011 *Improving Outcomes: A Strategy for Cancer*. Demand is also driven by the ageing population with new cases of cancer predicted to increase by around a third between 2001 and 2020. Demand for scanning equipment has been driven by a focus on reducing waiting times, and increasing clinical application of the equipment across the NHS. For example, the ability of scanning equipment to allow early diagnosis and provide timely intervention within areas such as cancer, stroke, dementia and major trauma.

**3** The number of scans carried out for NHS patients from CT and MRI machines has increased almost threefold in the last ten years, while for linacs the number of radiotherapy treatment sessions (fractions) has increased two and a half-fold. Ninety four per cent of trusts have MRI and CT scanners, 29 per cent have linac machines in 49 radiotherapy centres. Machines for diagnostic scanning (CT and MRI) and for radiotherapy treatment (linac) are used by different clinical teams and have different management processes. There are considerable differences in their planning and management, but there are also similarities which this report seeks to draw out.

**Figure 1**

## The three types of machines examined in this report

Radiologists are doctors who analyse images of the body for diagnosis. Diagnostic radiographers produce, appraise and interpret images from diagnostic equipment. Clinical oncologists are doctors who diagnose and treat cancer using radiotherapy and chemotherapy. Therapeutic radiographers manage and deliver care, support and treatment across the radiotherapy treatment pathway. Physicists are clinical scientists who develop, plan and implement patient treatment programmes and, alongside technologists and engineers, are key members of radiotherapy teams.

Machine	What the machine does	Purchase cost per machine <sup>1</sup> (£)	Total NHS machines (England)	Life (years)	Average age of existing machines (years)
Computed Tomography (CT)	Used for imaging the brain, chest, abdomen and pelvis, for identifying the stage a cancer has reached, and for trauma and stroke assessment.	579,000	Total: 426 376 installed in the last 10 years	7-10	6.2
Magnetic Resonance Imaging (MRI)	Used to evaluate the central nervous system, spine, bones and joints but also for complex cardiac, vascular and body imaging.	895,000	Total: 304 267 installed in the last 10 years	7-10	6.3
Linear Accelerator (linac)	Used in radiotherapy, for treating patients with cancer. It is used to treat all parts and organs of the body, delivering a targeted dose of high-energy x-ray to the patient's tumour.	1.4 million	Total: 246 currently in use in 49 NHS trusts	10	6.5

**NOTES**

- 1 Average NHS Supply Chain prices in 2009 and 2010, excluding VAT. Actual costs vary according to specification. Includes installation costs (but not the £1-1.5 million cost of bunkers needed for additional linac machines). After purchase, machines incur additional costs of maintenance, staff to operate them, and running costs (e.g. energy). The lifetime maintenance cost of machines is broadly equivalent to their purchase cost.
- 2 Numbers of CT and MRI machines are from Health Protection Agency (HPA) data, representing a snapshot of total machines at the end of 2010. Number of linac machines is from the Radiotherapy Dataset. Number installed includes replacement and additional machines. Average age is based on HPA data.

Source: National Audit Office examination

**4** During the 1990s, the UK's number of these types of machines for its population was much lower than other developed countries. In 2000, the Department of Health introduced its Cancer Equipment Programmes to manage funds provided centrally under various schemes to increase the replacement, and overall numbers, of these machines. Between 2000 and 2007, the centrally funded programmes spent £407 million on new capital equipment, resulting in greater numbers of CT, MRI and linac machines to spur implementation of increased diagnostic and treatment capability. During 2000-2007 the Programmes accounted for around three quarters of new and replacement machines purchased for the NHS in England.

**5** The Department currently has no plans for any further such centrally driven programmes. From 2007-08, the capital funding system for trusts has changed with capital now being funded from trust revenue and loans. Trusts now take financing decisions for delivering services from machines (whether purchasing, leasing or managed equipment services), and have to recover the costs of financing through the revenue they generate from commissioners, while acting as a provider in an increasingly competitive market. Although machines maybe used for longer than their expected working life, they become more expensive to maintain and may not be capable of delivering the latest techniques required by clinicians. They may also suffer more downtime when they cannot be used for the benefit of patients.

**6** Continuing demand pressures include increased focus on diagnostics for early identification of disease, and the Department's aim of increasing access to radiotherapy services. The Department expects increases in the demand for CT and MRI scans to continue, driven by technological improvements and clinical decisions. For radiotherapy, whilst current provision of linacs is around 4.8 per million population, within ten years the clinical need is expected to exceed 6 per million. As well as replacing current stock, approximately 60-80 new linacs will be needed in this period.

**7** The significant investments made during 2000-2007 purchasing replacement and additional machines present the challenge in future years as to how the costs of replacing machines will be met as they reach the end of their useful life. More immediately, the NHS faces the challenge to make better use of existing capacity in the current financial climate, as the Government aims to deliver up to £20 billion of efficiency savings in the NHS by the end of 2014-15. Furthermore, in its 2010 Spending Review, the Government announced a 17 per cent reduction in capital spending for the NHS over the next four years, from £5.1 billion in 2010-11 to £4.6 billion in 2014-15.

## Scope of our study

**8** This report examines how efficiently these three types of high value equipment are used. We examine:

- Planning for high value equipment (Part Two)
- Meeting the demand for services (Part Three)
- Improving management of high value equipment (Part Four)

## Key Findings

### On planning

**9** **Trusts make their own assessments of demand largely independently of each other.** Although the Department publishes data on activity, there is very little coordination of planning across the NHS for identifying increasing demand for scanning services and how it can be met. For some services such as stroke (for CT and MRI) and cancer (for linacs), networks covering populations of 1-2 million have a role in helping to identify demand and how to meet it.

**10** **We estimate that around half of all three types of machine across the NHS are due for replacement within three years,** and 80 per cent of machines are due for replacement within six years (based on ten year lifetimes). Were trusts to purchase machines to replace existing ones they would collectively need to find around £460 million within three years and a further £330 million within six years. As well as replacing machines, trusts could look at other options including leasing machines, contracting out or extending the use of existing machines. Existing linac capacity lies almost entirely in the NHS, with activity rarely commissioned from the private sector. Contracting of NHS diagnostic scanning is more common, with around 10 per cent of MRI scanners providing NHS services managed by the private sector.

### On acquisition and maintenance of machines

**11** **Trusts are not making best use of existing framework agreements which could secure lower prices on purchase of new machines, and lack independent procurement advice on how their needs can be met.** Increasingly, hospital trusts have freedom to decide what equipment they buy and how they buy it. A framework agreement organised by NHS Supply Chain was used for three quarters of purchases of the three types of machines in 2009 and 2010, but with no aggregation of volume (individual trusts working together to group demand). Trusts also lack independent procurement advice when purchasing new machines or new types of machines to help them decide the appropriate level of functionality to meet their operational clinical need.

**12 Trusts have no mechanism to determine if they have the appropriate type of maintenance for their CT and MRI machines.** Maintenance costs vary depending on the age of machine, service specification, manufacturer, how the maintenance contract was set up, and whether some maintenance can be carried out in house. NHS Supply Chain framework contracts account for around two thirds of all maintenance costs of CT and MRI machines, to a value of around £27 million a year. However, of the trusts we visited none assessed how their maintenance costs compared with other trusts. For linac machines, maintenance is carried out largely by trusts themselves.

On meeting the demand for services

**13 The workforce to support delivery of scanning and radiotherapy has increased but shortfalls in capability to deliver services remain.** Despite increasing demand for scans, many trusts had vacancy rates in 2009 for consultant radiologists of around 7 per cent. The situation is marked for radiotherapy, as rates of attrition are high for people training to become therapeutic radiographers delivering radiotherapy treatment, with one third of those due to qualify in 2010 leaving before the end of their course.

**14 There are wide variations in opening hours of units.** Imaging departments have to provide round-the-clock services for patients referred in an emergency. Otherwise, we found that opening times for MRI units ranged from 40 to over 100 hours per week, and for CT units from 40 to 90 hours per week, with some trusts offering seven-day-a-week services with extended hours. Scanning services restricted to 9am-5pm five days a week are not always sufficient to cope with demand, and expensive equipment can lie idle for much of the week. For radiotherapy, a 2007 report by the National Radiotherapy Advisory Group recommended extended hours for some units, but there is uncertainty about the willingness of patients to attend for treatment outside traditional opening times.

**15 There are wide variations in the time taken for scans to be performed.** By 2009, the activity levels for MRI and CT increased, virtually eliminating waits for scans of over six weeks, as part of the Department's 18 week referral to treatment target. However, the percentage of people waiting under two weeks from referral for an MRI scan in 2009-10 varied between trusts from below 20 per cent to 93 per cent. For CT scans, the percentage varied from 33 per cent to 98 per cent.

On improving the management of high value equipment

**16 Trusts lack accurate information on unit costs and a means to compare them.** A 2007 Healthcare Commission review identified wide variations in unit costs between imaging services in hospitals and recommended action to reduce unexplained variation. This has not been addressed. Although trusts report their unit cost per scan, they record these differently, and have no means to compare costs with other trusts.

**17 There are no systematic means to enable trusts to assess how efficiently they are using their MRI and CT scanning machines.** We found wide variations in utilisation rates of scanning machines. NHS trusts are unable to compare throughput and efficiency of machines with other trusts as there is no repository of data to do so. Utilisation rates for individual CT and MRI machines or for trusts cannot be identified from existing national data. Trusts therefore lack information on activity and costs to compare their efficiency of machine use with other trusts or with private sector benchmarks.

**18 For radiotherapy, new information is becoming available which will enable comparisons of efficiency and throughput of radiotherapy centres.** For trusts delivering radiotherapy treatment, a mandatory Radiotherapy Dataset was introduced in 2009. This shows a two and a half-fold variation in average fractions per linac between radiotherapy centres, which the Department is investigating.

**19 There are opportunities to improve the efficiency of the operation of machines.** We found examples of how trusts had evaluated the configuration of their services and have taken steps to improve their efficiency of machine use, by:

- achieving the right skill mix to support throughput;
- assessing the flexibility of working patterns and opening hours;
- strong engagement between finance and clinical teams;
- using the right data to measure performance; and
- assessing design and flow to support the patient pathway.

## **Conclusion on value for money**

**20** NHS trusts do not have the means to know if they are making best use, or getting best value out of their high value equipment. Equally, they do not have the means to determine if they are getting value for money from purchasing or maintenance. There are significant variations in levels of activity between trusts, and a lack of comparable information about performance and costs. In these circumstances the planning, procurement, and use of high value equipment is not achieving value for money across all NHS trusts.

## Recommendations

**21** Our findings point to recommendations in three areas:

### For the NHS in England

- a** **The NHS Commissioning Board should set standards for accurate and comparable data in the use of high value capital equipment.** The Department's proposed approach to information set out in *An Information Revolution* (October 2010) states that good commissioning requires high quality timely data about needs and services and the ability for commissioners to benchmark against comparable areas and between providers. The NHS Commissioning Board should set standards for data on availability, throughput, and unit costs of high value capital equipment so that this information is available to trusts and commissioners.
- b** **The Department of Health (for 2012-13), and the NHS Commissioning Board (for 2013-14 and thereafter) should design tariff prices in a way that incentivises efficiency of use of machines and recognise that trusts may need to find several hundred million pounds to replace machines over the next ten years.** The NHS Commissioning Board in designing the structure of the tariff, and Monitor in setting prices, should consult on how to improve unit cost information for scanning and radiotherapy machines, and address how tariffs can improve their efficiency of use.
- c** **As part of its Quality, Innovation, Productivity and Prevention (QIPP) savings programme, the Department should examine how well equipped trusts are to understand the value in their acquisition decisions** including the extent to which they use framework agreements to secure good value deals for purchase and maintenance of high value equipment.
- d** **Across the NHS, there needs to be a means by which hospital trusts can objectively determine the right specification of machine for their needs, and be assured that they are gaining value for money from procurement decisions.** Since April 2010, following the decommissioning of the Centre for Evidence Based Purchasing, there has been a lack of independent advice to help trusts decide what functionality they need when purchasing machines. The Department should explore ways in which Trust Boards can be confident that they have the right specification of machinery when making new equipment purchases. It might, for instance, consider with the National Institute for Health and Clinical Excellence (NICE) how learning can be applied from the Institute's technology appraisals and its new Diagnostic Assessment Programme.

### For NHS trusts acting together

- e** Greater savings and efficiencies for the NHS can be secured if trusts plan their decision-making in the light of capacity required beyond individual trusts, for example, cancer networks, which typically cover 1-2 million people, help identify demand for cancer services and how to meet it. However, it is not clear what



the future of such supra-trust structures are. Cancer networks have guaranteed funding until 2012 but the issues of purchase and maintenance of new equipment will persist far beyond that time frame. Whatever NHS structures develop, we consider there is more scope for trusts to act together in the following ways in the interests of patients and value for money:

- i** Trust Boards should participate in benchmarking activity to compare prices with other trusts, and look for opportunities to group their demand for machines with other trusts to secure savings on the price of machines.
- ii** The management of trusts should be able to demonstrate to Trust Boards that they have appraised the value of using framework agreements for the purchase of new machines and demonstrate, if they have not used framework agreements, that they have secured a lower price when purchasing machines.
- iii** GP consortia should work together to assess levels of demand expected across a wider locality when considering purchase of new machines, and establish the extent to which they might combine plans with other consortia to fund the capacity needed to meet demand.

#### For individual NHS trusts

- f** Clinical and finance teams within trusts should assess the costs and benefits of purchasing, leasing and outsourcing when replacing machines, and check for alignment with their planned levels of activity. As around half of machines are due to be replaced within three years, trusts need to plan their procurement now so that they can manage the risk of incurring higher costs, for example, extra maintenance costs or not achieving savings through aggregating requirements with other trusts seeking to replace their equipment to a similar timescale. Trust Boards should also scrutinise their existing deals for maintenance of machines by assessing current arrangements against, for example, the Department's NHS Procurement Diagnostic Tool.
- g** Trusts should look critically at the arrangements they have for meeting the demand for scans and for radiotherapy and consider whether they have sufficiently robust planning and flexibility in place to minimise the need for overtime. They can do this by collecting the right data to measure demand and capacity, examining trends and expected patterns in scanning and radiotherapy treatment and checking that they are using a combination of staff skills and extended hours in the most efficient way to maximise use of equipment for the convenience of patients. Planning should also focus on recruitment and retention of staff, including physicists, technologists and engineers.
- h** Trusts should assess the efficiency of their arrangements for delivery of services by exploiting existing good practice, using the work of NHS Improvement. Part Four of this report sets out how trusts can evaluate their processes and test the efficiency of services.