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The team who delivered the work comprised Tracey Davies, Philip Jones and Katrina Febry.

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Summary report

Background

- 1 Radiology is a key diagnostic and interventional service for the NHS and supports the full range of specialties in acute hospitals, primary care and community services. Hospital-based clinicians, including consultants, other doctors, and, in agreed circumstances, non-medical practitioners, often refer patients for radiology imaging, as do general practitioners.
- 2 Diagnostic radiologists employ a range of different imaging techniques and sophisticated equipment to produce a wide range of high-quality images of patients. Images include plain x-ray, non-obstetric ultrasound (US) and computed tomography (CT) as well as sophisticated techniques such as magnetic resonance imaging (MRI).
- 3 Clinical radiologists¹ are doctors who use images to help diagnose, treat and manage medical conditions and diseases. They have a key role in the clinical management of a patient's condition, selecting the best imaging technique to enable diagnosis and minimise radiation exposure. Interventional radiologists have a more direct role in treating patients. They use radiological imagery to enable minimally invasive procedures, such as stopping life-threatening haemorrhages, and day-case procedures such as oesophageal stenting and angioplasty. All radiologists work as part of the multidisciplinary teams which manage patient care.
- 4 Rapid advances in technology and understanding about how the features of disease present themselves on diagnostic images have allowed imaging to be used at earlier stages of the diagnostic process. Similarly, changes in the characteristics of disease with treatment can be better detected, and imaging is frequently used to monitor progress. From the patient's point of view, early radiological detection can improve the outcome of treatment and prevent unnecessary pain and suffering. It can also reduce the scale and cost of treatment.
- 5 Demand for radiology services continues to increase year on year. The increase is driven by a number of factors, including demographic changes, new clinical guidelines, lower thresholds for scanning and referral, surveillance work for surviving patients, a growth in screening, and increasing image complexity.
- 6 **The Future Delivery of Diagnostic Imaging Services in Wales** (2009)² showed that demand for some types of imaging had been increasing by 10% to 15% per year. Recent reports by the Auditor General on **NHS Waiting Times for Elective**

¹ In this report, where reference to radiologists is made, this includes consultant radiologists, middle-grade doctors, specialist registrars and junior doctors. Where there is any variation from this, the report content will specify that, eg consultant radiologists.

² Welsh Assembly Government, **The Future of Diagnostic Imaging Services in Wales**, 2009

Care in Wales (January 2015)³, and **Orthopaedic Services** (June 2015)⁴ showed that the increasing demand for radiology services is resulting in long waits for radiological diagnostic procedures and that sustainable solutions were needed to address this.

- 7 The Welsh Government has introduced delivery plans to improve the treatment of major health conditions such as stroke⁵, cancer⁶ and heart disease.⁷ The plans all highlight the importance of efficient and effective radiological services. The associated care pathways emphasise the need for rapid referral processes, rapid diagnostic testing at particular stages in the pathway, the right equipment and staff who are appropriately skilled.
- 8 While there is a need to deliver long-term solutions to manage and meet increasing demand for radiology services, there is general recognition that the UK consultant radiologist workforce is under significant pressure. In 2015, 9% of consultant radiologist posts in the UK were unfilled, with 7%⁸ of Welsh consultant radiologist posts unfilled. For the period 2015 to 2020, consultant workforce attrition due to retirement is likely to be higher in Wales than in any other part of the UK. Around 30% of consultants in Wales are expected to retire if the retirement age is 60, compared to 20% for the UK as a whole⁹.
- 9 The use of interventional radiology (IR) is growing. Such techniques rely on the use of radiological images to precisely target therapy. IR techniques can be used for both diagnostic and treatment purposes. The demand for these techniques is increasing and this places further pressure on already stretched radiology services' staffing resources. It is widely accepted by radiology professions that the numbers of interventional radiologists across Wales, similar to other parts of the UK, are too low. Within Wales, the National Imaging Programme Board (NIPB) has a programme of work which is considering interventional radiologist capacity and how it can be addressed.
- 10 The NIPB is the primary source of advice, knowledge and expertise for the planning of imaging services in Wales. It is made up of clinical and management representatives from organisations involved in the delivery of imaging services in Wales. In 2010 the NIPB was given delegated authority for developing and implementing a programme of strategic work for radiology through to 2016, and for adopting all-Wales standards and protocols for imaging services in NHS Wales.

³ Wales Audit Office, **Elective Care in Wales**, January 2015

⁴ Wales Audit Office, **Orthopaedic Services**, June 2015

⁵ Welsh Government, **Together for Health, Stroke Delivery Plan**, 2012

⁶ Welsh Government, **Together for Health, Cancer Delivery Plan**, 2012

⁷ Welsh Government, **Together for Health, A Heart Disease Delivery Plan**, 2013

⁸ The Royal College of Radiologists, **Clinical radiology UK workforce census 2015 report**, 2016

⁹ The Royal College of Radiologists, **Clinical radiology UK workforce census 2015 report**, 2016

Although progress is being made at national level, a number of significant challenges are yet to be fully addressed. For example, there are ongoing difficulties in recruiting general and specialist radiology staff and concerns about the information systems that support radiology services.

- 11 Given the challenges set out above, the Auditor General decided that it was timely to undertake a review of radiology services across all health boards in Wales. The work examined the actions health boards are taking to address the growing demand for radiology services, and the extent to which these actions are providing sustainable and cost-effective solutions to the various challenges that exist. The review also examined key radiology imaging techniques, or modalities, as well as interventional radiology in acute settings. It excluded therapeutic radiology.
- 12 We undertook the fieldwork at the Betsi Cadwaladr University Health Board (the Health Board) between June and September 2016. [Appendix 1](#) provides more details of the audit approach and methodology.
- 13 In addition to this local audit work at the Health Board, the Auditor General for Wales is conducting a value-for-money examination of the NHS Wales Informatics Service, which will, amongst other things, look at the implementation of RADIS¹⁰ and PACS¹¹ across Wales. The findings from that work are due to be published in late spring 2017.

Contextual information

- 14 The Health Board's radiology services are managed as part of the North Wales Managed Clinical Services Directorate (NWMCS), which is comprised of a number of different services. The management structure for radiology services is focussed around each of the Health Board's three main district general hospitals, at Ysbyty Gwynedd, Ysbyty Glan Clywd, and Ysbyty Maelor. Each has a radiology service manager and a clinical director. Site-level issues are addressed through processes within the divisional management structure, which comprises the East, Central, and West divisions.

¹⁰ RADIS – Wales Radiology Information System

¹¹ PACS – Picture Archiving and Communications System

Our main findings

- 15 Overall, we concluded that day-to-day operations are well managed, but increasing demand, workforce challenges, poor IT systems, aging equipment and weak strategic planning present risks to future delivery.

Exhibit 1: our main findings

Our main findings
<p>Factors affecting patient experience</p> <p>Out-of-hours access to emergency radiology services is limited but waiting times and reporting times are generally good. Audit arrangements are comprehensive and there is an effective culture for learning from incidents:</p> <ul style="list-style-type: none">• open access to radiology services is generally good but access to emergency radiology services out-of-hours is limited;• the period patients have to wait for their radiological examination has fallen over time, with few patients waiting longer than eight weeks;• average reporting times are generally good, outsourcing of out-of-hours reporting has helped to reduce pressures, and while good use is made of advanced practice radiographers, further development of these roles is limited by resources;• there is a comprehensive programme of multidisciplinary clinical audit, and support for clinical research; and• there is a framework and positive culture for learning from incidents, patients' views are proactively sought and facilities issues are being addressed through capital developments.
<p>Demand and capacity issues affecting service performance</p> <p>Demand for radiology services is generally beyond local control and despite workforce challenges, productivity is higher than average. Problems with IT systems inhibit more effective appointment booking:</p> <ul style="list-style-type: none">• demand for radiological services is generally beyond local control, and other specialties do not always give notice of service changes that impact on radiology demand;• the Health Board uses comprehensive national referral guidelines, although most referrals are still paper-based, and radiologist advice and support are generally considered to be good;• radiology IT systems inhibit more effective appointment booking;• the proportion of radiologists over 60 is higher than for the rest of Wales, and while the staffing establishment has increased at a greater rate than the rest of Wales, vacancies are difficult to fill;• while the radiology workforce profile is largely in line with the all-Wales average, staff carry out more examinations than average;• operational pressures limit training opportunities for staff. The radiology service maintains and shares development and training records, but this information is not consistently included in the Electronic Staff Record; and• there are fewer magnetic resonance imaging scanners when compared to Wales, computerised tomography and ultrasound scanners have shorter operating hours, and scanning at weekends is limited.

Our main findings

Extent to which radiology services are well managed

Site-level management arrangements are clear, although there is no overall strategic plan for radiology, and senior staff lack confidence in directorate management arrangements. There is dissatisfaction with the core radiology IT system, and some older equipment is reaching the end of life expectancy:

- there is no overall strategic, operational, or financial plan for the radiology service, although strategic workforce planning has taken place;
- site-level radiology management and accountability arrangements are clear, although staff lack confidence in directorate arrangements, and there is a perception that communication between sites has diminished;
- the service is not directly represented on some key Health Board committees;
- there has been variation in service expenditure above and below the budget in recent years, and savings targets have sometimes been exceeded;
- the radiology service maintains a medical-equipment replacement schedule and some equipment is reaching the end of life expectancy but there is no replacement budget;
- staff are dissatisfied with the functionality of the core radiology IT system, and with the PACS; and
- radiology performance is regularly reviewed at a local level, but a limited set of radiology performance indicators is presented at Board level.

Recommendations

- 16 As a result of this work, we have made a number of recommendations which are set out in [Exhibit 2](#).

Exhibit 2: recommendations

Table outlining our recommendations to the Health Board.

Factors affecting patient experience

- R1 By mid-2017, the radiology service should communicate with all GPs in the West to raise awareness that radiologists are prepared to consider patient access to imaging without an outpatient appointment beforehand. The communication should include details on how best to contact radiologists.

Demand and capacity issues affecting service performance

- R2 By the end of 2017, the radiology service should identify and implement ways to reinforce the need for other services to communicate with them about changes and initiatives that will affect the provision of radiology services.
- R3 By the end of 2017, the radiology service should review the co-ordination of radiology appointments within and across sites, and set out an action plan to offer greater patient choice while respecting preferences, to help distribute demand effectively and to reduce variations in waiting times.
- R4 The Health Board should, by the end of 2017, ensure that it includes data regarding statutory and mandatory training compliance for all radiology staff groups as part of its Electronic Staff Record.
- R5 The radiology service should establish a radiology strategic plan, by the end of 2017, to:
- show where it is now in terms of demand, capacity and available resources;
 - set out a view of where it needs to be; and
 - inform the development of annual operational plans.
- R6 By the end of 2017, the radiology service should set out a clear financial plan to inform annual operational plans.
- R7 The Health Board should, by mid-2017, establish clear executive accountability for the delivery of the radiology strategic plan.
- R8 The Health Board should ensure clear representation of the radiology service on its key committees, by mid-2017.
- R9 By the end of 2017, the Health Board should set out capital replacement plans, and contingency plans, for equipment which poses a particular risk to service continuity and patient care.

Detailed report

Out-of-hours access to emergency radiology services is limited but waiting times and reporting times are generally good. Audit arrangements are comprehensive and there is an effective culture for learning from incidents

Open access to radiology services is generally good but access to emergency radiology services out of hours is limited

- 17 Open-access services¹² are widely recognised as a means to reduce the time it takes for patients to access imaging. However, the approach can lead to demand-management challenges, particularly when used for more complex imaging. It also has the potential to raise patient expectations and encourage overtesting. For example, if a patient with lower back pain has an x-ray, it will not improve their condition. They may insist that the GP refers them for an x-ray because they feel as though something is being done for them. The decision to refer may not be supported when the radiology department or other referral screening service reviews the request. This can lead to a tension between patient expectations and the correct professional response.
- 18 While most radiology departments offer some form of open access to services, the extent of access varies. Typically, it is limited to plain x-ray only, such as a chest x-ray. If the referring medical professional has determined that a plain film x-ray is necessary, they complete a request form which the patient takes to the radiology department during opening times to receive, if appropriate, the requested x-ray. At the Health Board, access varies:
- Ysbyty Gwynedd provides open access for plain film x-ray (walk-in) and ultrasound (by appointment);
 - Ysbyty Glan Clwyd offers GPs open access to plain film x-ray (walk-in) and ultrasound (by appointment); and
 - Ysbyty Maelor offers GPs open access by appointment to plain film x-ray, ultrasound and all complex imaging modalities.
- 19 We were told that while GPs in the West do not have open access to MRI and CT, consultants are prepared to consider access to complex imaging without an outpatient appointment beforehand. Not all GPs may be aware of this potential, although we heard that consultant radiologists have tried to communicate that this is the case.

¹² Where an open-access service is provided, a GP can refer a patient to be seen by the relevant x-ray department.

- 20 Where open access is not available, for example, for more complex imaging, the referral should specify the degree of urgency. Typically, referrals are classed as urgent (outpatient) or routine priority (outpatient). This ensures that the patients with the most critical needs are seen first. Urgent referrals will be seen as soon as they can be accommodated. For all other referrals, the patient will be added to the waiting list, with urgent referrals prioritised. The Health Board uses three categories in order to prioritise its waiting lists ie 'urgent', 'urgent suspected cancer' and 'routine', and the categories are consistently applied.
- 21 Patients with emergency health needs may need access to prompt radiology diagnostics and care outside standard radiology working hours. The Health Board provides some emergency radiology services out of hours. The following cover is provided:
- CT – outsourced at night;
 - MRI scans – none, except for cauda equine ¹³;
 - Ultrasound scans – if needed (although rare), this is by consultant-to-consultant request; and
 - Interventional Radiology – ad hoc.

The period patients have to wait for their radiological examination has fallen over time, with few patients waiting longer than eight weeks

- 22 All NHS bodies in Wales are required to comply with the Welsh Government diagnostic waiting times target which states that no patients should wait more than eight weeks to receive their diagnostic test. The diagnostic waiting-time target applies to all radiological interventions including magnetic resonance imaging (MRI), computed tomography (CT), and non-obstetric ultrasound (US), fluoroscopy, barium enema, and nuclear medicine¹⁴. The Welsh Government target does not apply to plain film x-rays.
- 23 Since 2009 waiting times for radiological tests have also formed part of the referral-to-treatment target¹⁵. Health boards in Wales are required to ensure that 95% of all

¹³ **Cauda equina syndrome (CES)** is a serious neurologic condition in which damage to the **cauda equina** (lower end of the spinal cord) causes loss of function of the lumbar plexus (nerve roots) of the spinal canal below the termination) of the spinal cord.

¹⁴ WHC(2005)078 defined the initial exam groups that were included in the monthly waiting time reports, and Fluoroscopy was added in 2007, which includes Barium Enema

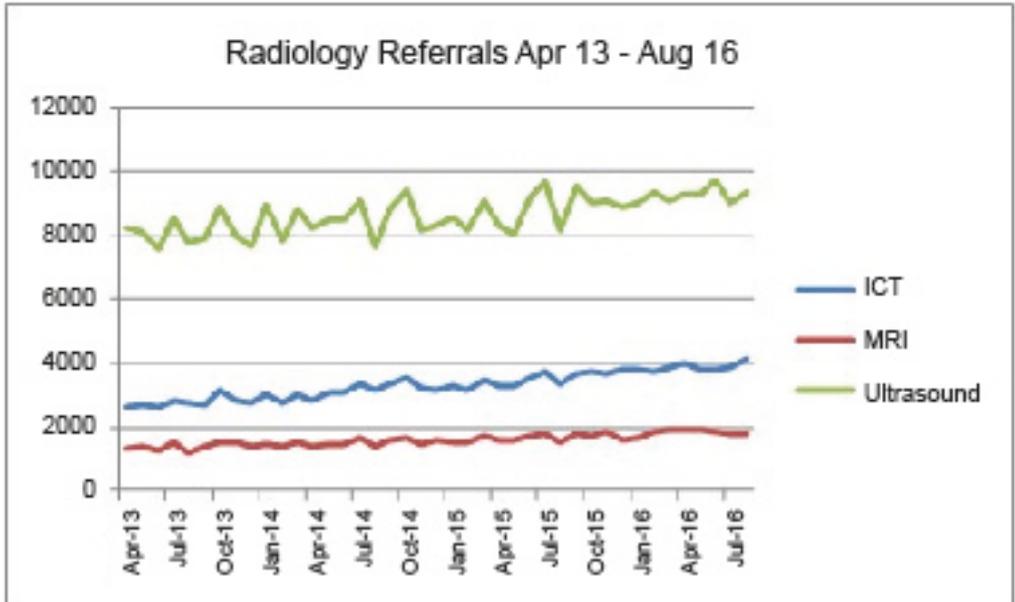
¹⁵ Welsh Health Circular (2007) 014 – **Access 2009 – Referral to Treatment Time Measurement**; Welsh Health Circular (2007) 051 – **2009 Access – Delivering a 26 Week Patient Pathway – Integrated Delivery and Implementation Plan**; and Welsh Health Circular (2007) 075 – **2009 Access Project – Supplementary Guidance for Implementing 26-Week Patient Pathways**

patients waiting for elective treatment, receive their treatment within 26 weeks from the point at which the referral was received. For many of these patients, diagnostic tests help decide which treatment is the best option.

- 24 The all-Wales radiology waiting times¹⁶ for consultant and GP referrals show that for August 2016 there were 6,617 patients waiting for diagnostic imaging at the Health Board: 60% for non-obstetric US, 19% for MRI, 18% for CT, and 3% for nuclear medicine imaging.
- 25 The Health Board’s own radiology performance tracker shows an upwards trend in referrals. Health Board data from April 2013 to March 2016 show average annual growth across all modalities of 3.7%, but in the same period CT referrals have increased by 13.6% per year, MRI referrals by 10.4% per year and US referrals by 4.5% per year (Exhibit 3).

Exhibit 3: Radiology referrals from April 2013 to August 2016

Table showing the upward trend at the Health Board in the number of referrals for CT, MRI, and ultrasound modalities between April 2013 and August 2015



Source: Betsi Cadwaladr University Health Board, radiology performance tracker

- 26 In August 2016, 1,277 patients were waiting for an MRI scan at the Health Board, of which only two were waiting over eight weeks (Exhibit 4).

¹⁶ NHS Wales Informatics Services, **NWIS Diagnostic and Therapy Services Waiting Times**, (accessed via StatsWales on 30 October 2016)

Exhibit 4: MRI waiting times for August 2016

Table showing that the Health Board had only two patients waiting over eight weeks for an MRI scan, which is significantly below the all-Wales figures.

	Total number of patients waiting for an MRI scan					Percentage of patients waiting more than 8 weeks
	Up to 8 weeks	Over 8 weeks and up to 14 weeks	Over 14 weeks and up to 24 weeks	Over 24 weeks	Total waiting	
Ysbyty Glan Clwyd	63	0	0	0	319	0%
Ysbyty Gwynedd	433	2	0	0	435	0%
Ysbyty Maelor	506	0	0	0	506	0%
Other	17	0	0	0	17	0%
Betsi Cadwaladr University Health Board	1,275	2	0	0	1,277	0%
All Wales¹	11,662	913	66	163	12,804	9%

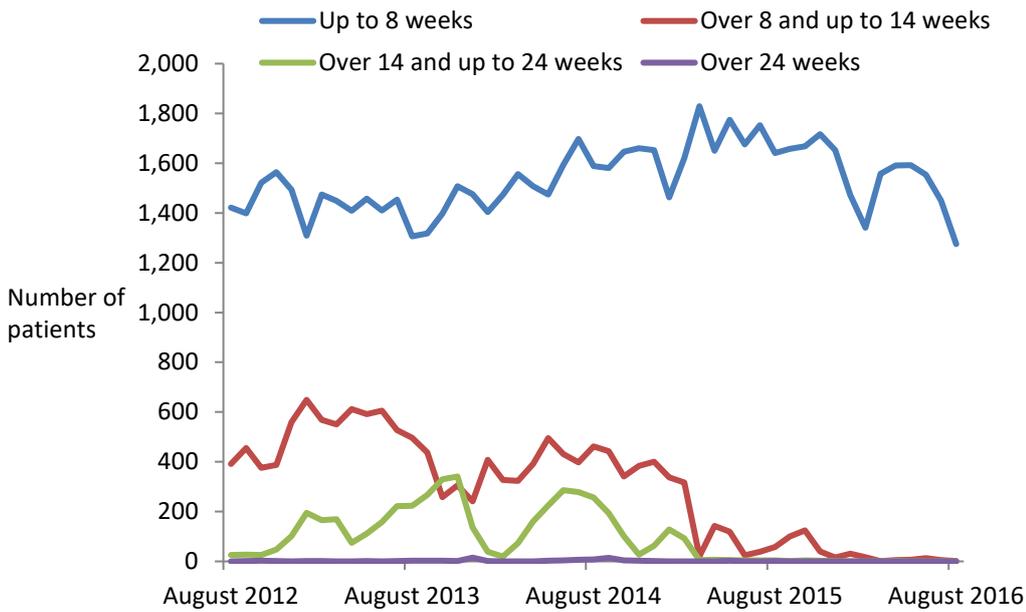
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards

Source: **Diagnostic and Therapy Services Waiting Times**, NHS Wales Informatics Services (accessed StatsWales, on 30 October 2016)

- 27 The total number of patients on the waiting list for an MRI scan at the Health Board decreased by 44% between August 2012 and August 2016, and the percentage waiting more than eight weeks decreased from 23% to 0% in the same period ([Exhibit 5](#)).

Exhibit 5: MRI waiting times trend from August 2012 to August 2016

Graph showing that there were around the same number of patients waiting up to eight weeks in August 2016 as there had been in August 2012, while patients waiting longer than eight weeks had fallen to zero by August 2016.



Source: NHS Wales Informatics Services, **Diagnostic and Therapy Services Waiting Times**, (accessed via StatsWales, on 30 October 2016)

28 In August 2016, 1,171 patients were waiting for a CT scan at the Health Board, of which none were waiting over eight weeks ([Exhibit 6](#)).

Exhibit 6: CT waiting times for August 2016

Table showing that the Health Board has no patients waiting more than eight weeks for a CT scan.

	Total number of patients waiting for a CT scan				Total waiting	Percentage of patients waiting more than 8 weeks
	Up to 8 weeks	Over 8 weeks and up to 14 weeks	Over 14 weeks and up to 24 weeks	Over 24 weeks		
Ysbyty Glan Clwyd	370	0	0	0	370	0%
Ysbyty Gwynedd	378	0	0	0	378	0%
Ysbyty Maelor	421	2	0	0	423	0%
Betsi Cadwaladr University Health Board	1,169	2	0	0	1,171	0%
All Wales ¹	7,293	63	51	11	7,418	2%

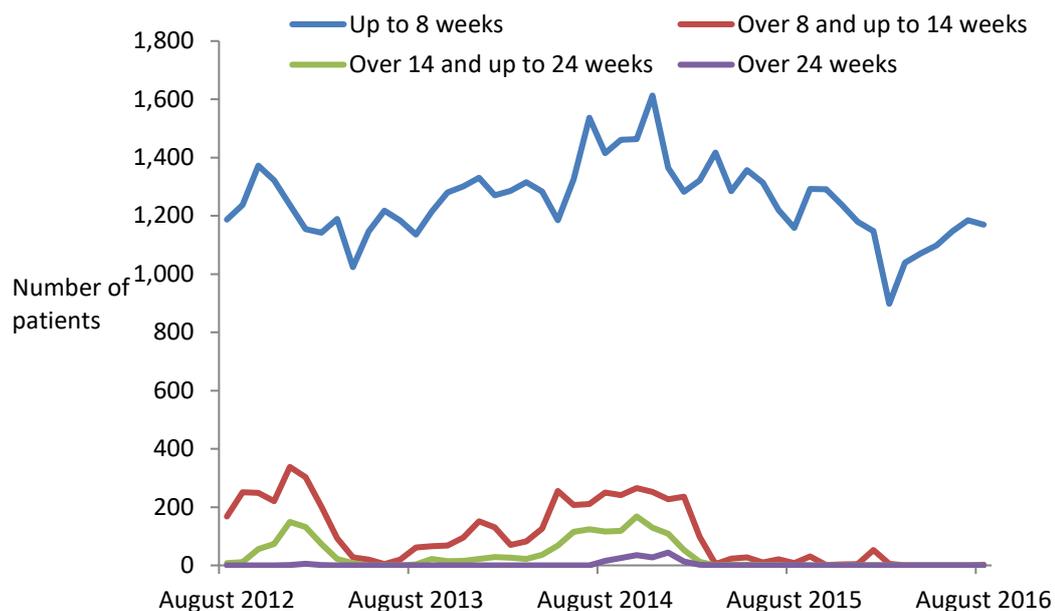
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards

Source: **Diagnostic and Therapy Services Waiting Times**, NHS Wales Informatics Services (accessed via StatsWales, on 30 October 2016)

29 The total number of patients on the waiting list for a CT scan at the Health Board decreased by 16% between August 2012 and August 2016, and the percentage of patients waiting more than eight weeks decreased from 5% to 0% in the same period ([Exhibit 7](#)).

Exhibit 7: CT waiting times trend from August 2012 to August 2016

Graph showing that around the same number of patients were waiting up to eight weeks in August 2016 as there had been in 2012. The number of patients waiting longer than eight weeks had fallen to zero by 2016.



Source: **Diagnostic and Therapy Services Waiting Times**, NHS Wales Informatics Services (accessed via StatsWales, 30 October 2016)

30 In August 2016, 3,948 patients were waiting for a non-obstetric US scan at the Health Board, of which none were waiting over eight weeks (**Exhibit 8**).

Exhibit 8: non-obstetric US scan waiting times for August 2016

Table showing that the Health Board has only six patients waiting over eight weeks for non-obstetric US scans, which compares well with the all-Wales figures.

	Total number of patients waiting for a non-obstetric US scan					Percentage of patients waiting more than 8 weeks
	Up to 8 weeks	Over 8 weeks and up to 14 weeks	Over 14 weeks and up to 24 weeks	Over 24 weeks	Total waiting	
Ysbyty Glan Clwyd	761	0	0	0	761	0%
Ysbyty Gwynedd	940	1	0	0	941	0%
Ysbyty Maelor	1,292	5	0	0	1,297	0%
Other	949	0	0	0	949	0%
Betsi Cadwaladr University Health Board	3,942	6	0	0	3,948	0%
All Wales¹	18,944	1,999	626	133	21,702	13%

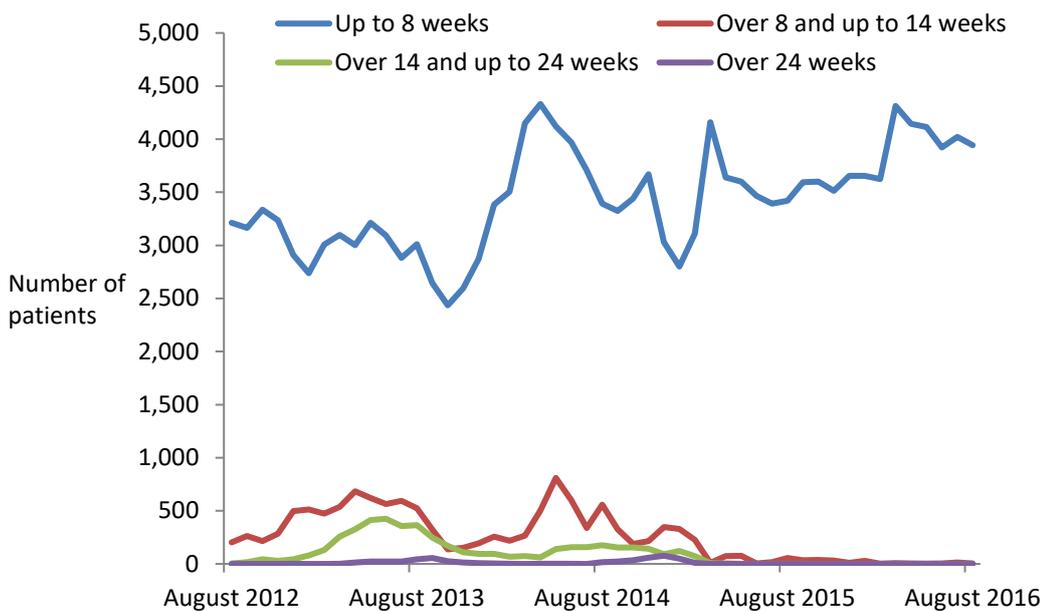
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards

Source: NHS Wales Informatics Services, **Diagnostic and Therapy Services Waiting Times**, (accessed StatsWales, 30 October 2016)

- 31 The total number of patients on the waiting list for a non-obstetric US scan at the Health Board increased by 13% between August 2012 and August 2016, and the percentage of patients waiting more than eight weeks decreased from 6% to 0% (Exhibit 9).

Exhibit 9: non-obstetric US scan waiting times trend from August 2012 to August 2016

Graph showing that the number of patients waiting up to eight weeks has increased over four years, and the numbers have fluctuated significantly during that time. The number of patients waiting more than eight weeks has fallen to almost zero during 2016.



Source: **Diagnostic and Therapy Services Waiting Times**, NHS Wales Informatics Services (accessed StatsWales, 30 October 2016)

- 32 Sonographers vet the request forms to find those which fall outside the request guidance. The referral process is largely paper-based and managers told us that it is highly complex. Delays can occur at any stage in the process eg while the referral is in the post; during specialty vetting; and upon return to the referrer. We heard that vetting a request can take almost half of an Urgent Suspected Cancer (USC) referral period.
- 33 At present, electronic requesting is only available for some of the referrals made at Ysbyty Glan Clwyd. Staff told us that electronic requesting would have an enormous impact on the speed of referrals, and would reduce incomplete referrals by forcing completion of the necessary details. It would also enable radiographers to respond immediately to clinicians who have made a request which does not comply with the guidance. This in turn would expedite the process leading up to patient imaging, diagnosis and treatment.

Average reporting times are generally good, outsourcing of out-of-hours reporting has helped to reduce pressures, and while good use is made of advanced practice radiographers, further development of these roles is limited by resources

- 34 Effective management of patient care requires timely reporting of radiology images, by a qualified authorised practitioner, generally a radiologist, reporting radiographer or sonographer. The report is a record of the interpretation of the scan, used to make further decisions on the care of the patient. Any delays in reporting can adversely affect patient outcomes.
- 35 All images must be reported and provided to the referring clinician in appropriate time in accordance with the patient's needs and clinical condition. The Welsh Reporting Standards for Radiology Services 2011 (the Standards) were produced in order to clarify previous guidance and regulations. The Standards set out that radiology should aim to provide reporting turnaround times as follows:
- Urgent – immediately/same working day
 - Inpatient – within one working day
 - A&E – within one working day
 - GP – within three working days
 - Outpatient – within ten working days
- 36 While radiology staff across the Health Board aim to adhere to these standards, there is recognition that they are not always achieved. Where delays occur, it can have an impact on the speed at which a diagnosis can be reached and a patient can be treated.
- 37 The RADIS core radiology system is in place at each of the three main sites and provides reports on reporting waiting times. A monthly divisional performance report is prepared which includes reference to reporting waiting times.
- 38 The introduction of Fujifilm PACS has enabled the creation of cross-site workstreams that help maximise reporting capacity and minimise delays.
- 39 We found that average reporting turnaround times for CT, MRI, plain x-ray and US, are generally good and relatively consistent across sites. Ysbyty Glan Clwyd has the lowest reporting times across all modalities, although the variation with other sites is small ([Exhibit 10](#)). Ysbyty Gwynedd has the longest report turnaround times, with the exception of ultrasound ([Exhibit 11](#)). Ysbyty Glan Clwyd has the lowest numbers of unreported examinations, with the exception of MRI ([Exhibit 12](#)).

Exhibit 10: average report turnaround time as at 31 March 2016

Table showing that average turnaround times are lower in Ysbyty Glan Clwyd across all modalities.

	Average report turnaround time (days)			
	CT	MRI	Plain x-ray	US
Ysbyty Glan Clwyd	1	3	1	0
Wrexham Maelor Hospital	2	4	3	1
Ysbyty Gwynedd	2	5	3	1

Source: Wales Audit Office, **Health Board Survey**

Exhibit 11: longest report turnaround time as at 31 March 2016

Table showing that the longest report turnaround times are lowest at Ysbyty Gwynedd across all modalities with the exception of ultrasound.

	Longest report turnaround time ¹ (days)			
	CT	MRI	Plain x-ray	US
Ysbyty Glan Clwyd	10	29	6	6
Wrexham Maelor Hospital	14	16	18	20
Ysbyty Gwynedd	22	31	24	8

¹ Longest report times exclude any obvious outliers

Source: Wales Audit Office, **Health Board Survey**

Exhibit 12: number of examinations not reported between 1 April 2015 and 31 March 2016

Table showing that the actual number of examinations not reported are lowest at Ysbyty Glan Clwyd across all modalities with the exception of MRI.

	Number of examinations not reported ¹			
	CT	MRI	Plain x-ray	US
Glan Clwyd Hospital	77	51	148	16
Wrexham Maelor Hospital	130	45	522	75
Ysbyty Gwynedd	123	63	549	94

¹ Unreported examinations are those that have remained unreported more than 10 days since the examination date.

Source: Wales Audit Office, **Health Board Survey**

- 40 Extended practice radiographers receive extra training to interpret and report some types of images, typically plain x-rays, ultrasound or fluoroscopy. For patients attending the emergency department and receiving a plain x-ray in normal hospital hours, the use of extended practice radiographers increases the likelihood that a report will be produced while the patient is still in the department. Where x-rays are reported by radiologists only, the formal report may not be produced until hours, and sometimes days, after the patient has left the hospital. In these instances, x-rays will be initially assessed by a clinician with no formal radiology training. The use of extended practice radiographers can help to reduce the number of patient recalls caused by initial incorrect x-ray interpretation.
- 41 The Health Board has established a number of advanced practice roles, including radiographer reporting of plain film exams and non-medical staff undertaking procedures such as upper GI (gastro intestinal) fluoroscopy¹⁷. Radiology service managers are generally supportive of the establishment of advanced practice roles. They recognise it as one means by which to address the national challenge of increasing demand for radiology services, and problems in recruiting radiologists (**Exhibit 13**).
- 42 There is a team of nine reporting radiographers across the Health Board, with three being based at each of the three main sites. We were told by the Health Board that the services they provide are vulnerable when staff are absent, or if they leave.

¹⁷ A fluoroscopy machine produces a constant stream of X-rays in real time, providing a continuously changing image. This technology normally delivers a lower dose of radiation than the previous analogue systems, whilst providing high definition, high resolution images.

Limited staff resources also make it difficult to allocate time for other staff to develop into this type of role.

Exhibit 13: percentage of scans reported by radiologists, radiographers and other staff between 1 April 2015 and 31 March 2016

Table showing that the percentage of scans reported by Health Board radiographers and other non-radiologist staff is generally higher than the average for the rest of Wales, with the exception of CT scans, where the Health Board reflects the national average exactly.

		% of scans reported by		
		Radiologist	Radiographer ¹	Others ²
CT	Glan Clwyd Hospital	100%	0%	0%
	Wrexham Maelor Hospital	95%	0%	5%
	Ysbyty Gwynedd	100%	0%	0%
	Betsi Cadwaladr University Health Board	98%	0%	2%
	Wales	98%	0%	2%
MRI	Glan Clwyd Hospital	99%	0%	1%
	Wrexham Maelor Hospital	92%	0%	8%
	Ysbyty Gwynedd	99%	0%	1%
	Betsi Cadwaladr University Health Board	96%	0%	4%
	Wales	98%	1%	1%
Plain x-ray	Glan Clwyd Hospital	62%	27%	12%
	Wrexham Maelor Hospital	44%	39%	17%
	Ysbyty Gwynedd	52%	30%	18%
	Betsi Cadwaladr University Health Board	53%	32%	15%
	Wales	63%	23%	14%
US	Glan Clwyd Hospital	13%	76%	11%
	Wrexham Maelor Hospital	16%	69%	15%
	Ysbyty Gwynedd	14%	85%	0%
	Betsi Cadwaladr University Health Board	15%	76%	9%
	Wales	26%	71%	3%

¹ Radiographers includes ultrasonographers and medical physics technicians.

² Others category also includes auto-reported and non-reported images. (Auto-reporting is performed by the referring clinician rather than the radiology team.)

Source: Wales Audit Office, **Health Board Survey**

- 43 Constraints on the availability of radiologists led to the introduction of a national contract to provide extra, outsourced radiology in November 2014. The contract, awarded to Radiology Reporting Online Limited (RROL), was to provide outsourced reporting capacity across Wales, initially for two years, with an option to extend the contract for an additional year. The contract value across Wales was for £1.5 million (excluding VAT) for both years. But, increasing demand, particularly in CT and MRI reporting, meant that usage has been significantly in excess of the predicted levels. The NIPB has estimated that the actual spend will be almost double the original contract value.
- 44 Outsourcing of reporting out-of-hours to RROL occurs at each of the three main sites and radiology managers commented that this generally works well. Consultants we spoke to had mixed views about the speed and quality of the service, with some indicating that turnaround could sometimes be three or more hours. Prior to the contract, Wrexham Maelor Hospital radiologist consultants had high levels of on-call activity, and there were also difficulties in ensuring appropriate compensatory rest. By using the contract with RROL, the Health Board has been able to significantly reduce the demand on radiologists, and compensatory rest is easier to organise as a consequence.
- 45 Radiology managers at each of the three main sites record and report the number of outsourced reports, and a single record is compiled from these figures for the Health Board as a whole. The response time for reporting is considered to be good. Any clinical issues which arise may be subject to a complaints procedure, or become part of the discrepancy audit work carried out by RROL which is reported back to the Health Board.

There is a comprehensive programme of multidisciplinary clinical audit, and support for clinical research

- 46 Radiology services must ensure that clinical performance always meets the appropriate standards for patient treatment and care. They need to comply with the National Diagnostic Imaging Framework (NDIF). The NDIF draws together a wide range of standards that apply and have relevance to radiology, such as waiting times targets, Healthcare Standards for Wales, and national delivery plans for specific conditions.
- 47 Radiology departments need to monitor clinical performance to ensure compliance with standards and maintain a clear programme of clinical audit. The Royal College of Radiologists' **Good Practice Guide for Clinical Radiologists** sets out good practice in relation to the design and delivery of clinical audit. This includes AuditLive, a tool which sets out a collection of audit templates, providing a framework identifying best practice in key stages of the audit cycle, covering over 100 radiology topics.
- 48 The Health Board has a clear overall programme of radiology clinical audit. The programme is designed to comply with a wide range of relevant audit regulations,

For example, those relating to the Medicines and Healthcare Products Regulatory Agency (MHRA), IR(ME)R, and the Imaging Services Accreditation Scheme.

- 49 Individual Health Board sites hold audit meetings every month, and a joint meeting takes place twice a year. All meetings are multidisciplinary. The radiology service has a research radiographer to support and develop clinical audit and research.

There is a framework and positive culture for learning from incidents, patients' views are proactively sought and facilities issues are being addressed through capital developments

- 50 Radiology services must ensure that their practices are safe. For example, patients should always be offered appropriate radiological techniques which balance any inherent risks with the potential benefits from diagnosis and treatment. The service should ensure that patients receive the correct radiation dose, and staff should be monitored and protected so that they are not exposed to dangerous doses of radiation in the course of their work. Where errors or incidents are identified, health boards should act decisively and openly to learn lessons and prevent such incidents reoccurring.
- 51 In 2015, there were 377 reported incidents in diagnostic radiology departments across the Health Board, of which 9 were classed as severe, 28 as moderate severity, and the rest classed as either low severity or causing no harm.
- 52 Radiologists hold monthly local learning discrepancy meetings. The meetings take place at each of the three main sites and are led by a designated radiologist. All are underpinned by reference to Royal College Radiologists (RCR) Standards for Learning from Discrepancies. The meetings draw on information from a number of sources, such as DATIX, recorded concerns, and general issues arising. There is a joint meeting across sites once a year. Relevant issues are taken to the Quality, Safety and Effectiveness Committee or to senior management teams.
- 53 When radiation incidents are reviewed, they lead to a learning point notice, which is disseminated to radiology staff across the Health Board. At the time of our fieldwork, formal consideration was being given as to how peer review and clinical audit can be best used to contribute to clinical learning. Reporting radiographers hold their own discrepancy meetings. They are required to carry out peer review of at least 5% of their work, and we heard that this standard is usually exceeded.
- 54 Radiology staff commented that they are encouraged to report incidents and errors. They also told us that there are good processes for learning from incidents and errors. Where significant concerns or incidents occur, they are recorded and any actions arising are subsequently followed up by the radiology Head of Quality and Governance. Lessons are shared and disseminated through local radiology quality and safety meetings. Where appropriate, learning is shared more widely across the Health Board.
- 55 Radiology staff must ensure they protect patients and staff members from the risks of radiation. The Ionising Radiation (Medical Exposure) Regulations 2000

(IRMER), and subsequent amendment regulations in 2006 and 2011, provide a set of regulations for medical staff referring patients to radiology, those justifying the examination and those operating the equipment. Healthcare Inspectorate Wales (HIW) is responsible for monitoring compliance against IRMER. The Health Board has been inspected once in recent years, at Ysbyty Gwynedd in January 2015. The subsequent report found that 'the standard of documentation submitted to HIW prior to the inspection was very high' and that 'the department should be commended for their high standards of work and compliance with IR(ME)R'. There were no breaches of the regulations.

- 56 Feedback from patients is a vital source of information for radiology services to understand and improve patient experience. A total of 91 compliments and 48 complaints were received by radiology services across the Health Board in 2015-16. Even if patients make a small number of complaints, it does not necessarily demonstrate that there is little to do to improve patient experience of aspects of service such as referral processes, imaging procedures, treatment, facilities, and staff attitude.
- 57 Various capital and equipment developments across the Health Board have presented an opportunity to address some of the environment issues that affect patient experience in radiology departments. The introduction of a new CT/MR suite at Ysbyty Gwynedd has enabled the service to address previously poor waiting and changing facilities in those areas. While there are separate inpatient and outpatient areas in the suite, that is not the case elsewhere. We were told that staff work to control the flow of inpatients as far as possible, so that they are being seen when outpatients are not in the area. The refurbishment of Ysbyty Glan Clwyd has provided an opportunity to address some of the environment issues. The second CT scanner will have separate inpatient and outpatient waiting areas. The MRI scanner will also have separate waiting areas. Previously limited disabled access is also being addressed as part of the refurbishment. At Wrexham Maelor Hospital there are separate inpatient and outpatient waiting areas for plain film x-ray. Waiting areas are not separate in the CT and MRI areas, and staff try to ensure that the progress of inpatients through those areas is expedited as much as possible.
- 58 The Imaging Services Accreditation Scheme is a patient-focused accreditation scheme that helps imaging services to manage the quality of their services and make continuous improvements. In Wales, the introduction of ISAS is being overseen by the NIPB. However, there is recognition that progress at individual health bodies has been limited by a lack of staff resources to enable co-ordination of the work associated with the accreditation process. Nonetheless, the Health Board is the Welsh pilot for the approach and is working towards accreditation, potentially over a two-year period.

Demand for radiology services is generally beyond local control and despite workforce challenges, productivity is higher than average. Problems with IT systems inhibit more effective appointment booking

Demand for radiological services is generally beyond local control, and other specialties do not always give notice of service changes that impact on radiology demand

- 59 The increasing role of radiology in clinical care has led to growing demand for radiological examinations, in particular for CT and MRI scans. While figures are not available for Wales, the most recent data available for England shows that there was a 42% increase in the number of radiology examinations undertaken per year between 2003 (28.8 million scans) and 2014 (40.9 million scans)¹⁸. The Royal College of Radiologists has predicted that by 2022 the number of radiological examinations carried out in England will be around 62 million¹⁹ per year driven by further innovation and demographic growth.
- 60 As well as the number of scans undertaken annually increasing, scans are also becoming more complex. The biggest percentage rise in volume for radiological examinations has been for CT and MRI scans as they play an increasing role in the early diagnosis of many diseases. The Royal College of Radiologists predicts that the biggest percentage increase in examinations up to 2022 is expected to be for MRI scans (from 2.7 million scans per year in 2014 to 7.8 million in 2022) and CT scans (5.2 million scans per year in 2014 to 12.3 million in 2022)²⁰. MRI and CT scans are complex data examinations, which generally include multiple images, and therefore, per patient examination, are more labour-intensive for radiologists interpreting images than less-complex scan types, such as plain x-ray.

¹⁸ **Annual Imaging and Radiodiagnostics Data**, NHS England, 2014

¹⁹ Royal College of Radiologists, **Information submitted to Health Education England workforce planning and education commission round 2015-16**

²⁰ Royal College of Radiologists, **Information submitted to Health Education England workforce planning and education commission round 2015-16**

- 61 Those we spoke to in the Health Board highlighted a number of factors contributing to an increase in demand and knock-on effects, for example:
- waiting list initiatives in other specialities – without advance consultation with radiology, they add significantly to the pressure on already stretched radiology resources;
 - external clinical guidelines and pathways – whilst improving standards they drive up demand for imaging; and
 - advances in radiological techniques – technological and clinical advances improve options and outcomes for patients, but add further pressure onto radiology services.
- 62 These factors are generally beyond the control of the radiology services in the Health Board. However, some regional radiology initiatives are being discussed to help manage demand for particular service aspects. For example, one of the options being considered as part of the cardiac MRI commissioning plan is for some MRI referrals to be directed to England. As some of the Health Board's tertiary referral centres are in England, there is a precedent for this kind of approach. Some clinical pathway work, such as for lower-back symptoms and colorectal symptoms, offers the potential to triage patients and direct them to imaging without the need for an outpatients appointment. Managers told us that one of the most significant internal barriers inhibiting their response to demand changes is the existence of three instances of the RADIS system across the Health Board. This prevents real-time communication with regard to activity and therefore, management of demand. The way forward is largely determined by the pace at which NWIS can respond to the need to bring systems together. We understand that there is no clear way forward yet.

The Health Board uses comprehensive national referral guidelines, most referrals are still paper-based, and radiologist advice and support are generally considered to be good

- 63 GPs and consultants refer patients to radiology. Ensuring that patients are referred for the most appropriate diagnostic investigation depends on clear guidance and standards. Guidance should be based on the Royal College of Radiologists' iRefer²¹ tool and support medical professionals referring patients to the service to select the most appropriate imaging investigation(s) or intervention for a given diagnostic or imaging problem. Each inappropriate investigative image performed is, in effect, an appointment slot wasted which adversely affects the service's ability to meet NHS waiting times targets and patient need in a timely way.

²¹ iRefer is a radiological investigation guidelines tool from The Royal College of Radiologists.

- 64 Available guidance is in the form of the national guidelines contained in 'iRefer: Making the best use of clinical radiology'. The Health Board complies with good practice by writing to all clinicians every year to inform them about the guidelines. These are available through a link on the Health Board's intranet. New radiologists receive an introduction to radiology referrals as part of their induction.
- 65 At the time of our fieldwork there were various referral request forms in use across the Health Board. The Health Board informed us that a joint referral request form is being introduced which will cover plain film x-ray, CT and US, alongside a separate joint referral request form for MRI.
- 66 Consultants said that in hospital settings, advice from radiologists is generally very good and that they had confidence in it. Some consultants commented that they prefer to seek out particular radiologists for specialist advice, although relative ease of access to radiologists varies across sites. We were told that radiologists generally identify where a GP has made a referral. As most GPs are not able to access images directly, radiologists report carefully to ensure that their response gives advice about how to proceed. They will say whether further imaging has been arranged, and where appropriate, give an indication that there is no wider disease implication, such as metastatic cancer.
- 67 As mentioned above, in the main, the Health Board does not have an electronic referral system, so all referrals are paper based. There was general agreement amongst those we interviewed that such a system would help to transform the service. Shortcomings and risks identified by staff within the current system include:
- the possibility that referrals may get delayed or lost within the system;
 - potential that GPs may not quickly see rejected referrals because they are overlooked amongst in a correspondence backlog, or missed because the referral is addressed to a GP who is away;
 - potential for mistakes in interpreting a request because of the poor quality of completion, and the need to return requests which were submitted without all of the information required; and
 - the lack of a documented audit trail to help monitor and manage referrals.
- 68 An electronic referral system would help to mitigate these types of risks, and reduce the elapsed time between a referral being made and a scan taking place.
- 69 Once a referral is made a radiologist or appropriately trained radiographer will justify (review) the referral for its appropriateness and to determine whether there is a sufficient benefit to the patient. Referrals may be declined or a more appropriate alternative investigation suggested. This legally required process of justification ensures that patients do not receive unnecessary exposure to radiation. It also helps ensure that appointment slots are not wasted.
- 70 The Health Board does not regularly review the appropriateness and quality of in-hours and out-of-hours referrals. While it has not carried out any recent audits of in-hours referrals, it has conducted an audit of out-of-hours referrals. Consultants

we spoke to were generally satisfied with the constructive nature of the feedback they receive in relation to inappropriate, queried, or incomplete referrals. Vetted referrals are occasionally returned to GPs with an indication that there may be insufficient information on the form. However, we heard that they generally do not receive comments about referrals.

Radiology IT systems inhibit more efficient appointment booking

- 71 Health boards should ensure that all appointment slots are made use of by keeping patient did not attend rates (DNAs) to a minimum. Some health boards operate partial booking systems. This means that when the patient nears the top of the waiting list, rather than allocating the patient with a set appointment time, the patient is asked to contact the health board to choose a time and (if possible) a place to suit the patient. Services offering partial-booked appointments typically see lower DNAs.
- 72 Radiology appointment booking arrangements across the Health Board are variable. In the East, the majority of patients are sent a letter inviting them to phone to arrange an appointment. In the Centre and West, the majority of appointments are allocated and sent to the patient in an appointment letter, with the option for the patient to phone to arrange an alternative appointment. Patient-survey feedback indicated that many patients would like to be offered the opportunity of evening or weekend appointments. We understand that Wrexham Maelor Hospital regularly offers patients this choice, although it was not clear whether the two other main sites offer the same choice.
- 73 The Health Board monitors and reports patient DNA rates on a monthly basis. For appointments sent out, DNA rates are reported by modality across each site. The cost of the DNAs can be calculated, and this information is included in appointment letters. We heard that the general rate of DNAs was low, at around two to four per cent.
- 74 Health boards must build in flexibility to the appointment timetable to ensure that emergency referrals for scans can be accommodated. Some modalities, such as MRI scans, take 30 to 40 minutes; therefore, health boards need to be able to accommodate any emergency referrals, but without leaving so many free appointment slots that it impacts negatively on the capacity to see routine referrals. At the Health Board, service leads for individual modalities discuss existing bookings with the radiology appointments team on each site. They try to maintain an appropriate balance between urgent and routine patients, and to ensure that, as far as possible, there are no unused slots. Through the year, referral type and referral source data is extracted from RADIS, and reviewed by clinical directors and radiology service managers to help to ensure the right balance of appointment slot types.
- 75 Health boards should reduce unnecessary ring fencing of appointments, other than to ensure that emergency and urgent referrals can be accommodated. Ring fencing of appointments is where some or all appointments are reserved for

specific sub-groups of patients (for example, where referrals are grouped by the type of scan, such as gynaecological scans, breast scans etc). This leads to the waiting list being split into sub-lists which increases the likelihood that some patients will wait longer, as sub-lists, will differ in length. Similarly, using a single central booking office for the whole health board (rather than for individual hospitals), can help patients to be allocated to the next available appointment rather than potentially waiting longer for a slot to become available at a particular hospital.

- 76 At present, the emphasis at each site is on trying to provide an appointment locally in the first instance, and only then looking elsewhere in the Health Board for an alternative location. With three separate instances of RADIS in use, it is not possible to manage appointments, and therefore demand, in real time across sites.

The proportion of radiologists over 60 is higher than for the rest of Wales, and while the staffing establishment has increased at a greater rate than the rest of Wales, vacancies are difficult to fill

- 77 Radiologists, radiographers, nurses, technical and administrative staff work together to deliver imaging services. It is important to have the right number and skill mix of staff to deliver these services.
- 78 Our review found that the full-time equivalent (FTE) establishment²² staffing level of radiologists at the Health Board increased by 12% between 2012 and 2016 (Exhibit 14), compared with 5.9% across Wales²³. Similarly, the FTE establishment staffing level of radiographers at the Health Board increased by 17% in the same period, compared with 10.2% across Wales.

²² The staffing establishment is the level of staff that the Health Board has determined it needs to provide services and for which funding has been made available.

²³ The Welsh percentage increase figures for radiologists and radiographers/ultrasonographers are based on Abertawe Bro Morgannwg, Betsi Cadwaladr, Cardiff and Vale, and Hwyl Dda University health boards only, as these were the only health boards that could provide data for each year between 2012 and 2016.

Exhibit 14: FTE establishment of radiology staff trend at the Health Board between 2012–2016

Table showing clear growth in the numbers of radiologist and radiographers over the last five years

	2012	2013	2014	2015	2016	Percentage change 2012-2016
Radiologists	35.9	36.9	36.0	32.3	40.0	12%
Radiographers/ ultrasonographers	163.6	169.0	169.0	177.7	191.5	17%

Source: Wales Audit Office, **Radiology Health Board Survey**. Data is provided as at 31 March each year.

- 79 The continued increase in demand for complex imaging (CT and MRI scans) has outstripped service capacity across the UK. The mismatch in demand and capacity has been exacerbated by difficulties recruiting radiologists and other staff such as ultrasonographers. NHS Wales has historically had difficulty attracting radiology consultants from outside Wales and traditionally loses two out of every five trainee posts to England or outside of the UK²⁴. Across Wales, there is a shortfall of consultant radiologists in interventional, breast, paediatric and nuclear radiology. Across the UK, the number of unfilled consultant radiologist posts in 2015 was 9%, with 7% in Wales²⁵.
- 80 **Exhibit 15** shows that vacancy levels within the radiology establishment at the Health Board are the highest amongst radiologists at Ysbyty Glan Clwyd and Ysbyty Gwynedd. At Wrexham Maelor Hospital, radiologists are staffed up to the establishment.

²⁴ NHS Wales, **NHS Wales Health Collaborative Diagnostic Services Modernisation Programme**, December 2015

²⁵ The Royal College of Radiologists, **Clinical radiology UK workforce census 2015 report**, 2016

Exhibit 15: FTE radiology vacancies, 31 March 2016

Table showing that vacancies are the highest amongst radiologists at Ysbyty Glan Clwyd and Ysbyty Gwynedd.

	Number and percentage of FTE radiology establishment posts that are vacant		
	Radiologists	Radiographers/ ultrasonographers	Other radiology staff
Ysbyty Glan Clwyd	4.8 (32%)	5.8 (8%)	4 (6%)
Wrexham Maelor Hospital	0.0 (0%)	4.6 (9%)	4.7 (9%)
Ysbyty Gwynedd	3.0 (20%)	4.5 (7%)	1.9 (4%)

Source: Wales Audit Office, **Hospital Survey**

- 81 Across Wales, the service is likely to lose many older and experienced members of its workforce to retirement in the very near future as 38% of consultant radiologists are aged 55 or over²⁶. To provide a future sustainable consultant radiologist workforce, NHS Wales needs to train radiologists and retain them in NHS Wales. The National Imaging Academy for Wales project is being developed in 2016-17 to achieve this aim.
- 82 At the Health Board, 17% of consultant radiologists at the Health Board are aged 60 and over, and potentially within five years of retirement, which is higher than the Wales average. The figure for consultant radiologists aged 50 and over is 27%, which is lower than the Wales average of 37%. Radiographers aged 60 and over comprise 8% of the total establishment, which is in line with the Wales average. The figure for radiographers aged 50 and over is 37%, which is also in line with the Wales average ([Exhibit 16](#)).

²⁶ NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016, 2016**

Exhibit 16: number and percentage of consultant radiologists and radiographers by age as at June 2016

Table showing that compared to the all Wales average, the Health Board has a lower percentage of radiologists aged 50 and over, although it has a higher percentage of radiologists aged 60 and over, and the percentage of radiographers aged 50 and over is broadly in line with the all Wales average.

		Age					
		Under 39	40–44	45–49	50–54	55–59	60+
Consultant radiologists ¹	Betsi Cadwaladr University Health Board	4 (14%)	11 (38%)	6 (21%)	1 (3%)	2 (7%)	5 (17%)
	All Wales	29 (18%)	43 (27%)	28 (17%)	20 (12%)	20 (12%)	21 (13%)
Radiographers ²	Betsi Cadwaladr University Health Board	92 (43%)	22 (10%)	30 (14%)	29 (14%)	23 (11%)	17 (8%)
	All Wales	473 (45%)	106 (10%)	103 (10%)	170 (16%)	125 (12%)	74 (7%)

¹ NHS workforce definition: staff with consultant grade code or job role working in radiology – note this includes both diagnostic and therapeutic radiologists.

² NHS workforce definition: Staff bands 5–9 with a diagnostic radiography occupation code (S*F).

Source: NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016**, 2016

- 83 We heard that there is a reliance on the use of overtime, locum radiographers and outsourced mobile radiography vans to maintain services in the face of ongoing radiographer vacancies. These services are funded at premium costs. Radiographer recruitment in the period in the interval between the annual completion dates of the radiographer training scheme is very difficult, and there are lengthy gaps before posts can be permanently filled.
- 84 A lack of porters out-of-hours at Ysbyty Glan Clwyd and Wrexham Maelor Hospital places additional pressure on radiographers. There is a general lack of patient escorts at all times, which is a significant problem. This has the potential to impact on patient experience and patient safety. In addition, radiographers sometimes have to escort patients themselves, which means less of their time is spent in the

department. It also means that patients may have to wait in the department before someone becomes available to take them back to the ward. It is also a matter of prudent healthcare and value for money, in that costly staffing resources have to be used to provide services which should be provided by other staff. The situation also leads to delays in service, which has an impact on overall activity.

While the radiology workforce profile is largely in line with the all-Wales average, staff carry out more examinations than average

- 85 We reviewed the numbers of FTE radiologists and radiographers in-post at each of the Health Board's main hospital sites, relative to both population and workload. Such measures provide an overall guide to the appropriateness of the number of staff to meet demand. However, these measures do not take account of the complexity of the imaging undertaken, and thus need to be treated with the appropriate caution.
- 86 The number of FTE consultant radiologists per 100,000 people in the UK in 2015 was 4.8 (4.8: Wales, 4.7: England, 5.4: Scotland, and 6.2: Northern Ireland)²⁷. **Exhibit 17** shows that the number of radiologists and radiographers relative to population and workload is lower than the all-Wales average.

²⁷ The Royal College of Radiologists, **Clinical radiology UK workforce census 2015 report**, 2016

Exhibit 17: FTE of in-post radiologists and radiographers, per 100,000 population, June 2016

Table showing that, compared to the all-Wales average, the Health Board slightly less radiologist and radiographers, per 100,000 population.

	In-post FTE consultant radiologists ¹ per 100,000 population	In-post FTE radiographers ² per 100,000 population
Betsi Cadwaladr University Health Board	4.1	26.1
All Wales	4.8	27.2

¹ NHS workforce definition: staff with consultant grade code or job role working in radiology – note this includes both diagnostic and therapeutic radiologists.

² NHS workforce definition: Staff bands 5–9 with a diagnostic radiography occupation code (S*F).

Source: NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016**, 2016; and Welsh Government, **Local Authority Population Estimates for Wales**, 2015, accessed 20 October 2016

- 87 When measuring radiology activity, care is needed to ensure that comparisons are like for like. A single image may count as one unit of activity; however, where a patient receives complex or multiple images, this may count as one or more units depending on the Health Board's view. There is no standardised activity measurement in use in radiology in Wales or the UK.
- 88 In the absence of standard activity count, the medical classification system – the Systematised Nomenclature of Medicine Clinical Terms (SNOMEDCT) – has enabled some activity measurement. SNOMEDCT allows clinical data to be recorded in a consistent way, as it uses a standardised set of clinical terminology and codes. NHS England is adopting SNOMEDCT as the universal classification and terminology for all health organisations and for all aspects of health. However, in Wales it has only been adopted in radiology and a small number of other specialties. SNOMEDCT provides a standardised way of describing radiology examinations, and automatically applies multiplication for some activities depending on the coding applied. However, comparisons of radiology activity between radiology departments have to be treated with caution as any count of activity is reliant on organisations recording activity using SNOMEDCT consistently. Currently in Wales radiology activity is not consistently recorded, which makes it difficult to provide a true comparison of activity.

- 89 The Health Board follows SNOMED²⁸ code rules, which indicate when multipliers should be attached to particular examination types. These rules are used when counting all radiology activity at the Health Board. Staff recognise that there may still be variation in the way that the rules are applied.
- 90 **Exhibit 18** highlights that the number of examinations per FTE in-post radiologist is higher overall than the average for Wales, while the number of CT and MRI scans is broadly in line with the average.

Exhibit 18: number of examinations per full-time equivalent in-post radiologist 2015–16

Table showing that the number of examinations carried out per full-time radiologist is broadly in line with the rest of Wales.

	Number of examinations per in-post FTE radiologist		
	All examinations	CT	MRI
Betsi Cadwaladr University Health Board	14,360	1,836	663
All Wales ¹	13,742	1,989	724

¹ All-Wales figures excludes Powys Teaching Health Board.

Source: NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016**, 2016; and Wales Audit Office, **Radiology Health Board Survey**

- 91 **Exhibit 19** highlights that the number of examinations per FTE in-post radiographer/ultrasonographer is higher than the average for Wales.

²⁸ SNOMED CT, or SNOMED Clinical Terms, is an international, systematically organised, computer processable, collection of medical terms providing codes, terms, synonyms and definitions used in clinical documentation and reporting.

Exhibit 19: number of examinations per full-time equivalent in-post radiographers/ultrasonographers 2015-16

Table showing that the number of examinations undertaken per FTE in-post radiographer/ultrasonographer is higher when compared to Wales.

	Number of examinations per in-post FTE radiographer/ultrasonographer			
	All examinations	CT	MRI	US
Betsi Cadwaladr University Health Board	3,021	386	140	644
All Wales ¹	2,465	357	130	523

¹ All-Wales figures exclude Powys Teaching Health Board.

Source: NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016**, 2016; and Wales Audit Office, **Radiology Health Board Survey**

92 The NHS Benchmarking Network (NHSBN) annual radiology survey compares around 80 radiology departments including large teaching hospitals each year. The audit uses various measures to compare staffing with establishment, other than staff in-post, as the workforce measure. For example, bed days and outpatient activity are used as the denominator. The Health Board has participated in the benchmarking scheme in recent years. It should draw on various workforce measures, including NHS benchmarking data to determine how the radiology staffing compares to elsewhere, and so inform workforce planning.

Operational pressures limit training opportunities for staff. The radiology service maintains and shares development and training records, but this information is not consistently included in the Electronic Staff Record

93 Annual appraisals of staff performance, and continuing professional development reviews are an important part of ensuring that the quality of radiology services is maintained and that staff training needs are properly addressed.

94 Only 67% of radiologists, and 75% of radiologists and other radiology staff, had received an annual appraisal of their performance in 2015-16. While the radiology service records and shares how many staff have a record of how many staff had a personal development plan in the same period, this was not recorded as part of the Electronic Staff Record. The health board holds an IR(ME)R entitlement matrix that records the duties that each operator/practitioner may undertake.

- 95 Staff said that the provision of initial training for those who are new to their roles is generally satisfactory, although the extent of workload means that it is a challenge to access training without it having an impact on operational commitments.
- 96 Radiographer and ultrasonographer compliance with mandatory and statutory training set out in the UK Core Skills and Training Framework is variable, and presents corporate and operational risks (**Exhibit 20**). While the radiology service records and shares the same information for radiologists and other radiology staff, the Health Board had not included it in the Electronic Staff Record. This presents corporate and operational risks, and it prevented us from including the information here.

Exhibit 20: percentage of radiographers/ultrasonographers compliant with statutory and mandatory training modules, as at July 2016

Table showing rates of compliance that with statutory and mandatory training modules amongst radiographers and ultrasonographers is variable.

	Radiographers/ ultrasonographers
Equality, Diversity and Human Rights	67.0%
Health, Safety and Welfare	85.0%
Fire Safety	85.0%
Infection Prevention and Control	93.0%
Moving and Handling	80.0%
Safeguarding Adults	71.0%
Safeguarding Children	65.0%
Resuscitation	80.0%
Information Governance	82.0%

Source: Wales Audit Office, Radiology Health Board Survey

There are fewer magnetic resonance imaging scanners when compared to Wales, computerised tomography and ultrasound scanners have shorter operating hours, and scanning at weekends is limited

- 97 The UK has a low number of scanners compared with other OECD countries. Across the UK there are eight CT scanners and seven MRI scanners per million population; Germany has 19 CT scanners and 11 MRI scanners, Spain has 17 CT scanners and 15 MRI scanners, and France has 14 CT scanners and nine MRI scanners per million population²⁹. Data are not available for the separate countries in the UK.
- 98 **Exhibit 21** shows the number of scanners per million population for Wales in 2016. The Health Board has fewer MRI scanners per million population when compared to Wales and the UK. The number of CT scanners at the Health Board is in line with the average for Wales, and is greater than the UK average. However, when, compared to OECD countries it has significantly fewer CT and MRI scanners.

Exhibit 21: number of CT, MRI and US scanners per million¹ population as at September 2016

Table showing the Health Board less MRI scanners per million population, and that the number of CT scanners are in line with the Wales average, while it has slightly more US scanners.

	CT	MRI	US
Health Board	10.1	5.8	47.5
All Wales ²	10.1	7.5	46.1

¹ Exhibit expressed as scanners per million population to allow comparison with other countries

² The All Wales figure is based on five health boards

Source: Wales Audit Office, **Radiology Equipment Age Survey**; and Welsh Government, **Local Authority Population Estimates for Wales**, 2015, accessed 20 October 2016

- 99 One way for health boards to ensure that patients waiting for diagnostic radiography scans wait as short a time as possible is to maximise the opening hours. The longer the opening hours, the more patients can be seen; however,

²⁹ Organisation for Economic Cooperation and Development, **OECD Health Statistics 2014 – Frequently Requested Data**, 2014

there are extra costs associated with longer operating hours. Operating longer results in increased staff costs, and scanning equipment lifespans are shortened. This factor has to be considered when assessing the potential for extending operating hours.

100 Data from 2014 (and updated in 2015) shows that on average, the Health Board operated their scanners for between 7 and 11 hours on week days, but made little use of scanners on weekends ([Exhibit 22](#)).

Exhibit 22: percentage usage of CT, MRI and US scanners, 2014 (verified and updated in 2015).

Table showing that compared to the Wales average, the percentage use of all types of scanner at the Health Board is lower. MRI and US scanners are not used at weekends.

Type of scanner	Average number of operating hours per scanner on each day		Percentage usage of equipment ¹	
	Monday to Friday	Saturday to Sunday	Health Board	Wales average
CT	7.2	1.2	45	52
MRI	11.0	0.0	59	66
US	7.4	0.0	45	46

¹ Based on the planned operating hours as a percentage of potential operating hours (seven days a week and 12 hours a day).

Source: **NHS Wales All-Wales Gantry Usage/Capacity Report**, November 2015. Data based on the operating hours in 2014, and the data was verified and updated in 2015)

101 If hospitals at the Health Board were operating 12 hours a day and seven days a week, we estimate that it may be possible to undertake an extra 445 CT scans, an extra 100 MRI scans and an extra 2,210 US scans a week³⁰.

³⁰ The time a scan takes depends on the nature of the scan required. CT scans can take between 10 and 45 minutes, MRI scans between 15 and 90 minutes, and US scans between 15 and 30 minutes. Therefore our estimation is based on a CT scan length of 45 minutes, a MRI scan of 90 minutes, and a US scan of 30 minutes.

Site-level management arrangements are clear, although there is no overall strategic plan for radiology and senior staff lack confidence in directorate management arrangements. There is dissatisfaction with the core radiology IT system, and some older equipment is reaching the end of life expectancy

There is no overall strategic, operational, or financial plan for the radiology service, although strategic workforce planning has taken place

- 102 The Health Board should have a clear strategic plan that sets out how it will meet current and future demand for radiology services. It is some years since a three year plan was drawn up, and while there was some work to introduce a five-year plan, this was not completed. Therefore, the Health Board's radiology service lacks a clear strategy, and this constrains its ability to set out sound operational plans.
- 103 Each radiology service should have an agreed documented annual operational/delivery plan. The plan should clearly identify service demand, the workforce and equipment capacity required to meet this demand as well as the finances available and required to deliver the service safely, efficiently and effectively. There is an overall Health Board annual operational plan for 2016-17, which includes some high-level objectives which relate to radiology services. For example, the introduction of a booking system to ensure that all patients waiting over six weeks will be contacted in order to reduce DNAs; and provision of increased access by primary care to diagnostic services. However, there is no annual operational plan specific to radiology services, and we did not see any detailed financial plans.
- 104 There is a consistent approach to demand and capacity modelling across the Health Board. The capacity planning document for 2016-17 sets out referral data for each of the previous four years. It includes a forecast of demand for three subsequent years by Health Board area, together with the associated scanning capacity requirement and consultant reporting requirement for key modalities. There is also an activity plan by modality for the Health Board radiology service as a whole. Funded activity for 2016-17 is based on the 2014-15 outturn plus 5% productivity. A funding gap, based on the number of unfunded cases, is identified in each modality.
- 105 The Radiology Workforce Strategy for 2016-17 provides a detailed picture of workforce requirements in the context of anticipated increases in demand for imaging. It sets out short, medium and long-term strategic workforce aims, and includes implementation details relating to workforce changes, and those

responsible for implementing them. However, without detailed operational planning, these workforce objectives are less likely to be achieved. We did not see any workforce contingency planning documentation.

- 106 Radiology operational plans should be informed by service changes and developments in the wider organisation. Almost all clinical specialties rely heavily on radiology to help diagnose, treat or monitor disease or injury. Radiology staff should, therefore, be appropriately involved in any decision making on service developments that will lead to an increase in the number of patients referred for radiology imaging, such as new consultant posts, clinics and services.
- 107 Across Wales our review found that there was variation in the degree to which radiology teams were involved in decisions made outside of the team that impact on radiology services. Staff told us that they are often not consulted about service changes or waiting-list initiatives, which will inevitably affect the radiology service.

Site level radiology management and accountability arrangements are clear, although staff lack confidence in directorate arrangements, and there is a perception that communication between sites has diminished

- 108 Effective leadership and clear lines of accountability are vital components of any healthcare service. Radiology is a complex service which comprises radiologists, radiographers and nursing staff working together to produce and interpret images. For a health board to deliver effective radiology services, it needs clear executive leadership, a designated overarching service lead, and a clear operational and professional management structure with clear lines of accountability. It also needs to have sufficient capacity to meet service demand and need in a safe and effective way.
- 109 The Health Board's radiology services are managed as part of the North Wales Managed Clinical Services Directorate (NWMCS), which comprises a number of different services. The operational management structure for radiology services is based around each of the Health Board's three main district general hospitals, at Ysbyty Gwynedd, Ysbyty Glan Clywd, and Ysbyty Maelor. Each has a radiology service manager and a clinical director. Radiology service managers report to the Professional Head and Service Lead for Radiography, who reports in turn to the NWMCS General Manager. Site-level issues are addressed within the area management structure. There is a Head of Quality and Safety and a Head of Systems and Information Management for radiology, who also report to the Professional Head and Service Lead for Radiography. Service managers and clinical directors were unclear about the executive responsibilities for radiology services.
- 110 Staff told us that some aspects of the previous Radiology Clinical Programme Group (CPG) had worked well. In addition, there was a Chief of Staff who was a radiologist. They thought that this led to a wider understanding of radiography

issues beyond the immediate service. However, the arrangement was not successful in achieving staff integration, with staff rarely moving between sites to increase resource flexibility. There were different departmental structures and different pay bandings across sites. The service had started to restructure staffing arrangements but progress was very slow. By the time the Health Board restructure was implemented, they had only been able to work down as far as the service leads. Subsequent work to address the next tier had taken two and a half years at the time of our fieldwork. Job descriptions were finalised in mid-2015, and a process of consultation had followed, and is ongoing.

- 111 Managers told us that the benefits of the NWMCS D are not clear yet, and that governance and accountability arrangements are not as well defined as they were previously. There is a perception that the service is at a greater distance from executive leadership than it was previously, and it is not clear whether NWMCS D arrangements will work effectively for radiology services. They also told us that links between radiology services across the Health Board are not as strong as they had been under the previous organisational arrangements. We understand that a consultation is planned with regard to how management arrangements within the NWMCS D might be developed and improved.
- 112 At the time of our fieldwork there had been a gap in arrangements for senior radiology staff to meet with the executive team. Previously the Radiology CPG had a four-weekly cycle of meetings for finance, workforce and organisational development, quality and safety, and to meet the executive team. Under the new structure, finance and workforce meetings take place at site level, rather than collectively across the Health Board. Quality and safety meetings are still Health Board-wide, although we were told that staff are concerned that they are not as effective in addressing discrepancies as they were previously. Meetings with the executive team were about to be reinstated.
- 113 Radiology groups report up to the NWMCS D, which in turn reports to the Central Hospital Management Team at Glan Clwyd Hospital, and to the Quality, Safety and Effectiveness Committee. Performance is managed through local radiology performance meetings in each of the three main areas. The Radiology Quality, Safety and Effectiveness Committee receives reports and information from a number of sub-committees, groups and meetings, including the:
- Radiology Radiation Governance sub-committee;
 - Radiology GP Engagement Group;
 - Radiology Medicines Management sub-committee;
 - Radiology CT Optimisation Team;
 - Radiology Audit Leads meeting;
 - training and extended roles meeting;
 - local quality and safety meetings; and
 - local learning discrepancy meetings.

The service is not directly represented on some key Health Board committees

- 114 If radiology is to have sufficient profile within the Health Board, radiology staff should have a regular presence on key Health Board committees such as the Quality, Safety and Effectiveness Committee and the Workforce and Organisational Development Committee. Radiology should feature sufficiently often on committee agendas to help ensure wider awareness of the service and its issues.
- 115 Across Wales, we found variation in the degree of radiology team representation on key board committees. Health Board radiology managers told us that the radiology service is not directly represented on the Quality, Safety and Effectiveness Committee or on the Workforce and Organisational Development Committee. In those instances, radiology is represented by managers who are one step removed from the service. Whereas under the previous Clinical Programme Group arrangements, there was direct representation by radiology managers.

There has been variation in service expenditure above and below the budget in recent years, and savings targets have sometimes been exceeded

- 116 Service expenditure has been above and below budget in recent years, and savings targets have sometimes been exceeded. Ongoing financial monitoring is necessary for radiology services to ensure that the service is operating within budget, to anticipate potential budget overspend, and to take remedial action where necessary.
- 117 There are no detailed financial plans through which radiology services can inform operational plans. Nonetheless, radiology managers actively work with members of the Health Board's finance team to regularly monitor in-year spending. Total Health Board expenditure on radiology services was 7% above the total budget in 2014-15, and 1.5% below the total budget in 2015-16 ([Exhibit 23](#)).

Exhibit 23: radiology service budget comparison with expenditure (£ million) 2014–15 and 2015-16

Table showing that expenditure was greater than the allocated budget in 2014-15, and less than the allocated budget in 2015-16.

		2014-15	2015-16
Health Board	Budget (£ million)	19.2	22.5
	Expenditure (£ million)	20.6	22.2
	Variance	7.0%	-1.5%

Source: Wales Audit Office, **Radiology Health Board Survey**

118 The radiology service exceeded, or came close to, its radiology CIP plan in each of the last three financial years (**Exhibit 24**).

Exhibit 24: CIP target versus actual cost improvement, for the financial years 2013-14, 2014-15, and 2015-16.

Table showing that the radiology service has exceeded or come close to achieving its CIP target in each of the three previous financial years.

	2013-14 £	2014-15 £	2015-16 £
CIP target	865,000	287,000	140,000
Actual cost improvement	881,000	234,000	434,000

Source: Wales Audit Office, **Radiology Health Board Survey**

The radiology service maintains a medical equipment replacement schedule and some equipment is reaching the end of life expectancy but there is no replacement budget

119 NHS bodies need to have comprehensive arrangements in place for the maintenance and replacement of radiology imaging equipment. Older imaging equipment has a higher risk of failure and maintenance costs increase, and the image quality declines with age. Radiology equipment more than ten years old is typically considered to no longer be state of the art and technical advances will render the equipment obsolete. The lifespan of equipment shortens with increased use. Newer equipment more readily enables dose optimisation and generally provides better image quality.

- 120 The capital allocation budget in the Health Board is nil. The radiology service maintains a medical equipment replacement schedule, which serves as the basis for equipment replacement prioritisation. Major radiology capital items (i.e. individual items with a value in excess of £400,000) across the Health Board have been projected for the period 2016 to 2023, and are listed together on a potential bids list.
- 121 Managers can present bids for priority equipment replacement on their local site. However, the Health Board does not have a clear financial plan to fund necessary and inevitable equipment replacement needs over the coming years. While staff said that equipment does sometimes break down, contingency planning is limited.
- 122 The European Society of Radiology³¹ advocates that equipment aged:
- up to five years old reflects the current state of technology, and can be upgraded;
 - between six and ten years old is fit to use if properly maintained, but requires replacement strategies to be in place; and
 - 11 or more years old requires replacement.
- 123 In November 2015, NHS Wales anticipated that 87% of imaging department scanners would require replacement by 2017³². **Exhibit 25** shows that, depending on whether there has been high, medium or low use, some of the Health Board's CT and MRI scanners have reached, or are reaching, the end of their life expectancy.

³¹ European Society of Radiology, **Renewal of Radiological Equipment**, September 2014

³² Diagnostic Service Programme NHS Wales, **All Wales Gantry (MRI, CT, Gamma Camera and Ultrasound) Usage/Capacity**, November 2015

Exhibit 25: age of CT, MRI and US equipment at the Health Board as at September 2016

Table showing that based on high and medium usage, some of the Health Board's CT and MRI scanners have reached, or are reaching, the end of equipment life expectancy

		CT	MRI	US
Age of scanners at the Health Board (years) ¹	Glan Clwyd Hospital	1, 10	2, 9	5 (average of 9 scanners)
	Wrexham Maelor Hospital	1, 5	5	2 (average of 8 scanners)
	Ysbyty Gwynedd	1, 3	8	4 (average of 9 scanners)
Average device life expectancy based on utilisation (years)	High	8	8	7
	Mid	10	10	8
	Low	12	12	9

¹ Where there are more than five scanners, the average age has been provided.

Source: Wales Audit Office, **Radiology Equipment Age Survey**; and European Society of Radiology, **Renewal of Radiological Equipment**, September 2014 (average device life expectancy)

Staff are dissatisfied with the functionality of the core radiology IT system, and with the Picture Archiving and Communication System

- 124 Having effective IT systems plays a central role in delivering efficient radiology services. In Wales, the Radiology Information System (RADIS) is a national system created and run by NHS Wales Informatics Service. It is used by all health boards. RADIS supports the scheduling of radiology investigations, provides a clinical record of scans received by patients and allows health boards to generate reports and statistics on performance. Other systems link to RADIS to provide additional functionality; these different systems must integrate well with each other to ensure that information easily transfers and updates between systems.
- 125 Our review found that across Wales, health boards have mixed views on RADIS. Some health boards told us they felt that RADIS is adequate in terms of patient scheduling, clinical reporting and management reporting. However, some health boards expressed concerns that RADIS does not integrate with other systems in use by health boards, and also about the quality of the management reporting, limitations of the clinical reporting and management reporting functions.
- 126 Electronic requesting systems can enable clinicians referring patients for diagnostic imaging to request and receive updates and the outcomes of radiology requests quickly. In Wales, the functionality of request software is generally limited to

providing a template for a request which then has to be emailed to the radiology service.

- 127 All health boards use Picture Archiving and Communications Systems (PACS). PACS software acquires and archives radiology images electronically, and enables the safe distribution of the image with other health professionals³³. The report and the scan image together comprise the clinical record of the image. When reporting on images, radiologists can choose to use voice-activated dictation systems to record their report.
- 128 The Health Board operates the same version of RADIS at each of its main hospital sites, although they are not connected. Radiology staff we spoke to about the system were generally very unhappy with its lack of functionality and poor connectivity to other systems. They found that promised developments to RADIS by NWIS were always very slow to be introduced.
- 129 RADIS has provision of waiting-list information, but staff said that it was not effective in supporting business planning. Whilst it has some scheduling functionality, it does not allow management of referrals in line with existing Welsh Government guidelines for waiting list management. The system does not currently support RCR peer review recommendations, and does not readily help to manage urgent/unexpected results, or acknowledge receipt of results. RADIS can be used to generate reports but input is required from NWIS team initially.
- 130 The Health Board reported that its radiology teams are generally dissatisfied with Fujifilm PACS³⁴. Most radiologists are able to access some images out-of-hours from home for a full range of modalities.
- 131 The Health Board was in the process of rolling out voice-activated software, but not as part of core systems. Initial staff training had recently been completed at Wrexham Maelor Hospital, and the system had been well received. Training for staff at Ysbyty Gwynedd and Ysbyty Glan Clwyd was ongoing.

Radiology performance is regularly reviewed at a local level, but a limited set of radiology performance indicators is presented at Board level

- 132 Effective monitoring and scrutiny of radiology service performance are important in assessing if the service is supporting delivery of the organisational goals and objectives, and identifying the need to take remedial action. Health boards should

³³ PACS is provided by a third party, Fujifilm. Fujifilm supplies hardware and software to health boards for the provision of PACS services, including voice recognition and full disaster recovery solutions. Each health board provides the necessary infrastructure to run those services, including networks and server space.

³⁴ At the time of our review, the Health Board had not upgraded from Windows XP to Windows 7, and thus, due to compatibility issues, had to use an older version of PACS, until the upgrade was complete.

use performance data and audit results to monitor and evaluate outcomes delivery and the performance of the radiology departments. Performance monitoring and review should take place at all levels within the organisation, from the operational level up to board level. Performance should be analysed, assessed and monitored at an operational level and reported to and scrutinised by relevant health board committees and the board.

- 133 Benchmarking enables health organisations to improve performance through comparison with other similar organisations. One source of comparative data that health boards have access to is NHSBN radiology data. The NHSBN collects and analyses radiology data from health organisations across the UK annually and publishes an analysis of its findings. All health boards and trusts in Wales are members of the NHSBN but not all participate in each audit.³⁵ The Health Board has participated in the scheme over the last few years.
- 134 The NWMCS D has a performance framework which includes elements such as activity and demand, DNAs etc. This is reviewed at a monthly directorate meeting. A performance summary is presented to the Board as part of assurance arrangements. A limited amount of radiology performance information is reported up to the Board, and many key indicators of service challenges are not included.

³⁵ Hywel Dda University Health Board and Powys Teaching Health Board do not participate or provide data to the radiology module.

Appendix 1

Audit approach

We carried out a number of audit activities between June and September 2016. Details of these are set out below.

Exhibit 26: audit approach

Table outlining audit approach used for this review.

Our main findings	
Information and data collection	<p>We used health-board-level and hospital-site-level survey forms to capture data and information on radiology services, which were completed by the Health Board.</p> <p>We also utilised data and information from a number of other sources, including:</p> <ul style="list-style-type: none">• NHS Benchmarking Network radiology 2015 and 2016 data collection (data collection period 2 May to 8 July 2016)• The All Wales Equipment Capacity Report, NHS Wales Health Collaborative (December 2015)• Stats Wales: Radiology Diagnostic Waiting Times• National Reporting and Learning System (NRLS) data: Patient safety incidents• HIW IH(ME)R (Ionising Radiation (Medical Exposure) Regulations): diagnostic incidents by Health Board between 2010 and 2016
Document request	<p>We requested and reviewed documents from the Health Board including:</p> <ul style="list-style-type: none">• terms of reference and membership of the Health Board's main radiology group, together with a sample of minutes from the previous meetings;• examples of condition pathway documents (for stroke, cancer or heart disease) illustrating radiology service provision requirements;• relevant radiology papers to the board and committees along with operational papers including safety reports;• examples of the Health Board's main radiology service performance reports or performance scorecards from the past six months;• the most recent financial report showing progress towards the savings/cost improvement plan;• the radiology equipment replacement plan;• the radiology risk register;• guidance provided to hospital referrers and GPs on expectations when referring patients to the service; and• examples of any work carried out over the past two years to measure radiology patient experience.

Our main findings	
Interviews and focus groups	<p>We interviewed a small number of staff including:</p> <ul style="list-style-type: none"> • radiology service managers at Ysbyty Gwynedd, Ysbyty Glan Clwyd, and Wrexham Maelor Hospital; • radiology clinical directors at the above hospitals; • a sample of consultants selected by the Health Board: <ul style="list-style-type: none"> – one Emergency Medicine – one consultant physician – a general practitioner • three x radiographer focus groups

Appendix 2

The Health Board's management response to the recommendations

The following table sets out the recommendations from the report and the management response.

Exhibit 27: The Health Board's management response to the recommendations:

Ref	Recommendation	Intended outcome/ benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R1	By mid-2017, the radiology service should communicate with all GPs in the West to raise awareness that radiologists are prepared to consider patient access to imaging without an outpatient appointment beforehand. The communication should include details on how best to contact radiologists.	To expedite patient treatment and reduce unnecessary outpatient appointments.	No	Yes	Area medical director has already initiated to set up quarterly GP engagement meetings with locality leads. Also whole service GP engagement meeting. Will remain as live action until fully embedded.	August 2017	Radiology CD- West Dr Kakali Mitra (KM)

Ref	Recommendation	Intended outcome/benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R2	By the end of 2017, the radiology service should identify and implement ways to reinforce the need for other services to communicate with them about changes and initiatives that will affect the provision of radiology services.	An ongoing focus on the importance of being informed of service developments and changes in other parts of the Health Board.	Yes	Yes	<p>Discussions have taken place to start aligning the radiology service with the strategic and operational objectives of BCUHB.</p> <p>Radiology need to inform and be informed by the workstreams established to deliver BCUHB's strategic aims of: 'Improving Health and Reducing Inequalities', providing 'Care Closer to Home' and 'Acute Clinical Services'.</p> <p>Representatives from radiology will, therefore, be invited to participate. It is noted that there are four particular key work streams for the service –</p>	December 2017	<p>Assistant Director Corporate Planning - John Darlington (JD)/ Assistant Director Health Strategy Sally Baxter (SB)/ Head of Strategy and Health Planning - Jane Trowman (JT)/ Director of Secondary Care - Nigel Lee (NL)</p>

				<p>these are: Stroke, Emergency Care, Surgery and Women's Services.</p> <p>BCUHB will establish a process for radiology, and other support services, to review business cases before formal sign off. The business case template will be assessed to establish its suitability for this purpose.</p> <p>A suitable mechanism or forum, possibly the Hospital Management Team meetings, will be explored to advise the service of planned medical appointments. This will help ensure that the impact of non-radiology medical</p>		
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					appointments on imaging services is understood and, as required, escalated.		
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Ref	Recommendation	Intended outcome/benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R3	By the end of 2017, the radiology service should review the co-ordination of radiology appointments within and across sites, and set out an action plan to offer greater patient choice while respecting preferences, to help distribute demand effectively and to reduce variations in waiting times.	Additional patient choice and the opportunity to distribute demand and reduce variations in waiting times across the Health Board.	Yes	Yes	<p>Radiology aims to provide patients with access to services close to home, in line with the RTT rules. However, the service will discuss with NWIS the proposal to move to a single instance of RadIS across the Health Board - this will improve mechanisms for cross site bookings.</p> <p>GPs will also be provided with information regarding opening times and access policies for all of the radiology departments in North Wales.</p>	December 2017	Head of Radiology Systems and Information Management - John Collins (JC)

					<p>Service expansion will include the consideration of additional evenings and weekend access to imaging.</p> <p>A census has been sent to all GPs about access to imaging – radiology will respond to the feedback.</p>		
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Ref	Recommendation	Intended outcome/benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R4	The Health Board should, by the end of 2017, ensure that it includes data regarding statutory and mandatory training compliance for all radiology staff groups as part of its Electronic Staff Record.	The capability to manage statutory and mandatory training more effectively and to reduce risk.	Yes	Yes	At the time the Radiology Service was being evaluated, it was not possible to observe the compliance of the Radiologists as a staff group on ESR – this has been rectified.	December 2017	Radiology Manager – Pat Youds (PY)

Ref	Recommendation	Intended outcome/benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R5	<p>The radiology service should establish a radiology strategic plan, by the end of 2017, to:</p> <ul style="list-style-type: none"> • show where it is now in terms of demand, capacity and available resources; • set out a view of where it needs to be; and • inform the development of annual operational plans. 	A clear strategic basis from which other planning activities can flow.	Yes	Yes	<p>In developing its strategy, radiology will review:</p> <ul style="list-style-type: none"> • modality and sub-specialty demand • workforce capacity • equipment capacity • implications of incoming technology • strategic planning workstream outcomes (see R2) • NICE and other clinical guidelines <p>The radiology strategic plan will be influenced by the Health Board's clinical services strategy which will be considered in Q4 2016-17.</p>	December 2017	<p>JC/PY/CDs - KM, Ed Favill (EF), Praveen Govind (PG)/ Radiology Service Managers - Stephen Roberts (SR), Vicky Freeman (VF), Chris Connah (CC), NL/ JD / JT</p>

Ref	Recommendation	Intended outcome/ benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R6	By the end of 2017, the radiology service should set out a clear financial plan to inform annual operational plans.	The basis for all financial planning.	Yes	Yes	<p>The financial plan will be developed in parallel with the strategic plan. Although an activity based funding model would be highly desirable, it has been established that this is not currently possible. Therefore, going forward, the radiology budget will roll over.</p> <p>In developing and meeting its financial strategy, Radiology will establish regular meetings with the relevant Director of Finance, Chief and Deputy Chief Finance Officers.</p>	December 2017	Finance Director – Provider Services Eric Gardiner (EG)

				<p>Radiology will also seek to establish a process for the service to work with primary and secondary care clinicians to influence demand and develop clinical pathways that optimise access to radiology.</p> <p>Radiology will review its cost pressures annually.</p> <p>The financial plan for radiology will inform the strategic plan and link in with the IMTP which will be finalised in March/April 2018.</p>		
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Ref	Recommendation	Intended outcome/benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R7	The Health Board should, by mid-2017, establish clear executive accountability for the delivery of the radiology strategic plan.	Director oversight to ensure a stronger focus on the objectives of the radiology service at corporate level.	Yes	Yes	<p>It has been determined that the Chief Operating Officer has executive accountability for the delivery of the radiology strategic plan.</p> <p>There is, in addition, a line of accountability to the Secondary Care Hospital Director - this post holder assumes operational responsibility for secondary care services including radiology.</p>	August 2017	Chief Operating Officer – Morag Olsen (MO)

Ref	Recommendation	Intended outcome/ benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R8	The Health Board should ensure clear representation of the radiology service on its key committees, by mid-2017.	Greater awareness at corporate level of the challenges facing the radiology service.	Yes	Yes	<p>Committee structures are established at corporate and secondary level and there is now radiology representation at a number of key committees. At a corporate level, these include 'Listening and Learning', 'Clinical Effectiveness' and 'Health and Safety'.</p> <p>The site based radiology services represent themselves at local 'Quality & Safety', HMT and Estates meetings.</p> <p>In keeping with hosting arrangements, radiology is also represented 'corporately' at Quality</p>	August 2017	Directorate General Manager – David Fletcher (DF), Hospital Director - Ellen Greer (EG)

				<p>and Safety and Workforce.</p> <p>It is planned for the North Wales Managed Clinical Support Services Directorate, which includes radiology, to review the entire Committee Structure to ensure that there is adequate representation of all six services and that a robust communication mechanism is in place to share information.</p> <p>Escalation routes and meetings have also been established at directorate level for governance and management board. Further elements will be resolved with finalisation of management structure.</p>		
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Ref	Recommendation	Intended outcome/ benefit	High priority	Accepted	Management response	Completion date	Responsible officer
R9	By the end of 2017, the Health Board should set out capital replacement plans, and contingency plans, for equipment which poses a particular risk to service continuity and patient care.	A clear picture of the capital requirements of the radiology service and of how the associated risks should be managed.	Yes	Yes	<p>Radiology has in place an 'Asset Register' which complies with radiology regulatory requirements and includes automatic updating of when a piece of equipment is due for replacement (in line with Royal College Guidance on equipment replacement age). The service is able to track its asset base with respect to these time scales.</p> <p>Much of the radiology equipment is now well beyond its recommended asset life but cannot necessarily</p>		Director of Strategy - Geoff Laing (GL),PY , Head of Radiology Governance – Helen Hughes (HH)

				<p>be replaced for this reason. The limited available discretionary capital within both BCU (equipment <£500K) and Welsh Government (>£500K) requires radiology to prioritise replacement-informed by risk assessment.</p> <p>It is planned for radiology to link the asset base to the Health Board capital replacement spreadsheet to facilitate easier production of the annual capital replacement requirements</p> <p>Radiology will continue to review its asset register and replacement priorities on a quarterly basis to</p>	<p>September 2017</p>	
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				<p>inform the submission of its replacement programme to (a) the Medical Devices Committee in October and (b), Welsh Government in April or whenever end of year slippage monies become available.</p> <p>The radiology risk register is established and will be reviewed quarterly. It will be reviewed, in particular, to ensure that business continuity risks associated with equipment failure are adequately captured in the risk assessments and that contingency plans are documented. Such plans need to include plain film rooms,</p>	September 2017	
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				<p>especially busy community sites, in addition to 'major equipment' single points of failure, e.g. MR scanners.</p> <p>In the future, Radiology's equipment concerns regarding risks to patient outcomes (poor image resolution affects diagnostic interpretation) and business continuity will be translated through a quality and safety route in addition to the Medical Devices Committee. This escalation route is established.</p>		
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