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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.

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.

- 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 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 radiologists 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.

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

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

- 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. 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 Cardiff and Vale University Health Board (the Health Board) between August 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 service (the service) provides a range of imaging and interventional procedures across several sites, the main departments are based at University Hospital Wales (UHW) and University Hospital Llandough (UHL). The radiology service is based within the Radiology, Medical Physics and Clinical

¹⁰ RADIS – Wales Radiology Information System

¹¹ PACS – Picture Archiving and Communications System

Engineering (RMPCE) directorate and sits under the Clinical Diagnostics and Therapeutics Clinical Board (the Clinical Board). As University Hospital Wales is a specialist hospital it provides some Wales wide services, which means that demand for certain specialisms is greater.

Our main findings

15 Overall, we concluded that whilst operationally the service is well managed, there are risks to the current and future service delivery because of a lack of strategic and business planning, increasing demand, reporting backlogs, aging equipment, and recruitment and retention issues.

Exhibit 1: our main findings

Table detailing our main findings.

Our main findings
<p>Generally, patients have good and timely access to the service, however, reporting backlogs and environmental issues need to be addressed:</p> <ul style="list-style-type: none">• patients have good access to in and out of hours radiology services, and there is a robust system to ensure referrals are correctly prioritised;• while the time patients have to wait for their radiological examination has fallen waiting time targets are still not being met consistently;• despite a backlog, reporting is not outsourced and radiographers are underutilised;• clinical performance is regularly audited, discussed and fed back to staff, however, there are concerns about staff participation because of capacity issues;• processes are in place to monitor and learn from complaints and incidents, however patient and staff feedback highlights long standing environmental concerns which are not being addressed.

Our main findings

Waiting lists and referrals are well managed, however rising demand and staffing challenges increase service pressures, and whilst there is potential to increase weekend equipment usage this may cost the service more:

- steps are being taken to try and reduce service pressures, but clinical advances and external factors, such as demand from other health board areas and public health campaigns, continue to increase demand;
- whilst clear referral guidance is in place, referring clinicians are unaware of it, and although the service is taking positive steps to reduce inappropriate referrals the lack of an e-referral system is a risk;
- the service has a good system to manage waiting lists and appointment slots;
- radiology staffing levels have grown at a slower rate than the rest of Wales and this is complicated by significant local and national recruitment and retention challenges;
- the radiology workforce profile generally compares favourably with the rest of Wales, although there are limitations on the staffing comparisons due to the tertiary nature of the service and difficulties accounting for complexity.
- staffing constraints hinder training opportunities and compliance with statutory and mandatory training is poor; and
- compared to Wales, there is an above average number of scanners, with longer operating hours, and whilst there is potential to further optimise weekend usage this may cost the service more.

Poor strategic planning and lack of equipment replacement programme presents a significant risk, however management structures are clear and there is good Board and corporate oversight of the service:

- the Health Board does not have a radiology strategy nor detailed operational and workforce plans, however, the service is taking steps to address this;
- the management structure and lines of accountability are clear, however management meetings require a greater strategic focus;
- the service is well represented on Board committees and sub-committees;
- in recent years, the service overspent against its budget and missed its savings target and whilst finance performance reports are clear, remedial actions are not included;
- despite equipment at or reaching the end of life expectancy, and frequent breakdowns, there is no equipment replacement programme in place;
- generally, radiology ICT systems do not serve the Health Board's needs; and
- radiology performance is regularly reviewed at corporate and management level, however the performance dashboard needs to be strengthened and used to its full potential.

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	<p>Develop an action plan detailing how reporting backlogs will be managed sustainably. For example by:</p> <ul style="list-style-type: none"> – making short-term use of outsourcing, whilst workforce and training plans are developed, – ensuring that radiographers already trained to report are fully utilised, and – establishing whether more radiographers need to be trained and how this will be achieved.
R2	Over the next year, increase appraisal rates for non-clinical radiology staff to at least the level of all other radiology staff.
R3	Over the next year, increase mandatory training rates for all radiology staff to at least the Health Board target of 85%.
Demand and capacity issues affecting service performance	
R4	Liaise with referring clinicians when developing and reviewing referral guidance. Ensure all referring clinicians know where to access up to date versions of guidance.
Extent to which radiology services are well managed	
R5	<p>Over the next 12 months develop a radiology strategy which sets out:</p> <ul style="list-style-type: none"> – where the service is now in terms of its demand, capacity and available resources; – where the service needs to be; and – how the service will achieve its aims.
R6	Develop a workforce plan alongside the radiology strategy, which identifies the baseline capacity needed to sustainably meet radiology demand in a timely and safe way.
R7	<p>By mid-2017, develop an equipment replacement plan. The plan should include:</p> <ul style="list-style-type: none"> – equipment priorities, requirements, and associated costs, and – outline the risks to the service/patients of not achieving the plan within the required timescales.
R8	<p>Strengthen directorate performance management by:</p> <ul style="list-style-type: none"> – setting clear business and service objectives; and – widening the range of performance measures aligned to the business and service objectives to include: equipment downtime, vacancy levels, the number of unreported images, performance against internal referral and reporting times.

Detailed report

Generally, patients have good and timely access to the service, however, reporting backlogs, training, and environmental issues need to be addressed

Patients have good access to in and out of hours radiology services, and there is a robust system to ensure referrals are correctly prioritised

- 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 over testing. 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. The Health Board has an effective access system for diagnostic requests from GP's. Patients are given a request form by their GPs, the patient can then either visit or call the radiology department for an appointment.
- 19 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 four referral categories, these being, emergency, urgent, urgent suspected cancer and routine. The Health Board operates a system where radiologists, not referrers, determine the degree of urgency. Radiologists vet (review) forms using the clinical information

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

provided by referrers. This system protects against mis-prioritisation and ensures waiting lists are based on clinical priority.

- 20 Patients with emergency health needs may need access to prompt radiology diagnostics and care outside standard radiology working hours. The Health Board provides a full range of emergency radiology services, which run jointly between UHW and UHL. The following cover is available during the out of hours service:
- CT scans – a radiologist and radiographer are on site at UHW and at UHL a radiographer is on call and discusses cases with a radiologist before accepting;
 - MRI scans – there is a radiologist and radiographer on-call and all emergency MRIs are transferred to UHW;
 - US scans – a radiologist on site at UHW covers both UHW and UHL;
 - interventional radiology – cover at both UHW and UHL; and
 - vascular radiology – the out of hour's service only runs from UHW.
- 21 A review of the service's risk register shows that there are some concerns about excessive numbers of CT scans undertaken during the out of hours service, which over burdens the single on-site radiographer. To mitigate this risk, in October 2015 the service introduced a shift system for out of hours CT cover.

While the time patients have to wait for their radiological examination has fallen waiting time targets are still not being met consistently

- 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 medicine. 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 target¹³. Health boards in Wales are required to ensure that 95% of all 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 times¹⁴ for consultant and GP referrals shows that for August 2016 there were 6,705 patients waiting for radiology diagnostic imaging at the Health Board: 43% for MRI; 38% for US; 16% for CT; and 3% for nuclear medicine.
- 25 The Health Board operates a single waiting list for scans that can be undertaken at both UHW and UHL. However, some patient groups, for example cardiac or paediatric, can only be accommodate at either UHW or UHL. This explains the variation in waiting times between the two hospital sites shown in exhibits 3, 5 and 7.
- 26 Our audit work found consistent waiting times for examinations types which are undertaken at both sites, however there is apparent variation in radiology waiting times across two sites, see exhibits 3, 5 and 7 below. This is as a result of some examinations not being able to accommodate specific patient groups. e.g cardiac patients/paediatric patients.
- 27 In August 2016, 2,854 patients were waiting for an MRI scan at the Health Board, of which 343 (12%) were waiting over eight weeks (**Exhibit 3**). Further analysis shows that 22% of the total number of patients waiting for an MRI scan across Wales can be attributed to the Health Board.

¹³ 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**

¹⁴ **NWIS Diagnostic and Therapy Services Waiting Times** – NHS Wales Informatics Services (accessed via StatsWales on 30 October 2016)

Exhibit 3: MRI waiting times for August 2016

Table showing that the Health Board has a higher percentage of patients waiting over eight weeks for an MRI scan compared to the all-Wales figures.

	Total number of patients waiting for an MRI 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		
University Hospital Llandough	792	31	1	3	827	4%
University Hospital of Wales	1,719	89	59	160	2,027	15%
Cardiff and Vale UHB	2,511	120	60	163	2,854	12%
All Wales¹	11,662	913	66	163	12,804	9%

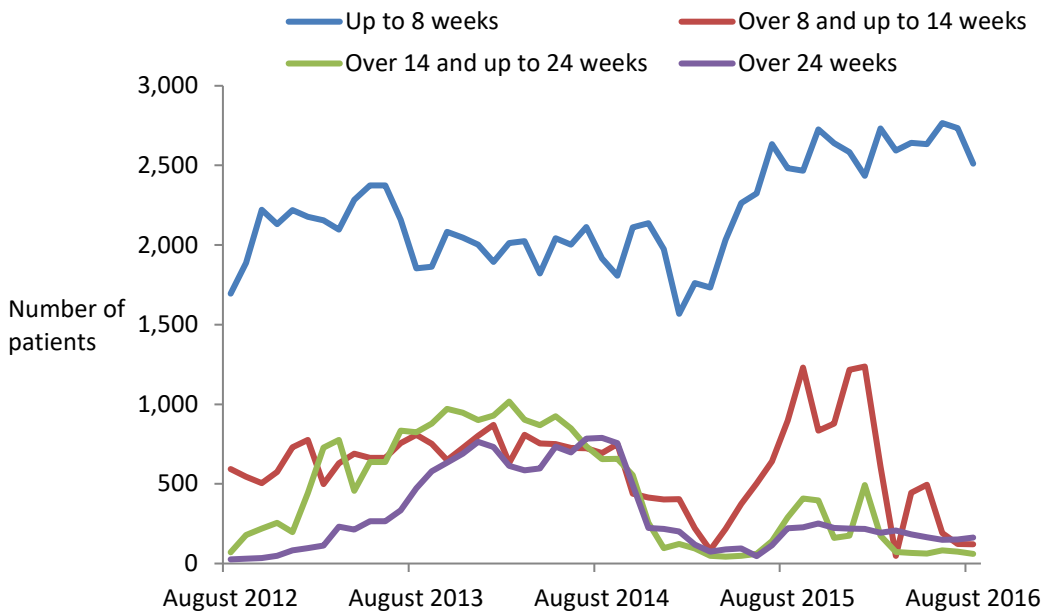
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards.

Source: **Diagnostic and Therapy Services Waiting Times**, NHS Wales Informatics Services (accessed StatsWales, hlth0019, 30 October 2016)

28 The total number of patients on the waiting list for an MRI scan at the Health Board increased by 16% between August 2012 and August 2016, but the percentage waiting more than eight weeks decreased from 29% to 12% in the same period (**Exhibit 4**).

Exhibit 4: MRI waiting times trend from August 2012 to August 2016

Graph showing fluctuating MRI waiting times over the last five years, and growth in the number of patients. However, in the six months between February 2016 and August 2016 the majority of patients received their scan within the eight weeks target.



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

29 In August 2016, 1,100 patients were waiting for a CT scan at the Health Board, of which just 16 (1%) were waiting over eight weeks (**Exhibit 5**). Further analysis shows that 15% of the total number of patients waiting for a CT scan across Wales can be attributed to the Health Board.

Exhibit 5: CT waiting times for August 2016

Table showing that the Health Board has a lower percentage of patients waiting over eight weeks for a CT scan compared to the all-Wales figures.

	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		
University Hospital Llandough	368	2	0	0	370	1%
University Hospital of Wales	716	9	5	0	730	2%
Cardiff and Vale UHB	1,084	11	5	0	1,100	1%
All Wales¹	7,293	63	51	11	7,418	2%

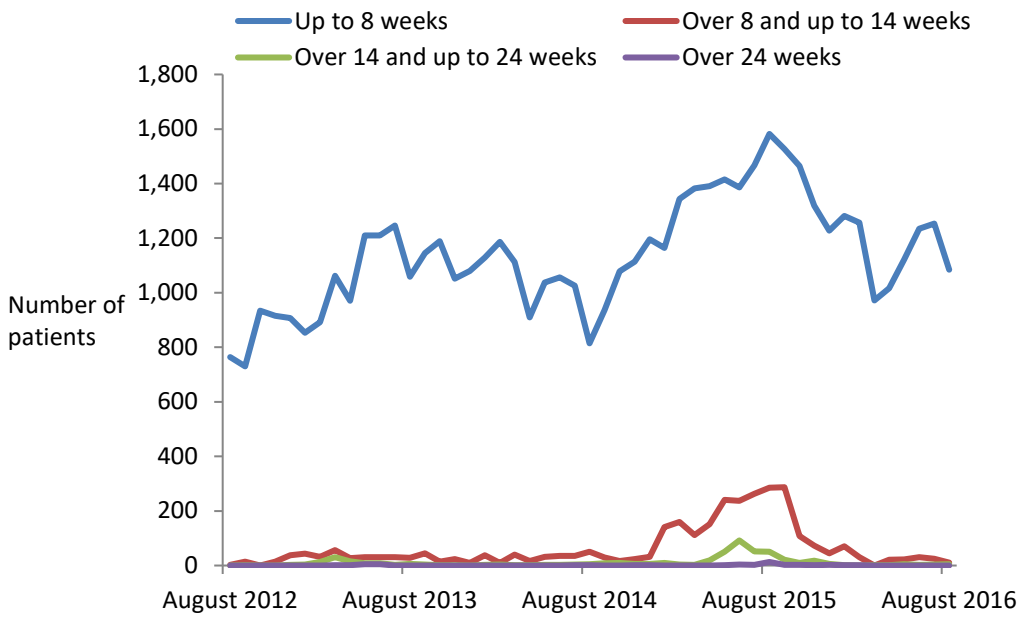
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards.

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

30 The total number of patients on the waiting list for a CT scan at the Health Board increased by 30% between August 2012 and August 2016, but the percentage of patients waiting more than eight weeks increased from 0% to 1% in the same period ([Exhibit 6](#)).

Exhibit 6: CT waiting times trend from August 2012 to August 2016

Graph showing a growth in the numbers of patients waiting for a CT scan. In general, other than a period during 2015, the service has consistently met the eight week waiting times target.



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

- 31 In August 2016, 2,559 patients were waiting for a non-obstetric US scan at the Health Board, of which 130 (5%) were waiting over eight weeks (**Exhibit 7**). Further analysis shows that 12% of the total number of patients waiting for a US scan across Wales can be attributed to the Health Board.

Exhibit 7: non-obstetric US scan waiting times for August 2016

Table showing that the Health Board has a lower percentage of patients waiting over eight weeks for non-obstetric US scans compared to the all-Wales figures.

	Total number of patients waiting for a non-obstetric US 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		
University Hospital Llandough	700	27	5	0	732	4%
University Hospital of Wales	1,729	95	3	0	1,827	5%
Cardiff and Vale UHB	2,429	122	8	0	2,559	5%
All Wales¹	18,944	1,999	626	133	21,702	13%

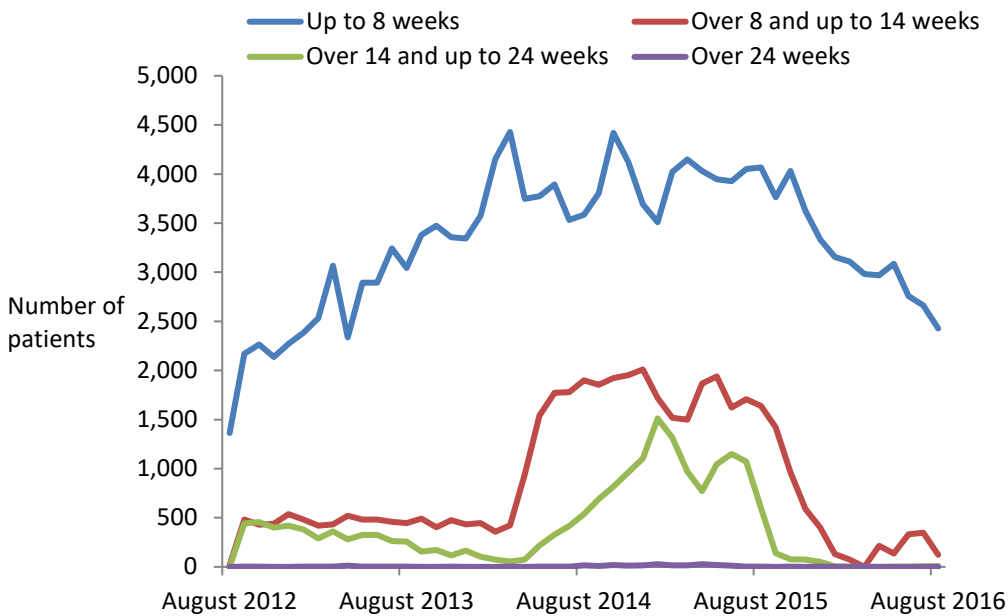
¹ All-Wales figures include all patients waiting for a diagnostic scan at Welsh health boards.

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

32 The total number of patients on the waiting list for a non-obstetric US scan at the Health Board increased by 46% between August 2012 and August 2016, and the percentage of patients waiting more than eight weeks decreased from 35% to 5% (**Exhibit 8**).

Exhibit 8: non-obstetric US scan waiting times trend from August 2012 to August 2016

Graph showing a sharp increase in the number of patients waiting for US scan between 2012 and 2015, and sharp decrease between 2015 and 2016. The rise in patients waiting more than eight weeks for their scan mirrors the increase in demand. However, between February 2016 and August 2016 waiting times performance improved.



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

Despite a backlog, reporting is not outsourced and radiographers are underutilised

- 33 Effective management of patient care requires timely reporting of radiology images, by a qualified authorised practitioner, generally a radiologist. 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.
- 34 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; and
 - outpatient – within ten working days.
- 35 The reporting times set out in the Health Board’s radiology service internal professional standards are as follows:
- referrals from the emergency unit, medical or surgical assessment unit, short stay wards at UHW, medical emergency assessment unit at UHL and other in patient ward areas will be reported within 24 hours;
 - urgent/emergency imaging will be reported within 1 hour of the scan being completed; and
 - referrals with planned date of discharge on the same day or following morning will be fast-tracked for same day reporting.
- 36 The Health Board reported that in order to highlight reporting backlogs, a list of unreported images is run from RADIS, which is then sent to the site superintendents who speak to the radiologist concerned. However, when we asked the Health Board to provide us with the average and longest report turnaround time for CT, MRI, US and x-ray scans during 1 April 2015 to 31 March 2016; the Health Board told us they were unable to provide this data. The Health Board was also unable to tell us the number of unreported examinations as at 31 March 2016 at UHL and UHW. Although they do monitor the number of images not reported within 10 days, the target for which is zero, as part of the directorate performance dashboard. A review of the 2015-16 performance dashboard shows the target is consistently unmet across all modalities, with higher levels of reporting backlogs for CT, MRI and x-ray images. The data for March 2016 shows: 1,585 x-ray, 524 MRI, 177 CT and 99 ultrasound images waiting in excess of 10 days to be reported. In 2015/16, on average, there were 1,339 x-ray, 288 MRI, 96 CT and 63 US images waiting over 10 days to be reported each month.
- 37 Service leads that we interviewed raised concerns that the radiological diagnostic national targets only included the time from referral to the time the diagnostic test is completed. In their view, the waiting time target should also include the time it takes to report, as until this is completed it may not be possible to determine definitive treatment for the patient. Positively, the target focus has meant that waiting times have improved greatly. However, as demonstrated above, reporting backlogs is still an issue, potentially meaning delays in the patient’s care journey.
- 38 Clinicians making referrals to the service had mixed views about the timeliness of reporting. The target for plain film x-rays in the emergency department is 24 hours but a consultant told us, at times, this target is not being met, especially on weekends when an x-ray taken on a Friday would not be reported until Monday. And CT reporting is supposed to be reported within an hour but there are instances where this target is not met. For GPs, whilst inpatient scans are reported on the same day, outpatients’ reports can take 2-3 week to be returned. Referrers’ also experienced different reporting turnaround times for different modalities for example MRI scans could take 4-6 weeks but for pelvic and abdominal ultrasound turnaround times are becoming faster. The referring clinicians that we interviewed

were aware of the reporting backlog. On receiving imaging reports referring clinicians generally felt they were able to get advice or clarification from a radiologist if needed, although the availability of radiologists is sometimes an issue.

39 Extended practice radiographers receive extra training to interpret and report some types of images, typically less-complex scans, such as plain x-rays. 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 whilst 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.

40 Our review found that across the service, a limited number of radiographers are trained and regularly report on images with the highest proportion reporting on ultrasound examinations. There are more reporting radiographers based at UHW than at UHL. However, the Health Board reported that radiographers are one team, and are rotated between sites to expose them to different specialism, which also ensures the service remains resilient. The breakdown is as follows:

- US scans – 15 radiographers at UHW and 5 radiographers at UHL, trained and regularly reporting;
- plain x-ray – 5 radiographers at UHW and no radiographers at UHL, trained and regularly reporting;
- nuclear medicine – 3 radiographers at UHW and 1 radiographer at UHL, have the qualifications to report, but only radiologist provide reporting; and
- upper gastrointestinal tract (GI) imaging – 3 radiographers at UHW and no radiographers at UHL, provide the first stage reports, these are then double reported by radiologist.

41 **Exhibit 9** shows that shows that between April 2015 and March 2016 radiologists reported on the majority of CT scans and all MRI scans. This is similar to the all Wales reporting figures, which show that very few if any radiographers report on these two modalities. For US scans there is an equal split between the percentage of scans reported by radiologists and radiographers. However, compared to the all-Wales figures, the Health Board has significantly fewer US scans reported by radiographers, approximately 20% less. The all-Wales figures show that across Wales just under 25% of radiographers report on plain x-ray, at the Health Board the figure is only 5%.

Exhibit 9: percentage of scans reported by radiologists, radiographers and other staff between 1 April 2015 and 31 March 2016

Table showing that between April 2015 and March 2016 the majority of CT and MRI scans were reported by radiologists. Half of radiographers report on US scans and 5% on plain x-ray but figures are low compared to all-Wales percentages.

		% of scans reported by		
		Radiologist	Radiographer ¹	Others ²
CT	University Hospital Llandough	100%	0%	0%
	University Hospital of Wales	91%	0%	9%
	Cardiff and Vale UHB¹	93%	0%	7%
	Wales	98%	0%	2%
MRI	University Hospital Llandough	100%	0%	0%
	University Hospital of Wales	100%	0%	0%
	Cardiff and Vale UHB¹	100%	0%	0%
	Wales	98%	1%	1%
US	University Hospital Llandough	45%	55%	0%
	University Hospital of Wales	54%	45%	0%
	Cardiff and Vale UHB	51%	49%	0%
	Wales	26%	71%	3%
Plain x-ray	University Hospital Llandough	78%	0%	21%
	University Hospital of Wales	87%	6%	7%
	Cardiff and Vale UHB¹	85%	5%	10%
	Wales	63%	23%	14%

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**

- 42 The Health Board is investing in extended radiographer roles, for example by creating consultant radiographer posts and training radiographers to report on imaging. However, radiographers felt that the opportunities for training and using new skills were limited. They raised a number of issues, such as:
- lack of budget for higher education and to extend roles/increase pay bands;
 - radiographers self-funding their higher education but not having the opportunity to use their skills;
 - reporting radiographers underused, for example some radiographers only report for one session per week;
 - time for reporting not factored in, some reporting radiographers are expected to fit reporting in around imaging duties;
 - extending roles is dependent on radiologists' capacity, for example to train; mentor and quality check radiographers' work, time which is not always available;
 - extending roles requiring a degree of culture change because radiographers will be doing roles that are traditionally done by radiologists; and
 - not having a training programme in place, radiographers felt that a plan needs to be in place to ascertain when the next cohort of radiographers needed to be trained.
- 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, 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 The last time the Health Board outsourced reporting was for a short period in early 2015, this was to alleviate pressure on out of hours CT reporting particularly at UHW. The Health Board reported that the RROL contract was not value for money and some questioned the quality of reporting. However, because of the reporting backlog some felt that the Health Board should outsource reporting more, or extend more radiographers roles.
- 45 To assess reporting quality the service monitors discrepancy rates, clinical incidences and complaints. The decision to stop outsourcing reporting was based purely on value for money because on review; outsourced and in-house reports had the same discrepancy rate (the discrepancies were mainly around levels of detail included within reports), there was only one clinical incident that did not lead to any harm, and few complaints received.

Clinical performance is regularly audited, discussed and fed back to staff, however, there are concerns about staff participation because of capacity issues

- 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 Since April 2015, the Health Board has undertaken a number of clinical audits:
- appropriateness of referrals;
 - demand levels by GP and hospital staff;
 - accuracy of reporting; and
 - reporting turnaround times.
- 49 The department also regularly reviews the quality of written reports, demand levels by time and undertakes a monthly patient ID check audit. However, appropriateness of urgent and out of hour's referrals, and lost and late reports are not regularly reviewed or audited.
- 50 The Clinical Diagnostics and Therapeutics Clinical Board has a clinical audit framework (2016-17). The framework sets out who the clinical audit leads are for each department. The leads are responsible for co-ordination and compliance of clinical audits. For example, ensuring compliance with national audits, making sure all audits are registered with the Health Boards clinical audit department and working with senior management to develop an audit programme. The framework also includes audit reporting mechanisms and the clinical audit plan. There are a number of radiology led clinical audits detailed in the plan and these include:
- lumbar spine radiography for low back pain;
 - audit of patient pathway from referral to interventional radiology procedure; and
 - comparison of carotid artery stenosis grading by ultrasound versus computerised tomography angiography.

- 51 The Health Board reported that senior radiologists lead clinical audits and that all clinical groups are involved. Although directorate management team minutes show concerns about releasing staff for audit at UHL because of the small pool of staff. On reviewing a selection of minutes, it is clear there is regular discussions about clinical audit at directorate management team meetings and through quality and safety, and radiation protection forums. Radiographers also told us they received feedback after audits had taken place. The minutes show feedback from external audits and plans for forthcoming audits.

Processes are in place to monitor and learn from complaints and incidents, however patient and staff feedback highlights long standing environmental concerns which are not being addressed

- 52 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.
- 53 The Health Board has processes in place at both corporate and operational levels to learn from incidents and errors, which are reported through a system called e-Datix. The Clinical Board and Directorate have health and safety sub-groups where incidents and errors are considered. Each of the teams within the directorate, including radiology, have their own health and safety groups that feed up to the directorate health and safety meeting. There is also a Radiation protection group which is attended by the senior leads from each of the divisional teams.
- 54 The Directorate level health and safety (H&S) group receives a summary of concerns and compliments, and discusses audit results. The Clinical Board H&S group receives reports of serious incidents and governance issues, plus remedial action plans are monitored to closure. The Clinical Board reviews themes emerging from complaints/compliments and the directorate performance dashboard is reviewed which includes quality and safety measures (e-Datix and serious incidents). Radiographers told us that monthly staff meetings take place after audit where incidents and errors are covered, also that they are encouraged to be self-reflecting on incidents and errors as part of their CPD.
- 55 In 2015, there were 168 reported incidents in radiology departments across the Health Board. Of which 12 were classed as moderate severity, and the rest classed as either low severity or causing no harm. The Health Board told us that there were no incidents reported in 2015-2016 as a result of delays or non-reported examinations.

- 56 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, provides 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. HIW recently conducted an [inspection of the nuclear medicine service at UHW](#). The inspection, undertaken in October 2016, found that the nuclear medicine service is safe and well managed with strong leadership in place. However, the inspection resulted in the Health Board having to complete an action plan to address the issues identified, such as maintaining patient dignity and privacy and updating and reviewing IRMER policies and procedures. Furthermore, the inspection found the service was not compliant with one of the regulations; this resulted in the issue of a compliance notice. The Health Board has since addressed most of the actions within their action plan, with the last to be completed by March 2017.
- 57 Feedback from patients is a vital source of information for radiology services to understand and improve patient experience. The service gets patient experience feedback through a number of mechanisms that include:
- the national survey of patients (runs every two years) for which the results and remedial actions are challenged through the Board's Quality, Safety and Experience committee; and
 - patient focus groups on particular issues, for example, the service is currently working with the Royal National Institute of Blind People (RNIB) to redesign the radiology reception at UHW.
- 58 The director responsible for patient experience said the service historically has struggled to get good levels of patient engagement. To increase participation the service is looking to use volunteers to conduct the Health Boards 'two minutes of your time' survey face to face.
- 59 In addition, the National Radiology Board is planning a Wales wide radiology survey, which at the time of this review was being approved by stakeholders.
- 60 The two professional lead radiographers have responsibility for managing complaints and compliments. They told us that the team often gets compliments about the staff. Complaints tend to focus on the facilities and waiting rooms. Each year the Community Health Council audits the facilities and raises issues around poor accessibility. Radiographers generally felt that radiology facilities are not patient focused. They accepted that buildings are old and there is little room or funding to update facilities, and service managers confirmed this.
- 61 At UHW, radiographers raised various issues that have an impact on patient experience, which included:
- no air conditioning in waiting rooms;

- waiting room chairs inadequate for larger patients and those with back problems;
- inadequate disabled access;
- limited supply of linen;
- hospital gowns supplied with security tags which pose a risk to patients if put through MRI scanners (the tags are cut out); and
- lack of patient privacy, for example, one room contains three gamma cameras side by side, separated by a curtain meaning personal questions can be over heard.

62 Similarly, radiographers at UHL raised several issues that impact on patient experience, which included:

- small changing rooms which only have one-way access. This means that access for disabled and larger patients is poor. Also, in an emergency, for example, if a patient collapses they could block the only door into the changing room, which in turn may delay any help they need;
- small waiting room with no privacy because everyone waiting can hear patients speaking to reception;
- corridors are often blocked with inpatients waiting on beds;
- the new mental health unit at UHL has bigger beds that are difficult to manoeuvre along the narrow corridors; and
- in general, disabled access is poor.

63 The Imaging Services Accreditation Scheme (ISAS) 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 coordination of the work associated with the accreditation process. For Cardiff and Vale, the Clinical Board is supportive of getting accreditation but there are no available resources to take it forward. The directorate is looking to resource this as part of next year's plan.

Waiting lists and referrals are well managed, however rising demand and staffing challenges increase service pressures, and whilst there is potential to increase weekend equipment usage this may cost the service more

Steps are being taken to try and reduce service pressures, but clinical advances and external factors, such as demand from other health board areas and public health campaigns, continue to increase demand

- 64 The increasing role of radiology in clinical care has led to growing demand for radiological examinations, in particular for CT and MRI scans. Whilst 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)¹⁵. The Royal College of Radiologists has predicted that by 2022 the number of radiological examinations carried out in England will be around 62 million¹⁶ per year driven by further innovation and demographic growth.
- 65 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)¹⁷. 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.
- 66 Those we spoke to at the Health Board highlighted a number of factors contributing to an increase in demand and the knock-on effects, for example:
- public health campaigns – the recent ‘lung cancer detection’ campaign caused an increase in chest x-ray demand for the service (by approximately 25%).

¹⁵ **Annual Imaging and Radiodiagnostics Data**, NHS England, 2014

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

¹⁷ Royal College of Radiologists, **Information submitted to Health Education England workforce planning and education commission round 2015-16**

- clinical trials and advances in interventional radiology – whilst positive, both add pressure to an already stretched service. Growth in these areas have a knock on effect on scheduling diagnostic patients and waiting lists.
- litigation and patient expectation – a culture of GPs ‘making sure’ and higher patient expectation has led to an increase in demand.
- external demand – as a tertiary and specialist centre patients from other Welsh health boards are legitimately referred to the Health Board. However, patients from other health boards are being sent to Cardiff and Vale for diagnostic scans, which could be done at their local hospital, this further increases demand.

- 67 In order to reduce demand the Health Board is reviewing some patient pathways, where imaging would not improve a patient’s outcome. Such as for lower back and shoulder pain for which physiotherapy is more effective, imaging would be better used for cases where physiotherapy does not improve symptoms. Business case sign-off has also been updated to ensure any service changes consider radiology. However, in general, the service feels it has little control over rising demand levels.
- 68 The Clinical Director said the Clinical Board and Health Board executives are aware of the capacity and demand issues facing the service.

Whilst clear referral guidance is in place, referring clinicians are unaware of it and although the service is taking positive steps to reduce inappropriate referrals the lack of an e-referral system is a risk

- 69 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’ iRefer ¹⁸ 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.
- 70 The Health Boards ‘guidance for new referrers’ is made available to hospital consultants and GP referrers. The guide clearly outlines referrer’s responsibilities and how to complete a radiology referral form. It includes a table that sets out what patient information must be included, an annotated copy of the referral form and the consequences of an incorrect or incomplete form. The guide is reviewed every 12 months. Clinicians are also referred to the iRefer website for further guidance. In addition, the British Medical Ultrasound association (BMUS) recently produced a

¹⁸ iRefer is a radiological investigation guidelines tool from The Royal College of Radiologists.

good practice guide for pelvic ultrasound referrals, which list a number of symptoms and explains whether or not ultrasounds are the best way forward. However, the clinicians we spoke to were not aware of any physical guidance produced by the radiology department and the radiology department did not involve them in producing the local guide.

- 71 The Health Board does not have an electronic referral system, so all referrals are paper based. Those interviewed felt that the paper based system was flawed because of the following reasons:
- risk of mismatching sticker with patient details with correct request form;
 - creating more administration because all referral forms have to be scanned;
 - difficulty in reading handwriting; and
 - a potential risk that patients may tamper with forms they have to hand in to the department.
- 72 There was general consensus that an e-referral system would help mitigate the risks identified above. An electronic referral system would also provide a clear audit trail of each referral, which would make audit of referral patterns and information easier.
- 73 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. The process of justification helps to ensure that patients do not receive unnecessary exposure to radiation and that appointment slots are not wasted.
- 74 At the Health Board, radiologists vet all referrals to check appropriateness and assign patient urgency. Currently, there are different vetting protocols for each modality and sub-speciality. Radiographers whose roles have been extended vet some plain x-ray, US and CT scans. A review of directorate management team minutes show that the Health Board is trialling electronic vetting and looking to standardise vetting protocols. The minutes identify difficulties with vetting referrals at UHL because there is a smaller pool of staff. Solutions such as ensuring vetting is on consultant job plans and/or delegating work to radiographers were outlined in the minutes.
- 75 To ensure they are not performing unnecessary examinations, the radiology department regularly reviews the appropriateness of referrals. For inappropriate x-ray referrals, the team completes a feedback form, which is sent to GPs explaining why their patients x-ray was refused. The department keeps a copy of the feedback form so 'frequent offenders' can be highlighted. For other modalities, for example CT, MRI or US scans, radiologists have a conversation with GPs. Service leads said that some inappropriate referrals are as a result of GPs not understanding new guidance, patient expectation and clinicians being cautious. A working group has been set up to look at how to reduce demand on imaging. The directorate manager, GP cluster lead and radiologists are members of this

group. Moving forward radiologists will attend GP cluster meetings and/or monthly education sessions to update on patient pathways and guidance.

The service has a good system to manage waiting lists and appointment slots

- 76 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.
- 77 Appointment slots at the Health Board are aligned with consultant radiologists job plans, which coupled with high levels of demand means the service does not offer patients flexible appointments and does not operate a partial booking system. Patients will be offered an appointment at either UHW or UHL, which is determined by the patient's address or referring GP practice. If available, urgent appointments and cancellations are offered to patients. However, positively the service has low and reducing levels of 'did not attend' rates (DNA):
- in 2014-15, the DNA rate was 3.1%,
 - in 2015/16 it reduced to 2.9%; and
 - so far rates for 2016-17 have reduced further to 2.8% (up until October 2016).
- 78 To help with imaging backlogs the service sent some patients to the Royal Glamorgan hospital for MRI scans, however many patients felt the hospital was too far way and did not turn up for appointments.
- 79 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. The Health Board carves out time in the rota for emergency and inpatient referrals. Time allowed is based on forecast and trends, but demand is unpredictable which means, sometimes, too much or too little time is allowed in the rota. There is also a designated emergency unit superintendent to manage emergency referrals. However, the Directorate Manager told us that if there is a need for a radiologist in the emergency unit, planned appointments suffered because there is a limited pool of radiologists who cover both emergency and planned interventions.
- 80 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.

- 81 There is a central radiology waiting list for the Health Board. The waiting list is managed by modality and based on treatment in turn, only clinical prioritisation overrides this system. Each week the two lead radiographers meet with heads of staff, there is one for each modality, to plan how to accommodate the waiting list and prioritise appointments. The modality leads at each site (UHW and UHL) work together to manage the waiting lists appropriately for example by making sure where possible that one site is not overburdened.
- 82 Booking clerks work to a modality/specialism because there are different protocols. To allow the service to have a central pool of booking clerks, the service is in the early stages of standardising protocols. However, the Service Manager said this is a difficult exercise because there are a number of protocols, which differ greatly.

Radiology staffing levels have grown at a slower rate than the rest of Wales and this is complicated by significant local and national recruitment and retention challenges

- 83 Radiologists, radiographers, nurses, technical and administrative staff work together to deliver radiology services. It is important to have the right number and skill mix of staff to deliver radiology services.
- 84 Our review found that the full-time equivalent (FTE) establishment¹⁹ staffing level of radiologists at the Health Board increased by 3.8% between 2012 and 2016, compared with 5.9% across Wales²⁰ (**Exhibit 10**). Similarly, the FTE establishment staffing level of radiographers at the Health Board has increased by 5.6% in the same period, compared with 10.2% across Wales.

¹⁹ 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.

²⁰ 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 10: FTE establishment of radiology staff trend 2012–2016 at the Health Board

Table showing there has been little growth in the numbers of radiologist and radiographers over the last five years.

	2012	2013	2014	2015	2016	Percentage change 2012–2016
Radiologists	50.30	50.60	48.70	51.40	52.20	3.8%
Radiographers/ ultrasonographers	147.66	145.29	136.32	143.40	155.91	5.6%

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

- 85 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 UK²¹. 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 Wales²².
- 86 As part of our review, we asked the Health Board to provide the number of vacancies as at 31 March 2016 within the radiology department at UHL and UHW. However, the Health Board was unable to provide this data.
- 87 Those interviewed expressed real concerns with staffing levels within the department. The Clinical Director explained that whilst the number of radiologists is relatively stable, the service needs more. Notwithstanding the national challenges mentioned earlier, the department has recently been successful in recruiting two radiologists, a chest specialist and a neurological specialist.
- 88 For radiographers, the service successfully recruits new graduates each year although the Radiography Professional Leads expressed concerns about the low numbers of radiographers graduating each year. As UHW is a specialist hospital, it provides more development opportunities and is seen as a more attractive workplace for graduates. However, this means the service finds it more difficult to attract graduates to UHL.

²¹ NHS Wales, **NHS Wales Health Collaborative Diagnostic Services Modernisation Programme**, December 2015

²² The Royal College of Radiologists, **Clinical radiology UK workforce census 2015 report**, 2016

- 89 A radiology service relies on a number of support staff such as nurses, porters, admin and booking clerks. Those interviewed as part of this review felt that the support staff were undervalued and overlooked when planning services. Since 2012, the Health Board has gained an additional nine (WTE) support staff, broken down as: 1.25 clerical staff, 2 porters, 2.75 radiology department assistants, and 3 radiology assistant practitioners.
- 90 The Directorate Manager told us that the service needs a better understanding of its interdependencies, for example for each scan how many radiologist, radiographers, porters, administrative staff, nurses and beds are needed. The Health Board reported that often when submitting a funding bid for a radiologist, the bid includes support staff but when the funding is awarded all but the radiologist funding is stripped out. For example, the service submitted a funding bid to the Welsh Health Specialised Services Committee (WHSSC) for three radiologists and support staff, because the one radiologist supporting 14 cardiologists was overstretched. However, the service was only awarded half of the funding requested, enough for one radiologist and an anaesthetist.
- 91 A lack of support staff causes delays because existing staff have to meet the extra demand. At UHL, radiographers often man reception and because of a lack of porters have to collect and return their patients to the wards. At UHW, again because of a lack of porters patients often have to wait on beds in corridors before their X-Ray and before returning to their ward.
- 92 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 over²³. 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 2016-2017 to achieve this aim.
- 93 Thirty-seven per cent of the consultant radiologists and 21% of radiographers at the Health Board are aged 50 and over and potentially within five years of retirement (**Exhibit 11**).

²³ NHS Wales Workforce, Education and Development Services, **NHS workforce census data for June 2016, 2016**

Exhibit 11: number and percentage of consultant radiologists and radiographers by age as at June 2016

Table showing that compared to the all Wales figures, the Health Board has a slightly higher percentage of radiologists aged 60 and over, and a higher percentage of radiographers aged under 39.

		Age					
		Under 39	40–44	45–49	50–54	55–59	60+
Consultant radiologists ¹	Cardiff and Vale UHB	6 (16%)	10 (26%)	8 (21%)	4 (11%)	4 (11%)	6 (16%)
	All Wales	29 (18%)	43 (27%)	28 (17%)	20 (12%)	20 (12%)	21 (13%)
Radiographers ²	Cardiff and Vale UHB	101 (64%)	14 (9%)	10 (6%)	19 (12%)	6 (4%)	8 (5%)
	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

94 Between 2011-12 and 2013-14 the Health Board did not use locums or agency staff. However, in 2014-15 this trend changed with 0.2% of the radiology budget attributed to locums and agency staff, the following year (2015-16) this increased to 0.9%. A directorate finance performance report (from May 2016) shows that radiology is overspending on medical staffing to cover consultant sickness, pay for additional sessions and temporary consultant sessions to cover retirement.

Staffing constraints hinder training opportunities and compliance with statutory and mandatory training is poor

- 95 Annual appraisals of staff performance, and continuing professional development (CPD) reviews are an important part of ensuring that the quality of radiology services is maintained and that staff training needs are properly addressed.
- 96 All radiologists, most radiographers and just under half of other radiology staff received an annual appraisal of their performance and a personal development plan in 2015-2016.²⁴ The Health Board keeps a register of all registered practitioners and operators engaged to carry out medical exposures, including the date the training was completed and the nature of the training undertaken. The records are kept under Ionising Radiation Medical Exposure Regulation (IRMER) requirements for radiographers and assistant practitioners within the Radiology department, and trainee radiologist records are kept with the Trainee Programme Director (South Wales).
- 97 Radiographers told us that they were happy with training at the beginning of their careers when they receive training for the various modalities. However, due to the size of the team and demand on the service, once initial training is over it is difficult to release staff. If a member of the team is training, the rest of the team have to cover their shifts. Because UHW is a specialist hospital, radiographers based at UHL often work shifts at UHW to develop their skills and to help with staffing levels. Radiographers were positive about gaining experience within a specialist environment but at times felt unsupported and left to deal with patients on their own. Whilst consultant radiologists can be called upon for support they are not always available because of their heavy workloads.
- 98 Radiographers confirmed that their training needs are discussed through their annual performance appraisal, but they also said that whilst they receive the recommended six hours per year for CPD, they felt this was insufficient.
- 99 **Exhibit 12** shows that compliance with statutory and mandatory training is generally poor and presents corporate and operational risks. Radiographers are more compliant than radiologists and other radiology department staff.
- 100 A review of Board papers show that low levels of statutory and mandatory training compliance is a Health Board wide concern. In order to address the issue the Health Board has set an 85% compliance target for all UK Core Skills, this objective is detailed in their workforce and organisational development plan (2016-17). The Health Board has also set up a mandatory training steering group, chaired by the Director of Workforce and Organisational Development, which meets monthly to track delivery of improvement actions.

²⁴ 100% of radiologists, 81% of radiographers/ultrasonographers and 47% of other radiology staff received an appraisal of their performance and 100% of radiologists, 81% of radiographers/ultrasonographers and 47% of other radiology staff had a personal development plan.

Exhibit 12: percentage of staff compliant with statutory and mandatory training modules, as at July 2016

Table showing that radiologists are the least compliant with statutory and mandatory training modules and radiographers are the most compliant.

	Radiologists	Radiographers/ ultrasonographers	Other radiology department staff
Equality, Diversity and Human Rights	52%	81%	47%
Health, Safety and Welfare	54%	87%	75%
Fire Safety	33%	73%	59%
Infection Prevention and Control	57%	86%	73%
Moving and Handling	11%	85%	71%
Safeguarding Adults	26%	57%	52%
Safeguarding Children	24%	75%	57%
Resuscitation	2%	46%	41%
Information Governance	33%	66%	61%

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

The radiology workforce profile generally compares favourably with the rest of Wales, although there are limitations on the staffing comparisons due to the tertiary nature of the service and difficulties accounting for complexity

- 101 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.
- 102 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)²⁵. **Exhibit 13** shows that the number of radiologists and radiographers relative to population and workload is larger than the all-Wales average, suggesting a more

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

generous staffing establishment when compared to the all-Wales position. As a tertiary and specialist hospital UHW receives patients from other health board areas, as such, the population served would be greater than the catchment population. Therefore the measure based on local population for this Health Board needs to be treated with caution.

Exhibit 13: FTE of in-post radiologists and radiographers, per 100,000 population, June 2016

Table showing, compared to the all-Wales average, the Health Board has more 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
Cardiff and Vale UHB	7.0	30.0
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

- 103 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.
- 104 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 has 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.

- 105 The Health Board measures imaging activity by ‘investigation’ which means each part of the body scanned counts as one investigation. The Health Board expressed concerns that the NHS Wales waiting times target for radiology may be too simplistic as it is based on the number of patients scanned and as such does not recognise that some parts of the body take longer and are more complicated to scan.
- 106 **Exhibit 14** highlights that the number of examinations per FTE in-post radiologist is lower than for other parts of Wales. The lower number of examinations per FTE radiologist could be attributed to the Health Board having a higher number of radiologists per 100,000 population, as demonstrated in **Exhibit 13**. A comparison of large specialist teaching hospitals would provide a helpful benchmark.

Exhibit 14: number of examinations per FTE in-post radiologist 2015–16

Table showing the number of examinations undertaken per full-time equivalent in-post radiologist at the Health Board compared to Wales. This shows that the Health Board undertakes less examinations per full-time radiologist.

	Number of examinations per in-post FTE radiologist		
	All examinations	CT	MRI
Cardiff and Vale UHB	7,348	934	399
All Wales¹	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**

107 **Exhibit 15** highlights that the number of examinations per FTE in-post radiographer/ultrasonographer is higher than for Wales.

Exhibit 15: number of examinations per FTE in-post radiographer/ultrasonographers and ultrasonographers per 100,000 examinations 2015–16

Table showing the number of examinations undertaken per full-time equivalent (FTE) in-post radiographer/ultrasonographer compared to Wales. This shows that the Health Board undertakes more examinations per FTE in-post radiographer/ultrasonographer.

	Number of examinations per in-post FTE radiographer/ultrasonographer			
	All examinations	CT	MRI	US
Cardiff and Vale UHB	2,862	364	155	539
All Wales¹	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**

108 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 should draw on various workforce measures, including NHS benchmarking data to determine how the radiology staffing compares to inform their workforce planning.

Compared to Wales, there is an above average number of scanners, with longer operating hours, and whilst there is potential to further optimise weekend usage this may cost the service more

109 The UK has a low number of scanners compared with other OECD countries. Across the UK there are 8 CT scanners and 7 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 9 MRI scanners per million population²⁶. Data are not available for the separate countries in the UK.

110 **Exhibit 16** shows the number of scanners per million population for Wales. The Health Board has a higher number of MRI scanners when compared to Wales, but a lower number of CT and US scanners. When compared to OECD countries it has significantly fewer CT and MRI scanners.

Exhibit 16: number of CT, MRI and US scanners per million¹ population as at September 2016

Table showing, compared to the all Wales average, the Health Board has more MRI scanners and less CT and US scanners per million of the population.

	CT	MRI	US
Cardiff and Vale UHB	8.3	8.3	43.3
All Wales²	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

111 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, 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.

112 Most recent data from 2014 (**Exhibit 17**) shows that on average, the Health Board operated their scanners for between 7 and 11 hours on week days, but made less use of scanners on weekends.

²⁶ Organisation for Economic Cooperation and Development, **OECD Health Statistics 2014 – Frequently Requested Data**, 2014

Exhibit 17: percentage usage of CT, MRI and US scanners, 2014 (verified and updated in 2015)

Table showing that compared to the Wales average, the Health Board has a higher percentage of usage for CT and MRI scanners, but not US scanners.

Type of scanner	Average number of operating hours per scanner on each day		Percentage usage of equipment ¹	
	Monday to Friday	Saturday to Sunday	Cardiff and Vale UHB	Wales average
CT	10.0	0.0	60%	52%
MRI	10.8	4.5	75%	66%
US	7.4	0.0	44%	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.

- 113 If hospitals at the Health Board were operating 12 hours a day and seven days a week, we estimated that it may be possible to undertake a minimum of 130 CT scans, 55 MRI scans and 1,500 US scans a week
- 114 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 less use of scanners on weekends.
- 115 However, radiographers and service leads said that due to the age of the scanners, particularly MRI scanners, there are frequent 'down-times', so the operating hours shown in **Exhibit 17** are not a true reflection of the actual hours of operation.

Poor strategic planning and lack of equipment replacement programme presents a significant risk, however management structures are clear and there is good Board and corporate oversight of the service

The Health Board does not have a radiology strategy nor detailed operational and workforce plans, however, the service is taking steps to address this

- 116 The Health Board should have a clear strategic plan that sets out how it will meet current and future demand for radiology services. The plan should set out how the Health Board will meet current and future demand for radiology services.
- 117 There is no strategy for the radiology service. Some radiology priorities are outlined within the Health Board's Integrated Medium Term Plan (IMTP)²⁷ but the detail is insufficient to understand the strategic approach and intent. Within the IMTP there is no dedicated section to detail the vision, challenges and strategic priorities for the service. There is some mention, but little detail, about the imbalance of supply and demand within the service, priority to reduce backlogs and radiology services moving into the new children's hospital.
- 118 Without a strategy, it is difficult for the service to set out how to meet future demands. The service leads have identified that the radiology service does not understand its baseline capacity, as in what can be delivered by the service at any given time or day of week, which makes forward planning difficult. Current demand and capacity modelling is done manually as the Radiology Information System (RADIS) used to extract radiology information does not support demand/capacity modelling. Service and performance leads told us that waiting lists and appointments slots are manually sorted which is time and resource intensive. Work is now underway to establish a 'zero base' capacity for the service, but it is anticipated that this will take approximately six months to complete, as it will need to be done manually.
- 119 The absence of a clear strategy for the Health Board's radiology service constrains its ability to set out sound operational plans.
- 120 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.

²⁷At the time of this review, the Health Boards IMTP had yet to be approved.

- 121 The Health Board does not currently have an overarching radiology operational / delivery plan nor does it have a workforce plan. There are a number of contributory factors including the absence of a strategy and the poor understanding of capacity and demand. However, the service recognised a gap in business planning and at the time of this review had very recently recruited a Directorate Manager whose role involves business, financial and project planning.
- 122 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 to the number of patients referred for radiology imaging, such as new consultant posts, clinics and services.
- 123 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. The radiology service at the Health Board told us that while the radiology team is very involved in decisions to introduce new interventional radiology procedures, they are rarely involved in decisions to introduce a new consultant or introduce a new clinic/service. Even if the change impacts on the service. For example, earlier this year UHL opened a new mental health unit. Radiographers told us that the unit has created extra workload for the team but there is no provision for extra staff or portering. In addition, if there are new trials, the radiography team get told after the changes are implemented, even if this means there is an increase in work. It was felt the value and cost of radiology is not considered, for example when the NICE guidelines on head trauma (all head trauma cases have to be scanned) were released the cost and demand on the radiology service was not factored in.
- 124 However, to try and stop business cases overlooking the radiology service, a new process has been introduced. Any new service which requires a business plan cannot be approved without being reviewed and signed off by the Clinical Board Director of Operations, who has responsibility for the radiology service; this process has been in place for 12 months. In addition, the service is strengthening its relationship with other Clinical Boards and the Chief Operating Officers team get sight of business plans through weekly meetings.

The management structure and lines of accountability are clear, however management meetings require a greater strategic focus

- 125 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.

- 126 Radiology sits within the Radiology, Medical Physics and Clinical Engineering (RMPCE) Directorate and is part of the Clinical Diagnosis and Therapeutics Clinical Board.
- 127 The Clinical Director is responsible for the directorate, and reports to the Clinical Board Director. At the time of this review, the directorate had recently changed its management structure to improve business planning and management. The change aims to create a balance between clinical and business expertise and leadership. For example by splitting the roles of directorate manager and radiography professional lead, the roles were previously held by one person. There are now two professional leads, based at UHW and UHL, their role is to manage and support the radiographers. The Directorate Manager, who was recruited from outside the NHS, reports to the Clinical Director and is responsible for business management for example; financial, programme/project management and service improvement and efficiency.
- 128 Those interviewed generally felt the structure worked well and that there are clear lines of accountability. However, it was felt that further work was needed to bring the different teams within the directorate together. Some of the teams need to work together, for example medical physics who prepare some injections for radiology. However, the clinical engineering team, who repair medical equipment across all Clinical Boards, do not fit neatly into the directorate structure.
- 129 The main forum for the radiology service is the Radiology, Medical Physics and Clinical Engineering Directorate Management Team (DMT). The team meets monthly and includes a multi-skilled membership: the clinical director, directorate manager, admin manager, senior representative from each of the teams within the directorate, senior radiology nurse and site superintendents. DMT reports up to the Clinical Diagnosis and Therapeutics Clinical Board. There is a terms of reference for the group and whilst the aims, membership and practicalities of the group are set out it does not list the sub-groups (eg health and safety) and needs to be reviewed to reflect the new management changes.
- 130 A review of DMT minutes show the meetings are well attended and it is a good forum for raising concerns such as workforce capacity, staffing changes, equipment issues and financial concerns across the directorate. However, those interviewed raised concerns that the meetings were too operational which left little room for strategic discussions and made it less relevant for non-radiology attendees. The directorate manager is starting to address these concerns by introducing highlight reports for each modality, which creates time to discuss financial, and project risks and making minutes open access.
- 131 Radiologists hold a weekly lunchtime catch-up meeting but the Clinical Director said this is often cancelled due to service pressures. The radiography professional leads are reinstating a radiographers team meeting which will also include

administrative staff and nurses. Both meetings are important communication channels for the radiology department, where staff can discuss common concerns and receive wider updates cascading from DMT and for collating feedback to be fed up to DMT.

The service is well represented on Board committees and sub-committees

- 132 If radiology is to have sufficient profile within the Health Board, radiology staff should have a regular presence on key Health Board's committees such as the Quality Safety and Experience Committee and the People, Planning and Performance Committee. Radiology should feature sufficiently often on committee agendas to help ensure wider awareness of the service and its issues.
- 133 Across Wales we found variation in the degree of radiology team representation on key board committees. We found that the radiology service in the Health Board was represented on the key Board committees for information and technology, performance, information governance and quality and safety. At Board level radiology issues, risk and updates are highlighted through Quality Safety Experience Committee, the committee meetings are regularly attended by the responsible Chief Operating Officer and the committee has sight of the Clinical Board Health and Safety group minutes. A review of minutes show that key policy updates and changes are also taken to Quality Safety and Experience Committee for approval, for example in May 2016 the non-medical referrers policy was presented to the committee.

In recent years the service overspent against its budget and missed its savings target and whilst finance performance reports are clear, remedial actions are not included

- 134 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. The radiology service does not have a strategic financial plan, but the RMPCE directorate prepares a financial performance report for the Clinical Diagnostics and Therapeutics Clinical Board. The Board meets every two months. The financial report clearly sets out the financial position for the radiology service and the reasons for any over or underspend. The report however does not set out any remedial actions. The RMPCE performance dashboard, which is reviewed by the Clinical Board also monitors in-year financial spend on a rolling basis. In 2014-15 the service overspent by £277,000 and in 2015-16 by £216,000.

Exhibit 18: radiology service budget comparison with expenditure (£ million) 2014-15 and 2015-16

Table showing variance between radiology service budget and actual expenditure. In both 2014-15 and 2015-16, expenditure was greater than the allocated budget.

		2014–15	2015–16
Cardiff and Vale	Budget (£ million)	£18.5	£19.3
UHB	Expenditure (£ million)	£18.8	£19.5
	Variance	1.5%	1.1%

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

135 Over the last three years the service's cost improvement programme has become increasingly difficult to meet. Over these years the radiology service has achieved cost saving through measures such as; changing the skill mix in teams, offering voluntary redundancy, reviewing contracts, purchasing annual leave and by using different products. During the three years between 2013-14 and 2015-16, the service missed its savings targets by:

- £35,000 in 2013-14, target was £734,000;
- £85,000 in 2014-15, target was £767,000; and
- £152,000 in 2015-16, target was £609,000.

Despite equipment at or reaching the end of life expectancy, and frequent breakdowns, there is no equipment replacement programme in place

136 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.

137 The main equipment concern for most of those interviewed was the age of equipment, especially at UHW. There are particular concerns about the MRI scanners, which are reaching the point where parts will become obsolete. Radiographers and service leads said that MRI scanner maybe out of service for 2-3 days, which has an adverse effect on appointments. Frequent breakdowns cause delays in treatment and waiting times. At peak times the service uses mobile vans for scanning (such as MRI) and has also sent patients to the Royal Glamorgan

Hospital for their scans. The service has a critical need for MRI scanners and this is reflected in the directorate's risk register; however, we were told there has not been funding provision.

- 138 The Health Board does not have an equipment replacement programme. The radiology asset register lists details such as; equipment age, location, make and model, date purchased, purchase price and current value. Those interviewed were concerned about the lack of equipment replacement planning and about the way funding for equipment was released. The Health Board has limited discretionary capital to fund the replacement of equipment alongside its broader estates and ICT requirements. However, given the Health Board does not have overarching radiology plans, and the absence of an equipment replacement programme to support a prioritisation process, there is significant scope for improvement to help address the equipment replacement challenges.
- 139 This year, Welsh Government released £16 million of capital funds for scanning equipment. The Health Board's share of the fund is £4.5 million and the service is prioritising the purchase of three gamma cameras. The Health Board reported they have the oldest MRI scanners in Wales, but have prioritised gamma cameras because installation of MRI scanners would need additional capital funding. The service is working closely with the Health Board's estates team and Welsh Government to make sure there is long-term consideration for radiology equipment.
- 140 The European Society of Radiology²⁸ 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 require replacement strategies to be in place; and
 - 11 or more years old requires replacement.
- 141 In November 2015, NHS Wales anticipated that 87% of imaging department scanners would require replacement by 2017²⁹. **Exhibit 19** shows that there are a number of scanners, at both UHW and UHL, that are either approaching or have exceeded their life expectancy. In the context of the Health Board's role as a tertiary and specialist centre, it is concerning to find that it houses some of the oldest scanners in Wales. Clinical staff expressed concerns about patients having their initial scans at hospitals with newer scanners and then receiving specialist services on older scanners at UHW. Radiographers at UHW told us that equipment breaks down on most days, which disrupts patients' treatment and causes delays because appointments have to be rebooked. UHL experience fewer issues with breakdowns. The Health Board reported that data on scanning days lost has been

²⁸ European Society of Radiology, **Renewal of Radiological Equipment**, September 2014

²⁹ Diagnostic Service Programme NHS Wales, **All Wales Gantry (MRI, CT, Gamma Camera and Ultrasound) Usage/Capacity**, November 2015

collected since October 2015, and that the service keeps a log of equipment faults. However, the frequency of downtime caused by faulty equipment is difficult to determine because not all faults result in equipment downtime.

Exhibit 19: age of CT, MRI and US equipment at the Health Board as at September 2016

Table showing that based on high and low usage, a number of the Health Boards scanners have or are reaching end of equipment life expectancy

		CT	MRI	US
Age of scanners at the Health Board (years) ¹	University Hospital Llandough	5	10	4 (average age based on 9 scanners)
	University Hospital of Wales	2, 5, 11	13, 13	4 (average age based on 12 scanners)
	Children's Hospital for Wales	none	1	4
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)

Generally, radiology ICT systems do not serve the Health Board's needs

- 142 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.
- 143 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.

- 144 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.
- 145 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 professionals³⁰. 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.
- 146 The Health Board, in general, is dissatisfied with RADIS as its core radiology information system, as they feel it does not serve their needs well. This is because it was felt that RADIS is not good enough for business intelligence. Although there is a lot of data captured on the system, the Health Board believes it lacks the functionality to produce the reports that the service needs. Where reports are run from RADIS the service has little confidence in the accuracy of the data, it is therefore necessary to calculate data manually, which as previously stated is time consuming. Those we spoke to felt that RADIS was already out dated by the time it was introduced to the Health Board. More and better use of data is needed to manage the growing demands on the service and it was felt that RADIS does not have the scope to meet the challenge.
- 147 As discussed earlier ([paragraph 70](#)), the Health Board does not have an electronic system to manage radiology requests. The paper-based system could cause clinical mistakes because of illegible referrer's handwriting, or GPs faxing a form and then posting it as well, which in some cases can lead to a duplicate referral if not checked thoroughly. The Health Board has systems in place to mitigate risks but occasionally mistakes still happen.
- 148 The service is generally satisfied with their PACS system. The system allows radiologists to see digital images for all modalities at home when covering out of hours shifts. All PACS users within the Health Board have access, and images are available to some GPs and NHS staff outside of the Health Board. Radiographers raised that 3D imaging is not possible on the PACS system. 3D images allow information from other diagnostic tests or scans to be layered on top of a radiology

³⁰ 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.

scan, such as a CT scan, meaning that the different sources of information have to be viewed side by side instead. However, the Health Boards PACS Manager confirmed that 3D imaging was possible; this highlights the need for training on the full functionality of the PACS system. There were no real concerns expressed about the number of workstations but more about the positioning because of the availability of space in the department. Some workstations are positioned in corridors or central areas where people are walking past and there is limited space, the alternative for radiographers is to use a workstation in a radiologist's office, which is not always practical.

- 149 To save time when reporting on images, radiologist and radiographers use speech recognition software. The software used by the Health Board is called G2 and it is fully integrated with RADIS and PACS. However, the service is generally dissatisfied with the software. This is because whilst advanced, the speech recognition rate is not as good as some other available systems. The PACS Manager explained that the software will format a report as requested, but cannot create a structured report (nor can RADIS). Developing a function that creates structured reports is gaining momentum in radiology ICT circles.
- 150 The Health Board's PACS system contract is with Agfa and this expired in December 2015. The contract has been temporarily extended while preparations are made for the all Wales PACS contract with Fujifilm. However, the Health Board would prefer a fully integrated radiology system because it better suits their needs. The preferred integrated system would include the functionality of RADIS, PACS, speech recognition and patient administration. A system that tracks referrals from the beginning right through to imaging reports being acted upon. It was felt that buying separate systems for different functions increased the risk of interface problems. The service is aware of integrated products on the market and of them being used at other health boards in England.

Radiology performance is regularly reviewed at corporate and management level, however the performance dashboard needs to be strengthened and used to its full potential

- 151 Effective monitoring and scrutiny of radiology service performance is 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 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.
- 152 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.³¹ The Health Board contributes to NHSBN audits and use the benchmarking data to identify areas for service improvement.

- 153 The RMPCE Directorate has a performance dashboard that is reviewed at the monthly DMT meeting and performance is reviewed at the two monthly Clinical Diagnostics and Therapeutics Clinical Board. In addition, the Executive team receive weekly updates on Tier 1 targets.
- 154 The RMPCE performance dashboard monitors:
- levels of activity and demand;
 - waiting times over 8 weeks;
 - reporting backlogs (in excess of 10 weeks);
 - cancer imaging times;
 - finance measures;
 - workforce measures, which include sickness and appraisal rates; and
 - incidents and complaints.
- 155 The dashboard works on a red, amber, green rating system (RAG). However the target for some measures is not displayed. It also includes a set of measures and targets for internal referrals and reporting times, however, these are not monitored. The performance dashboard needs to be used to its full potential and strengthened, to give a better understanding of service strengths and weaknesses.

³¹ 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 July and September 2016. Details of these are set out below.

Exhibit 20: audit approach

Table outlining audit approach used for this review.

Method	Detail
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; and• HIW IH(ME)R (Ionising Radiation (Medical Exposure) Regulations): diagnostic incidents by Health Board between 2010 and 2016

Method	Detail
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.
Interviews	<p>We interviewed a small number of staff including:</p> <ul style="list-style-type: none"> • Director of Operations • Clinical Lead for Radiology Service • Radiology Service Managers <ul style="list-style-type: none"> – Directorate Manager – Service Manager • Radiography Professional Leads • Quality and Safety Lead • Performance Lead • Consultant Physician • EU Consultant • GP Cluster Lead/Primary Care Assistant Medical Director.
Focus groups	<ul style="list-style-type: none"> • We carried out focus groups with radiographers at both University Hospital Wales and University Hospital Llandough.

Appendix 2

Management response

Exhibit 21: management response.

The table sets out the report's recommendations and the actions that the Health Board's intends to take to address them.

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
R1	<p>Develop an action plan detailing how reporting backlogs will be managed sustainably. EG:</p> <ul style="list-style-type: none"> making short-term use of outsourcing, whilst workforce and training plans are developed, ensuring that radiographers already trained to report are fully utilised, and establishing whether more radiographers need to be trained and 	<p>Reduce reporting backlog, leading to patients receiving imaging results in a timely way.</p> <p>Efficient use of available radiology workforce and skills.</p>	Yes	Yes	<p>Actions identified:</p> <ul style="list-style-type: none"> A demand and capacity analysis has been completed and further investment agreed into reporting in 2017-18 in order to address known demand growth. The recruitment process has begun in May 2017. 	1 April 2017	Clinical Director

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
	how this will be achieved.				<ul style="list-style-type: none"> review trained reporting radiographers to ensure fully utilised identify further areas for trained radiographers and develop a training plan. 	<p>1 April 2017</p> <p>1 July 2017</p>	<p>Professional Heads</p> <p>Clinical Director & Professional Heads</p>
R2	Over the next year, increase appraisal rates for non-clinical radiology staff to at least the level of all other radiology staff.	<p>Well supported staff, encouraged to reach their full potential.</p> <p>Better understanding of individual and team training needs.</p>	Yes	Yes	A plan for the achievement of the PADR rate across the directorate has been agreed with the Head of Workforce and OD which includes implementation of Group PADRs.	1 April 2017	Professional Heads & Service Area Leads.
R3	Over the next year, increase mandatory training rates for all radiology staff to at least the Health Board target of 85%.	Better trained staff and improved patient safety.	Yes	Yes	There is an ongoing focus on the completion of the mandatory training requirements to meet the health boards	1 June 2017	Professional Heads & Service Area Leads.

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
		Helping to meet corporate mandatory training target.			target including the use of mandatory May initiative. The success of the plan is being monitored through the Workforce and OD function and deviation from the plan would be managed via workforce performance panels.		
R4	Liaise with referring clinicians when developing and reviewing referral guidance. Ensure all referring clinicians know where to access up to date versions of guidance.	Referring clinicians have better access to radiology referral guidelines.	Yes	Yes	As part of the ongoing work associated with the trading framework further guidance and protocols are being developed on an ongoing basis. There is a developed clinical engagement mechanism which is utilised. A review of the availability of guidance will be undertaken	End of 2017-18 financial year, recognising and ongoing management requirement.	Clinical Director & Radiologist Clinical Leads.

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
					throughout the 2017-18 financial year.		
R5	Over the next 12 months develop a radiology strategy which sets out: <ul style="list-style-type: none"> Where the service is now in terms of its demand, capacity and available resources; Where the service needs to be; and How the service will achieve its aims. 	Improved strategic and business planning of the radiology service.	Yes	Yes	Development of a cohesive strategy for Radiology.	End of 2017-18 financial year	Clinical Director & Directorate Manager
R6	Develop a workforce plan alongside the radiology strategy, which identifies the baseline capacity needed to sustainably meet radiology demand in a timely and safe way.	Better understanding of current and future workforce capacity and needs.	No	No	Whilst there is a recognition that there is a requirement to review the workforce plans on an ongoing basis, radiology has undertaken significant restructuring over the last two years in	Ongoing	Professional Heads, Directorate Manager & Service Area Leads

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
					response to the established workforce planning process.		
R7	<p>By mid-2017, develop an equipment replacement plan. The plan should include:</p> <ul style="list-style-type: none"> • equipment priorities, requirements, and associated costs, and • Outline the risks to the service/patients of not achieving the plan within the required timescales. 	Documented equipment replacement plan to inform strategic and business planning.	Yes	Yes, in part	There is ongoing work with Welsh Government in respect of major capital replacement for radiology and the priorities for the next two financial years are well understood. There is further work that can be developed for a longer term view.	End of 2017-18 financial year for longer term view	Professional Heads, Directorate Manager & Service Area Leads
R8	<p>Strengthen directorate performance management by:</p> <ul style="list-style-type: none"> • Setting clear business and service objectives; • Widening the range of performance measures aligned to the business and service objectives 	Wider pool of performance information from which to identify and strengthen service weakness.	No	Yes – in part	Equipment downtime already captured. There is an ongoing programme of reviewing the performance data utilised in radiology.	End of June 2017	Professional Heads, Directorate Manager & Service Area Leads

Ref	Recommendation	Intended outcome/ benefit	High priority (yes/no)	Accepted (yes/no)	Management response	Completion date	Responsible officer
	to include: equipment downtime, vacancy levels, the number of unreported images, performance against internal referral and reporting times.				Further development to strengthen robust and improve performance management, is significantly constrained by the absence of an integrated end to end radiology and performance management system.		

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