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Data Quality

Aneurin Bevan Health Board

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Summary

1. The NHS in Wales uses information as an integral part of its approach to delivering health services. Operationally, NHS bodies are now fully reliant on electronic information systems to support a range of key activities including:
 - patient administration, scheduling and booking;
 - diagnostic processes, ordering tests, requesting and viewing results;
 - joining primary and secondary care pathways, sharing potentially lifesaving critical patient information;
 - effective financial management and enable management of productivity;
 - identification of patient and demographic needs, so that services can be tailored and focussed in areas that will achieve the most benefit; and
 - identification and achievement of clinical and business outcomes.
2. Information used to support management and healthcare delivery is only reliable if the quality of the underpinning data is sound. The NHS Wales Informatics Service (NWIS) identifies six core elements that affect data quality, which are timeliness, completeness, validity, consistency, precision and accuracy. While it is rarely possible to ensure details 100 per cent correct, 100 per cent of the time, it is critical that health bodies have appropriate and effective data-quality arrangements in place to minimise clinical risk, support effective operational delivery and management, and to underpin performance management and health board assurance processes.
3. In 2008, the Corporate Health Information Programme (CHIP) undertook a review across the former NHS trusts to assess data-quality arrangements. The report identified a range a varying practices, and made a number of recommendations to improve arrangements. The Ministerial Letter (EH/ML/007/08) issued in September 2008 included formal recommendations for all NHS trusts and local health boards.

The work of the CHIP now forms part of NWIS. While the NWIS has not formally followed up the original report, it continues to co-ordinate and monitor the validity of key data.
4. As part of its work to review NHS bodies' arrangements for ensuring efficient, effective and economical use of resources, the Wales Audit Office has examined data-quality arrangements at Aneurin Bevan Health Board (the Health Board). The Wales Audit Office has designed this review with input from NWIS and we are undertaking the review at all health boards and NHS trusts in Wales.
5. Whilst this review is not a direct follow-up of the 2008 Ministerial recommendations, we have sought to incorporate each of these areas into our review work. The audit has therefore examined:
 - governance and accountability arrangements relating to data quality;
 - data-quality operational arrangements, including local responsibilities, processes, procedures and policy and approaches for internally monitoring and reporting the effectiveness of data-quality processes; and
 - data-quality performance.

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6. In undertaking this review, we have assessed key relevant documentation and reports, and undertaken a series of interviews with a range of staff. We have also undertaken a data-analysis exercise to identify the extent of duplicate patient records in and between the main Patient Administration System (PAS) and the Radiology information system, (RADIS) as an indicator of the effectiveness of data-quality arrangements. This review has focussed on data-quality arrangements for the Health Board's own data, and therefore does not consider data-quality arrangements for primary care datasets.
 7. This review set out to identify whether the Health Board has effective data-quality arrangements.
 8. Our conclusion is that: Overall, the Health Board demonstrates a good standard of data quality; however, complex governance arrangements present a potential barrier to improvement.
 9. We reached this conclusion because:
 - data quality governance structures are currently too complex and the Health Board is currently reviewing these arrangements;
 - the data-quality audit programme and processes are appropriate; however, the Health Board could strengthen these further to ensure that good data quality is maintained and embedded; and
 - our data analysis shows a high standard of data quality, which indicates the Health Board's arrangements are broadly effective.

Recommendations

10. To help the Board move forward we have provided the following recommendations.

Data-quality assurance

R1 Introduce an annual report on data quality to provide organisational-level assurance which covers the arrangements in place to ensure data quality, and the effectiveness of the arrangements.

R2 Ensure that information governance arrangements are efficient, effective and appropriately include data quality on the agenda.

Data-quality process

R3 Ensure that the Data Quality Policy is updated:

- the scope should cover all aspects of the Health Board including primary care;
- the policy should identify all relevant committees and reflect their terms of reference; and
- roles and responsibilities should reflect current actual arrangements.

R4 Incorporate data quality into the induction process or training for all new starters who have responsibility for inputting, analysing or amending clinical and business data. Provide data-quality refresher training as required.

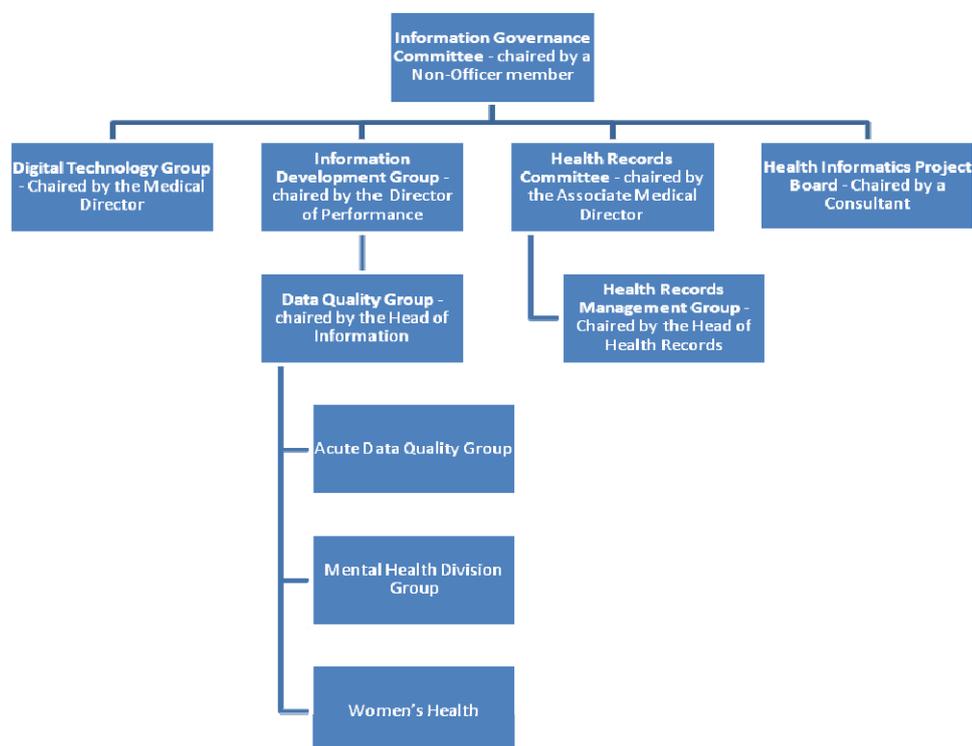
Detailed Report

Data-quality governance structures are currently too complex and the Health Board is currently reviewing these arrangements

Current governance arrangements include a complex structure and no clear approach to provide assurance on data-quality issues, although these issues are likely to be addressed as part of the current review

11. A clear line of accountability is required to ensure effective decision-making and that the Health Board can appropriately discharge its assurance requirements. The Health Board can achieve this through a well-designed governance and management group structure. Exhibit 1 identifies the Health Board Information Governance Group structure.

Exhibit 1: Data-quality reporting structure to the Information Governance Committee



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12. These committees and groups have appropriate terms of reference and include key aspects which affect data quality. However, these committees are resource intensive, with each consisting of 15 to 20 members. As well as being large, there can be up to five members from the main Information Governance Committee who also attend sub-committee meetings.
 13. Interviews indicated a lack of clarity over the exact role of the Information Governance Committee. There is a mixture of views within the Health Board over what its remit should be and whether or not it has a remit to review aspects of performance as part of its agenda. There is also lack of clarity over the strategic and operational responsibilities of the committee reporting structure. This separation of responsibilities needs to be better defined within the structure.
 14. The Health Board's Data Quality Management Policy identifies that the functions of the Committees (with relation to data quality) above are as follows:
 - The Information Governance Committee develops and agrees policies and processes for information collection, storage and dissemination. The Committee directs and monitors the Health Board's approach to Information Governance in order to meet local and national plans, standards and legislation.
 - The Information Development Group identifies the clinical and business information need across the organisation and develops systems and processes to meet this need. Its agenda directs the data-quality work programme and the work of the Data Quality Group.
 - The Data Quality Group reports to the Information Development Group. The Group acts as the enforcement body for the Data Quality Policy and monitors and reports performance against standards and improves data quality processes.
 - The Health Records Management Group is an operational group and raises data-quality awareness amongst health records staff. This group receives mandatory data quality audit results, which help to identify training needs.
 15. However, there is no mention of the Health Records Committee in the data-quality policy. This Committee sits between the Health Records Management Group and the Information Governance Committee, and the policy should reflect the Committee's function.
 16. The Data Quality Management Policy does not identify how the Information Development Group will provide the Information Governance Committee with assurance on the quality of the Health Board's data. Although there is routine reporting of data quality to the relevant sub-committees and groups, there is no annual data-quality assurance report. In 2008, the previous Minister for Health and Social Services recommended that health boards should commission a formal annual report on data quality to ensure that there is a focus on continuous improvement.
 17. We understand that the Health Board is undertaking a review of its data-quality reporting structure and related committees. The Health Board should ensure that the review takes into account, and acts upon the issues raised in this report. The Information Governance Committee should regularly receive updates on the effectiveness of sub-committee and group arrangements until it is confident that they are firmly embedded.

While senior managers indicate a commitment to improving data quality and have continued with data-quality investment, this commitment is not demonstrated by the recent downgrading of the data-quality group

18. The Data Quality Management Policy states that the senior management responsibility for data quality belongs with the Medical Director. However, through interviews, we have found that the responsibility actually rests with the Director of Performance and Improvement. The Health Board should amend the Policy to reflect the current responsibilities. The Health Board will need to communicate the accountability and responsibility for data quality so that everyone involved understands the arrangements. The Board will need to monitor and periodically review its arrangements to ensure they remain effective.
19. Senior managers demonstrate commitment to data quality and have continued with resourcing its programme of data quality of work. Management also effectively implement improvements in response to independent reports on data quality.
20. In 2009, the Data Quality Group and Information Development Group were at the same level within the governance framework. Nevertheless, the Data Quality Group was downgraded owing to a lack of engagement by some members. In early 2011, the decision was taken to make the Data Quality Group a sub-group of the Information Development Group due to a lack of clinical 'buy in' and a lack of support from the service.

Appropriate data-quality roles and responsibilities are in place

21. Data-quality roles and responsibilities are in place. The Head of Information is formally responsible as the corporate 'Data Quality Officer'. This role is responsible for maintaining and improving data quality at an operational level throughout the Health Board. Departmental managers, in both corporate and clinical departments, are responsible for the quality of their own data.
22. Job descriptions appropriately include Data Quality requirements for all staff who work with health records. Acute hospital staff interviewed indicated a general commitment to improving data quality and were clear of their own roles and responsibilities. It is less clear, however, whether the same formality of roles and responsibilities exists and is effective for information used by the Health Board, but which rests with others, such as in community and primary-care environments.
23. The Health Board is in the process of introducing Information Governance Stewards (piloted in Health Records). The Steward's responsibility is to audit and make sure that staff carry out processes correctly, and to improve the information governance in their department. This will include a requirement to maintain data-quality standards.
This will be a positive exercise if it is undertaken effectively and if the stewards effectively report progress to the appropriate committee.

Data-quality programmes and processes are appropriate but the Health Board could strengthen

these further to ensure that good data quality is maintained and embedded

The data-quality policy identifies key requirements but its scope does not cover primary-care information, which the Health Board increasingly relies upon

24. The Information Governance Committee approved the Data Quality Management policy. This is the responsibility of the Head of Information. The policy covers most of the key themes to manage and improve data quality, including:
- scope and aims of the policy;
 - responsibilities (Individual roles and committees);
 - training;
 - policy review/monitoring arrangements;
 - data validation processes; and
 - components of data quality embedded across information services.
25. Whilst the policy applies to everyone who inputs patient information into Secondary Care or Community patient-based systems, it does not incorporate primary-care data quality into its Data Quality Management Policy. The Health Board has overarching responsibility for the health of its local population and therefore services provided in the community and in primary care. As health models modernise under the framework of 'Setting the Direction' there will be increasing reliance on joined-up outcome and activity performance information. Therefore, the Health Board needs to equally ensure that primary and community information is as robust as acute data.

Data-quality training, education and awareness meets the Health Board's basic needs, but the Health Board needs to ensure that training is consistently applied throughout the organisation

26. The Health Board has a range of different approaches to train and support staff to help to improve its data quality. These approaches are varied in coverage and scope based on staff need, although the main focus is on the acute information.
27. The Health Board delivers training to staff to help them undertake operational processes and procedures using the new Myrddin PAS. The Health Board expect staff to continue to have refresher training thereafter as needs arise. Specific Myrddin training manuals support the delivery of training, and these identify key processes and system use.
28. Generic information governance training is available online, which covers data-quality issues. It is a requirement that staff complete this annually as part of mandated training. The generic staff induction process does not include advice on data quality. As data quality is business critical, it should be part of induction for key staff, so they are aware of its importance, and of following acceptable standards of data quality throughout their everyday work.

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29. The NWIS runs clinical-coding specialist training courses for the Health Board's staff. Clinical-speciality workshops provide additional focussed training on a needs basis. The NWIS provides clinical-coding refresher training every three years. If there are any changes within the NHS, or new data standards, then the Health Board holds clinics to give updates to staff. Clinical-coding staff are also able to apply for the national clinical-coding qualification.
30. Clinical-coding staff indicate that that more could be done to highlight the issues that coders have when they receive bad data, and more responsibility should be placed on staff who input data. The Health Board needs to reinforce a corporate-wide approach to data quality, where staff complete processes correctly the first time round.
31. There are effective arrangements to ensure the quality of data submissions to the Welsh Government. The informatics team uses Validation At Source (VAS) reporting to check and test data prior to submission to central government. In addition, the Health Board uses CHKS electronic monthly reports to support data analysis. This helps to identify anomalies and prioritise the key areas where data quality may require addressing.
32. Other internal feedback, validation, verification and assurance approaches which help the Health Board manage the quality of data include:
- the Patient Episode Database Wales (PEDW) – data that supports validation, for example, of NHS numbers and LHB names.
 - the Gwent Reporting and Performance Evaluation reporting tool (GRaPE) which uses data, primarily from within the data warehouse to analyse and verify secondary care data against a range of parameters.
 - clinical audits of accuracy and reliability of clinical data. This is performed by the Clinical Coding Department
 - clinical-coding audit against national standards. This is performed by Clinical Coding Department
 - admitted-patient-care validation and verification checks ensure that the paper records hold the same data as the electronic records of Myrddin and the Clinical Work Station. The Information Governance Department undertakes this process.
 - case-note quality and standards – checks the structure, size, tracking, reporting authorisation and set-up of the paper file.

The Health Board is responding appropriately to data-quality internal audits and reviews

33. The Health Board has a wide-ranging data-quality audit programme in place. Deloitte (as part of internal audit) carried out a 'Data Quality and Performance Monitoring' review. The Information Governance Committee received this report which had a 'Limited' Assurance rating, in July 2011. The review approach focussed on key performance information used by the Health Board but also covered cross cutting governance, management and process areas. As a result of the Internal Audit review, the Health Board has developed a plan which responds to the recommendations, and reports progress to the relevant information governance sub-committee.

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34. The Health Board internal auditors intends to undertake two further audits in respect of data quality accuracy and procedures. The Health Board believes that the introduction of these audits will enable them to meet the Internal Audit report recommendations and to provide the Information governance committee with assurances about the quality of the data and the processes behind it.
 35. Internal Audit is planning an additional review on Data Quality and Performance Management Review. Internal Audit will place emphasis on the timeliness of performance data that the Board uses to inform decision making as well as undertaking a performance data-quality risk assessment.

Our data analysis shows a high standard of data quality, which indicates the Health Board's arrangements are broadly effective

36. As part of our audit approach, we have considered and targeted our assessment of data-quality performance where it is nationally comparable, and where we could relate findings to operational process effectiveness, and consequent clinical or business risk areas. This includes review of the national data validation data sets and electronic demographics data analysis of 8.5 million patient administration records and 5.2 million radiology administration records.
37. Our analysis, however, is narrow in scope in the context of the large number of clinical and business data sets held by the Health Board. Therefore, the analysis should be considered an indicator or proxy for the overall effectiveness of data-quality arrangements in the Health Board.

The Health Board is generally meeting data-validity targets for key data sets

38. Across Wales, health boards submit data to the NWIS which then undertakes validity checks. The NWIS then communicate the results back to the health boards at regular intervals; usually monthly or bi-monthly.
39. We have reviewed the four data-validity reports covering the 1 April to 30 November 2011 period. These reports covers admitted patient care, outpatient referrals, outpatient activity and emergency (A&E). The NWIS reports identifies the percentage of data items have met the national standards. The information presented in exhibits 2 to 5 provides a summary of the NWIS reports and indicates the percentage of data fields which meet the national target for that indicator.
40. Overall, the exhibits indicate that the Health Board is meeting the majority of validity standard and is performing at or above the Wales average. For example, exhibit 2 indicates that the Health Board meets the national validity targets for 97 per cent of the data items checked within that dataset of admitted patient care. Exhibit 5 shows the Health Board is meeting the majority of emergency-data-set validity standards and compares favourably to other health boards in Wales. However, although the Health Board's performance exceeds the Welsh average, there is room for further improvement.

Exhibit 2

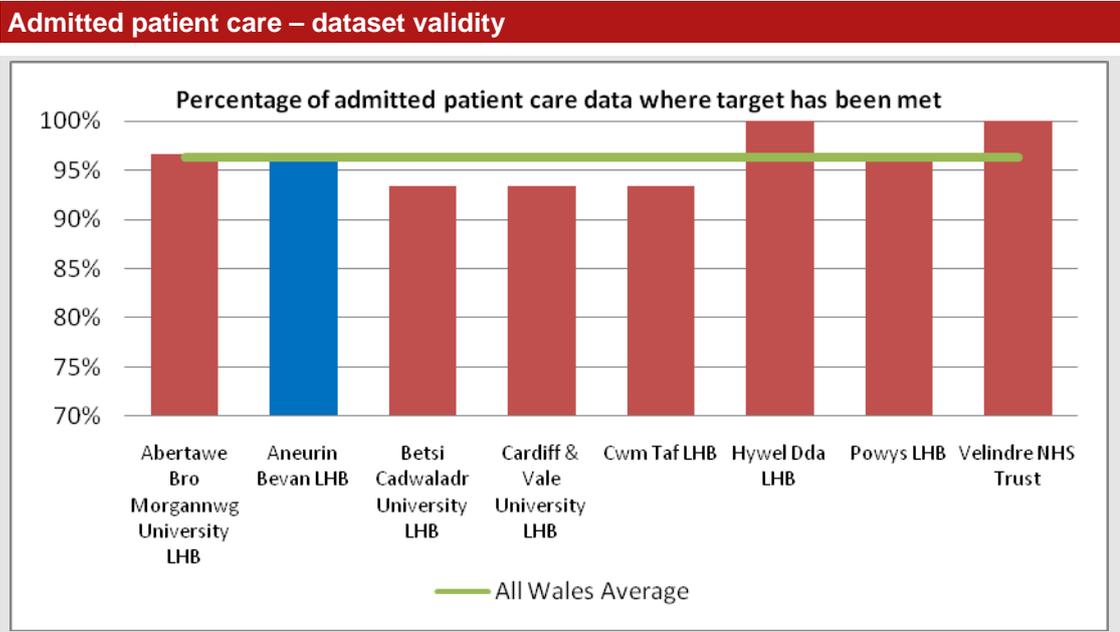


Exhibit 3

Outpatient referral – dataset validity

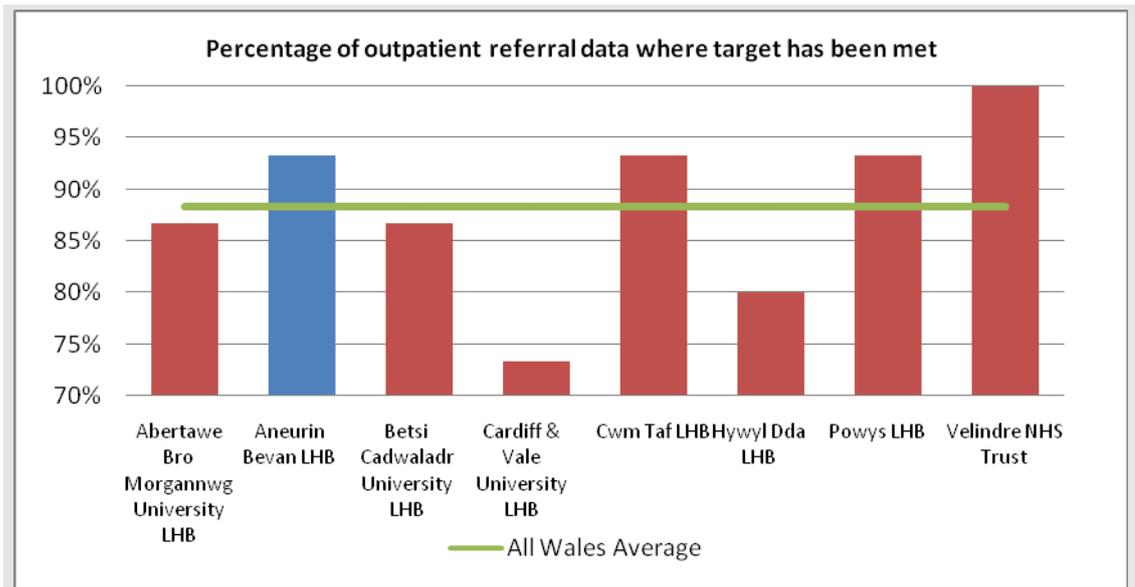


Exhibit 4

Outpatient activity – dataset validity

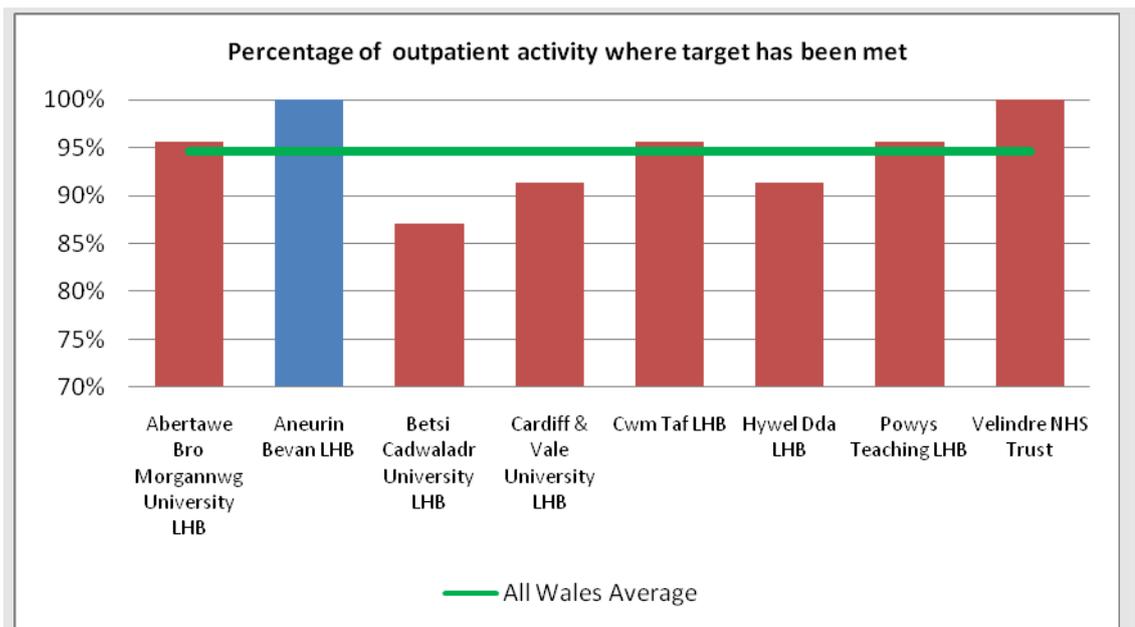
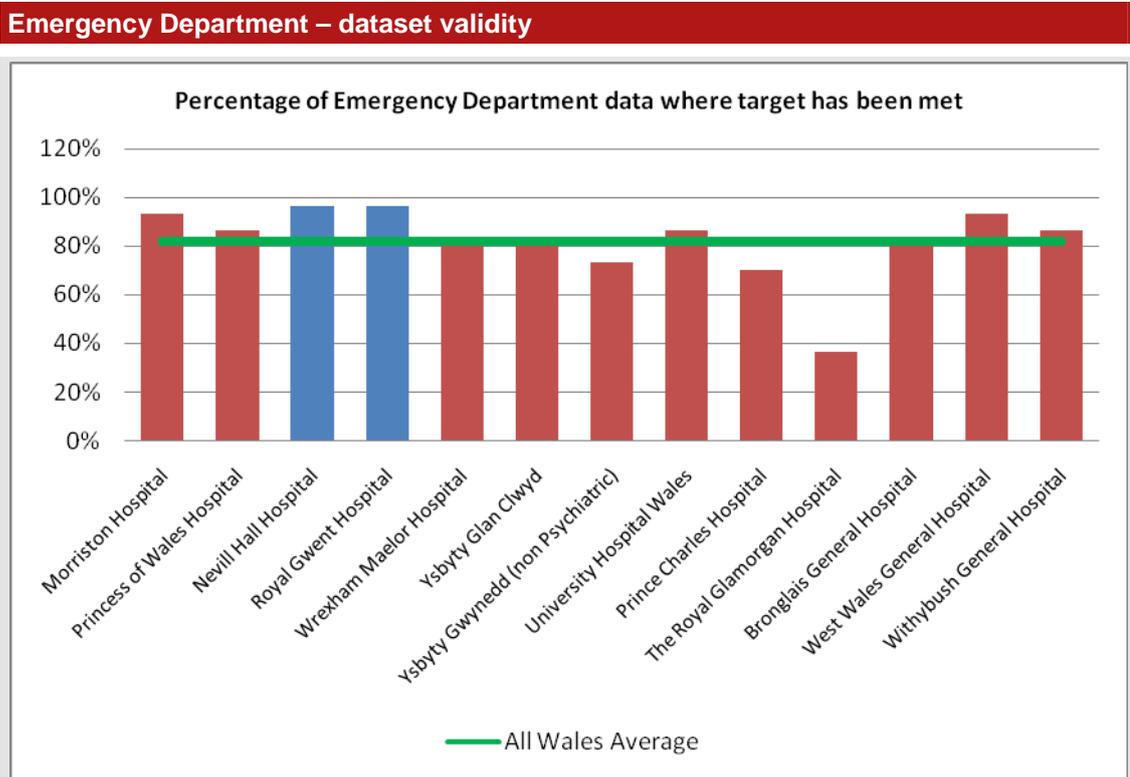


Exhibit 5



Our analysis of PAS and RADIS system demographic data indicates reasonably effective controls are in place but records with no NHS Number present a risk to the Board

41. A key building block of good-quality data in the NHS is patient demographic information, for example, name, address and date of birth. Separate patient information systems are often in use across different hospitals and departments such as Radiology. This means that a patient who has received care in a number of different settings can have numerous records and identifiers. In such a scenario, it is unlikely that the Health Board holds all the clinical information about that patient in one place. This creates potential clinical safety risks and makes it more difficult to locate the right records for the right patient.
42. In addition to considering the arrangements for achieving data quality as discussed in the earlier sections of this report, we undertook demographic data testing. We have designed our testing approach to support our assessment of the Board's data quality arrangements, by looking at an indicator of good-quality data. We analysed the core demographic patient data held on both PAS and RADIS, to assess the extent of duplicate entries, or cases where patient identifiers are missing.

43. The key findings from this work are that:

- The patient demographic data held on the PAS systems has 5,019 (0.6 per cent) total duplicate NHS numbers. This indicates reasonable approaches to cleansing and will help minimise error, risk and inefficiency, although ideally there should be no duplicates.
- 90,069 (11 per cent) patient registrations on PAS have no NHS number. Taking into account legacy and overseas patient records there should still only be limited number of new patients without NHS numbers. This performance suggests there is a potential clinical risk in identifying the correct patient record for those patients with no NHS number. However, this may also present a financial cost because the Health Board can only charge other health boards and English trusts for services provided to their patients where the NHS number allows them to be identified.
- The patient demographic data held on each RADIS system has only four duplicates (0.0005 per cent) duplicates. More concerning is the number of patients without NHS numbers on the system, which stand at 5.5 per cent. This may be because of primary or community-care-based diagnostic requests, but it may make tracking and linking the full radiology diagnostic activity for some patients to their PAS record more difficult.

44. The findings above align to our review of the data-quality processes in place, which includes the Board's recent and ongoing IM&T and informatics work. The Board's work has improved key data in preparation for the implementation of the Myrddin system. While our data analysis does not suggest significant risk to the Board, there may be both clinical risk and business inefficiency arising from patients with no NHS number, as mentioned above. The Health Board should incorporate areas for improvement into existing master patient index plans and cleansing processes. Further details on our data testing results are provided in Appendix 1.

Appendix 1

Patient-demographic data analysis results

As part of the data-quality fieldwork, the Wales Audit Office undertook an analysis of PAS and Radiology System patient-demographic data. This appendix provides a summary of our findings.

The table below identifies key relevant statistics from our records analysis. We have also included a set of charts, which provides an indication of the data quality in the Health Board.

Indicator	Aneurin Bevan HB	Wales
Total number of electronic patient records (PAS)	810,828	8.5 million (total)
Total number of PAS records with no NHS number recorded	90,069 (11%)	1,150,090 (total) 16% (average)
Total number of multiple PAS registrations within ABHB's own individual PAS system	5,019 (0.6%)	6.2% (average)
Total Number of Radiology records	809,331	5.2 M (total)
Total number of Radiology records with no NHS or hospital number recorded	44,790 (5.5%)	443,570 (total) 10% (average)
Total number of multiple Radiology registrations in ABHB	4 (0.00%)	39,539 (total) 0.73% (average)
Records in PAS with more than one corresponding Radiology record by NHS Number	0 (2) 0 (3 or more)	5,821 (2) 237 (3 or more) Average
Records in Radiology with more than one corresponding PAS record	2 (2) 0 (3 or more)	20,900 (2) 758 (3 or more) Average

Well-controlled and clean demographic information is a pre-requisite for a good level of overall data quality. Our analysis of the data indicates that the demographic data held within the PAS and Radiology systems at the Health Board is particularly well controlled and consistent. The indicators we evaluated above and in the graphs, which follow, show the Health Board's profile compares well to those of the other health boards in Wales.

There is some scope for further data cleansing by reducing the incidence of records where system records have no NHS number or hospital identifier. Our major concern would be that records with no NHS or hospital number recorded could be more difficult to match to patients and could lead to clinicians having an incomplete medical history.

The Health Board has the lowest incidence in Wales of multiple NHS-number-based duplicates within its own PAS system. However, a further complication is the number of records held without an NHS number, which in the Health Board is still relatively low at 90,069 or around 11 per cent for the PAS and 44,790 or 5.5 per cent for Radiology. Not having a valid NHS number makes patient tracing more difficult and can prevent the Health Board recovering treatment costs for visiting patients.

Clearly, there remains some scope for reducing these numbers further, but both compare well against the average for Wales. Again, the new Enterprise Master Patient Index uses sophisticated algorithms for matching and this should go a long way to further mitigating this situation. Historically, the PAS records without an NHS number could have occurred at any time in the past, there being several possible explanations for this including previous mergers of hospital systems.

Chart 1 – PAS: Patients with several different identifiers

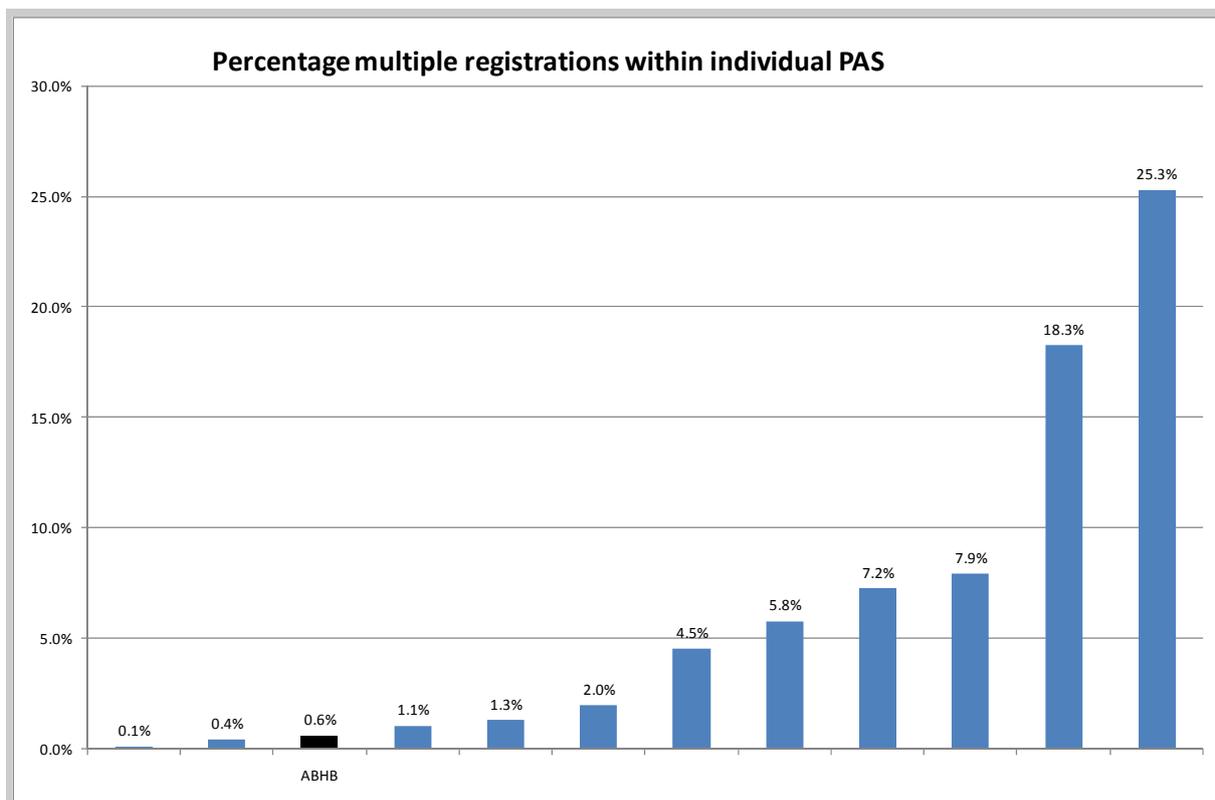


Chart 1 identifies the multiple registrations, but with different identifiers within each single PAS system in Wales. This means that there are instances of individual patients with more than one electronic record at a single site. This may present a clinical risk if the patient also has duplicate written case notes. We have analysed this data at a system/site level, which is why there are 12 bars in the above graph. Other health boards in Wales are included anonymously. There seem to be three distinct groups within Wales: those with under two per cent of such multiples, those with under 10 per cent and two with significantly higher at around 20 per cent.

Chart 2 – PAS: Patients with no recorded NHS numbers

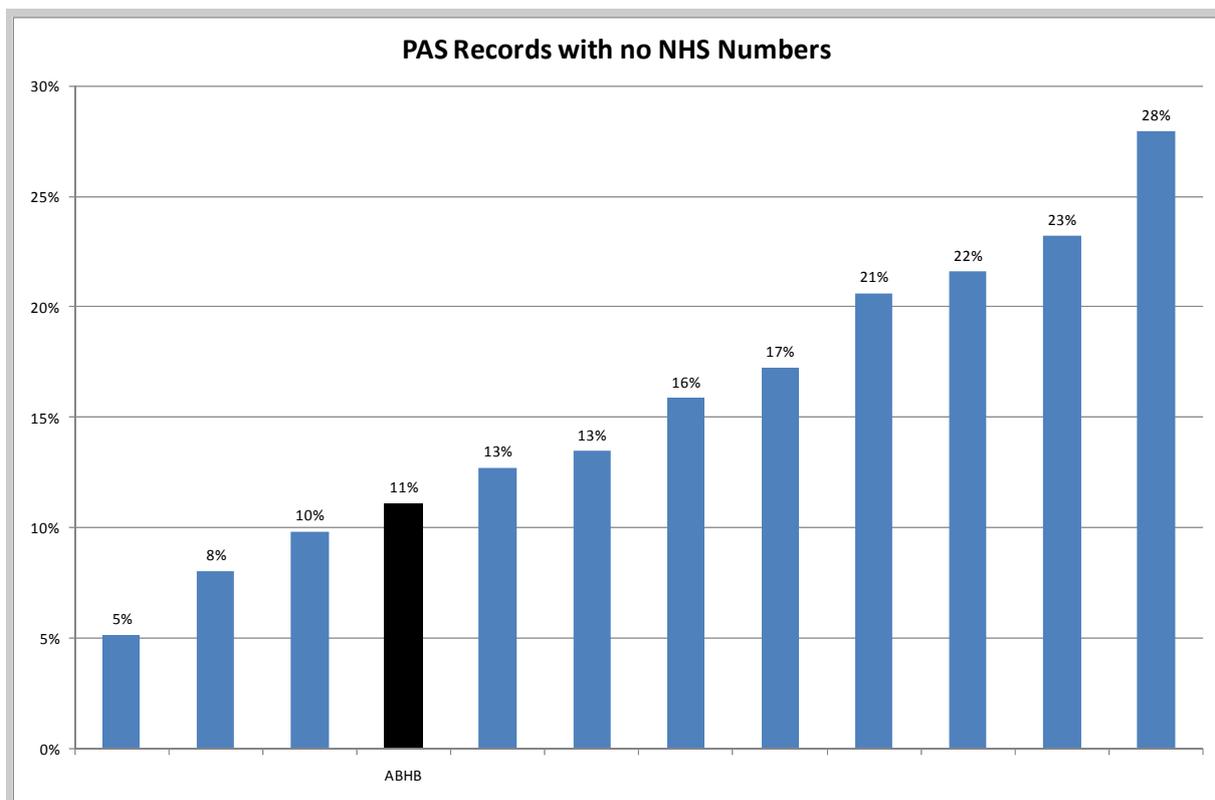


Chart 2 identifies the incidence of records with no NHS number. While it is still possible to identify patients by their personal details, or using existing hospital numbers, these methods are less precise than using NHS numbers. Furthermore, the lack of an NHS number can have a financial impact in that health boards cannot recover the treatment costs associated with patients from other LHBs in Wales or in the rest of the UK without quoting the NHS number. The Health Board's incidence of records with no NHS number recorded is towards the lower end of the spread in Wales. Chart 2a below shows the same data broken down by LHB.

Chart 2a – PAS: Patients with no recorded NHS numbers by LHB

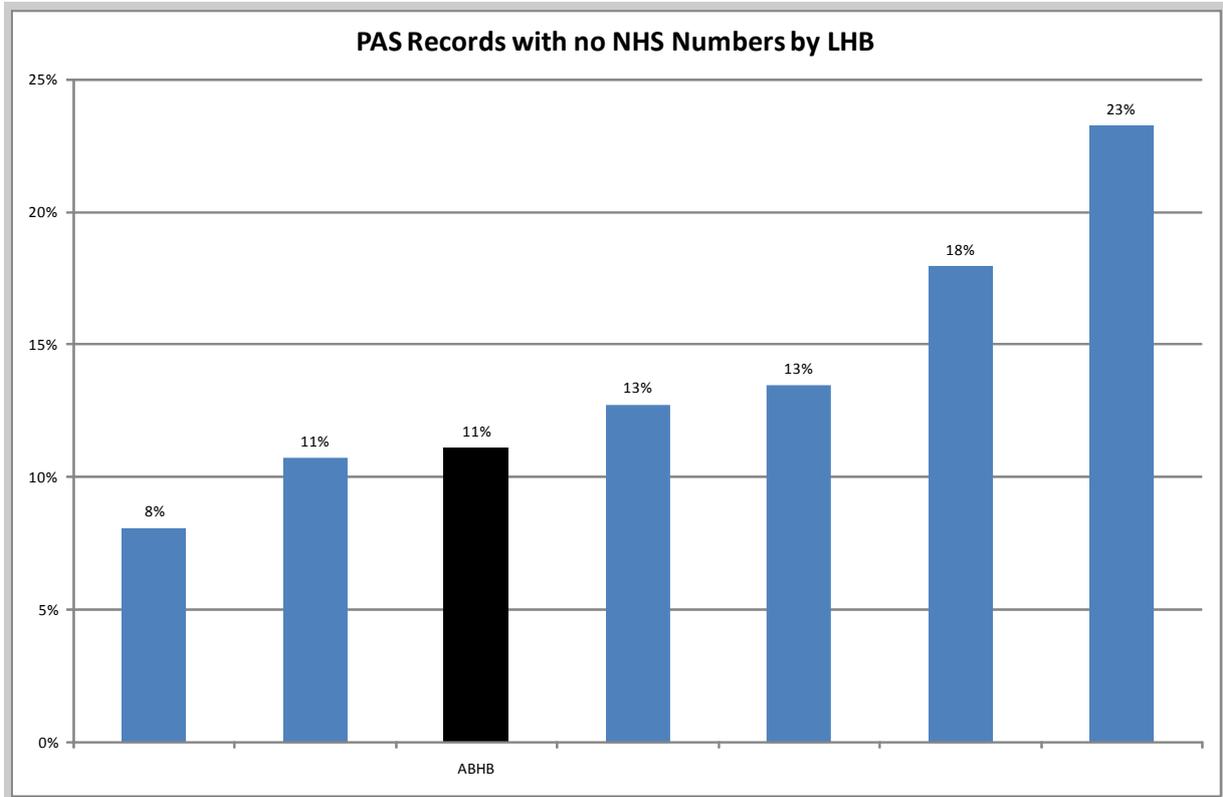


Chart 3 – Radiology: Patients with several different identifiers

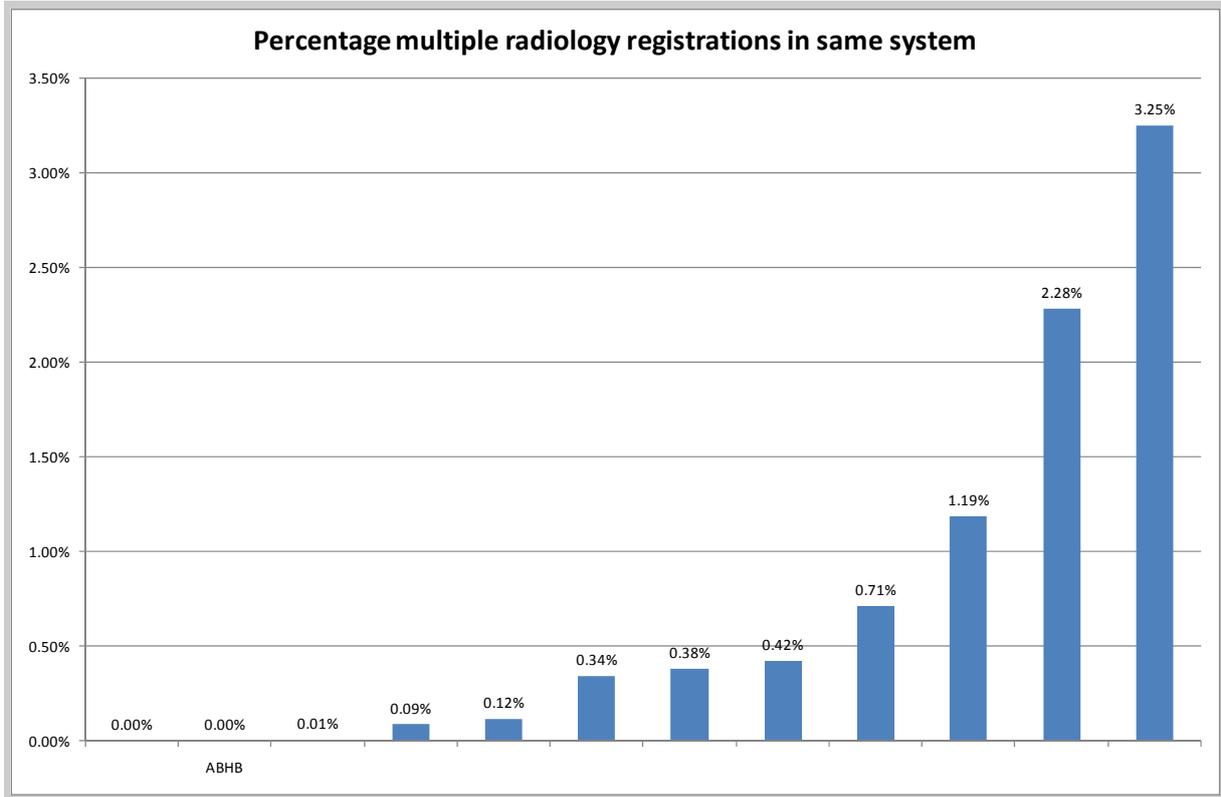
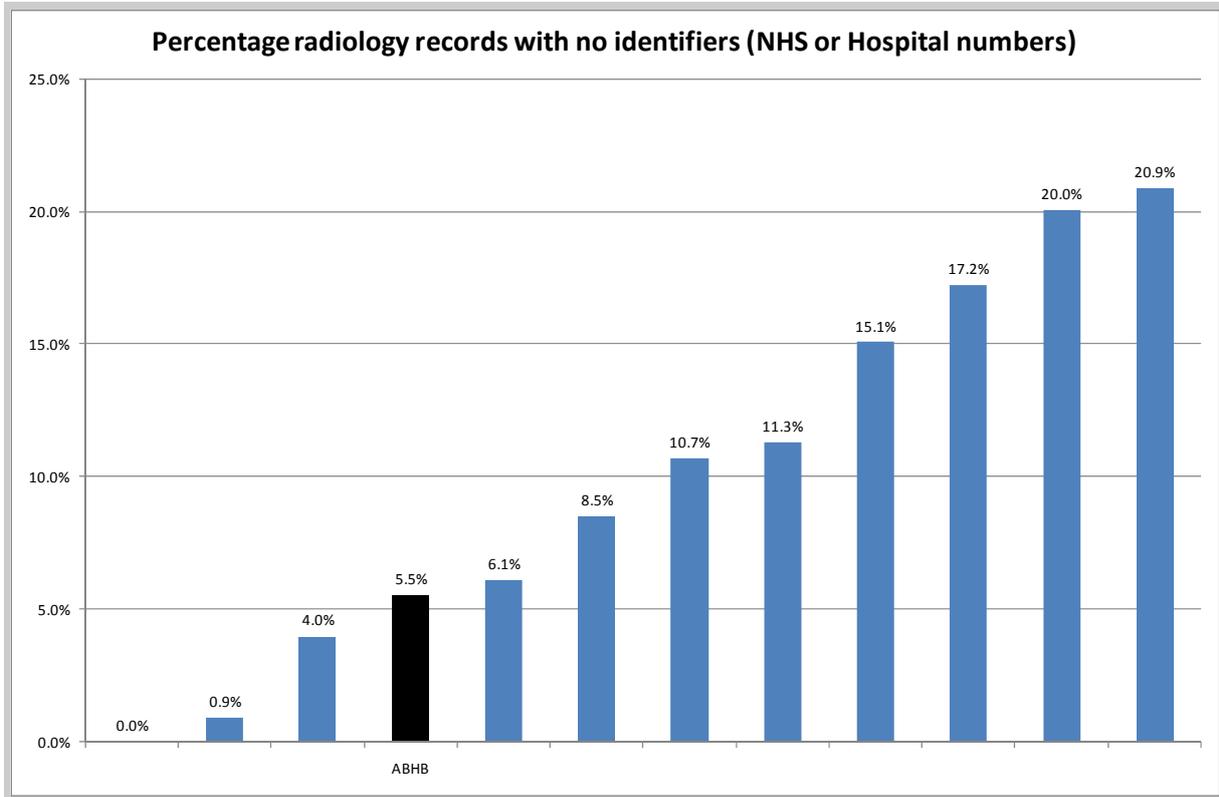


Chart 3 identifies the multiple registrations, but with different identifiers within each single radiology system within Wales. This identifies instances of individual patients with more than one electronic record at a single site. This may present a clinical risk and may result in an incomplete diagnostic record if results are recorded only on one of the patient's electronic records. Other health boards are anonymously included, and the chart reflects that the Health Board only has four such records.

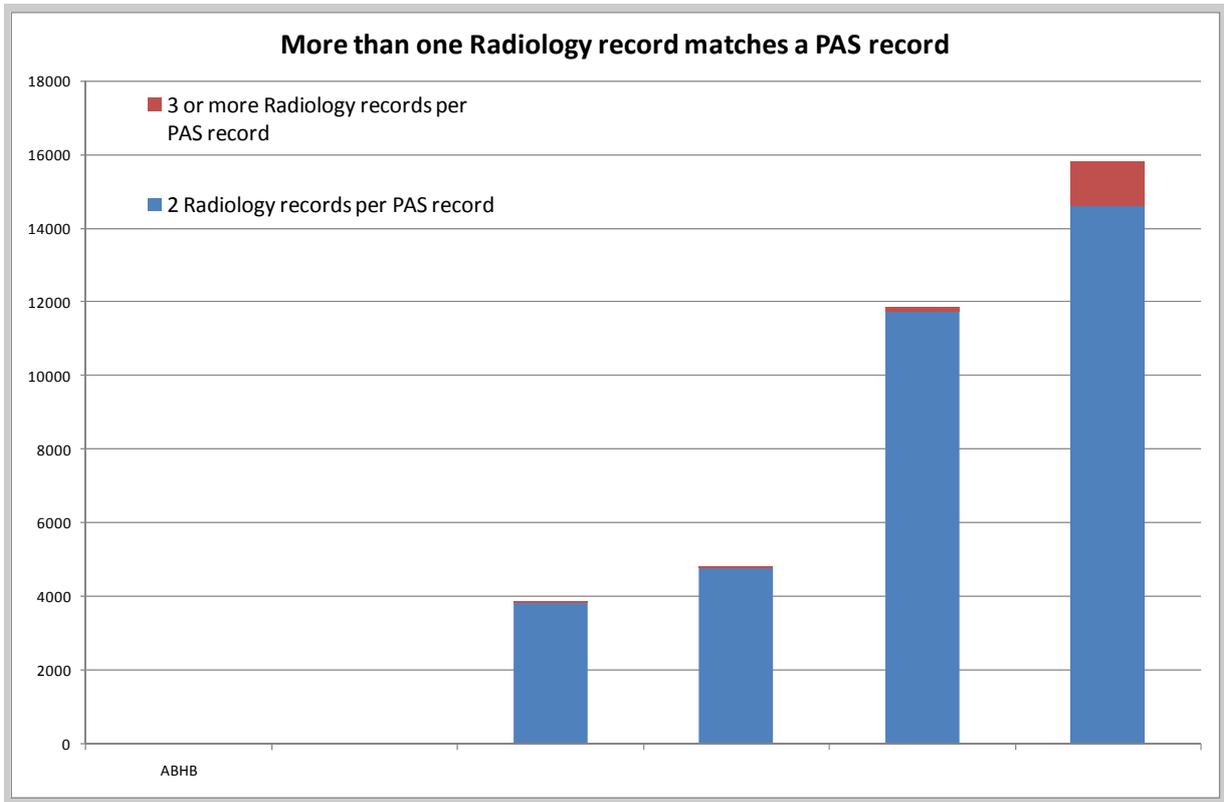
Chart 4 – Radiology: Patients with no recorded identifiers



This chart compares radiology records with no identifier (NHS number or hospital number) at all, within each radiology system in use in Wales. These records are difficult to match to a corresponding PAS record.

This means that a single patient may have one or more radiology records which staff cannot easily match to the rest of their medical records. This may present a clinical risk because a search for a patient's information via the PAS may result in only a partial representation of their full electronic record. In terms of efficiency, this may result in patients having more radiology investigations than necessary. Other Welsh LHBs are anonymously included.

Chart 5 – PAS and Radiology: Patients with two or more radiology records



This chart compares the number of cases where a patient with at least one record in the PAS has two or more associated records within the radiology system. In this case, we have considered all the PAS and all the radiology systems within each health board together. The Health Board had no records of this type.



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