Governance of radiology picture archiving and communication systems (PACS) following the United Kingdom deployment, 2006–2010
Foreword

Clinical Radiology has been rapidly developing discipline through recent years, frequently leading in the introduction of new technology into medicine and in the improvement of patient care. The Royal College of Radiologists (RCR) has supported this evolution by publishing clear and practical standards, underpinned by the power of Clinical Audit to assure safety and demonstrate effectiveness.

PACS technology became mature in the last decade and its installation throughout Britain’s National Health Service has been as much a political as a clinical investment. Radiology has done its job well and the UK PACS deployment project has run both to time and to budget. It has brought demonstrable benefits¹ to Britain’s hospitals, to NHS staff and to our patients.

RCR notes that in the main, sound Governance has been shown to be in place and any exceptions arising in this study have been brought to the notice of appropriate government agencies, presently Connecting for Health. Matters that might benefit from review within a local radiology department or an NHS Trust have been outlined in a suggested Action Plan on page 12.

Thanks are due to the many Departmental Audit Leads and PACS Managers who have contributed to the National Audit of PACS Governance 2010, finding time in busy schedules to collect necessary information and complete data returns to a high standard. The College thanks its Clinical Radiology Audit Committee (CRAC) members who participated in development of the audit under the chairmanship of Dr Sue Barter. We thank Dr Chris Ryall, who led the project within CRAC and RCR Audit Officer Karl Drinkwater, who worked closely together to collate the Audit’s standards, to design a data collection tool and to evaluate the response.

The 2010 PACS Governance Audit’s findings were presented to Radiology Audit Leads at the RCR Audit Workshop in May 2011, and subsequently to the United Kingdom Radiology Conference (UKRC) in June 2011.

Dr Tony Nicholson
Vice-President and Dean
Faculty of Clinical Radiology

1. Background

References to a pure electronic implementation of a picture archiving and communication system (PACS) can be traced back to 1979 with references to experimental “filmless hospitals” in the early 1990s. Following numerous technical developments, a UK Government Information for Health strategy proposed a fundamental transformation of National Health Service (NHS) radiology departments from a predominantly photographic silver film technology into a digital network based on PACS.

This programme was renamed the National Programme for Information Technology (NPfIT) in 2002 to include wider objectives such as electronic prescribing, an NHS Data Spine and the Integrated Patient Record. Some 19,000 locations were said to have been connected in 2007 and the wider NPfIT system was asserted to be “one of the largest virtual private networks (VPN) on the planet.”

Deployment of PACS technology was modular. Roll-out began in 2005 and five English “clusters” were reported as complete in December 2007. Scotland followed in early 2009 and the Welsh hospitals in 2010. Final completion of full Welsh networking and the Ulster deployment has been through 2010/11.

The programme was found to have completed on time and within budget in the National Audit Office report of May 2011. It has cost about £886m (2005 prices). PACS has therefore been one of the more successful elements of the recent NHS IT expansion.

PACS deployment was a busy and challenging time for British radiology departments. It seemed appropriate to review this deployment and to audit its Governance arrangements against standards developed by the Information Technology and Standards Sub-Committees of The Royal College of Radiologists (RCR).

Timing of the PACS Governance audit

The RCR Clinical Radiology Audit Committee (CRAC) had to balance benefits of commencing a Governance audit early in PACS deployment against the very different project timescales applied to the NHS regions. Timing was also influenced by publication of various formal RCR PACS-related standards late in 2008.

It had been hoped at outset to gather useful information on “time to report” under the new system. Seventeen trusts had kindly agreed to pilot the spreadsheets involved and some had problems extracting normalised data for this aspect. A separate (liver biopsy) project was offered while such issues were reviewed. A decision to offer a simple PACS governance audit was then made in CRAC and invitations to submit data sent out to radiology departments in spring 2010. Please note that some trusts were still installing their PACS at this juncture, and that in particular Northern Ireland’s deployment was still under negotiation.
2. Standards

A series of questions were drawn up to broadly test the governance of British PACS systems. Where possible, these were based on standards expressed in the RCR Information Technology (IT) Sub-Committee “guidance” series, and RCR Standards for patient confidentiality and PACS (both published 2008), or on the principles implicit within these. The reader should note that these standards emerged around 2 years into the overall deployment and that many departments had to start using their PACS without benefit of this advice.

In areas such as transfer of images by CD-ROM, problems were anticipated, and questions were designed to explore this. It was also suspected that many departments might not have adapted their film quality assurance (QA) methods to the new technology. The governing standard for this is essentially the broad “Duty of Quality” laid out in the 1999 Health Act, and it was not clear that current PACS systems properly facilitated traditional QA management.

Survey Items

Some survey questions were added to explore the general use of PACS, detection of its abuse, and local implementation and documentation of “A&E red dot” (or equivalent system for indicating fractures). There were two survey questions with regard to adequacy of workstation provision.
3. Methods

The audit was implemented on a locked down MS Excel spreadsheet allowing a limited range of answers to most questions. Where possible, questions were designed to obtain simple “yes” or “no” responses, with “don’t know” and “not applicable” options available. Where a department was confident of its governance arrangements the majority of questions could be answered in under an hour, with some consultation then anticipated for a few of the more technical issues. The RCR is grateful to the seventeen trusts that piloted the spreadsheet before its general distribution, but few amendments were needed in this area, but a parallel project to look at reporting time improvement encountered problems in data extraction from RIS systems and was not used.

Department identities were anonymised by the RCR Audit Office in the usual way and were not available during analysis. As this was a governance survey, the spreadsheets were distributed by email to the RCR list of department heads and clinical directors in February 2010. Copies were sent to their associated audit leads. Reminders were sent to non-responders in March and August. The effective deadline for inclusion in analysis was 29th September 2010.

Response

Eighty-five clinical radiology departments had responded by the deadline. An accurate response rate is difficult to calculate as there is currently no complete list of such departments across the UK held by the RCR. A recent RCR audit suggested there are around 210 managerially independent departments across the UK. The moderate response rate is comparable with previous RCR audit projects. In this instance, there may have been an effect from late PACS deployments in Northern Ireland and Wales. Taking this into account the response rate from organisations having real experience of PACS was arguably slightly higher.

The 85 participating departments were drawn from 70 English acute NHS trusts, five Scottish health boards, three Welsh health boards and two Northern Irish health and social care trusts. Forty out of the 70 (57%) English trusts represented had Foundation status and the proportion is similar (54%) among English acute trusts in general.

Analysis strategy

Questions were grouped according to the area of governance being examined. In most cases, it was possible to assign an expected “yes” or “no” answer. Actual responses were then compared to this paradigm.

The calculated compliance percentages listed in the tables take no account of blank, “don’t know” or “non applicable” responses. However, in some cases – for example the questions on illicit PACS accesses or the availability of any QA system – a “don’t know” response may have its own Governance implications and this is explored out in the specific discussion for each section.
4. Results

Group 1. Questions looking at the Governance of PACS access

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 Have you discussed and agreed clear local policy on access and use of PACS with your Caldicott Guardian and IT department?</td>
<td>Yes</td>
<td>4</td>
<td>81</td>
<td>7</td>
<td>74</td>
<td>91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Does your induction teaching for new users clearly state a duty of confidentiality?</td>
<td>Yes</td>
<td>2</td>
<td>83</td>
<td>5</td>
<td>78</td>
<td>94%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q5 Has your department published clear local guidance to the hospital community on the use of PACS for teaching, audit and research?</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>77</td>
<td>51</td>
<td>26</td>
<td>34%</td>
</tr>
</tbody>
</table>

Following implementation of the 1997 Caldicott report, PACS images are subject to the same general rules of confidentiality as any other medical record. Each NHS trust must appoint a “Caldicott Guardian” and radiology directorates have a duty to reassure that their Caldicott Guardian, and through them the trust’s Chief Executive and Board, that patient PACS information is secure. This applies whether a report is bundled with the image or not, although the former is generally the case. Documentation of the policy agreed through discussion with the Caldicott Guardian is then a straightforward issue of governance. The 91% compliance achieved may reflect poor documentation rather than inadequate discussion as these two aspects were not explored separately. Compliance is slightly worse if one regards “don’t know” as a negative.

The related issue of induction confidentiality training scored slightly higher, suggesting that some directorates may be implementing a policy independent of the formal Caldicott mechanism. Aspects of separately training radiological, and other hospital staff who might have PACS access were not explored.

The low score of 34% with respect to teaching, audit and research is of concern. Many PACS systems allow export of PACS images in JPEG or similar format. Although this might commonly be logged, control is believed to be uneven, and no PACS system operating under Microsoft Windows can protect against harvest of images via a simple operating system screen save. It is, therefore, important that clear and contractual guidance is given to all staff with respect to the confidentiality of PACS access. Under Caldicott rules, use of PACS images to facilitate a clinical audit process is privileged, but audit presentations may become an issue if images are later propagated outside the trust involved. Local educational use would normally be covered by general trust policy in a teaching environment, but nevertheless need to be formally documented. Use of images in research has the same Governance rules as any other research process and is subject to the usual ethical supervision. Images subsequently used in scientific meetings or journal publication must be fully anonymised, and furthermore “not recognisable though any anatomical feature”. The evidence is that a majority of departments may need to give further consideration to these issues.

Group 2. Questions looking at audit of PACS access

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3 Does your PACS offer an audit trail of access to PACS data?</td>
<td>Yes</td>
<td>5</td>
<td>80</td>
<td>7</td>
<td>73</td>
<td>91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4 Are users reminded of ongoing audit of their use every time they log on?</td>
<td>Yes</td>
<td>4</td>
<td>1</td>
<td>80</td>
<td>71</td>
<td>9</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Q13 Have you made any audit of access to your PACS?</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>82</td>
<td>55</td>
<td>27</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Q14 Has any inappropriate access of your PACS been detected (either sporadic case, or via audit)?</td>
<td>Survey</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>76</td>
<td>63</td>
<td>Yes =13</td>
<td>17%</td>
</tr>
</tbody>
</table>

A simple test of one’s PACS audit trail facility is for a member of staff to inquire who has viewed their own images. In one author’s case, this involved a wait of several months for provision of several gigabytes of raw, improperly parsed XML log file. It now appears that most if not all suppliers now routinely log PACS access, but it is disappointing that only one in three departments has explored these data.
It is a matter of concern that one in six of responding departments has already detected improper access following just two to three years of PACS use. This can only be an approximation, and begs a question why “don’t know” responders might not have simply said “no”. As this is usually a sporadic issue, many improper accesses probably remain undetected. There is a potential confidentiality problem and preventative action seems indicated. For example, it is a trivial matter for suppliers to remind users of confidentiality at login as recommended in the RCR standard. PACS managers should request their PACS access logs and store these in such a way that any misbehaviour can be formally investigated. This is not however a straightforward IT matter and there is considerable scope for imaginative research to identify patterns of improper PACS access from the supplier log data.

Group 3. Questions looking at the technical aspects of PACS image access control over networks

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q6 Can your PACS or radiology information system (RIS) be accessed outside your trust’s secure data network?</td>
<td>Survey</td>
<td>85</td>
<td>24</td>
<td>Yes = 61</td>
<td>72%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q7 Is such access made for external reporting?</td>
<td>Survey</td>
<td>9</td>
<td>76</td>
<td>42</td>
<td>Yes = 34</td>
<td>45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q8 Is such access for on-call teleradiology?</td>
<td>Survey</td>
<td>9</td>
<td>1</td>
<td>75</td>
<td>13</td>
<td>Yes = 62</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>Q9 Is such access for internet-based image sharing?</td>
<td>Survey</td>
<td>9</td>
<td>1</td>
<td>75</td>
<td>35</td>
<td>Yes = 40</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>Q11 If answers to any of questions 6 to 9 are “yes”, have you taken steps IN ALL CASES to ensure the same degree of confidentiality protection that would apply to information processed within the trust?</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>64</td>
<td>2</td>
<td>Yes = 62</td>
<td>97%</td>
</tr>
<tr>
<td>Q15 Can an IMAGE be restricted, eg, only visible within (or by) department?</td>
<td>Yes</td>
<td>8</td>
<td>77</td>
<td>40</td>
<td>37</td>
<td>48%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q16 Can a REPORT be restricted, eg, only readable within department?</td>
<td>Yes</td>
<td>1</td>
<td>3</td>
<td>81</td>
<td>37</td>
<td>44</td>
<td>54%</td>
<td></td>
</tr>
</tbody>
</table>

Use of teleradiology was widespread among respondents, essentially absent only where it was “not applicable”. Increasingly images and related radiological reports are transported across electronic networks which may range from hard-wired systems and “virtual private networks”, to simple internet protocol transfers with varying degrees of encryption. This is a developing technology and the survey’s 97% gross compliance is excellent. We should however note several “don’t knows” and that only 93% (62/(64+3)) of departments have answered a confident “yes”.

Restriction of images and associated reports requires suitable technical arrangements on both PACS/RIS installation and any wider trust IT system (a common use might be with respect to staff or local celebrities). Approximately half of NHS hospitals report an inadequate facility in this regard. It appears that some departments may not yet have explored this issue.

The “external reporting” rate was around half. The survey did not explore whether this was supply by private sector, or specialist departments.

Other methods

Twenty-eight of the 85 respondents had entered information into a cell for “other methods” in image viewing. Description varied but among these, eight appeared to be internet VPN schemes, mainly used for on call. Eleven reported dedicated line links or DICOM push/pull arrangements. Three appeared to have proprietary supplier solutions and two described a “locally written portal”. Only two reported access over the wider internet. One department had reported using the newly developed “Cloud” system.
Group 4. Questions looking at data sharing between PACS and other imaging systems

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q17 Does your department IMPORT exams by secure network or “FTP”?</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td>83</td>
<td>20</td>
<td>63</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>Q18 Does your department IMPORT exams by email?</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>83</td>
<td>4</td>
<td>79=no</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Q19 Does your department IMPORT exams by CD-rom?</td>
<td>Yes</td>
<td>1</td>
<td>84</td>
<td>2</td>
<td>82</td>
<td>98%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q20 Does your department EXPORT exams by secure network or “FTP”?</td>
<td>Yes</td>
<td>1</td>
<td>84</td>
<td>9</td>
<td>75</td>
<td>89%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q21 Does your department EXPORT exams by email?</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>83</td>
<td>3</td>
<td>80=no</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>Q22 Does your department EXPORT exams by CD-rom?</td>
<td>Yes</td>
<td>1</td>
<td>84</td>
<td>1</td>
<td>83</td>
<td>99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q23 Do your methods for CD transfers meet the following standard?</td>
<td>Yes</td>
<td>1</td>
<td>4</td>
<td>80</td>
<td>18</td>
<td>62</td>
<td>78%</td>
<td></td>
</tr>
</tbody>
</table>

There is now considerable traffic of electronic image portfolios between radiology departments, tertiary hospitals, the private sector and various legal agencies. Larger departments often have several staff dedicated full-time to such transfers. When the survey was planned most of this communication was via the depreciated medium of CD-ROM. Many of these integrated a PACS viewer so that confidentiality in case of loss was at best precarious. Password protection is one solution, but is a two-edged sword risking lock out from information that might be urgently needed in an emergency.

The answers in this group were generally confident with few blanks or don’t knows. Problems had been anticipated here, but progress toward secure network transfer appears to be good. Development of safe methods requires symmetrical technology, and therefore naturally tends to progress at the pace of the slower partner. It is therefore unsurprising that figures for import and export by various methods were broadly equal. A continuing high prevalence of CD-rom transfers is believed to be with respect to private medicine and legal work. It is of concern that a quarter of respondents (including “don’t knows”) felt unable not assert that they met the RCR’s data security standard for CD transfers.

Radiological email transfers are now rare, only around one in 20 departments still use this method (although clinician to clinician email transfers may be more prevalent).

Group 5. Questions looking at the management and governance of PACS quality

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q24 Do you have a documented system for correcting CR/DR/PACS errors (viz absent or otherwise unreportable images)?</td>
<td>Yes</td>
<td>3</td>
<td>82</td>
<td>12</td>
<td>70</td>
<td>85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q25 Do you have a documented system for PACS quality assurance (viz reportable, but substandard images)?</td>
<td>Yes</td>
<td>10</td>
<td>75</td>
<td>34</td>
<td>41</td>
<td>55%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q26 Do you have a documented and effective system “red dot” or equivalent on PACS A/E images?</td>
<td>Yes</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>78</td>
<td>9</td>
<td>69%</td>
<td>88%</td>
</tr>
<tr>
<td>Q27 Do you hold PACS issues discrepancy meetings?</td>
<td>Yes</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>81</td>
<td>48</td>
<td>33%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Despite professional care, occasional errors do occur in image acquisition such as right/left inversion, or even wrong patient. Such images are not safely reportable until the error has been corrected and it was understood that all PACS systems had methods to deal with this. It was therefore surprising that around one in six departments felt themselves non-compliant. This is though therefore to be another documentation failure. “Red dot” systems giving
radiographic advice of for example likely fracture have been well validated as beneficial, and were in widespread use in film radiography. These seem to have been successfully transferred to the new technology, with most negatives appearing in the “not applicable” column.

There is a second class of imperfect film which might be reportable, but displays a quality issue such as local under-penetration. The 1999 Health Act mandated a Duty of Quality and it is disappointing that only half the respondents reported suitable arrangements. The low prevalence of PACS discrepancy meetings may be another facet of this issue. This audit has not tested the actual quality of PACS images in UK radiology departments, but the limited implementation of formal quality assurance (QA) systems in our survey suggests that there is not a perceived problem in this respect. Nevertheless, it is unlikely that all departments meet the standards of quality assurance required by NHS trust boards and service purchasers.

Mechanisms to implement QA are best set within the PACS or RIS software system. There is evidence that this has not been provided, or at least not promoted in the same way as the error mechanism. One might argue that it is not be in manufacturers’ direct interest to highlight issues of poor quality, but in view of the governance imperative it is urged that suitable systems be implemented. These should provide an easy method for flagging poor quality images at report time, a route for communication of the issue involved into a radiographic discrepancy meeting, statistical output to monitor quality and facility to demonstrate improvement through audit. One author’s experience in two departments has been that QA meetings rapidly reduced the number of poor images and provided a mechanism for superintendents to identify, advise or retrain radiographers who had repeated quality problems.

**Group 6. Survey questions looking at some aspects of PACS support and development**

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q28 Did your PACS supplier provide pre-installation training?</td>
<td>Yes</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>83</td>
<td>2</td>
<td>81</td>
<td>98%</td>
</tr>
<tr>
<td>Q29 Did your PACS supplier provide post-installation training?</td>
<td>Yes</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>83</td>
<td>8</td>
<td>75</td>
<td>90%</td>
</tr>
<tr>
<td>Q30 Does your PACS/RIS offer integrated dictation?</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85</td>
<td>15</td>
<td>70</td>
<td>82%</td>
</tr>
<tr>
<td>Q31 Does it offer paperless info such as scanned forms or electronic referral?</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85</td>
<td>12</td>
<td>73</td>
<td>86%</td>
</tr>
<tr>
<td>Q32 Does your PACS/RIS provide speech recognition?</td>
<td>Yes</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>84</td>
<td>19</td>
<td>65</td>
<td>77%</td>
</tr>
</tbody>
</table>

There were few surprises in this group. Pre-installation training was believed to be specified in all PACS contracts and near complete compliance was anticipated. As some late PACS deployments were in progress at the time of the survey, a lower figure for retraining seems reasonable. Integrated dictation, paperless working and speech recognition are all developing technologies and there appears to be good progress in their implementation.

**Group 7. Questions looking at adequacy of PACS workstation provision within department**

<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answer</th>
<th>Not applicable</th>
<th>Blank</th>
<th>Don’t know</th>
<th>No of depts</th>
<th>Not achieved</th>
<th>Achieved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q33 Are there regularly times when radiologists cannot access a workstation?</td>
<td>No</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>83</td>
<td>9</td>
<td>74</td>
<td>89%</td>
</tr>
<tr>
<td>Q34 Do members of your department still regularly report viewing on standard PC screens?</td>
<td>No</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>84</td>
<td>7</td>
<td>77</td>
<td>92%</td>
</tr>
</tbody>
</table>

When PACS roll-out was planned there was no generally accepted standard for workstation provision and the numbers needed seem to have been generally estimated quite simply by interview and departmental observation. NB both these questions had anticipated a “no” answer, and so the 92% negative reply suggests that there is adequate provision. Overprovision may still be a cost burden to some departments, but was not tested in this survey.
5. Important overall conclusions

Due to the incomplete response, there is risk of selection bias in all sections. However, the following seem to offer a clear enough picture to merit consideration in most Radiology departments.

- There appears to be a gap in governance arrangements with regard to the use of PACS for teaching, audit and research. Only 34% of respondents had published guidance to their hospitals, and the “don’t know” departments are arguably in the same situation. While all these aspects should be addressed, NHS trusts seem most likely to be embarrassed by ungoverned external publication of images in research papers.

- A disturbing 17% (13) of respondents have already detected inappropriate access of their PACS. In the nature of things, the true incidence of this is almost certainly higher. Most PACS offer an access audit trail, but software does not comply with an RCR recommendation to remind users of this at each sign in. Very few departments (33%) have used this facility to audit accesses formally, be that in their trust or elsewhere.

- Confidentiality arrangements for PACS access outwith the central network appear to be sound, but there is some progress to be made in the more generic restriction of access of “sensitive” images and reports. (These might include staff or celebrities.)

- Progress towards secure transmission of images between PACS installations is felt to be good, but depreciated CD-rom transfer is still prevalent. Email transfer looks to be on the way to being eliminated, as recommended.

- The minor deficiency in arrangements for “unreportable” PACS image errors is thought to be a documentation matter (all practical PACS systems implement error folders).

- Quality assurance is felt likely to be a more genuine issue, with only half the respondents reporting arrangements as robust as those traditionally used in the film era.

- “A&E red dot” radiographic practices seem to have migrated much more successfully. There are felt to be important issues here for radiographic management.

- No general training issue has emerged.

- Most departments report adequate workstation provision.

- There is evidence of progress in the new developments of paperless working, integrated dictating and towards speech recognition.
6. Suggested Action Plan

1. Radiology management teams should review whether arrangements for PACS access have been formally discussed with their trust Caldicott Guardian, and that the policy evolved is properly documented. It should be published to all staff in the trust, with particular attention to any staff newly joining. We should require PACS suppliers to remind users of this nationally advised policy and possibility of audit at sign in. Any issue of possible inappropriate access should be brought to the attention of your Caldicott Guardian and suitable local audit of this explored.

2. Radiology management teams should review the facility to restrict sensitive reports or images within their own systems. They should discuss which PACS records should be so protected with clinical colleagues, patient representatives and their Caldicott Guardian. Any policy evolved should be documented. In practice, implementation of restrictions may involve adjustments to wider hospital information systems. Reports in particular tend to propagate into these systems independent of departmental safeguards and this then becomes a wider trust governance issue.

3. Effort should be made to eliminate all image transfer by email or CD-rom. Discussion should be opened with peer managers of PACS still using these depreciated vectors. While such methods are still in use, managers should consider flagging this onto their trust risk register.

4. Documentation for PACS error, PACS quality assurance, “red dot” and any related systems should be reviewed and updated if necessary.

5. Radiographic managers should discuss whether their own facility for quality assurance (QA) is as robust under PACS as it had been when film was used.

   Assurance of image quality involves judgements by radiological and radiographic staff as well as technical matters. Ideally, any system should allow free communication of image problems or judgement queries for later review and discussion in a regular QA meeting (one author’s experience is that there is benefit in flagging both good and poor images). Records should be kept of all QA issues in case specific action is predicated. Supervisors have a duty to check for any individual pattern in the record that might require counselling or retraining.

   The precise detail of any QA scheme will depend very much on local systems, but both PACS and RIS should be looked at as a means of communication and for convenient production of suitable statistics. As UK PACS has been implemented in clusters, there is likely to be benefit from discussion with neighbouring departments.

Note

Several of the issues in this plan may not be under departmental control due to the “cluster” system of deployment. All manufacturer issues have been brought to the attention of Connecting for Health and departments will have opportunity to assert such standards in the PACS re-procurement phase starting in 2012.
References

The following are available all on the RCR website www.rcr.ac.uk, published 2008 unless stated.

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