Clinical
Radiology
The Royal College of Radiologists

Sustainable future for diagnostic radiology: flexible home working

Faculty of Clinical Radiology

Contents

Key points

- Working at home using remote access may be one way of solving the problem of reporting backlogs and improving the radiology service.

- A radiologist reporting remote from the radiology department must ensure that the reporting environment is at least of the same standard, in terms of safety and suitability for reporting, as that within the department. Workstations should include a pair of portrait monitors of at least 3 megapixels each.

- Internet connections must be secure, preferably via a virtual private network (VPN) and data must be encrypted. Speed is not critical but download speeds of less than 10 megabytes per second (Mb/s) are probably not workable in practice. If local caching is not available, at least 40 Mb/s is recommended.

- The ideal situation is to use the departmental radiology information system (RIS) as a client on the remote workstation so that all relevant patient information is available. This should include fully integrated voice recognition software. It is less important which digital imaging and communications in medicine (DICOM) viewer is used but there should be desktop integration between the RIS and the image viewer.

- Radiologists working predominantly remotely must maintain skills and knowledge by taking part in peer review, learning from discrepancies meetings (LDMs), audit and other related activities, and must take part in annual appraisals and revalidation in the same way as full-time radiologists working within the department.

- Remote reporting should be contracted separately with a clearly defined service level agreement and a clear statement of the responsibilities of both the radiologist and the employing trust.

Background

As a result of technological advances within and outside radiology, the working pattern of radiologists has undergone enormous change in the last 10–15 years. Radiologists are no longer dependent on hardcopy films to issue reports: technology allows radiologists to work remotely from where the images are acquired. Working at home is not new for the NHS; for many years radiologists have been performing on-call reporting from home on laptops. While remote or home working is gaining acceptance, there is also recognition of the need for radiologists to be present within radiology departments to support radiographers, and also to support the referring clinical teams with regular face-to-face dialogue. Hospitals will continue to employ radiologists to work on-site for the foreseeable future.

Radiologists largely participate in three types of reporting activity as part of their agreed job-planned contract:

1. Emergency on-call reporting

Low-volume reporting for emergency on-call has been carried out at home for many years, generally using laptops. Until recently, doing full reporting sessions from home was limited by internet speeds and by the capital cost of workstations.

2. General reporting of plain X-rays

With increasing home internet speed and reducing costs of reporting workstation hardware, regular reporting at home is becoming more acceptable and this works particularly well for general practitioner (GP) and accident and emergency (A&E) plain X-rays, where regular dialogue with referrers is less often required.

3. Special interest reporting

Special interest reporting is tightly linked to regular clinical dialogue and multidisciplinary team meetings (MDTMs) with hospital specialists (breast, gastro-intestinal [GI], chest, gynae, ear, nose and throat [ENT], ophthalmology, urology, musculoskeletal [MSK], neuro/stroke, haemato-oncology and so on). Hence, it is important that radiologists involved in special interest reporting are available on-site for face-to-face dialogue. Furthermore, radiographers often need help and support in protocolling for special interest imaging acquisition for computed tomography (CT)/magnetic resonance imaging (MRI) and so on.

Potential use – cases for home reporting

Home reporting has been used for night-time emergencies for many years by NHS radiologists around the country. With increasing broadband speeds and availability of pre-caching on picture archiving and communications systems (PACS) workstation software, there has been an increase in the home reporting of back-logs for GP and A&E plain X-rays. While technology does allow all types of reporting (including special interest reporting) to be done from home, it is important that NHS trusts recognise the importance of on-site radiologists and building face-to-face relationships with clinical colleagues and radiographers. Hence, a cautious approach must be taken by trusts when deciding what type of reporting activity should be performed from home.

The following aspects of flexible home reporting will be considered:

1. What are its potential benefits?
2. How is it best designed and managed?
3. What are the contractual issues?
4. What are its potential disadvantages?

What are its potential benefits?

Potential benefits of flexible home working include:

- *Providing a less disruptive/stressful environment*
  Working in a busy radiology department can be disruptive if there are frequent interruptions. Even where there is a 'duty radiologist' who should field queries and requests, there tend to be multiple distractions. Depending on individual circumstances, reporting away from the department, such as from home, may provide a more peaceful environment in which to work.

- *Being more suitable for some radiologists*
  For some radiologists, such as young parents and recently retired radiologists, working within a radiology department may not be a desirable, or even possible, option (for example not enough office space). In these cases, working at home could not only provide satisfying employment but could also offer busy departments a welcome addition to their workforce.

- The potential to encourage full-time radiologists to undertake additional reporting

- The potential to attract radiologists living remotely who do not want to move

- The potential to provide increased productivity through reduced interruptions

- The potential to be more cost effective than using third party reporting companies

- The potential to ease pressure on limited office space within the department.

How is it best designed and managed?

Considerations for the design and management of flexible home working include:

- *Environment*
  Extending reporting services outside a radiology department necessarily means contracting for work to be carried out for the trust in an environment which the trust has not created and is not responsible for maintaining. However, the trust retains a legal duty to ensure its work is carried out to a suitable standard which, in this example, would mean specifying to the home reporting radiologist (HRR) what environmental standards are mandated. It is then the responsibility of the radiologist undertaking reporting at home to ensure that the environment in which he/she is working is suitable. This includes ambient temperature, humidity, lighting and noise, and safety factors.

- *Internet connection*
  This will be the method of communicating digital images and other data to the trust for the majority of radiologists reporting from home. Numerous types of broadband connection are available, with variations in download speeds, usage caps, support terms and costs. There are a range of options available from various suppliers of broadband services and the choice of service will be largely an individual decision, unless the trust is involved directly in its procurement. Faster broadband connections are more expensive and a balance must be struck between this cost and the viability of downloading large volumes of image data using a slow connection. For a HRR reporting more than about 50 computed radiography (CR) examinations or ten cross-sectional studies, it is probably impractical to use a bandwidth of less than 10 Mb/s, and at least 30 Mb/s is recommended. Pre-fetching and local caching can be extremely helpful where connection speed is limited. Download speed should ideally be close to 100 Mb/s, particularly if streaming is involved. (A download speed significantly less than this would require pre-fetching and caching onto the workstation.) Slower speeds are workable but require significant changes to working practices. The HRR may well be best served choosing an uncapped/unlimited download service given the significant quantities of imaging data that will be downloaded.

- *Workstation/display*
  Typically, laptops used for home reporting (on-call) have been less well specified (in terms of connectivity, disk space and performance) than normal PACS workstations. Where HRRs are now reporting a much higher number/size of exams regularly, the improved performance and ease with which multiple monitors can be connected may make investment in workstations more cost-effective. In terms of display hardware, the quality/performance requirements for a workstation at

home are exactly the same as for those within the radiology department – please refer to The Royal College of Radiologists' (RCR) publication *Picture archiving and communication systems (PACS) and guidelines on diagnostic display devices.*[1] However, the increase in reporting volume and perhaps also the number of cases with relevant prior imaging to be reviewed means that the provision of a second PACS display monitor may bring significant efficiency benefits. Ultimately, given the minimal cost of adding a low resolution third display (for the RIS), a- reporting setup similar to that within the department will likely be the solution of preference. In terms of display size/resolution, a larger screen has many advantages, although these must be weighed against the costs involved. For plain films, the larger the screen, the greater the opportunity to view the image at near native resolution with less image manipulation (pan, zoom) required. Similarly, for cross-sectional imaging, the provision of advanced processing tools (not least multiplanar reformats) within the PACS viewer means that a larger screen is preferable.

- *Image viewer*
  There are many ways in which radiological images from a hospital or trust PACS can be viewed by an HRR, and the specifics will largely be dictated by local preferences. The College document *Guidelines and standards for implementation of new PACS/RIS solutions in the UK* is a useful source of information and guidance.[2] There are some requirements without which the system is unlikely to perform satisfactorily. Factors to consider are:

  - Unless download speeds match those within the hospital department, there must be a facility for caching examinations on the home workstation

  - Ideally, the same solution(s) used within the department for work list management, report entry and alerting should be used at home, irrespective of whether this is achieved through the RIS, PACS or other third party software. If an alternative is used, care must be taken to ensure that the same quality and range of applications are available to the HRR as would be in the radiology department. While it is possible to report remotely using another RIS, this negates some of the advantages of using the department RIS (which include access to full patient history, efficient work list management, messaging and so on). In particular, report entry and subsequent propagation back to the departmental systems (and on to requesting clinicians) should be fully automated, thereby preventing incorrectly assigned or lost reports.

o In the event of unexpected urgent or significant findings, the HRR must still adhere to trust protocols including direct contact with emergency and admitting teams or 24-hour services (for example, oncology helplines).

o Any additional clinical systems available on-site (electronic patient record [EPR], order-comms and so on) should also be made available to the HRR.

o Desk-top integration between the RIS and image viewer is strongly recommended to minimise the risk of manual input of patient identification data.

● *Other software*
Most users will find it advantageous to have access to a suite of software for word-processing, spreadsheets, internet access and other frequently used applications (such as email and access to shared network folders).

● *Secure connection*
It is essential that the home reporting workstation is connected to the host PACS and RIS via a secure connection. In general, this will be via a VPN and the choice of system will largely be governed by local information technology (IT) policies. Whatever solution is chosen, it must be adequately supported; this must include out-of-hours work.

● *Maintenance and repairs*
Extending computer systems outside the physical environment of a hospital introduces an additional challenge in terms of maintaining the equipment and software, which must be budgeted for. It may not be practical for IT personnel to travel to an HRR's home to carry out maintenance (such as routine quality assurance [QA] on the monitors) and repairs, and not all software problems will be amenable to resolution via remote access. Consideration should therefore be given to transporting faulty equipment into the hospital/trust IT

department, either by the HRR or using a postal service, with its attendant risks of loss of, or damage to, the equipment.

● *Ownership of equipment*
Whoever owns the equipment and/or licenses will bear the responsibility for maintenance and this will form part of the contract negotiations between the trust and radiologist.

– VR software/hardware – Voice recognition (VR) has been developing over the last two or three decades and there are now systems available with a high degree of accuracy and reliability. In the UK, the best known systems within radiology are Philips Speech Magic and Dragon Naturally Speaking. Other VR systems are available but have not been tested widely in the medical environment. For most people reporting at home, VR is the only practical solution and where VR is used within the host department it should also be used in the home system (this should include sharing of the speech profile and stored script/shortcuts/report templates). It remains the responsibility of the HRR to ensure that the final authorised report is correct.

– Insurance – The trust must ensure that each HRR is covered by medical indemnity. There must be a clear understanding about the insurance cover for hardware.

– Hardware/software support from the local IT department or PACS/RIS supplier – The trust should ensure that the hardware and software deployed in the home reporting environment will be supported, either by the trust itself or through a third party. There should be a service level agreement (SLA) between the trust and the HRR regarding response times for technical support and there must also be a contractual understanding of how a loss of reporting service due to technical problems will affect the SLA in terms of reporting volumes and turnaround times.

What are the contractual issues?

There are a number of contractual issues to be considered when making arrangements for flexible home working. Some of these are set out below.

- *Fixed or flexible*
  Reporting from home raises a number of issues which are not generally relevant for radiologists working within the department. One of the benefits of working at home is the flexibility this can afford in terms of the volume of reporting carried out and the timing of that work. Contracts for HRRs will therefore tend to be based on reporting numbers rather than time. The trust may wish to specify turnaround times for reports and a minimum number of reports to be carried out within certain time limits (for example, minimum 300 CR reports per week). This will allow the trust to achieve a worthwhile financial investment and help in capacity management. Provision must also be made for periods of absence for holidays, sickness and so on. For radiologists working at home, in addition to a full-time or part-time contract within the department, having a separate contract for home reporting may be advisable. The 2003 contract does not provide for volume-based sessions and therefore an HRR may be offered a locum or zero-hour contract.[3] Maintenance of continuing professional development (CPD), learning from discrepancies meeting attendance and other supporting professional activities (SPA) activity may require specific contractual negotiation and/or some on-site programmed activities (PAs) within the contract.

- *Skills maintenance*
  It is essential that HRRs maintain their skills and knowledge in the same way as a radiologist working within the department.

- *CPD*
  Annual appraisal and General Medical Council (GMC) revalidation are as essential for HRRs as for radiologists working within the department. For HRRs working significantly less than full-time it may prove challenging, for example, to achieve the full quota of 250 RCR credits over a five-year period, and the trust should be prepared to support the HRR financially, particularly for attendance at relevant scientific meetings, carrying out audit and other relevant activities.

- *Peer review*
  The RCR has published relevant guidance in relation to peer review, including *Quality assurance in radiology reporting: peer feedback* and *Standards for Learning from Discrepancies meetings.*[4,5] These apply equally to HRRs and trusts should ensure that HRRs make use of all available methods for obtaining supportive feedback from colleagues.

- *Learning from discrepancies meetings (LDMs)*
  The HRR remains subject to the RCR's current guidelines regarding involvement in the discrepancy learning process which, for on-site radiologists, is traditionally via attendance at regular departmental LDMs.[5] There should be an agreement with the trust in relation to supporting this and other CPD work for HRRs. LDMs are held at least once every two months. HRRs should attempt to attend at least 50% of the meetings on-site but physical presence may not be necessary if there is video-teleconferencing available. Where this is not possible, individual review of the cases discussed, along with any formal minutes provided, may satisfy the RCR's CPD requirements.[6] Any discrepancies arising within LDMs from an HRR's reporting should be notified confidentially, to the HRR.[5] The RCR's *Radiology Events and Discrepancies* (READ) newsletter, which includes peer reviewed cases suitable for reflection and CPD, is also a useful learning resource.[7]

- *Security and responsibilities*
  It is clearly the responsibility of each HRR to ensure that equipment is secure from physical damage and that any data are secure from unwanted access. Trust configured authentication (password, smartcard or biometric) is essential; hard-drive encryption is preferable; no-one other than the HRR or relevant trust staff should be permitted to use the equipment and patient identifiable data should not be held for longer than is necessary to carry out the work for which the HRR is contracted. Image data should be deleted regularly, preferably on a daily basis. Image deletion may not be an issue if the trust PACS is used as the image viewer with image streaming over a 100 Mb/s connection. Cases stored for CPD/audit may be held for audit cycle completion as agreed with the clinical governance/audit lead at the trust.

- The reporting hardware should be insured against loss or damage and this will require clarification with the trust.

- HRRs should be aware that working from home may affect tax, home insurance and mortgage arrangements.

What are the potential disadvantages?

While there are many potential benefits of flexible home working, there are some disadvantages outlined below.

- Encouraging a shift of radiological manpower away from radiology departments.

- De-skilling of radiologists doing predominantly remote reporting.

- Capital outlay and higher running costs.

- Quality assurance issues – difficulty maintaining CPD, attendance at LDMs, peer review.

- Equipment maintenance – more difficult to access the equipment.

- Contractual issues – home reporting does not fit easily into the 2003 contract.[3]

- Loss of contact between HRR and colleagues within the department.

References

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5. The Royal College of Radiologists. *Standards for Learning from Discrepancies meetings.* London: The Royal College of Radiologists, 2014.

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The Royal College of Radiologists
63 Lincoln's Inn Fields, London WC2A 3JW
Tel: +44 (0)20 7405 1282
Email: enquiries@rcr.ac.uk   www.rcr.ac.uk

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