The Royal College of Radiologists
Board of the Faculty of Clinical Radiology

Electronic remote requesting
This guidance forms part of a series on the developments in information technology in radiology. This is a fast-moving field and developments are occurring rapidly. Consequently, this guidance will be updated regularly and readers should check regularly that they are using the most up-to-date guidance available.
1. Introduction

1.1 Electronic remote requesting systems enable clinicians to request radiology procedures and receive updates on their progress using a computer terminal, replacing the need for conventional paper-based systems.

1.2 Electronic remote requesting is synonymous with other terms, such as remote order entry and order communications (order comms). In the UK, the term ‘request’ is preferred to ‘order’ to signify that, under the Ionising Radiation (Medical Exposures) Regulations (IR(ME)R),¹ it is the radiology practitioner that justifies the procedure. Internationally, however, it is acknowledged that the term ‘order’ is also used to mean a request for a service, and it is acceptable to use this as a synonym providing the requirement for justification of procedures is made clear.

1.3 Remote electronic requesting systems are usually enterprise based, enabling communication of orders and results between multiple departments, including haematology, biochemistry, microbiology, histopathology and so on. Each department is served by a common user interface, with a dedicated pro forma to enter the information required for that specialty. These systems form a core component of the electronic patient record (EPR).

* The term ‘orders’ has unfortunately been adopted by industry to designate imaging ‘requests’. This follows from the application of these ‘order comms/communications’ remote electronic requesting systems to imaging, when they were originally designed for ‘ordering’ blood tests (mainly haematology and biochemistry). These were tests on blood samples that had already been withdrawn from the patient and merely needed to be run through a machine which produced an automatic print-out of the levels of various constituents in the blood sample, and as a result such ‘orders’ were rarely vetted and refused by a haematologist/biochemist (unless for reasons of the cost of performing a particular specialised test). Clearly, in imaging, the situation is different: these are truly ‘requests’ for investigations, which will often require the use of ionising irradiation (so IR(ME)R applies), are expensive, and time consuming for the operator, reporter and patient. Such requests frequently require approval and vetting, and can often be modified or even refused (unlike ‘orders’). However, since ‘orders’ has become the accepted term used by industry vendors, we have (reluctantly) used it in this document, but put it in italic font to designate its inappropriateness.
2. Integration of electronic requesting and result reporting with RIS and PACS

2.1 A prerequisite of any EPR-based remote requesting system is that a common unique patient identifier is used in both the requesting and the receiving system. Systems must be integrated to enable patient registrations, updates and merges to be exchanged. These processes are catered for by standard health level 7 (HL7) transactions incorporated within the Integrating the Healthcare Enterprise (IHE) scheduled workflow and patient information reconciliation profiles.

2.2 In IHE, an electronic remote requesting system is called an 'order placer', and the receiving system where the request is justified and booked is called an 'order filler and department system scheduler'. In radiology, the receiving system is typically a RIS, but it could be part of a larger enterprise-wide appointment scheduling system.

2.3 IHE has defined the following groups of HL7 transactions to support order communications within the scheduled workflow profile.

- **Placer order management** transactions enable a clinician to place a new order or cancel an existing order. To change an order, the order placer system must send a message to cancel the initial order, and then place a new one.

- **Filler order management** transactions are used by the radiology department system (order filler) to inform the electronic requesting system (order placer) about any new orders that have been entered independently on the radiology department system. This may be because a paper request card has been received and the details entered directly on the RIS, or the radiology department decides to book an alternative investigation to the procedure requested. Filler order management transactions also enable the radiology department system to let the requesting system know the progress of the request, by sending a message when the status of the order has changed (for example, from requested to booked, in progress, discontinued, completed, and so on). It also informs the orderplacer if the order has been rejected or cancelled by the department. Again, if the department needs to change an order, it has to do so as a combination of order cancel followed by new order. It is desirable to have this vetting procedure carried out electronically, with the reason for any cancellations/examinations changes recorded, and an audit trail of who made the changes.

- **Appointment notification** transactions enable the radiology department system scheduler to inform the requesting system of the dates and times of any appointments relating to the requested procedures. These can
reduce the number of appointment related enquiries made to the radiology department.

2.4 **IHE order communications transactions** can be specified as follows. ‘The electronic remote requesting system and radiology scheduling system shall support the IHE scheduled workflow profile fulfilling the roles of the order placer and order filler actors, and including the appointment notification option.’ The advantage of specifying integration in IHE terms is that the detail underlying this specification is contained within the IHE radiology technical framework, and therefore does not need to be stated explicitly.

3. Planning and implementing electronic remote requesting systems

3.1 The change from a paper-based system to remote electronic requesting enables the redesign of radiology services. Trusts implementing these systems should take the opportunity to process map their existing workflow, and consider how use of the technology can improve patient and staff experiences of the service. Options to consider include:

- Adopting a centralised booking service to coordinate appointments and provide patients with a choice of appointment times
- Ensuring clinicians have access to information and decision support tools to help them request most appropriate investigations
- Providing radiology staff with electronic worklists to facilitate justification, scheduling and reporting of examinations, independent of the paper request card.

3.2 **Designing electronic request forms**

3.2.1 The first step in designing an electronic request pro forma is to ensure all the essential information is captured, by modelling it on the existing paper request forms. There is then the opportunity to enhance the pro forma by collecting any additional relevant information, making some fields compulsory, and by providing clinicians with decision support tools. Existing order comms systems are quite variable in how much support they provide, but desirable features include:

- Access to the patient’s electronic record and radiology examination history to avoid requesting duplicate or unnecessary examinations
- Pre-population of request fields based on information stored in the electronic record (such as patient demographics, location, principle diagnoses and allergies)
• Targeted information based on the user selection (for example, guidelines from The Royal College of Radiologists\textsuperscript{2} specific to the requested procedure, links to the relevant patient information leaflets)
• Drop-down menus of clinical specialty-oriented requesting details, depending upon user log in
• Electronic diagram facility for certain requests, such as mammography and breast ultrasound, arterial Doppler
• Alerts based on custom rules designed into the system (for example, if a duplicate examination request is made within a predefined interval, if a CT scan is requested within a week of a barium enema, and so on).

3.2.2 It is essential to include the clinicians in the design process. There may be a temptation to request far more information than was every on the paper requests, but this has to be balanced against the usability of the system from the clinical perspective.

3.2.3 The data entered on the order comms pro forma need to be mapped to the fields available in the RIS, and vice versa. It is unlikely the RIS will have a matching field for every request field, and it may be necessary to design the system to map several request fields into a single free text field in the RIS. The ability of the RIS to record and display this information is critical to whether the department can achieve paperless workflow.

3.2.4 When mapping fields, it is important that any fields that contain coded information have the same look-up table on both the requesting and the receiving system. This will usually necessitate modifying the codes on at least one of the systems. National standard codes have now defined to support this within the Connecting for Health programme.

4. Remote electronic requesting and IR(ME)R
4.1 IR(ME)R requires that employers have written procedures to enable identification of the referrer, operator and practitioner for any procedure using ionising radiation.\textsuperscript{1} Procedures for electronic remote requesting system are similar to paper-based systems, but rely on a user’s logon credentials to identify the referrer, instead of a handwritten signature. The trust’s procedures should ensure it a disciplinary offence to request a procedure using someone else’s logon, just as it is to request a procedure on a pre-signed request card.
4.2 Electronic remote requesting systems can assist an employer in complying with the legislation by:

- Restricting referrals to users with appropriate access privileges
- Providing the referrer with recommendations concerning referral criteria for medical exposures, including radiation doses
- Ensuring the referrer provides the radiology department with required information to enable the practitioner to justify the procedure
- Maintaining a log of all requested procedures for audit purposes.

5. Remote electronic requesting and electronic feedback of results

5.1 It is desirable that the same remote electronic requesting system accommodates the facility for the referring clinical team to be able to read the imaging examination reports, on their patients’ current (and previous) imaging examinations. Functionality of this feedback should allow:

- Flagging of urgent/unexpected results by the radiologist, at the time of reporting. Flagging should be possible from within their speech recognition system or the PACS
- Electronic feedback of imaging results not only to the requesting doctor, but to his/her clinical firm (team)
- Easy access by the requesting clinician and his/her firm to all their imaging study requests, with their progress status, in reverse chronological order
- Visible acknowledgement on the system that a report has been read, and by whom, when, with a permanent audit trail
- Active acknowledgement by a member of the clinical firm (for example, by clicking a check box) that the report has been understood, (that is, that responsibility for acting upon the report of the imaging has been transferred to the clinician), with a visible record of the identity of that person, when this occurred, with a permanent audit trail.

Summary

The introduction of electronic requesting is a major step towards a healthcare institution becoming paperless, as well as filmless, especially if the electronic requesting system includes a means of electronic feedback of results to the relevant requesting clinician and his/her clinical firm.

Unfortunately, the initial misguided concept by vendors that these ‘order comms systems’ designed for ordering blood tests, could simply be transferred for use with imaging procedures, has meant that none of these systems yet has the sophistication desirable for their use in the imaging arena. It is vital for
radiologists to involve themselves in changing the software in these systems, to make it better suited to the requirements of imaging workflow. This applies particularly to the areas of procedure vetting and electronic feedback of results. Radiologists need actively to involve themselves in the vendors’ user groups in order to get their voices heard. Electronic requesting systems are still in relatively embryonic form, as PACS technology was about a decade ago, but – as was the case in the early days of PACS software – it is to be hoped that the free intellectual property given by radiologists to these electronic requesting system companies, telling them how to improve their systems to suit clinical imaging workflow (and thereby improving their sales) will ultimately mean that radiologists will have access to better, safer and less rudimentary systems than are available today.

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References

