It appears, in theory, that we are making substantial savings by adopting this practice. The reality is that there are no cost savings but significant benefits to patients as we are able to treat more patients within the same budget constraints. We are also able to demonstrate to our funding partners effective, appropriate and cost-effective use of scarce resources.

D.G.I.S. is in receipt of grants and research funding from Wyeth, Schering Plough, Abbott and Roche.

M. SOMERVILLE, A. BROOKSBY, D. G. I. SCOTT

Rheumatology Unit, Norfolk and Norwich University Hospital, Colney Lane, Norwich, Norfolk NR4 7UY, UK
Accepted 28 October 2005

Correspondence to: M. Somerville.
E-mail: margaret.somerville@nnuh.nhs.uk

Rheumatology 2006;45:354–355
doi:10.1093/rheumatology/kei235
Advance Access publication 13 December 2005

The impact of Picture Archiving and Communication Systems (PACS) implementation in rheumatology

Sir, Radiology plays an important role in the decision-making processes of rheumatologists. Therefore, the implementation of Picture Archiving and Communication Systems (PACS) as part of the National Programme for Information Technology (NPfIT) is an agenda that affects us all. PACS is a filmless digital storage system of X-ray images that allows images to be viewed on a workstation or PC. At our Trust, hard copies are no longer routinely available. Some hospitals already have PACS, with the intention that PACS will be fully available nationally by March 2007 [1]. Although concerns exist about the timetable for implementation [2], eventual widespread use of PACS with integration into an electronic patient record is inevitable.

The benefits of a fully digital X-ray storing and reporting system are fairly obvious: images should be quick and easy to retrieve; comparison with old films should be easily facilitated; digital manipulation may aid interpretation (for example, by zooming in), images can be easily shown to colleagues at other hospitals or sites; films should not be lost; images can easily be accessed for use as teaching aids; and there are theoretical beneficial long-term cost implications.

We performed a survey across four different NHS Trusts where PACS had already been implemented to assess users’ views of using PACS in rheumatology. The aims of this project were to gather structured feedback to present to the local radiology department; to collect information that may be of interest to other rheumatologists not yet using PACS; and to establish local standards for use in a future cross-speciality audit planned within our Trust.

We designed a questionnaire that included a five-point Likert scale to assess users’ views on a number of areas, particularly concerning quality of images, usability, reliability of retrieval and overall perceptions. A record of the software used at the different NHS Trusts was also recorded. For reference purposes, the questionnaire is included as supplementary data at Rheumatology Online.

The questionnaires were distributed to each rheumatology department involved and participants were asked to complete the questionnaire once, based on their overall experience of using PACS. Twenty questionnaires were returned. Each Trust used a different software system. Ten (50%) of the respondents had not been trained on PACS; of these, six (60%) had not been offered training. Mixed views were obtained relating to quality and usability, which are summarized in Table 1. Specifically, there was no clear consensus about digitized films compared with hard films for viewing erosions or periarticular osteopenia. Eighty-five per cent (17) of the respondents were sometimes unable to retrieve images. Forty per cent (8) had difficulty in retrieving images in more than 50% of estimated total time that PACS was used. Seventy-five per cent (15) of the respondents felt PACS delays resulted directly in clinic delays and, worryingly, 70% (14) reported having to bring patients back for unnecessary clinic appointments to review films that they had been initially unable to trace on PACS. The top two advantages of PACS were listed as quality of images and the ability to digitally manipulate images. The top two disadvantages were the poor reliability and the speed of retrieval of images.

This small study has a number of limitations and direct comparisons between sites are inappropriate due to the fact that different software was used, and respondents had varying levels of training and experience. However, a number of important points are raised. The technology clearly has enormous potential, and undisputable theoretical advantages over a hard film system. A number of studies of users’ perceptions report high levels of satisfaction with this technology [3, 4], although concerns have also been expressed regarding confidentiality [5]. The main problems that our study identified concerned the retrieval of images and usability, which have implications for risk management and clinical governance. The usability of a system is affected by a number of factors, including training and the type of software used. We consider that some of the problems identified may have been alleviated by improved communication between radiology, information technology, hospital management and non-radiology clinicians, particularly at the time of implementation.

Although it is unlikely that clinicians will have influence over the choice of software, especially in the context of the NPfIT,

### Table 1. Summary of results: quality of images and usability

<table>
<thead>
<tr>
<th>Statement</th>
<th>Median (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find overall the images on PACS to be better quality than hard images</td>
<td>3 (1–5)</td>
</tr>
<tr>
<td>I find plain film images on PACS to be better quality than hard copy images</td>
<td>3 (1–5)</td>
</tr>
<tr>
<td>PACS images are as good as plain films for identifying erosions</td>
<td>4 (1–5)</td>
</tr>
<tr>
<td>PACS images are as good as plain films for identifying periarticular osteopena</td>
<td>4 (1–5)</td>
</tr>
<tr>
<td>I find the ability to digitally manipulate images useful</td>
<td>4 (2–5)</td>
</tr>
<tr>
<td>I find PACS easy to use</td>
<td>2 (1–5)</td>
</tr>
<tr>
<td>I find the time taken to retrieve PACS images satisfactory</td>
<td>2 (1–5)</td>
</tr>
<tr>
<td>I find the ability to display images to other colleagues satisfactory for my clinical work</td>
<td>3 (1–5)</td>
</tr>
<tr>
<td>I find the reliability of PACS satisfactory</td>
<td>2 (1–5)</td>
</tr>
<tr>
<td>I find it more convenient to retrieve images from PACS than to rely on locating an X-ray packet</td>
<td>3 (1–5)</td>
</tr>
<tr>
<td>I would recommend PACS to another hospital</td>
<td>3 (1–5)</td>
</tr>
</tbody>
</table>

© The Author 2005. Published by Oxford University Press on behalf of the British Society for Rheumatology. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournals.org
clinicians should liaise, where possible, with radiology and IT departments locally concerning issues of training and implementation, to ensure PACS works as well for clinicians as it does for radiologists [6]. Pilling describes his experience of PACS installation, and suggests that exciting the interest of clinicians in the early phases is challenging, but also describes the importance of working with non-radiologists who have different needs from the system [7]. If PACS implementation is looming at your hospital, we recommend early consideration of the needs of your department in relation to the training of staff, the number and quality of PC screens or workstations available, arrangements for the reporting of films, and contingency arrangements for a transition phase during implementation.

We would like to thank the doctors who completed the questionnaire and specifically acknowledge the help of Professor D. G. I. Scott, Dr W. Hassan, Dr A. Kinder, Dr J. Dixey, and the Clinical Audit Department at Worcestershire Acute Hospitals NHS Trust.

The authors have declared no conflicts of interest.

Z. Paskins, A. Rai
Highfield Unit, Worcestershire Centre for Rheumatic Diseases, Worcestershire Royal Hospital, Worcester, UK
Accepted 28 October 2005
Correspondence to: Z. Paskins, Department of Rheumatology, University Hospital of Coventry and Warwickshire NHS Trust, Clifford Bridge Road, Coventry CV2 2DX, UK. E-mail: zpaskins@doctors.org.uk

Supplementary data
Supplementary data are available at Rheumatology Online.


Rheumatology 2006;45:355–356
doi:10.1093/rheumatology/kei246
Advance Access publication 1 February 2006

Prevalence and long-term significance of paraproteinaemia in rheumatoid arthritis

Sir, Uncontrolled studies [1, 2] suggest monoclonal gammopathy (MG) is more common in rheumatoid arthritis (RA), while oligoclonal gammopathy (OG) is rarely reported. We describe cross-sectional and longitudinal studies assessing the prevalence, clinical features and prognostic significance of MG/OG in RA. We obtained approval from Joint Ethical Committees of the Grampian and Highland Health Boards, and informed written consent from subjects, according to the Declaration of Helsinki.

In 1993–1995, we obtained serum samples from 101 consecutive RA out-patients (26 male, 75 female) and 87 controls (32 male, 55 female) with non-inflammatory rheumatism, requiring orthopaedic surgery. RA patients were mostly seropositive (n = 79) and erosive (n = 81), 64 patients were currently using DMARDs and of these, 8 were on cytotoxic type of DMARDs (and by implication 56 were taking non-cytotoxic DMARDs). The same applies to the prior exposure group, with 16 having been exposed to DMARDs previously, of whom 8 had used cytotoxic DMARDs; physician-rated disease activity was assessed as mild (n = 57), moderate (n = 37) or severe (n = 6), 31 had at least one arthropathy, and one male patient had previously been diagnosed with MG of uncertain significance (MGUS). Controls were slightly older than RA patients (mean ± s.d., 63.7 ± 14.4 vs 60.1 ± 11.7 yr, P > 0.05). Using agarose gel electrophoresis (AGE) [3] and isoelectric focusing (IEF) for immunoglobulin (Ig) G [4], the consensus prevalence of MG/OG was higher in RA patients than controls (17 vs 7%; difference 10%, 95% confidence limits 0.9%, 19%; uncorrected χ² = 4.3, P = 0.038), and usually oligoclonal. MG was detected in 2% (0.2%, 7%) of RA patients using AGE and 3% (0.6%, 8%) using additional IEF; no controls [0% (0%, 4%)] had MG, using either technique. Paraproteinaemic patients tended to have more severe RA (P < 0.05) and showed a non-significant excess of erosive disease. We separately studied records of six RA patients and six haematology out-patients (matched for age at diagnosis and disease duration) with MGUS (normal bone marrow, low serum paraprotein concentration; absent immunoparesis, Bence Jones proteinuria or osteolytic lesions). Mean ± s.d. baseline serum paraprotein concentrations were higher among controls than those with RA (15.0 ± 6.63 vs 5.67 ± 1.21 g/l, P = 0.018). Of the six RA-MGUS patients, five had an IgG κ band, and one an IgA κ, and RA had preceded paraprotein detection by a median (range) of 11.5 (1–27) yr; all had erosive disease, but two males were consistently seronegative. Pooled analysis of all RA patients (n = 106, as one RA patient appeared in both study groups) confirmed an association between paraproteinaemia and disease severity, and a trend toward an increased prevalence of erosive disease (Table 1). Cytotoxic exposure was uncommon among RA patients with MG (2/8) or OG (1/14).

Subjects with screen-detected MG/OG and the 12 established MGUS patients were followed up after a median (range) of 114 (11–139) months and 116 (66–148) months, respectively. No MG/OG subject showed clinical evidence of a plasma cell dyscrasia, but deaths occurred in 4/17 RA patients (two cardiorespiratory, two with disease complications), and 2/6 controls (one cardiorespiratory, one unknown). In the six RA-MGUS patients, paraprotein concentrations gradually increased in three, fell in two (becoming consistently undetectable in one) and remained faint (< 5 g/l) in one. One male RA patient (IgA κ) developed immunoparesis, but none suffered malignant transformation and overall the mean ± s.d. serum paraprotein concentration at follow-up (6.3 ± 3.9 g/l) was similar to baseline. In MGUS controls, mean serum paraprotein concentrations increased during follow-up to 22.3 ± 12.1 g/l, with three subjects developing overt myeloma and one Waldenström’s macroglobulinaemia.

MG has been reported in 0.9% of patients with inflammatory joint disease [1] and 1.7% of patients with classical RA and high titre rheumatoid factor [2]. Interpretation of historical uncontrolled studies is difficult (the prevalence of MG increases more than 10-fold with advancing age [5]), but contemporary comparisons [1, 5] suggest a modest increase in risk. We found a higher absolute risk in our RA patients (partly due to the improved