



20 November 2007

Carol Reid
A/G Director
Diagnostic Imaging Section
Department of Health and Ageing
MDP 107, GPO Box 9848
CANBERRA ACT 2601

Dr Peter McCombe
Level 9
Watkins Medical Centre
225 Wickham Terrace
Brisbane 4000
Australia

T 07 38317034
F 07 38326021
E pmccombe@bigspine.net

Re: Provision of Radiology Services for Spine Surgeons

The Spine Society of Australia is a cross specialty organization that represents both Orthopaedic and Neurosurgically trained spinal Surgeons. We have had a number of complaints from our surgical members about the practice of having radiological images provided on CD rather than by the provision of hardcopy films.

Spine surgeons, as a group, are one of the most frequent users of CT and MRI images. In the course of our practice we need to view high quality images for the purposes of diagnosis and surgical planning. This process is a complex visuospatial exercise that requires access to a large number of images, usually from different sources (ie plain radiographs, CT scans and MRI scans). It is important that:

1. The individual images are of sufficient quality.
2. There are unambiguous easy to access and interpret scout views that link individual images to an orthogonal plane that allows the level to be identified.
3. There is enough viewing area (typically at least a triple light box) to allow a simultaneous comparison of multiple studies.
4. Light boxes of sufficient size need to be available, not only in consulting rooms, though in hospital wards and operating theatres.

Before any consideration of digital radiology standards are considered, the Spine Society would like to express the opinion that current hard copy film standards vary considerably from very poor to good. Of major concern to us is the frequency of inadequate or absent scout views. The absence of a scout view, or the presence of an inadequate scout view, means that pathology seen on an axial cut cannot be ascribed to a particular anatomical level. The consequence of this may mean that a diagnosis that requires the correlation of symptoms to an anatomical site may be incorrectly made. The more serious problem however is that it may result on *wrong level surgery* being performed. Wrong level surgery is

the leading cause of iatrogenic adverse outcome that occurs with spinal surgery. Common examples of poor scout view include:

1. Absence of scout views – the most common example being sagittal images of the lumbar spine – so that there is no way to determine left from right.
2. Scout views being too small to read.
3. Scout views having no identifying numbers.
4. Scout views being placed on different sheets to the axial images – so that a surgeon is not clear which scout view applies.
5. Scout views with no identifiable land marks. Particular examples occur with CT scans of the cervical spine where the scout view is a reformatted sagittal image that fails to show the craniocervical junction.

In a survey of our members conducted in 2006, the following results were obtained.

Scout Views	
The following questions relate to scout views on CT and MRI scans	
In your practice how often do you have trouble interpreting levels from scout views	
0 - 19 % of the time:	- 19 (41.30%)
20 - 39 % of the time:	- 14 (30.43%)
40 - 59 % of the time:	- 8 (17.39%)
60 - 79 % of the time:	- 4 (8.70%)
80 - 100 % of the time:	- 0 (0.00%)
In your practice have you had occasions in the last 6 months when there was no scout view available	
yes:	- 40 (86.96%)
no:	- 5 (10.87%)

The Society is aware that there is currently no medicare requirement to provide any form of image, rather that the requirement is to provide a report. We strongly hold the view that there needs to be a requirement that a radiological service provide, as well a report, a set of images that satisfy the reasonable needs of the referring doctor. The Spine Society would be happy to collaborate with any other body in order to formulate guidelines for images for spinal radiology services.

With regard to digital radiography in the private sector we strongly hold the view that the current provision of CD only images is unsatisfactory and should not occur. The reason for this is that with current technology CD based images still fail to meet many of the objectives outlined above and repeat many of the failings (to a different degree) of current film based services particularly:

1. Scout views are more commonly absent or uninterruptible.
2. Lack of screen space to show as many images as on an XRay viewing box.

As well as this the following are particular disadvantages of CD based images compared to film:

1. Software based

- a. Image quality can be worse due to images being saved in low resolution or with lossy compression algorithms.
 - b. Time taken to load images and viewing software that can be a significant proportion of a consultation time. If multiple cd's of different images from different providers need to be viewed the time penalty is correspondingly greater and the utility of switching between different viewing packages is poor.
 - c. Poor quality accompanying viewing software with varying user interface.
2. Hardware based
- a. Access to computers with adequate specifications within operating theatres and hospital wards is poor and nearly non-existent.
 - b. Specifications for a quality viewing workstation higher (and more expensive) than otherwise would be required for 'office' type tasks. A typical quality workstation would require more memory, more processing power, high quality, high resolution dual LCD screens, high quality video card capable of supporting the screens. A shift from film based radiology transfers this cost from the supplier to the user. The cost of outfitting and maintaining the countries operating theatres, consulting rooms and wards with quality workstations would be substantial. This cost would need to be recovered from somewhere – presumably by an increase in medical fees and hospital charges.

There are however some advantages to the provision of digital images on some form of removable media. These are.

1. Easier to store and archive.
2. Easier to copy.
3. Easier to mail.
4. Easy availability of selected digital images for teaching and research.
5. The ability to control window levels and hence subtly vary tissue contrast.
6. The ability (with appropriate software) to take measurements of angles and distance.
7. The ability, with appropriate software and availability of the raw image data from a CT scan (not currently provided on routine cd based solutions) to perform further multiplanar reconstructions in a format that may enable the spine surgeon to gain further insight into the diagnosis.
8. Potentially a better approach to scout views with live scrolling through stacks of images with a real time display of the plane of the an image in an orthogonal view (available on some software packages – usually higher end).

At present we do not believe that these advantages are sufficient to outweigh the disadvantages. We do not believe that CD based provision of images is adequate for the use of spine surgeons and it is likely currently that these investigations are commonly being repeated in order to obtain adequate film based images. We believe that new standards need to be introduced for film based radiology that addresses the current shortcomings. This is particularly important with regard to scout views. Addressing the scout view issue is important to patient safety as it is a potential cause of wrong level surgery.

Only when an acceptable standard for film based spinal images is established would it be appropriate to consider the question of whether films could be *replaced* by digital images provided on removable media. The test then would need to be if the digital images could

provide at least the same level of utility as the (new) film based standard. At present there are advantages to continuing to have digital images provided on removable media *as well as* on film. These advantages are listed above. We would support the provision of digital images as well as films particularly if it allows the raw dataset for spiral CT scanning to be stored as this would allow for later reprocessing into reconstructions in different planes.

We would regard the minimum requirement for a national digital radiology service based on removable storage as:

1. Storage on removable media of sufficient capacity to allow storage of raw data.
2. Storage on removable media in a format with a data transfer rate that allows loading an image sequence in an acceptable time ie close to hard disc data transfer speed.
3. A national standard for software functionality for software vendors to meet. This standard would need to involve.
 - a. Data compatibility
 - b. Data transfer rate
 - c. Minimum image resolution.
 - d. Minimum image loss due to compression.
 - e. Software ability to have real time scrolling through image stacks with level display on orthogonal images (ie functional 'scout views')
 - f. Minimal standards for digital measurement of linear and angular dimensions.
 - g. Standards for multiplanar reconstruction.
 - h. Software interface for the provision of specialized 'plugins'
 - i. Standards for user interface and help files.
4. A national approach to the funding, standards and availability of image viewing workstations.



Dr Peter McCombe
Vice President Spine Society Australia