

## **The Radiographic Image: A Cultural Artefact?**

### ***Introduction.***

Radiographers produce a diagnostic image (the visible product) as a result of their interaction with a patient during an examination. The author considers this unique to the diagnostic radiographer. Although other health care professionals produce and use images, the radiographic image is the product of the radiographer's interaction with the patient and is used for diagnosis. This is the purpose of the whole imaging procedure<sup>1</sup>. The image encapsulates not just the science of producing an image from X-rays but it is also a record of the unique interaction that occurs.

The radiographic image is subsequently used by the radiographer, and other health care professionals to aid in diagnosis and treatment of the patient<sup>2</sup>. Radiographic images are, however, context dependent and when viewing the image the observer has no awareness of the state of the patient at the time of image acquisition.

This paper presents some of the data from a doctoral study of the culture in a diagnostic imaging department<sup>3</sup>, where the radiographic image as a 'visible product' emerged as one of the key themes. This key theme from the study is explored in this paper.

### ***Literature review.***

A search of the literature was carried out using the databases CINAHL and Medline. The search terms radiograph\*, resultant, image and technology were used. There were very few studies found, illustrating a gap in the literature.

### *Imaging technology.*

Since the installation of computed radiography (CR), direct digital radiography (DDR) and picture archiving and communication systems (PACS) radiographers' working patterns have changed. Larsson et al.<sup>4</sup> carried out a two year ethnographic study in Sweden to look at the effects of PACS on radiographers' work practice, using observation and interviews in five different hospitals. They found that the introduction of PACS meant that radiographers' work practices changed and that space in the imaging department was used differently, with radiographers working more independently and with less time waiting for the images to be processed. They state that the tools and artefacts are integral to their role and form part of the workplace culture. In their seminal work on culture Beals et al.<sup>5</sup> suggest that artefacts, in this case the equipment used, and the radiographic images produced are a significant part of any culture, and therefore any changes to these artefacts will have an effect on the workplace culture.

Larsson et al.<sup>6</sup> also investigated the way in which radiographers use knowledge in image production from the same data. Radiographers need to know how the equipment works in order to produce a diagnostic image and combine these skills with those of patient care. Murphy<sup>7</sup> says that

“The role of the radiographer, in an area requiring highly skilled technological knowledge, may appear to be in opposition to high quality patient care” (p169).

He suggests that technology may be daunting for patients and previous research describes a boundary between patient and machine<sup>7, 8</sup>. Professionals can hide behind technology. Murphy<sup>7</sup> in his literature review of technology in radiography calls this the 'paradox of imaging technology and patient care'.

### *Radiographic images.*

Radiographers need to view their images, ensure they are of high quality and send them to be reported. Radiographers often provide an initial comment or opinion about their images as well. Thomas et al.<sup>10</sup> suggest that post processing of an image is a crucial part of the workload. The radiographer needs to ensure that the images produced are of good quality for a diagnosis to be made.

Fridell et al.<sup>11</sup> carried out a qualitative study exploring radiographers' work after the implementation of PACS. In the move from film to digital images, there was no longer one original film, but rather digital radiographic images could be accessed at any time in any place. Fridell et al.<sup>11</sup> carried out 38 structured interviews with radiographers over a seven year period looking at professional role, image production practice and technology during this period of transition. The radiographers commented on their role as 'image creators', stating that that it was important to optimise the likelihood of producing a diagnostic image, even if the patient was ill or frail. They also described the thrill of waiting for their images to see how they had turned out; they wanted to see what sort of image they had created and they were taking ownership of their images. During the time of this longitudinal study some radiographers began interpreting images, and they were more interested in the diagnostic quality of their images. Despite the changes in technology it appeared that radiographers took responsibility for and valued their resultant radiographs.

Reeves and Decker<sup>1</sup> argue it is the radiographic image and not the patient that is at the centre of radiographic practice. The production of a radiographic image or set of

images is the diagnostic radiographer's role. This could be seen as the long-term goal of the examination and humanistic interaction could be seen as the short-term goal needed to acquire the image<sup>12, 1</sup>.

In summary; imaging technology, X-ray equipment and radiographic images are artefacts within the workplace culture. They are integral to the culture and are part of the way in which radiographers work. Radiographers see themselves as image creators and the production of a diagnostic radiographic image is their main focus. This can lead to a perceived emphasis on the technical side of the workload. Radiographers take responsibility and ownership for the images they produce.

### ***Methodology.***

This study used a qualitative methodology; ethnography to study the culture in one diagnostic imaging department in the East of England<sup>3</sup>. The methods used were participant observation for a four month period and semi-structured interviews with key informants from the department. The observation notes and interview transcripts were analysed using thematic analysis.

The purpose of this research was to investigate the culture in the imaging department amongst radiographers. Qualitative methods provide further insight and rich data about the complex issue of culture<sup>13</sup>.

Ethnography was selected as a methodology as it is the study of groups and cultures. It is carried out in natural settings, where people live and work in groups<sup>14</sup>.

Ethical approval was obtained from the University Ethics Committee, the local research ethics committee (LREC) and the research and development committee (R&D) at the NHS Trust where the study took place.

### *Observation.*

The observation started with an initial mapping of the department<sup>15</sup>. This involved observing the patient's journey through the department, recording where events occurred and creating a floor plan of the department in order to understand how the space was used.

Observation prompts the researcher to consider what it means to be a part of the group being studied<sup>16</sup>. It was useful to have some sense of shared cultural knowledge. Holland<sup>17</sup> believes that undertaking research in one's own field of practice reduces the 'culture shock' and makes the researcher more sensitive to the participant's behaviour. However, she also says that there is a danger of data being overlooked because of familiarity. During the whole period of observation the researcher was aware that her insider status could contribute to missing out on important information<sup>18</sup>, as she would not necessarily see something as strange or unfamiliar and record this. The researcher needed to fight familiarity when carrying out observations and look at the environment with a sense of strangeness<sup>19</sup>. The researcher had to try and view the environment from a different perspective<sup>20</sup>, and be aware of over familiarisation<sup>21</sup>. The researcher endeavoured to look around the department for something new that hadn't been seen before or written about. In this way the researcher tried to keep the observations fresh and to see the environment in a new light.

Observations were continued until data saturation had been reached, a point when no new information is generated<sup>22</sup>.

### *Interviews.*

Interviews were used following the observations to explore issues further. A cross-section of staff from the department were interviewed. Ten interviews were carried out with a purposive sample of key informants<sup>13</sup>. The staff members interviewed are listed in table 1.

The interviews were semi-structured and explored further the issues highlighted by the observations as recommended by Coffey<sup>19</sup> and Johnson<sup>23</sup>. Interview questions were open and exploratory, based on the themes from the observations and the literature.

The observation and interview data were analysed using a thematic analysis. Themes were categorised and coded<sup>24</sup>.

### ***Results and Discussion***

One of the key themes to emerge from the data was that of the radiographic image as a visible product. From the data it was felt that the radiographic image is something unique to the diagnostic radiographer.

In this section relevant data about the visible product will be presented from the study along with discussion and links to literature.

It appeared that radiographers were defensive about the images they produced, and this can be illustrated by an incident recorded in the observations.

*“A member of staff from the intensive therapy unit (ITU) came to the imaging department to find out who had imaged a particular patient. The radiographers were immediately defensive in case they had done something wrong. The patient had tuberculosis (TB) and the nurse wanted to arrange for radiographers he had come into contact with to be screened. After this one radiographer said to me that as a profession we can be quite defensive, always worrying about what we have done wrong and worried about the consequences, when we should be happy to admit that we are human and sometimes we make mistakes.”*

**Observation 13/8/08.**

It seemed that the radiographers were immediately concerned about the quality of their images, and they could not think of anything else that the nurse might be coming to discuss. The reaction from the radiographers was that their work was about to be criticised.

There were other occasions where there was concern from radiographers about their images recorded in the observations.

*“Some of the radiographers appear to worry about other radiographers seeing their images.”*

**Observation 24/11/08.**

One of the radiographers was asked about this in her interview. She said that radiographers are very aware of the images that they produce and can be quite self-conscious.

*“With CR (computed radiography) it’s much more difficult to hide. If you’ve done an image that you think ‘oh dear’ about you can’t just put it straight into the reject bin. It’s up for everybody to see.”*

**Interview with Radiographer 1.**

Because the images come up on the computer screen in the viewing area, members of staff can view one another's work. In the past, when radiographs were produced on film, it was easier for the radiographer to view their images in a more private way on a light box, and although this might be in the viewing area alongside other staff, somehow the image on a computer screen appeared to be more public and less difficult to hide.

Some of the radiographers appeared to be concerned about this and felt that their work was under scrutiny. Colleagues will only see the resultant radiographic image, which is the product of the radiographer's interaction with the patient, and won't see the patient or how the examination went. Therefore just viewing the image is not really a good way of judging the work of the radiographer, as only the product can be judged, not the process. If the patient is difficult or challenging, or the examination did not go well this is not necessarily reflected in the resultant image. Reeves and Decker<sup>1</sup> in their oral history study of radiographers also found that radiographers felt that they were judged by the quality of their images. One participant talks about being 'proud of their image', and another talks about 'liking to see an aesthetically beautiful image' <sup>1, p80</sup>. The radiographers were not, however concerned about other people seeing them taking the images. This did not appear to make them nervous; they were more worried about their resultant images being viewed by others.

In other health care professions for example nursing, physiotherapy and medicine there is a product in the form of the patient and the outcome to the patient from whatever the interaction was. However, in diagnostic radiography there is the



patient and the radiographic image as products. The manager discussed this in his interview.

*“Radiography is different from physiotherapy, you have the image. So looking at the product happens to a much greater degree in radiography than physiotherapy because there’s the image there to discuss. A physiotherapist goes out and treats a patient but none of the other physiotherapists can see that patient so unless the physiotherapist actually comes back and says ‘this is my patient’ and describes exactly what the situation is the other physiotherapists will not know. But if you go and do a chest X-ray or any other X-ray, there it comes up on the screen and actually it’s in front of everyone, it’s a very public area which can be in some ways far more challenging. When it’s an image on a screen you can see the image coming up and then boom there it is there it is on the screen, two feet across for the world to see and usually that’s when I come strolling into the viewing area and I see the radiographers worry then! So yes, so your output is far more public.”*

#### ***Interview with Manager.***

There are a number of points raised here. The manager talks about the visual nature of the image and that for radiographers, the product of their interaction is visible. He talks about the fact that the radiographer’s work is under the scrutiny of their colleagues, they see colleague’s images on a regular basis and are able to make an assessment of their work.

There is also the notion of producing a ‘good image’. Part of the role of the radiographer is to produce a diagnostic image; this means that the image provides sufficient detail to answer the clinical question and aid in the patient’s diagnosis. However, there is more to it than this; the radiographer is conscious that their image is under scrutiny and that their performance will be judged on the basis of the quality of their images. Their colleagues may not see the patient but they will see the image on the computers within the viewing area, which is a space where all of the staff in

the department can view images. It has been argued that the images take on a reality of their own<sup>25</sup>.

The manager mentions that radiographers are concerned about their images, indicating that the radiographers would worry if he came into the viewing area and saw their images on the monitor. He felt that radiographers were self-conscious about their work and were concerned that they would be judged by their images. This could have an effect on the radiographer's self-esteem and their learning. This links to blame culture and the fact that radiographers appear to take personal responsibility for their images, especially if their image is not optimal<sup>26</sup>. Conversely, radiographers appear to take pride in their images if they are optimal, Reeves and Decker<sup>1</sup> also discuss this aspect, one of their participants describes 'getting a kick' out of producing a wonderful image (p80).

The radiographic image can be seen as a cultural artefact. Beals et al.<sup>5</sup> describe artefacts as the material part of a culture. Spradley<sup>27</sup> says that artefacts are items that we make or use within a culture. This is particularly applicable to the radiographic image, as it is created by the radiographer and then used by other professionals. So this cultural artefact is produced within the imaging department and then used by others outside of the culture, but it represents the work of those within the department. Heath et al.<sup>28</sup> also say that artefacts feature in the production and co-ordination of social actions or activities. Thomas<sup>29</sup> takes this a stage further by suggesting that artefacts represent a meaning. Within a department the radiographic images are the results of the work of the radiographer, and they provide

the meaning for the existence of the diagnostic imaging department. The radiographic images are therefore integral to their role<sup>4</sup>.

The radiographic image is an important aspect of the radiographer's work and every patient that visits the imaging department ends up with a radiographic image as a record of their interaction with the radiographer. This radiographic image is there for all time as a record of the radiographer's work. With PACS, radiographic images are filed and can be recalled to view at a later date, so this is a permanent record.

Therefore the radiographer values their images very highly and is aware of their significance in terms of the patient's diagnosis and treatment.

Consequently it seems that a lot of emphasis is placed on the image produced. The author considers that it is easier to quantify the quality of the radiographic image than the quality of the interpersonal interaction between the radiographer and the patient as there is no visible record of this interaction. However, there is little success in producing an excellent diagnostic radiographic image if the patient is very upset or in a lot of pain as a result of the examination. Conversely there is no point in trying to keep the patient happy and pain free if the radiographer does not position the patient correctly for the examination and does not produce a good quality image for diagnosis. There is the need to balance these two important aspects, process and product. A study by Whiting<sup>30</sup> of radiography students argued that there is a disparity between patient care skills and technical competence. Students felt that they were being socialised into a profession where technical competence was being prioritised over patient care.

## ***Implications***

The issue of ownership of the images that radiographers display is very strong. It appears that radiographers are possessive of their images. It is almost like a parental or an artistic relationship; 'my baby' – 'my image', I made it and created it.

Consequently, any criticism of the image is taken personally, as if it is a criticism of the radiographer themselves and a reflection on them as a professional. The criticism is taken as if it is aimed directly at the radiographer and is seen to be a judgment about something they have created. It is interesting that the reaction to any criticism of images is a defensive one, which can be seen in the radiographers reaction to the ITU nurse recorded earlier, although this may not always be the case. However, as has already been discussed it is not really possible to make a judgement about the radiographic examination based on the resultant image alone. The image does not provide a lot of information about how the patient was at the time of the examination. Yes, it can often be seen from the image that the patient was unwell and a diagnosis can be made, but it is difficult to know a lot about the behaviour or condition of the patient when the examination took place. Having not seen the patient at that time, not knowing how the examination went and if there were any problems it is not possible to tell if this is the best quality radiographic image that could be produced.

As has already been mentioned the radiographic image is recorded for all time as a record of the examination and can be viewed in the future. However, the context is not part of this record; only the time and date of the examination is recorded along with the reason for the examination and the report which indicates what the image

demonstrates. Often abbreviations are used on the imaging request card and not all of the clinical information is recorded along with the image. The image is essentially a snapshot of the patient at the specific time the examination happened.

Radiographers are responsible for making a judgement about the diagnostic usefulness of the radiographic images they produce. They have to decide if the image produced answers the clinical question and is of sufficient quality. Images not considered to meet these requirements may be rejected and repeated. Rejected images may be scrutinised at a later date as part of quality assurance processes. This is a subjective judgement and professionals differ in their interpretation and quality assessment of radiographic images. Ween et al.<sup>31</sup> found this in their research. Image quality is a subjective judgement and radiographers will consider 'is this image 'good' or 'good enough'?' It will always be a conflict in the radiographer's psyche where they have to balance producing a diagnostic image and being a caring professional.

### ***Conclusion.***

The radiographic image then is an important product of the diagnostic radiographer's work. It is important in the diagnosis and treatment of the patient. This is different from other professional groups, where there is no tangible artefact from the professional to patient interaction. There are very few other professions that have a product from their interaction with the patient.

Radiographers appear to take ownership of the images they produce, which could be likened to a parental relationship. Radiographers can be sensitive about their images

and seem to take negative judgements personally, however they also demonstrate satisfaction in the production of a good quality radiographic image.

It is important to acknowledge that just by looking at the radiographic image we cannot pass judgement on how the examination went or the patient's condition during the examination.

The way in which radiographic images are viewed, used and judged is an important aspect of the role of the diagnostic radiographer.

### ***Limitations***

It is acknowledged that this is a qualitative study in one department and as such the findings cannot be generalised. However, it is anticipated that the findings from this study will resonate with radiographers in other departments.

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