

**048**

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***Analysing the introduction of new technologies within the hybrid imaging***

**£2,361.00 awarded**

**Lay Summary**

This research study will analyse the impact of introducing hybrid imaging technology (SPECT/CT and PET/CT) within nuclear medicine practice. The hybrid-imaging workforce has developed as a result of the clinical availability and utilisation of multi-imaging systems, capable of providing functional and anatomical information within a single environment. The research will focus on potential cultural changes, workforce development requirements and emerging professional identities for radiographers within the nuclear medicine environment.

Although hybrid imaging systems have been available for over ten years, their introduction has provided new imaging pathways for traditional examinations, increasing overall accuracy rates and diagnostic quality. The introduction of new hybrid imaging equipment and associated software has required the nuclear medicine workforce to further develop skills and competencies and operate within a new culture, dealing with transmission imaging (X-ray source) in addition to conventional transmission imaging (gamma sources).

At present there is a lack of educational guidelines and core competencies for radiographers working within a hybrid imaging environment. The Society and College of Radiographers (SCoR) have produced a draft learning and development framework (SCoR, 2010) for professionals working within a hybrid imaging environment and although this document covers the fundamental levels of practice, there has been no national research evaluating the impact of hybrid imaging technology on the nuclear medicine workforce. This research aims to evaluate the future training and workforce requirements of nuclear medicine practitioners working within a hybrid imaging environment and influence the development of a competency based framework for clinical practice in the United Kingdom (UK).

**Rationale**

Hybrid imaging in nuclear medicine is providing an opportunity for radiographers to develop their core practitioner skills and create new multi-professional working opportunities. Analysing the cultural and professional changes to the existing nuclear medicine workforce will provide a focus for future educational strategies in the UK and identify possible multi-professional opportunities. This will ultimately result in an increase in research / service development publications, raising the profile for radiographers in nuclear medicine and provide a clear training strategy in hybrid imaging and follow on future research projects.

The proposed research project fits within the "service delivery and organisation" programme area and will specifically evaluate the sociological aspects of introducing hybrid imaging technology and associated software on the radiography workforce. By evaluating the cultural changes associated with the introduction of hybrid imaging technology, a fluid understanding of the emerging roles, responsibilities and training requirements will be available. This will provide the CoR with an informed opinion of the emerging "hybrid imaging" workforce and potential multi-professional relationships. Providing a flexible, skilled hybrid imaging workforce is integral to service / workflow delivery in the modern NHS.

## **Principle aim of the study**

The aim of the research study is to analyse the introduction of new imaging technologies within the nuclear medicine workforce. The research will focus on the potential cultural changes and social meanings within this workforce, following the introduction of new technologies and the subsequent development of professional identities and inter-professional working relationships.

## **Primary research question:**

What, if any, are the cultural changes and associated workforce development requirements of radiographers working in a hybrid imaging environment?

## **Secondary research questions:**

- 1) How do new technologies impact on the professional development of the hybrid imaging workforce and what are the challenges of introducing new imaging pathways?
- 2) What are the training and educational challenges of incorporating new technologies specifically within hybrid imaging workforce?
- 3) How technologically focused is a radiographer working within a hybrid imaging environment and does this impact on the level of humanistic patient care?

## **Outcomes:**

The outcomes from the proposed research will contribute to the development of an educational framework for hybrid imaging practitioners and a career progression structure within an emerging workforce. Being able to establish whether the introduction of new technology in the hybrid imaging environment is socially constructive or deterministic will enable practitioners to further understand their working practices and identify the developments of their roles and responsibilities. Data collected and analysed from observational studies, interviews and reflective blogs will generate key themes focusing on the learning and development requirements of radiographers working within hybrid imaging environments and those who will be experiencing a transitional period of change in the future. The Workforce Review Team (WRT) have previously identified occupational shortages within nuclear medicine (WRT, 2009) and mapping the learning and skill development is important for future strategic workforce planning.

## **Review of the literature and identification of current gap in knowledge:**

The modern NHS requires health care professionals to gain new skills effectively whilst delivering patients' services using evidence-based approaches (NHS, 2010), which may involve technological advancements. Central themes that have emerged from nuclear medicine practitioners (service users) attending the hybrid imaging module at the University of the West of England (UWE) emphasise the scale of transformational change related to service redesign, evolving traditional clinical techniques and appropriate training for the emerging hybrid workforce. The interactions between work practice, emerging technology and changes within professions and workplaces have not been sufficiently analysed (Crump and Pfeil, 1995), but have led to the introduction of new ways of communicating, engagement, learning (Bortot et al, 2004) and independent working practice (Larsson et al, 2006). This is coupled with the necessity to standardise patient pathways across the UK and service improvement strategies to deliver quality patient services (DH, 2009).

An exploration of the potential cultural changes within this relatively small scale workforce has not been conducted and contrasts with healthcare areas such as nursing and radiography, where technological changes have re-shaped cultural working practices and undergone subsequent analysis (Schoenhofer and Boykin, 1998; Simmons, 2007; Fridell et al, 2009). Barley (1986), Murphy (2001), Deutschman (2005) and Larsson et al (2006) reported changes in working cultures of other departments within the acute and community health care environments.

Murphy (2001) explores the potential workforce development required with the introduction and “professional acceptance” of new technology within the clinical environment and the requirement for health care professionals to collaborate and consolidate their expertise in order to provide a holistic patient experience. Holistic care is a central theme of the CRS (DH, 2007), placing patients at the centre of cancer imaging, treatment and management, however, this approach can become “absorbed” within the practitioner’s necessity to understand the operations of new technology (Benfield, 1997; Bolderston et al, 2010). Non-contextualisation of the effect of introducing such new technologies on practitioners with traditional based social identities and associated symbolic references may prevent professional development and future social structures (Nagle, 1998). In addition, there is a potential for a theory and practice knowledge gap within particular professional groups where appropriate training and development frameworks are not present (Dall’Alba, 2010).

### **Methodology to be adopted:**

A qualitative methodology will be adopted for the research project and organisational ethnography utilised in order to develop a cultural interpretation and collective understanding of working practices. Organisational ethnography is useful where “members” of an organisation / traditional environment are experiencing change, especially where technology and service delivery methods are evolving (Neyland, 2008; Ybema et al, 2009).

### **Method:**

Four clinical hybrid imaging sites across NHS Trusts in the south of England and Wales will be purposively selected for this multi-site ethnographic study. One independent PET/CT centre which is cited within one of the NHS Trusts in England will also be included in the research. This approach will capture unique perspectives on cultural changes within working practice (Hovland, 2005) and develop an informed landscape that is representative of the community being studied (Ybema et al, 2009). Three radiographers from each clinical site will be recruited for the research, with two of the proposed sites being considered as “new implementers” of hybrid imaging equipment. Initial scoping work has identified willing participants for the research data collection.

The researcher envisages spending four days at each clinical site performing the departmental observational analysis and interviews will be conducted with three hybrid practitioners at each location, following the completion of the reflective journals / blogs. The following selection criteria will enable the researcher to recruit departments for the observations, radiographer journals and semi-structured interviews:

1. Hybrid imaging practitioners working routinely with hybrid technology (PET/CT and SPECT/CT equipment)
2. Hybrid imaging practitioners who have previously worked within traditional nuclear medicine environments

Research participants will consent to the observation of working practice, semi-structured interviews and practitioner journal / blog on-line form. However each participant will be asked to confirm their continued consent before each stage of the data collection is undertaken.

Research participants will be observed in clinical practice over a period of four days, with an extra day being reserved in the event of any unforeseen circumstances. Overt observations of clinical staff will be performed, with clear guidelines provided in the patient information sheet. The semi-structured interviews will last for approximately thirty minutes and be conducted within the clinical environment. A quiet room will be utilised for the interview process and the research participant will be provided with an opportunity to review the initial transcript for accuracy purposes. Interviews will be transcribed by an independent transcriber who will receive non identifiable data on tapes.

The practitioner journal / blog will be undertaken for two weeks by the research participants. A choice of a traditional written journal or web based blog will be offered, along with guidelines regarding completion. The web based blog will be password protected and accessed by the research participants, who will invite the chief investigator to view the blog

entries. Weblogs are now an established feature of the internet and are a useful way of encouraging personal reflection (Oravec, 2002; Ferdig and Trammel, 2004).

#### **Research data collection methods and tools:**

- 1) Researcher diary, which will be recorded from the “embedding / gaining membership” phase until the completion of the data collection
- 2) Observation of clinical practice, using organisational ethnography framework
- 3) Practitioner journals / blogs, which will include guidance for completion
- 4) Semi-structured interviews of hybrid imaging practitioners

#### **Researcher diary:**

As part of the observation of working practice within each of the hybrid imaging departments at the specified clinical sites, the chief investigator will record notes, which will include basic information, such as the date, time, location within the hybrid imaging department and nature of the observation. This information will be triangulated with the data collected from the observational analysis, semi-structured interviews and practitioner journals / blogs.

#### **Observation of clinical practice:**

Participant observation of working practice within the hybrid imaging workplace will form the initial element of the research data collection. The observation data will be analysed using an identified methodology (Watson and Whyte, 2005) and categorised using Mason’s (2006) sectional approach to observation studies, which includes literal, interpretive and reflexive data types. The chief investigator will also document observational field notes, as recommended by Neyland (2008) as a means of identifying key aspects of working practice within the hybrid imaging environment. Embedding an understanding of practitioners’ beliefs, working practice and symbolic interaction within the observational element and practitioner journals will generate central themes for the interviews.

#### **Reflective journal / blog:**

The practitioner journals / blogs will be evaluated using thematic analysis software package (Nvivo) and each theme will be assigned a code, enabling simple quantification (Burns and Grove, 1997) and perform subsequent analysis (Gibbs and Taylor, 2005). Each research participant will be asked to generate an anonymous account on a web based blog platform (WordPress™). Each participant will subsequently invite the chief investigator to view the blog entries once the created has been activated. Guidelines will be provided by the chief investigator for the research participants in terms of how to create a blog account and documenting events.

#### **Semi-structured interviews:**

Participants who complete, sign and return the participant consent form will be interviewed following the completion of the observations and reflective journals / blogs. Interviews will be transcribed by an independent transcriber who will receive non identifiable data on tapes. The qualitative data will be analysed using an established “fivefold” open coding process (Bryman, 2010) which includes familiarisation, identifying a thematic framework indexing, charting and mapping and interpretation. Thematic coding will be performed on the interview transcripts using the Nvivo software package and each theme will be assigned a code, enabling simple quantification (Burns and Grove, 1997) and perform subsequent analysis (Gibbs and Taylor, 2005).

#### **Ethical Considerations:**

Consent to participate in observational analysis, semi-structured interviews and reflective journals will be obtained by the chief investigator after full explanation of the purpose and process of the research and after participants have read and discussed the content of the

Participant Information Sheet. All participants will have access to telephone numbers and e-mail address through which the chief investigator can be contacted. Patients will be given one month to decide if they would like to participate in the research and the results of the research will be disseminated widely locally, nationally and internationally. All raw data quotes will remain anonymous and participants will not be identifiable. A summarised copy of the research results will be offered to all participants on completion of the study and participants who request a copy will be invited to make themselves known to the chief investigator so that they can receive it by post.

Interview transcript data will be stored on an encrypted portable hard drive which is password protected and analysis of interview data will be undertaken by the chief investigator on a computer at the University of the West of England, using a portable hard drive. The chief investigator will act as custodian of the research data (observation, semi-structured interviews and reflective journals / blogs) and interview data will be stored in a locked cabinet in the chief investigators office at the University of the West of England.

The researcher will obtain honorary contracts with each of the research sites and time will be spent in the clinical field working with hybrid imaging practitioners, in order to develop multiple levels of trust, such as communication, sharing of information involvement within the organisation. All observation data, reflective journals and interviews will be undertaken with respect and respondents will be provided with an opportunity to review the observed actions and their transcript in order to ensure accuracy. Research data will be securely stored on an encrypted hard drive in accordance with the Data Protection Act (DH,1998) and the raw data destroyed upon completion of the research. Their wish to withdraw from the study at any time will be respected without compromising their professional role.

#### **Dissemination:**

The findings from the research study will contribute to the development of an educational framework for hybrid imaging practitioners, building on the Society and College of Radiographers (SCoR) learning and development framework for hybrid imaging practice (SCoR, 2010) and a career progression structure within an emerging workforce. Being able to establish whether the introduction of new technology in the hybrid imaging environment is socially constructive or deterministic will enable practitioners to further understand their working practices and identify the developments of their roles and responsibilities. Following completion of the research study, the findings will be submitted for publication in a suitable nuclear medicine journal, with a reputable journal impact factor and publication at an appropriate international conference. In addition, the central themes emerging from the research will be used as market intelligence to develop an educational framework in conjunction with the Workforce Review Team in order to map future workforce requirements.

#### **Timeline:**

<b>September 2010</b>	Obtain ethics approval (NRES) & complete honorary contracts with clinical sites.
<b>October - November 2010</b>	Pilot participant observation guide and practitioner journal
<b>November 2010 - March 2011</b>	Participant observation and practitioner journals undertaken at identified NHS sites
<b>March - April 2011</b>	Analysis of observations and reflective journal data
<b>April -May 2011</b>	Development of semi-structured interview questions & pilot interviews
<b>May - June 2011</b>	Practitioner interviews at NHS sites
<b>July - August 2011</b>	Thematic analysis of interview data & personal reflective diary
<b>August 2011</b>	Write up findings and present report to College of Radiographers / NMAG & submit findings to suitable conferences.

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