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Professional identity and role perception of Radiographers and Clinical Technologists in Nuclear Medicine — An exploratory qualitative study

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ABSTRACT

Introduction: An awareness of Professional Identity (PI), an individual's identity in relation to their professional group, and Role Perception (RP), an individual's view of their specific role, may enable safe and effective practice by providing an understanding of professional boundaries, behaviours and activities. This research aimed to explore and gain an understanding of the PI and RP of Radiographers and Clinical Technologists working as Nuclear Medicine Technologists (NMT's).
Methods: 10 NMT's were recruited from a large National Health Service (NHS) Trust. Utilising the established methodology of *Qualitative Description*, data was obtained using semi-structured interviews and analysed using inductive thematic analysis.
Results: Four themes were identified: "Becoming the Unexpected" which detailed various training pathways; "Caring with Science" which described the NMT's role and defined their PI; "Same View, Different Lens" which portrayed how Radiographers and Clinical Technologists practise as team of NMT's; and "Confirmation of Professional Self" which presented how individuals view their professional status.
Conclusion: The study showed that the NMT role is highly specialised, multi-faceted and patient-centred. Their professional status is based on the nature of their role and their university level education and training. They work together under the umbrella title of NMT with a dual professional identity of "provider of care" and "user of science and technology". However, they may have an individual identity of Radiographer or Clinical Technologist that is determined by their training pathway.
Implications for practice: This research has provided valuable understanding of the PI and RP of NMT's. By highlighting the differences in the regulatory status of this workforce, an insight into the future implications in the context of national healthcare planning has been provided, highlighting potentially significant issues that may impact on the manner in which NMT's can practice.

Introduction

Nuclear Medicine is a specialised area of imaging that falls within the broad professional remit of Radiography[1] and is included in the Health and Care Professions Council's (HCPC) standards of proficiency for Radiographers.[2] However, Nuclear Medicine is also practised by Clinical Technologists who along with Radiographers form a multidisciplinary workforce known as Nuclear Medicine Technologists[3,4] (NMT's). The NMT is a specialised healthcare role that combines expert scientific knowledge with patient care, and whose core duties include the preparation and administration of radiopharmaceuticals, operation of sophisticated imaging equipment, and processing and manipulation of image data.[3,4] Nuclear Medicine and Radiography share a common theoretical background in Physics and have traditionally developed alongside each other, with most NMT's having first trained as Radiographers.[5,6] However, approximately 50 % of the contemporary NMT workforce do not have a Radiography background, and have trained by completing an undergraduate Nuclear Medicine degree or related scientific discipline, or via in-house training.[3,4] Consequently, the NMT workforce is composed of practitioners who have trained by various routes and are governed

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differently,[3,4,6–9] with Radiographers being statutorily regulated by the HCPC[10] and Clinical Technologists being governed by a voluntary accredited registration system.[11]

Although Professional identity (PI) can be difficult to define,[12] it is generally described as the knowledge, beliefs, skills, attitudes, morals and values that are common to and aligned with the expectations of a professional group.[13,14] It implies an individual responsibility to uphold the public perception of a profession regardless of context,[15] and affects judgements, behaviours and attitudes within and beyond the workplace.[16] Role Perception (RP), a sub-component of PI, relates to an individual's role in their specific workplace or area of practice rather than the general professional group,[17] and a clear understanding of RP positively correlates with an understanding of one's PI.[17] Importantly, understanding PI may promote safe and effective practice by clarifying behaviours, activities and professional boundaries.[13] For example, it was reported that understanding public health nurses' PI strengthened and legitimised their role,[15] whilst an appreciation of the PI of various professions in multi-disciplinary dentistry improved teamwork.[18] Moreover, Gregory and Austin[19] discussed how understanding PI formation in the newly established professional role of Pharmacy Technician may improve the role's long-term sustainability and allow individuals to fulfil their potential, whilst a poorly developed PI may result in inappropriate behaviour including suboptimal decision-making and failure to take professional responsibility.

In multidisciplinary groups such as NMT's, an individual's PI may be less distinct and different to that of the team.[18,20,21] However, at the time of this research, no published evidence of the investigation of the PI of NMT's could be identified. Therefore, this research intended to address this knowledge gap with the following aim and objectives:

Aim

 a. To explore and gain an understanding of the PI and RP of NMT's.

Objectives

 a. To describe the characteristics of NMT's within the sample population.
 b. To identify and examine the training pathways that participants have taken to become an NMT.
 c. To describe how NMT's view their role and scope of practice.
 d. To ascertain differences amongst NMT's who have taken different training pathways and how these individuals compare themselves to their peers.
 e. To explore how NMT's determine their professional status.

Methods

The established methodology of Qualitative Description[22] (QD) was utilised, which focusses on rich descriptions in plain language of individuals' lived experiences, and is invaluable in describing little known phenomena in exploratory research.[22,23] QD has a relativist ontology and interpretivist epistemology, and by minimally theorising findings using descriptive language familiar to relevant stakeholders, it can provide straightforward answers that may be valuable to practitioners and policy makers.[22–24]

The research site was a single, large NHS Trust. Participants from a non-probability convenience sample of 22 NMT's were invited to participate by e-mail. As the researcher was also an employee at the research site, participants were accepted on a first-come, first-served basis to avoid any perception of coercion. Interviews were

Table 1
Topic guide.

Question/Topic
Can you tell me about yourself?
What led you to having a role in Nuclear Medicine?
Can you tell me about your career so far?
Can you tell me about your role as an NMT?
Can you tell me about your education and training?
What makes a good NMT?
Would you say that you are a typical NMT?
What do you think about Nuclear Medicine as a profession?
What do you think about professional registration?
How do you think the NMT role compares with other healthcare roles?
How do you think other healthcare workers view NMT's?
Is there anything else that you would like to tell me?

scheduled after recruits had reviewed a Participant Information Sheet (PIS) and signed a consent form. A sample size of 6—12 was targeted which allows the assumption of data saturation in qualitative research of this kind.[25] Semi-structured interviews were conducted using Microsoft Teams (range: 66—100 min) with recording of audio only, using a topic guide (Table 1) determined by the main author based on a literature review with face validity checked by the second author. A pilot study was not completed due to the small sample size.[26,27]

The main researcher manually transcribed interviews verbatim and analysed the transcripts using Thematic Analysis[28] (TA) (Fig. 1). TA describes qualitative textual data by allocating codes that categorise data segments,[29] which are used to formulate themes (broader phrases that identify patterns and
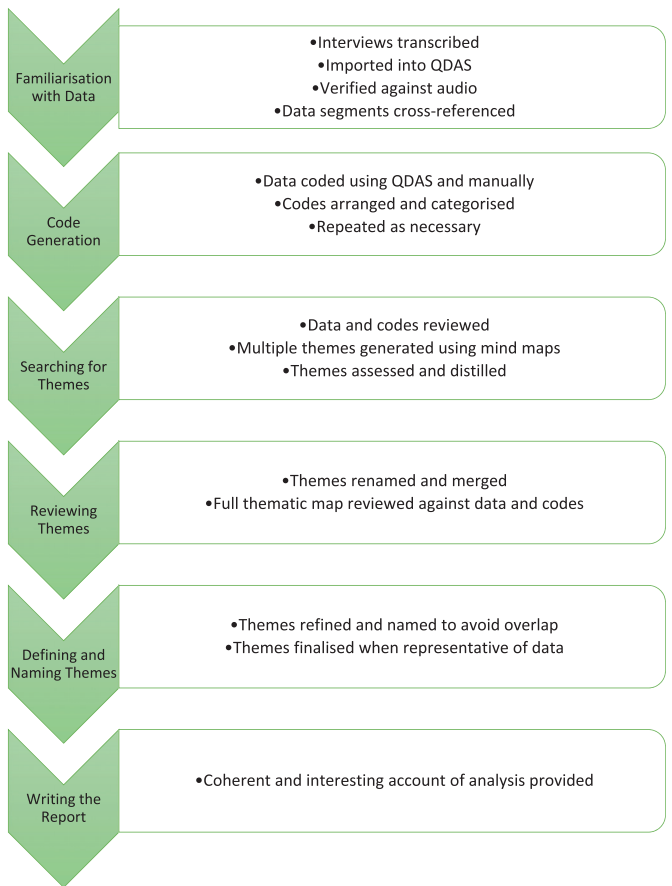

Figure 1. Thematic analysis.

meanings throughout the entire data set) to provide a coherent narrative of the data.[28,30]

Interviews and analysis were undertaken concurrently, with newly identified codes checked against previous transcripts. This allowed the researcher to judge when data saturation had occurred, that is when no new codes or themes emerge from subsequent interviews, which was fulfilled after ten interviews.

Transcripts were analysed using Qualitative Data Analysis Software (QDAS) and manually.[31] QDAS allowed manipulation of large amounts of interview data, whilst the creation of physical mind maps of codes written on post-it notes, which were continuously visible at the researcher's work area, facilitated researcher engagement with the data over an extended period of time to provide an awareness of coding decisions.[29,32]

Ethical approval was provided by the St George's Research Ethics Committee (REC reference 2021.0098) but was not required from the research site nor the NHS Research Ethics Committee.

Research quality and trustworthiness were established by applying measures to ensure credibility, transferability, dependability and confirmability.[33,34] The researcher maintained a reflexive position throughout the research.[35–38]

Results

Participants are collectively referred to as NMT's but will be described as Radiographer or Technologist (as determined by participants to reflect the philosophy of QD of portraying individuals' experiences) when appropriate. Demographic data was recorded to provide context about the participants (Table 2). Interview quotations used to support findings have been minimally rephrased to aid clarity whilst maintaining their original meaning.

Themes

Four themes were identified (Fig. 2) and are considered to be complementary and interconnected. Whilst themes 1, 3 and 4 primarily relate to the PI of the NMT, theme 2 is predominately concerned with RP.

Table 2
Participant characteristics.

Self-Identified Role		Agenda for Change Job Banding				Post-Qualification Experience (Years)		
Radiographer	Technologist	Band 6	Band 7	Band 8a	Band 8b	Range		Average
						Min	Max	
4	6	4	4	1	1	<1	33	10.1
Level of Academic Qualification								
Higher National Diploma (Level 5)		Undergraduate Degree (Level 6)				Postgraduate Degree (Level 7)		
1		5				4		
Registration Status								
Register of Clinical Technologists (RCT)		Health and Care Professions Council (HCPC)				None		
4		4				2		

Figure 2. Themes derived from TA.

Theme I: Becoming the Unexpected
Theme II: Caring with Science
Theme III: Same View, Different Lens
Theme IV: Confirmation of Professional Self
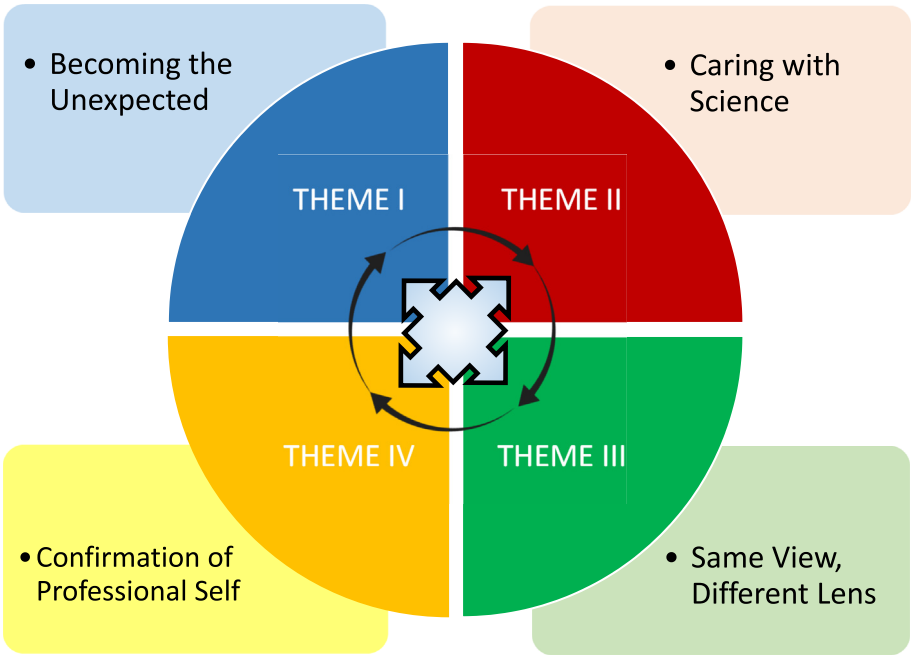
Theme One: Becoming the Unexpected

This represented the various academic and training pathways that participants took to become an NMT.

Four participants completed undergraduate Radiography programmes before undertaking postgraduate study in Nuclear Medicine. Another participant completed a Higher National Diploma in Science with work-based practical training, whilst five completed undergraduate Nuclear Medicine degrees. These pathways have been categorised as follows:

The direct route by choice

Two participants chose an academic program intending to pursue a career in Nuclear Medicine. One Technologist completed a Nuclear Medicine undergraduate degree whilst one participant trained as a Radiographer intending to practise Nuclear Medicine.

The direct route by chance

Four participants started academic study/training without intending to work in Nuclear Medicine, although their training allowed them to practise as an NMT. Three individuals trained as general Radiographers with the intention of working in that field before discovering Nuclear Medicine, either during their studies or post-qualification. One individual studied general science but then focussed their studies on Nuclear Medicine after a chance introduction to the field.

The indirect route

Four participants completed academic study that introduced them to Nuclear Medicine but which would not in itself have led directly to employment as an NMT without further training. One Technologist described their pathway as follows:

P002- *"… I was doing a master's, specialising in Medical Physics, there were different modules and Nuclear Medicine was one of them, I had no idea it existed, but I was so interested I took a placement in a hospital to see how Nuclear Medicine works and I was fascinated."*

Theme two: caring with science

The career of an NMT was regarded by Technologists and Radiographers as an opportunity to combine patient care with science and technology:

P002 (Technologist): *"I've always wanted to work in hospitals, patient-related work like Nursing, but involving technology and science …"*

P007 (Radiographer): *"… my choices have all been patient-centred, the reason I ended up choosing Nuclear Medicine is because I realised how much more time you get with patients."*

The clinical role was summarised as follows:

P001- *"… my job is to administer radioactive isotopes to patients in order to provide diagnostic images …"*

P009- *"… patient care, imaging, scanning, producing diagnostic images that are adequate enough to make a report on."*

The core duties and responsibilities of the role were described as:

- Intravenous administration of radiopharmaceuticals
- Operation of specialised equipment to produce diagnostic images
- Preparation, manipulation and presentation of image data for diagnosis

- Patient care
- Use of expert knowledge

Although there was general agreement regarding core duties, defining the NMT scope of practice was less straightforward:

P008- *"I know I have a scope of practice, if you want me to outline it clearly, I think I would struggle to do that …"*

Participants acknowledged that their role was evolving to include duties considered to be advanced practice, primarily image review and interpretation:

P002- *"We're doing image interpretation, that's advanced practice for seniors, using professional judgement to check pictures …"*

Finally, the role was perceived to be complex, multi-faceted and requiring expert knowledge and patient care skills:

P004- *"… we get loads of young breast cancer ladies that come for breast injections to look at lymph nodes, they're very frail, they're having surgery the next day, they're confused and they start crying in front of you, so you need to be emotionally capable …"*

P006- *"I feel that as Nuclear Medicine Technologists, our role is so complex … because we can do such a lot of things."*

Theme three: Same View, Different Lens

The duties of the NMT, as described in theme two, were practised by all NMT's regardless of their background:

P009- *"I mean our daily responsibilities are the same."*

P001- *"There's none of "I'm a Technologist you're a Radiographer" sort of thing."*

However, some Radiographers distinguished themselves from Technologists:

P010- *"I'm being honest here, if it's Radiographers around, I say I'm a Radiographer, but if I'm around Technologists, you try to fit in."*

The reason for this was posited by one Radiographer as follows:

P009- *"The title is important because it's self-identity, and as part of a multi-disciplinary team, it's important to have self-identity."*

Nevertheless, Technologists also differentiated themselves from colleagues according to their perception of their own and others' knowledge, for example:

P004- *"I compare myself to other Technologists and I think we're equal, but when I compare myself to Radiographers doing Nuclear Medicine, I think we're not in the same level, in terms of knowledge …"*

One Radiographer acknowledged the synonymy between the titles "Technologist" and "Radiographer" whilst clearly defining their own identity:

P009- *"I think the terms are used interchangeably, someone could refer to me as a Technologist, and that's fine, but in terms of personal or professional identity, I consider myself a Radiographer."*

Furthermore, it was suggested by the following Radiographer that they have a higher status when compared to Technologists:

P007- *"I'm HCPC registered, I'm trained as a Radiographer. Why would I change my title? I don't know if it's a statement saying I'm not just a Technologist, I'm a Radiographer!"*

This relatively positive view of Radiographers was also suggested by a Technologist when discussing other healthcare professionals' perception of NMT's:

P008- *"I think every Nurse would say a Radiographer is comparable to them, I'm not sure they would say a Clinical Technologist is comparable."*

This may be due to Radiographers' higher profile and wider scope of practice, as suggested by two Technologists:

P003- *"… everybody knows what a Radiographer is and what they do …"*

P008- "… Radiographers have more flexibility because I'm constrained to Nuclear Medicine, whereas Radiographers can work in MRI, X-ray, ultrasound. It gives you a lot more scope."

However, another Technologist appeared to view Radiographers' broader scope of practice negatively, suggesting that Technologists are more specialised:

P004- "… I think of Technologists as a more specific, directed role, and Radiographer a more general one".

Finally, another Technologist compared their undergraduate training with that of Radiographers and posed the following rhetorical question:

P006- "They said Radiographers can do all the modalities, including Nuclear Medicine. If Radiographers can do all of this, why do you need Technologists?"

Theme four: Confirmation of Professional Self

All participants considered the NMT role to be professional. The requirement for specific training and skills that can only be achieved with academic study was commonly stated, for example:

P001- "… I consider myself a professional because I've done a degree on a specific subject and a postgraduate diploma. The job that I do can only be done by someone with the type of qualifications that I have …"

Secondly, the role requires expertise and skills that can only be provided by NMT's:

P005- "You're opening a Nuclear Medicine service, but if you don't have Technologists or Radiographers, you cannot run the service."

Furthermore, participants noted the importance of delivering complex, patient-centred healthcare as justification of their professional status:

P002- "It's the role, patient-facing, working with technology, research …"

However, the relationship between statutory regulation and professional status is less clear. Radiographers suggested that statutory regulation is important but not the dominant factor in determining professional status, for example:

P001- "I think that's part of it, but it's not the be-all and end-all. It's what's required of you to perform that job."

However, Technologists indicated that their lack of mandatory registration undermined their professional status compared to Radiographers, and that statutory regulation would improve their professional standing:

P008- "I think I'm a professional, but I don't know that it's a profession in the same way as a Radiographer."

P005- "I think they should be registered, if we're comparing Technologists with Radiographers, Dietitians, Physiotherapists, they have HCPC. If we want to be at the same level, be recognised as professional … we need to be the same."

Nevertheless, it was generally understood by all participants that the primary purpose of professional regulation was to protect patients:

P007 (Radiographer): "I know there can be people who are HCPC registered that may not be up to standard, but at least they can be held accountable because they're registered."

P008 (Technologist): "I would prefer something comparable to the HCPC because the difference is, if you were struck off that register, you can't apply elsewhere, you won't be able to practise, it would hold us to higher standards."

Discussion

The findings of this research have provided a picture of a workforce that is united in its aims and function but complex in terms of identity.

The first theme, "Becoming the Unexpected", presented the academic and training pathways taken by individuals to become an NMT. Whilst the mixed training background of the NMT workforce is already well-known,[3,4] this research has provided further detail. A majority of the participants (80 %) became involved in Nuclear Medicine by chance, either directly or indirectly, whereas only two participants explicitly chose to complete training pathways with the intention of becoming an NMT. It appears that for four participants, the choice of a career in Nuclear Medicine was potentially due to finding a "best-fit" vocation that suited their academic learning rather than choosing a course of study directed by a specific career. Moreover, three participants stated that they would have trained directly in Nuclear Medicine if they had known about it, indicating that its career profile is relatively low. This is a more complex picture than that presented by the BNMS of a workforce that simply has a mixed background of Radiography and Science.[3,4]

Theme Two, "Caring with Science", described how the participants perceived their role, and there was a general consensus regarding the core duties of the NMT. These included specific tasks such as producing diagnostic images and administering radiopharmaceuticals, but rather than forming separate distinct identities of "producer of images" or "injector of radiopharmaceuticals", they appeared to represent components of the participants' RP, which then contributed to two clearly defined, broader concepts of PI of "providers of care" and "user of science and technology", supporting the notion that RP is a subcomponent of PI.[17] Indeed, whilst it is acknowledged that PI can be difficult to define,[12] it may be described according to specific skills[39] and/or broad concepts.[15] Moreover, focussing on broad, abstract components of practice rather than specific tasks distinguishes the professional role from technical occupations,[40] thereby reinforcing the professional status of the NMT. Furthermore, this research suggests that the PI of the NMT compares directly with previous findings of the PI of general Radiographers as based on the scientific/technical nature of the role and the humanistic, caring side.[41] This contradicts the views of the organisations that represent Clinical Technologists in Nuclear Medicine, which consider the role to be part of the healthcare science career structure rather than a caring profession in its own right.[42,43]

Theme three, "Same View, Different Lens", illustrated how NMT's identify as a team and how they view their own individual identity in relation to their peers. The findings suggest that the participants had a strong team identity of NMT's whilst maintaining their own individual identity of Technologist or Radiographer, reflecting previous research which reported that a dual identity of both the team and one's profession is maintained in a multi-professional environment.[12] In particular, Radiographers identified with their own profession rather than that of the team, and this may be because "Radiographer" is a protected title which indicates true professional status[44–46] whereas anybody can use the title of "Technologist". However, the participants highlighted that all NMT's worked interchangeably without any group having an exclusive area of practice. Nevertheless, differences between professional groups in multi-disciplinary teams may lead to interprofessional hostility[21,47] and there was evidence of discord between the two groups, for example, "… not *just* a Technologist …" (author's italics). This hostility may emanate from a perception of inequality due to Radiography being statutory regulated, something that Clinical Technologists are actively lobbying for.[48,49]

Theme four, "Confirmation of Professional Self", illustrated the nature of the role, the training requirements and the impact that statutory regulation and voluntary registration have on how participants confirm their own sense of professional status. The majority of the participants cited the opportunity to work with patients as a prime motivator for becoming an NMT. Caring for

patients is considered a hallmark of professional status in health-care,[40,44,50] and therefore it is understandable that as providers of care, NMT's consider themselves to be professionals. Furthermore, 90 % of participants had completed university-based qualifications, which along with statutory regulation, is an essential component of professional status[40,44,46] provided that qualifying credentials are validated by regulators and professional organisations rather than the labour market.[40,44,51] Although this is the case for Radiographers,[2,52] the legitimacy of unregulated Technologists' qualifications is assessed by employers. Nevertheless, whilst Radiographers in this research cited their regulatory status to distinguish themselves from Technologists, who in turn felt that their voluntary accredited registration undermined their professional status, overall, the participants' professional status was not conditional on being statutory regulated. Indeed, the relevance of the traditional definition of "profession" is contemporaneously questionable[53,54] and this research has shown that NMT's consider themselves professional due to their own lived experiences.

Finally, the significance of this research should be considered in the context of policy, specifically the NHS Long Term Plan[55] (LTP). One of the objectives of the LTP is to improve career progression by delivering roles in Advanced Clinical Practice[56] (ACP). However, the response to the impact of the LTP on the NMT workforce has primarily focussed on Radiographers rather than Clinical Technologists,[57,58] specifically image reporting which is a longstanding aspiration for Nuclear Medicine Radiographers and is considered to be the crux of ACP for NMT's.[58,59] Nevertheless, at the time of writing, only statutory regulated professions can undertake accredited ACP roles,[60] meaning that Clinical Technologists are excluded. Indeed, statutory regulation is essential for other areas of professional practice, for example, the administration of medicines to patients under patient group directives (PGD),[61] but significantly, the government recently reiterated that it has no plans to bring in statutory regulation for any other healthcare occupations with the exception of physician associates.[62]

Limitations

This exploratory research was conducted during the COVID-19 pandemic and the research design reflected this. Firstly, the sample was from a single site at which the researcher was employed due to the difficulty in obtaining multi-site ethics approval for non-pandemic related research.[63] Secondly, interviews were conducted virtually to maintain social distancing rather than in-person which may have affected interviewer-interviewee rapport. However, these limitations were balanced with the variety of professional backgrounds of potential candidates at the research site, and the benefits of a shared culture between the researcher and participants which may have aided elicitation of valuable information.[64,65] Nevertheless, this will impact the generalisability of the findings to the wider NMT workforce and it is acknowledged that future research projects should address these limitations.

Conclusion

This research has presented a group of individuals who work under the umbrella title of "Nuclear Medicine Technologist". They view their role as highly specialised, complex, and patient-centred, and described a common PI of "provider of care" and "user of science and technology", attributing their skills and expertise to their university-based education, which together validated their professional status. The multi-disciplinary nature of the workforce was confirmed and although individual personal identity may differ from that of the team, NMT's undertake the same role for the same

purpose and remuneration, working together to deliver a patient-centred service regardless of their training background. However, the workforce is divided into statutory regulated Radiographers and voluntarily accredited (unregulated) Clinical Technologists. Therefore, this research suggests that although Technologists and Radiographers practise their role in Nuclear Medicine interchangeably and have the same PI and RP when working under the umbrella title of NMT, Technologists may not have the same professional opportunities as Radiographers, due to differences in regulatory oversight between the two professional groups. Consequently, there is the potential for the NMT workforce to be significantly affected by moving from the cohesive group of practitioners presented in this research to a disparate, two-tier workforce whose career development, progression and practice will be directly determined by their initial route into the profession.

Recommendations for future research

It is recommended that this research should be repeated using a larger, multi-site sample to gain insight at a national level, including the impact of specific participant demographics such as academic level of qualification and post-qualification experience on the findings. Further areas of investigation should focus on exploring the need to harmonise training routes for NMT's, the benefits of establishing statutory regulatory oversight for all NMT's, how might the current mixed regulatory status of the NMT workforce impact on the professions' ability to deliver advanced clinical practice, and what benefits would be realised if the NMT workforce developed into a single professional group rather than remain multi-disciplinary.

Conflict of interest statement

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