



Understanding experiences of the radiography workforce delivering medical imaging as part of patients' end of life care: An exploratory qualitative interview study



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ARTICLE INFO

Article history:

Received 5 July 2023

Received in revised form

30 September 2023

Accepted 24 October 2023

Keywords:

Palliative care

Terminal care

Qualitative research

Cancer

Delivery of health care

Emotional distress

ABSTRACT

Introduction: People nearing the end of life often require medical imaging in hospitals to manage symptoms and care, despite this little is known about the experiences of those delivering it. The aim of this study is therefore to explore the experiences of the radiography workforce delivering medical imaging as part of patients' end-of-life care.

Method: Qualitative design using semi-structured interviews and thematic analysis. A total of 8 participants participated in the study including registered diagnostic radiographers (n = 5), imaging assistants (n = 2) and assistant practitioners (n = 1). All have been involved in the medical imaging of patients receiving end of life care in UK hospitals.

Results: Findings identified an absence of end of life care policy guidance and education accessible to radiography staff, limiting their ability to provide evidenced based care for those nearing the end of life during medical imaging examinations. Findings also suggest difficulty in identifying patients receiving end of life care further hindered staffs' ability to adapt their care to provide a more person-centred approach. Lastly, the workforce felt an accumulative emotional burden following their interactions with patients nearing the end of life.

Conclusion: There is a clear need to develop policy and education to support the radiography workforce to ensure care is appropriately identified and adapted to those nearing the end of life. Furthermore, staff support and wellbeing needs to be considered.

Implications for practice: Future research is required exploring the patient perspective to understand their experiences so that the education and practice provision is driven by patient need. International exploration of end of life care in medical imaging is recommended to explore whether similar challenges related to clinical practice exist in other countries.

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Introduction

End of life care refers to the care given in the last twelve months of life which comforts and supports people who are dying from a progressive life-limiting condition.¹ Thus, end of life care aims to avoid where possible, unnecessary treatment that will not benefit the individual, but conversely could cause adverse effects and false hope.^{1,2} Nonetheless, some interventions are necessary to alleviate symptoms, measure disease progression and alter care

management, for example, medical imaging.³ Medical imaging involves taking images of the body and are mainly carried out by the radiography workforce (diagnostic radiographers, assistant practitioners and radiology assistants). Images of the abdomen, chest and head are often used to assess disease progression and support patients' care plans for conditions such as terminal cancer.^{4,5,6} In addition to image acquisition, it is essential that medical imaging staff communicate effectively with patients and place them at the centre of their own care,⁷ explaining each examination and allowing for questions to be asked. Furthermore, it is also the responsibility of the radiography workforce to adapt care during examinations based on patients' clinical information, responding appropriately to different patient's needs.^{7,8}

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A scope of international literature in this area reveals that although studies have reported on the medical and physiological importance of imaging in the field of end-of-life care,^{4,5} and the over- and misuse of imaging during end-of-life care,^{9,10} little work has focused on exploring the experiences of those delivering it. This is important as hospitals still represent the most common place of death across Europe,^{9,11,12} Clark et al.¹³ identified that almost 30 % of inpatients in a UK hospital died within 12 months of being hospitalised and were frequent users of inpatients services, such as medical imaging. Similar findings have been identified in Europe, with one study reporting that out of 541 hospice patients, 463 (85.6 %) undergone at least one medical imaging procedure.⁹

Additionally, there is a sparsity of policy for medical imaging staff in regards to end of life care across the world. For example, in the UK in 2009, the Society and College of Radiographers UK (SCoR)¹⁴ published policy guidance in response to the 2008 End of Life Care Strategy produced by the Department of Health (DH).^{14,15} The guidance acknowledged that medical imaging staff commonly encounter patients receiving end of life care yet are often poorly prepared. Specifically, it was summated that complaints from across the National Health Service such as poor communication and a lack of awareness of patient preferences likely included medical imaging services.¹⁴ However since this policy there has been no further guidance, policy or research exploring these issues, despite wider UK health policy asserting it is essential that all healthcare professionals who encounter patients dying from a terminal illness are supported to be able to provide high quality care.¹⁶

It is therefore vital that there is a better understanding of end of life care provision in medical imaging. Addressing this gap in knowledge will generate evidence needed to inform and develop future service delivery, training and policy to support the experiences of those involved in the delivery and receipt of medical imaging as part end-of-life care. Furthermore, given the sparsity of guidance, policy and training worldwide, evidence generated from this UK study can have international applications. Thus, the aim of this study is to explore the experiences of the radiography workforce delivering medical imaging as part of patients' end-of-life care.

Methods

Ethical considerations

Ethical approval was granted by the University of Salford ethics committee (Ref: 8737) on 02/12/2022. Informed consent was provided by all the participants in the study. If any participants became upset or distressed during the interview, they were offered a break or the opportunity to terminate the interview. No participants asked for a break or to end the interview. Participants were directed to the SCoR's support resources if they become upset after the interview.

Design

This exploratory qualitative study used semi-structured interviews and open-ended questions to explore the experiences of the radiography workforce delivering medical imaging as part of patients' end-of-life care. Exploratory studies are often used to explore a new or novel area to determine the evidence base in preparation for a larger or main study.¹⁷ A qualitative methodology was deemed most appropriate as qualitative research is concerned with exploring and understanding the experiences and behaviours of study participants with the aim of discovering something new or interesting.^{18,19}

We undertook a constructivist-interpretivist paradigm which posits that an individual's knowledge and understanding develop from their interactions with culture and society, whilst also acknowledging researcher influence.²⁰ The study was reported using the Consolidated Criteria for Reporting Qualitative research (COREQ) guidelines.²¹

Population and eligibility criteria

Participants included assistant practitioners, radiology/imaging assistants and Health and Care Professions Council (HCPC) registered diagnostic radiographers. All participants had experience of being involved in the medical imaging of patients receiving end of life care. In terms of setting, all participants worked in a radiology department within a UK hospital. Other locations where medical imaging may take place such as hospices or care homes were not included. See Table 1 for a breakdown of participant roles. Further information on the roles and responsibilities can be found in the Education and Career Framework for the Radiography workforce.²²

Non-medical staff working in the National Health Service are categorised and paid in accordance to their banding from 1-9.²³ Participants included in this study ranged in terms of banding. For example, imaging assistants are typically band 2 or 3 whilst assistant practitioners are typically band 4. Diagnostic radiographers typically start at band 5 and can progress up to band 9.²³

Sample

A purposive sampling strategy²⁴ was used to recruit UK assistant practitioners, radiology/imaging assistants and Health and Care Professions Council (HCPC) registered diagnostic radiographers who have been involved in the medical imaging of patients receiving end of life care in UK hospitals. Morse et al.²⁵ states that sample size can be determined by several factors including the usability/quality of the data, scope of the study, nature of the topic and the study design. Furthermore, in line with the constructivist-interpretivist paradigm adopted, every experience explored in this study is deemed important.²⁰ N = 8 medical imaging staff participated following the recruitment strategy outlined below. No limits on participant numbers were set, and given the recruitment methods used, we were unable to estimate the total sample approached.

Recruitment

Participants were invited to take part in the study via the Society and College of Radiographers (SCoR) website from 05/12/22 to 01/04/2023. Social media was also used to advertise the study. Additionally, a snowballing technique²⁶ was used where participants were encouraged to share information about the research among their colleagues. Interested potential participants were able to contact the lead researcher directly and were given the opportunity to ask any questions related to the study. Potential participants' eligibility was checked and they were given participant information sheets and a consent form. The research team then contacted participants who sent back a consent form to book an interview date and time.

Data collection

Semi-structured online interviews took place between 06/01/2023 and 28/04/2023. See supplementary Material 1 for the topic guide used. The open-ended questions within the topic guide were developed by the authors with academic and clinical experience in the field. The research team consists of a lecturer in Radiography

Table 1
Participant roles.

Participant	Role
Diagnostic Radiographer	Diagnostic radiographers are registered healthcare professionals who are responsible for the medical imaging process/examination from patient care and communication, positioning patients to taking medical images.
Imaging assistant	Imaging assistants are used to support radiographers in terms of collecting patients from the waiting room, patient identification and communicating with patients.
Assistant practitioner	Assistant practitioners support radiographers and their roles can consist of patient care, communication, positioning and taking medical images. Assistant practitioners working in the UK are not registered healthcare professionals therefore must have their medical images checked and 'signed off' by a registered radiographer.

with over 7 years of experience in the field of end of life care research, as well as 8 years as a HCPC qualified Diagnostic Radiographer. The second author is a Professor of Nursing and Healthcare equity with experience and expertise in qualitative research. The final author is an Associate Professor of medical imaging, with 25 years of clinical and educational experience. Topics explored experiences and roles during medical imaging examinations including feelings, understanding and emotions during and after the examination, support and policy guidance in the area and teamwork.

The audio recorded online interviews were carried out by a male researcher (AS) who has had interview training as well as previous experience interviewing participants on the subject of end of life care. There was no prior contact other than to send the participant information sheets and organise the interview time/date. Participants were given the option to take part in the online interview while in work or at home. Following written and verbal consent the semi-structured interviews were carried online via phone or video call depending on participant preference. Only audio was recorded for the purposes of this study. To aid understanding during the interviews, additional questions, rephrasing and prompts were used. All the interviews were recorded and transcribed verbatim by A.S, and transcripts were anonymised before data analysis.

Analysis

Thematic analysis²⁷ was used to analyse the transcribed interview data, non-verbal gestures were not considered. Inductive iterative coding was conducted to explore and understand the experiences of the radiography workforce involved in the medical imaging of patients as part of their end of life care, and deductive to locate data aligned to the research aim. This analysis process followed six stages: familiarisation via iterative reading, initial code generation, theme generation and development, theme review, naming and defining the themes and lastly writing up and reporting the themes. Analysis was initially carried out by A.S and cross checked by the research team, see Table 2 for a breakdown of the analytical process. Moreover, frequent discussions were held between the research team during the construction of the themes and analysis process to enhance trustworthiness. All names were replaced with pseudonyms.

Table 2
Six stages of thematic analysis adapted from Braun and Clarke (2006).

Stage	Description
Data familiarisation	Following transcription, data were read and re-read several times, and any early ideas/concepts were recorded.
Developing initial codes	Parts of the transcript that were relevant to the research aim were systematically coded.
Searching for sub-themes and themes	Sub-themes were then assembled from the coded data and main themes were then compiled from the data relevant to each sub-theme.
Revising themes	The assembled themes were then checked in relation to the sub-themes, codes, and the entire data set.
Naming and defining themes	To refine, name and define each theme analysis was ongoing and conducted several times following initial theme development.
Developing the report	The most relevant and important examples following final analysis were chosen to best achieve the research aim. See Table 4 for a breakdown of the sub-themes and themes.

Results

Participants

In total, there were 8 participants (n = 5 Diagnostic Radiographers and n = 3 imaging assistants and assistant practitioners). Interviews took on average 35 min and ranged from 21 to 53 min. The research team were not aware of any notable or obvious reasons for the range in interview times. See Table 3 for participant characteristics.

Three themes were identified from the interview data following thematic analysis, see Table 4 for a breakdown of the analysis process.

Education, training and policy

An absence of policy, education and training was identified across all transcripts in relation to supporting and guiding the radiography workforce to care for patients receiving medical imaging as part of their end of life care. Participants highlighted that they would not know where to go to seek support and guidance. Also, despite participants demonstrating a knowledge of other courses and educational packages delivered within their hospital trusts, they unanimously highlighted that these do not cover end of life care topics and are not fitting to end of life care scenarios in which they find themselves in. Analysis also identified that the absence of policy and education was evident across the modalities from general X-ray to nuclear medicine, as well as across the workforce from imaging assistants to radiographers.

There is no policy that I can think of regarding radiology and end of life. I wouldn't know where to go ... as a radiographer, it's not something that we would get involved in. [Male diagnostic radiographer working in general x-ray and nuclear medicine]

Not specifically for dealing with patients with terminal illness or those kind of things. As I say, there is courses that we have on occupational health with counselling, and things like that, but it doesn't seem necessarily fitting for those [end of life care] situations, if that makes sense. [Female imaging assistant working in MRI]

Table 3
Participant characteristics.

	Diagnostic Radiographers (N = 5)	Imaging assistants (N = 2)	Assistant practitioners (N = 1)
Age			
31–40	1		1
41–50	1	2	
51–60	2		
Unknown	1		
Sex			
Male	1	1	1
Female	4	1	
Primary modality			
General X-ray	1		1
Computed Tomography (CT)	2		
Nuclear Medicine	1		
Magnetic resonance imaging (MRI)		2	
Breast imaging (mammography)	1		
Years of experience			
1–10	1		1
11–20	1	1	
21–30	3	1	

Table 4
Summary of analytical process (excerpts, codes, sub-themes and themes).

Extracted excerpts	Codes	Sub-theme	Theme
<i>There is no policy that I can think of regarding radiology and end of life. I wouldn't know where to go ... as a radiographer, it's not something that we would get involved in. [Male diagnostic radiographer working in general x-ray and nuclear medicine]</i>	Policy Education	• Absence of policy and education across modalities	Education, training and policy
<i>This is the terrible thing actually, we are always going on about this, that we don't actually have any training as radiographers ... [Female diagnostic radiographer working in breast imaging]</i>	Learning Training Opportunities	• Perceptions and inclusive education and training opportunities • Tailored and profession specific education and policy • The impact on the workforce and practice	
<i>So you don't get to see a lot of the information ... You just see the clinical information regarding the request. So it didn't say anything in the request about her being on end of life. [Male diagnostic radiographer working in general x-ray and nuclear medicine]</i>	Patient-needs Knowledge Identification Awareness	• Awareness and identification of end of life care needs • Repeat visits of patients receiving end of life care • Impact of not knowing • Person centred care	Awareness and identification of patients receiving end of life care
<i>What you see and what you feel can link up to what you have going on in your own life, but also it does have an accumulative effect and it's funny because radiographers do suck it up and they get on with it and I just say it does become your norm. [Female imaging assistant working in MRI]</i>	Emotions Toll/effect Support Resilience /expectations Personal life Accumulation	• Accumulative emotional toll and personal life experiences • Managing emotion in the context of expectations and responsibilities • Support available	Emotional toll and burnout

Some participants held the perception that they were not included in end of life care education because patients leave the department and they do not usually see patients die in the same way nursing staff do.

I'm sure there's very specific training for that for those staff [nursing staff], but I don't think in CT in radiology there is that because that's not the expectation of the patient's journey through our department You know, they're expected to leave the department and not pass away in the department. So I don't know whether that's part of the reason why there isn't that training there. [Female diagnostic radiographer working in CT 1]

Radiographers tended to feel they were missed out of end of life care policy and education compared to other professionals such as nursing.

There may be guidelines on end of life care for the nurses and things like that, but as far as we're concerned, we have nothing. [Female diagnostic radiographer working in general X-ray]

A similar lack of formal training was also noted in breast imaging. It was expressed that despite radiographers working in breast imaging regularly caring for patients on supportive end of life care pathways, they receive no training to support them during the often sensitive and emotional imaging examinations. Despite having no formal training, it was apparent that staff still made an effort to provide high quality care, namely care they would be happy to receive themselves.

This is the terrible thing actually, we are always going on about this, that we don't actually have any training as radiographers to deal with this sort of thing. I mean, you just kind of dig into yourself being like a human being and thinking, well, how would I feel in this situation? Because I've had times when I've had women weeping ... [Female diagnostic radiographer working in breast imaging]

A lack of education and training was also noted by the assistants included in this study. For example, it was identified that imaging assistants commonly come face to face with patients receiving end

of life care as part of their frontline job role (greeting patients, explaining the procedures and positioning patients), but despite this they expressed feeling forgotten despite feeling that they have most of the patient contact. Imaging assistants therefore expressed the importance of including all levels of diagnostic radiography staff who have contact with patients receiving end of life care in training and education opportunities, not just radiographers.

The assistants do have the majority of the patient contact and so I think sometimes that's forgotten you know, assistants are band threes in our MRI department, I think sometimes because you're band three you're not seen as a professional and then sometimes you can also be missed ... So I think it's important that if any kind of training or anything comes into play with regards to dealing with difficult situations or sensitive conversations, I think it's important that all levels of staff are included. [Female imaging assistant working in MRI]

In terms of education topics and area of need participants highlighted they would value education and training to support them to be able to have sensitive conversations with patients receiving end of life care. Participants highlighted they need guidance to support to appropriately step in and start conversations as well as deal with potential emotions during and after interactions. Building knowledge and skills on how and when to conclude and stop sensitive conversations was also identified as a key area requiring training, especially given the fast paced and busy medical imaging environment.

It's something we've always complained about as radiographers that we see these ladies [receiving end of life care], but we don't really know what to say or how to say it. [Female diagnostic radiographer working in breast imaging]

A lot of them [patients receiving end of life care] are able to communicate, and a lot of them are visually and verbally upset and so I think training and support on how to have conversations with patients and, have them in a sensitive way ... sometimes it can be hard to know how to stop a conversation if somebody's pouring their heart out to you and their worries. Sometimes it's hard to know how to deal with that and you'll you've got time constraints in imaging. There's always a queue of people that need to come in and be imaged. [Female imaging assistant working in MRI]

Our analysis suggests that all participants would like education and training to support end of life care, but there were some diverging viewpoints with regards to mode of delivery. For example, while some highlighted, they would like online education and for it to sit alongside their current eLearning modules as part of mandatory training, others expressed the need for the education to be delivered in person to enable the sharing of stories and scenarios they have faced, with online delivery seen as depersonalising.

I think if you can do training for things like safeguarding and recognising scenarios, that should be raising a red flag, then surely there's like an eLearning module or something that could be created to just say think about these patients. [Female diagnostic radiographer working in CT 2]

The online quiz type thing and the cartoons and stuff, I don't think are necessarily the best way, especially when you are dealing with, you know, it's quite a serious subject, end of life and terminal illness. So I think something that's kind of depersonalised does not really doesn't fit with it ... it would be good to hear other people's stories [Female imaging assistant working in MRI]

Analysis suggests that the absence of policy and educational support has negatively impacted the radiography workforces' knowledge and confidence when caring for patients receiving end of life care, with some participants highlighting they have to rely on life experience to not shy away from sensitive subjects. However, it was suggested that not all staff may be able to draw on their life experience, such as those with less experience. Radiographers working in CT highlighted their role in supporting and preparing students for potentially upsetting experiences without any training themselves.

[policy and guidance and education] just doesn't exist, and the only way that you can start to be able to help that patient is with your life experience and not shying away from it. [Female diagnostic radiographer working in CT 2]

And so I do try and prepare people ... I would do that with the students and then obviously sometimes our students stay on with us and get jobs with us so they have kind of been exposed to that [end of life scenarios] over time. [Female diagnostic radiographer working in CT 2]

Awareness and identification of patients receiving end of life care

Being able to identify patients who were receiving the medical imaging as part of their end of life care was challenging for some staff. Specifically, it was apparent that information needed to determine whether someone was receiving end of life care could not always be learnt from the X-ray requests on the hospital systems. Therefore, frontline staff often relied on the department lead or external staff for information pertaining to the patient. This lack of clinical knowledge was particularly prevalent in nuclear medicine where it was highlighted that the vetting of patients' X-ray requests is carried out by a radiologist rather than a radiographer.

I only knew because my ... the lead told me that she [the patient] had been put on end of life. So yeah there was nothing. The hospital where I worked was all electronic notes. So working in nuclear medicine, all requests are vetted by a radiologist, not by the radiographer. So you don't get to see a lot of the information ... You just see the clinical information regarding the request. So it didn't say anything in the request about her being on end of life. [Male diagnostic radiographer working in general x-ray and nuclear medicine]

Similar responses were apparent across the modalities, with participants working in general X-ray highlighting that they have to rely on doctors to provide them with information that a patient is receiving medical imaging as part of their end of life care. However, some radiographers felt that a lack of information pertaining to patients was not unique to end of life care, and was experienced for other patient groups, such as those with COVID-19.

When they doctor rings up for it [requesting the x-ray], they will say this person is end of life. And that's the only way we would know ... They don't give us a lot of information and I don't know why. But they are like that with everything. I mean, when we had COVID patients initially they wouldn't tell us that they were COVID patients. [Female diagnostic radiographer working in general X-ray]

It was however identified that repeat exposure to patients that return to the department for staging and surveillance scans helped the workforce develop a better understanding of patients end of life care trajectories.

You know, a few years of me working at the [hospital name] I didn't have much understanding of what was going on like I'd see the same patients ... because in X-ray and CT, you kind of see the same people quite often. You'd see them very unwell. [Female diagnostic radiographer working in CT 2]

We have a lot of patients that obviously come for different staging. Obviously a lot of people come back for surveillance ... it's something that happens day in, day out. [Female imaging assistant working in MRI]

Participants unanimously supported and understood the importance of being able to identify patients receiving end of life care. For example, it was highlighted that being cognisant of a person's end of life care needs could allow staff to better adapt their communication to avoid potentially upsetting patients and their significant others. It was expressed that saying something potentially upsetting could be remembered by the family into the bereavement period. Although this should be standard practice for all patients, it was apparent that being able to adapt care and communication was particularly important in these situations given the sensitive nature of end of life care.

I think it would be better for the radiographers to know that the person is on an end of life pathway and that's mainly because you know that as a radiographer you chat with patients and if somebody's on their end of life pathway you don't want to be saying the wrong thing and things that kind of upset the patient ... Your actions could be upsetting to the patient and their family. If there's family with them, that's what they're going to remember. [Male diagnostic radiographer working in general x-ray and nuclear medicine]

Yes, it [being aware that a patient is receiving end of life care] does, because you kind of know what you're dealing with, but we wouldn't start the conversation unless the lady wanted to ... [Female diagnostic radiographer working in breast imaging]

It was also expressed that for some staff having the knowledge that someone was receiving medical imaging as part of their end of life care would help them change and 'soften' their usual approach to care, enabling a more informed approach to care.

And I have one colleague who is kind of known for being a little bit impatient ... So, I think maybe for instance, if somebody like him was aware that they were dealing with somebody that had just had a terminal diagnosis or was end of life, it would potentially maybe soften people that. [Female imaging assistant working in MRI]

The importance of increasing awareness of end of life care needs was not only apparent amongst radiographers, but also support staff, such as imaging assistants. Examples were given where assistants had not been aware of patients end of life care needs, and therefore were not able to understand the persons emotions and provide adequate support and person centred-care.

I had a young girl once who was in the waiting room and she had shouted at the aid [imaging assistant] who'd gone to prepare her for the CT scan and he'd come away very put out by that. But I went out to see what the problem was, and she was like I'm dying of cancer. I've got three young kids at home. [Female diagnostic radiographer working in CT 2]

Emotional toll and burnout

Although the level of awareness of patients' on end of life care varied between participants (discussed in the previous theme), it was evident that in cases where medical imaging staff were aware

that a patient was receiving imaging as part of their end of life care an emotional toll was felt.

This was one that we actually knew [was receiving end of life care] ... It was the most horrendous thing and working with my colleague, we've spoke about this briefly before, but neither of us can articulate it. [Female diagnostic radiographer working in CT 2]

It was suggested that this emotional toll was accumulative. However, despite strong emotions and feelings 'accumulating' within radiographers and support staff, our analysis suggests that they tended to suppress rather than express their emotions due the nature of their job. Furthermore, the emotional toll was particularly significant when participants could relate a patients' situations through their own life experience.

What you see and what you feel can link up to what you have going on in your own life, but also it does have an accumulative effect and it's funny because radiographers do suck it up and they get on with it and I just say it does become your norm. So, it doesn't necessarily hit home with every single, sad story. You see some where you do feel you're able to move on, but every now and again, there will be something that sticks with you. [Female imaging assistant working in MRI]

There was evidence that end of life care experiences, particularly in cases where staff related the experience to their personal life had long lasting and potentially permanent emotional impacts. For instance, participants commonly spoke about their own families and feeling deep sadness and empathy especially towards patients receiving end of life care who have children.

Yeah, that's still upsetting to me now because I have my own children and you. So, you can put yourself in there. That persons shoes. [Male diagnostic radiographer working in general x-ray and nuclear medicine]

Similarly, it was apparent that despite regular exposure to patients on end of life care trajectories and some staff viewing it as 'part of the job', caring for those nearing the end of life still had an emotional toll, especially in cases of younger patients with family.

... I think now it's a sad thing say this, sometimes it just feels like it's become like a job where you think ohh. I mean, granted it does shock you still, like the other day I had a 28-year-old who was pregnant and that threw me completely because she's very young and she was expecting her second child. [Female diagnostic radiographer working in breast imaging]

It was suggested that the accumulation of these emotions can lead to burnout. Specifically, examples were evident throughout the transcripts where being frequently exposed to end of life care scenarios combined with personal life experiences, and without any formal support led to emotional trauma and burnout for some staff.

... she basically had to stop being a CT radiographer because her husband had cancer and she started to find it too traumatic. [Female imaging assistant working in MRI]

Despite feeling these emotions, analysis suggests that the fast-paced nature of the job, increasing responsibilities and meeting the needs of other patients led the radiography workforce to bury their feelings and emotions about patients going through end of life care. Staff felt they did not have the time to be able to properly reflect and deal with their emotions and prioritised getting the next patient scanned. The fast-paced nature was particularly evident in CT.

It is however evident from the data presented in this theme that although some staff felt they did not have time to reflect on their experiences, an emotional toll was still felt.

It's hard going in CT because it is fast-paced, there is all this pressure on the services because you are dealing with very ill patients one minute and somebody who walking and chatting in the next ... you know the contrast is stark sometimes ...

You might, you know, reflect on it a little bit at the time. But then, like you say, it's a fast pace environment. You know, you've got another patient to deal with that's coming in the scanner straight after. So there isn't always a time to do that at the time. [Female diagnostic radiographer working in CT 1]

There was a clear lack of formal support mechanisms in place for the radiography workforce to be able to reflect on their experiences and manage their emotions.

There is no support that I know of at all. There's no policies about how we would deal with it, if it affected us emotionally, what we should do. [Female diagnostic radiographer working general X-ray]

Although staff highlighted the importance of supporting each other informally through traumatic experiences, it was apparent that peer support often relied on teams who have worked together for a long period.

We do look after each other in our team and if somebody had something that happened to them while they were on shift, we would always make sure they were OK, you know. ... we've all kind of worked together for a long time. So we kind of know we've all been through similar things at one point or another. [Female diagnostic radiographer working in CT 1]

It was identified that increasing workloads, high staff turnover and extended shift patterns hindered togetherness in the team and thus ability to provide peer support. A lack of supportive leadership was also apparent, with some frontline staff highlighting that they felt their managers were unaware of end of life care responsibilities and emotions they felt and were just concerned with numbers of patients being scanned.

Because workloads increased so much and we've had so many new people coming in and a high turnover of staff, we've lost the old values of looking out for each other and being protective of each other ...

I don't think the managers know. They are just so concerned with numbers we've got this many scans outstanding. We need to scan this many a day. [Female diagnostic radiographer working in CT 2]

Discussion

Main findings

This study has provided a first insight into the experiences of the radiography workforce delivering medical imaging as part of patients' end of life care. Findings identified a distinct lack of policy, education and training to support radiography staff. The absence of education hindered staff's ability to be able to provide evidence based care for those at the end of life. Participants expressed a need to develop the skills and knowledge to be able to conduct sensitive conversations with patients and their significant others. Our findings also identified that participants wanted to increase their awareness of end of life care needs to be able to adapt a more

person centred approach to care. Lastly, findings revealed the accumulative emotional toll experienced by radiography staff caring for those nearing the end of life. Despite this, it was apparent there is a notable lack of emotional support for radiography workforce at all levels, which our findings suggest has been worsened by high staff turnover and increasing workloads and expectations.

What this study adds?

Our findings identified that despite the radiography workforce frequently interacting with patients on an end of life care trajectory, there was little formal training, education or policy guidance to support them. Other patient groups such as those living with dementia have received much more attention in regards to education,²⁹ and policy guidance aimed at supporting the radiography workforce improve care.³⁰ Our findings have thus highlighted an important policy and education gap which must be filled. We recommend the development of policy and education that is aimed specially at radiography workforce to increase their awareness of patient needs as well as supporting with the knowledge and confidence to initiate and deal with sensitive conversations with patients on end of life care, as well as their significant others.

Although the call for education was unanimous, our findings did identify disagreement amongst participants in relation to how education and training should be delivered. Wider literature has found that education delivered using a range of different delivery modes was necessary to meet the needs and requirements of a diverse workforce.³¹ For instance, in the social care sector it has been found that training delivered via online asynchronous was particularly effective for staff as it allowed them to download material and read in their own time,³² whilst 'on the job' and scenario based face to face training were also identified as effective by staff who prefer to learn by doing by doing.^{28,33} However, further research is required to better understand the contextual barriers and facilitators to education and training delivery in medical imaging departments. Previous work has suggested that high staff turnover may hinder the retention of knowledge within the workforce, especially if it is delivered as a 'one off' single session.³⁴

Our findings identified that the radiography workforce felt they had a limited understanding and awareness regarding being able to identify patients on end of life care. All participants agreed that increasing their awareness and ability to identify those on end of life care was important for them to be able to adapt their care and provide a more informed patient centred approach. Again, other patient groups such as those living with dementia tend to be more identifiable to radiography staff through the electronic request system, moreover, it is also advised that any staff caring for those with dementia should be informed about the person's diagnosis prior to the examination.³⁰ Despite this, recent research has found that radiographers still have difficulty identifying patients living with dementia, and often only find out when they are in the X-ray room.³⁵

Nonetheless, it was still evident that being exposed to patients during their end of life care had an accumulative emotional toll on the radiography workforce. Though not directly comparable to the context of medical imaging, the emotional toll of caring for those on end of life care has been well reported in nursing and social care.^{36,28} Although informal peer support was utilised by radiography staff, our findings suggest that in the absence of formal support combined with increasing workloads, led to the suppression of negative feelings and experiences. Previous work has also found that negative emotions associated with exposure to death and dying were exacerbated and heightened by increasing responsibilities, workloads and high staff turnover.³⁷ Thus, although

the HCPC's new standards of proficiency for radiographers has adopted an increased recognition of the emotional burden that comes with working in high pressured environments,⁸ our findings suggest a clear need to provide more formal support not only for radiographers but for support staff such as assistant practitioners and imaging assistants who support radiographers on the front-line.

Strengths and limitations

This is the first study exploring the radiography workforces' experiences of providing medical imaging for patients as part of their end of life care. However, given the authors' backgrounds in both medical imaging and end of life care, there was a potential for bias and subjectivity during data collection and analysis. To mitigate potential bias and subjectivity, reflexivity was considered throughout our study³⁸ via frequent meetings and discussions between the research team such as during analysis.

Another strength was the diversity of our sample, with a mix of participants with different roles, backgrounds, experience levels, cultures. Whilst this data set has allowed us to capture the experiences of a typically diverse workforce, it is acknowledged that cultural and contextual depth specific to particular religions and communities may have been missed. We therefore recommend further research in hospitals within specific geographical areas, particularly those serving socio-economically diverse populations.

We acknowledge the potential sample bias brought about by the purposive sampling strategy. Thus, it must be recognised that our findings only relate to the study sample and do not necessarily represent the wider experiences and opinions of the medical imaging workforce. Consequently, we recommend further research into end of life care provision in UK medical imaging departments as well as international exploration to explore whether the findings expressed in this study are experienced and evident in other countries. Also, no pilot interviews were performed to test the topic guide, thus we consider the possibility that conducting pilot interviews may have reduced the need to rephrase some of the questions during the interviews.

Lastly, the authors recognise that without an understanding of the experiences of patients themselves at centre of the process, the evidence is radically incomplete. It is therefore important that future research engages directly with patients receiving medical imaging as part of their end of life care. It is hoped that this study will lay the foundations for this future research.

Conclusion

This study has provided the first insight into the delivery of end of life care in medical imaging, highlighting the clear and important role of the radiography workforce in patients' end of life care. Findings identified an absence of end of life care policy guidance and education accessible to radiography staff, limiting their ability to provide evidence-based informed care for those nearing the end of life during medical imaging examinations. Findings also suggest difficulty identifying patients receiving end of life care further hindered staffs' ability to provide informed person centred care. Lastly, the workforce felt an accumulative emotional burden following their interactions with patients nearing the end of life; findings suggest these feelings were largely suppressed. Despite these barriers, it is important to recognise our findings suggest that staff persisted to provide the best care possible and recognised the importance of their role within patients' end of life care journeys.

We therefore recommend the development of policy and education initiatives aimed directly at radiography staff to improve their knowledge and confidence particularly in relation to

conducting and dealing with sensitive conversations and improving awareness of patient's needs. We also recommend formal support interventions are put in place to help staff manage and understand their emotions and build emotional resilience. However, there is first a need for future research exploring the patient perspective in order to understand their experiences so that the education and policy provision is driven by patient need.

Author contributions

AS conceptualised the study and collected the data. AS, VH and KS were involved in the data analysis. AS drafted the manuscript, with the support of VH and KS. All authors contributed and agreed to the final manuscript.

Conflict of interest statement

None.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2023.10.019>.

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