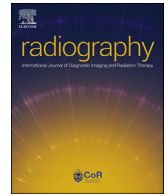




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# The lessons learned working in diagnostic and therapeutic radiography departments through the COVID-19 pandemic in Northern Ireland, UK. What can we do differently the next time?



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## ABSTRACT

**Introduction:** Following the emergence of the COVID-19 pandemic in January 2020, a radical restructure of NHS services occurred, prioritising the acute needs of infected patients. This included suspending routine procedures, leading to an inevitable resurgence in the future, placing increased demands on the NHS, including diagnostic and therapeutic radiographers. With radiography departments already experiencing staff shortages due to COVID-19 related illnesses and vulnerable staff shielding, there is a need to implement plans within radiography departments to ensure their sustainability in the future. **Methods:** A mixed methods study was undertaken in Northern Ireland, involving distribution of a survey to diagnostic and therapeutic radiographers alongside conducting interviews with radiography department managers.

**Results:** 106 radiographers completed the survey, with 9 radiography managers and 2 band eight superintendents participating in interviews. Over 60% of participants felt that morale declined in their departments, with the majority feeling that the pandemic had a negative impact on their physical or mental health and wellbeing. Managers felt that to improve staff morale and motivation, incentives need to be offered including remuneration, flexible working and support for professional development.

**Conclusion:** Whilst predicting when the next wave of a COVID-19 variant or the next pandemic will occur is impossible, preparation and planning will help manage the situation better. This requires identifying clinical areas for expansion/retraction and having access to additional staff to meet the demands on the service to ensure all patients receive care not just those acutely ill.

**Implications for practice:** This study has identified key lessons learned from the pandemic within the radiography departments. This will enable preparation and strategic planning for future pandemics.

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## Introduction

The COVID-19 pandemic emerged as a serious public health concern in January 2020 <sup>1</sup>, subsequently resulting in a total of 214,015,140 cases and 1,983,650 deaths globally with 21,933,206 cases and 173,352 deaths in the UK alone (as of 25 April 2022).<sup>2</sup> However, COVID-19 was not the first pandemic, following the Spanish flu in

1918, Severe Acute Respiratory Distress Syndrome (SARS) in 2003 and H1N1 or “swine flu” in 2012.<sup>3</sup> Experience of managing these pandemics led to the development of a global network of laboratories linked to the World Influenza Research Centre in London in 1957, which acted as a research hub for virus tracking.<sup>4</sup> Despite better virus tracking vigilance and communication systems than in previous pandemics, it took only three months for the COVID-19 epidemic, first recognised in China, to spread across the globe.<sup>5</sup> Recent authors have reported that it is possible the COVID-19 virus will mutate and evolve into a more dangerous variant which could lead to the possibility of a “more lethal and virulent virus” in the future.<sup>6–9</sup> At the time of writing (June 2022) current media headlines are warning against the emergence of another wave of

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coronavirus globally i.e. BA.4 and BA.5 COVID-19 variants<sup>10–12</sup> It is projected that new variants are 30% more infectious than Omicron which is already 70% more infectious than the previous one and “it’s almost impossible to avoid this”.<sup>13</sup>

The pandemic forced the NHS to radically restructure services, prioritising the acute needs of infected patients while suspending most routine health procedures to cope with increased demand on the service.<sup>14</sup> While the general public delayed seeking help in order to protect the NHS during this period, this has merely postponed healthcare assessment and treatment causing an inevitable resurgence of need that will challenge the NHS in the future; this is particularly true regarding incidences of cancer and heart disease, two of the major killers in society today.<sup>15,16</sup>

Oncology experts estimate that 60,000 cancer patients could die because of a lack of diagnosis or treatment due to the impact that the COVID-19 pandemic has had on society.<sup>17</sup> Deaths and a surge of more advanced, critically ill patients may be inevitable in the not-too-distant future with each new mutation of the virus. This parallel cancer “epidemic” is something the diagnostic and therapeutic radiography workforce will be faced with for months and years to come. The radiography workforce is already facing staff shortages due to COVID-19 related illness, with vulnerable radiographers requiring shielding and pregnant radiographers leaving patient-facing roles earlier.<sup>18</sup> Plans need to be implemented into radiography departments to ensure the sustainability of services into the future. As identified by Albert Einstein “If you want to know the future, look at the past”.

This study aims to identify lessons learned from the COVID-19 pandemic and to review successes and failures within radiography so that as a profession, we can prepare strategically for the next wave of COVID-19 or another communicable or vector-borne disease.

## Methodology

A mixed methods study was performed, to obtain views from Diagnostic Radiographers (DRs), Therapeutic Radiographers (TRs) and Radiography Managers in Northern Ireland.

Phase 1 included an electronic survey designed using Qualtrics and reported to adhere to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES)<sup>19</sup> (see appendix 1). Diagnostic and Therapeutic radiographers throughout NI were invited to participate using Twitter and LinkedIn and the survey ran from 26th February 2021 to 20th April 2021. Participation was voluntary and participants were recruited by snowball sampling. Radiography managers in Northern Ireland were also sent the link and asked to share information of the study with their staff. A participant information sheet (PIS) was provided at the start of the survey detailing the study aims and rationale. The PIS informed participants about the content of the survey, indicating that it would take approximately 10 min to complete. Participants were then given the option to click “proceed” to give their consent to proceed. The questionnaire consisted of five main sections or ‘blocks’, four of which have been reported in a previous publication.<sup>20</sup> This current paper focuses on section 1 “participant demographics” and section 5 of the survey i.e. the section titled “Learning from the COVID-19 experience” which consisted of a mixture of 9 open and closed questions. A pilot study was performed with a panel of 8 qualified radiographers and academics working in medical imaging and radiotherapy. Minor typographical and formatting changes were made before sharing widely.

Phase 2 utilised online semi-structured interviews with both Diagnostic and Therapeutic Radiography Managers in Northern Ireland, conducted with the aid of Microsoft Teams. Dates and times of each interview was agreed in advance via email. One

experienced researcher who is fully trained in qualitative interviewing, conducted all semi-structured interviews with the aid of an interview guide which was developed using preliminary data gained from the all the survey responses in Phase 1 (see appendix 2). Once consent was obtained, interview data was digitally recorded. Transcription and coding of all data was performed independently by two researchers. Full details of the methodology has been described in the previous publication.<sup>20</sup>

## Ethics

Ethical approval was obtained from the Ulster University Filter Committee and NHS Research Ethics Committee (NHS REC) in December 2020 (IRAS project ID 287032).

## Data analysis

Descriptive analysis of the quantitative survey data was performed with the aid of IBM SPSS v27.0. Survey and interview data were transcribed verbatim, checked for accuracy, and analysed using NVivo. An iterative approach of Braun and Clarke's (2006) six stage framework was used to conduct thematic analysis. Two independent researchers coded the data prior to any discussion as recommended by Cutcliffe & McKenna (2004). A 90–99% alignment was found and following a brief discussion, coding agreement reached 100% between the researchers. Codes were then analysed together by the researchers and subthemes (first order themes) were developed. These subthemes were then grouped into second order themes.

## Results

### Phase 1: staff survey

#### Professional/personal demographics

106 radiographers completed the survey; 82 DRs 24 TRs. Respondent demographics are outlined in [Table 1](#).

#### Staff mental and physical well-Being

The impact of COVID-19 on the mental and physical well-being of staff was evident through the survey. It was apparent in the staff surveys that morale declined throughout the pandemic for both DRs and TRs (61% and 62% respectively) with only 7% of DRs and 4% of TR feeling morale improved, with some staff feeling morale remained the same (22% DRs and 13% TRs) ([Table 2](#)).

DRs most commonly cited (32 comments) that feeling a moral obligation to work overtime and changes in shift patterns, had the greatest impact on declining morale as this left staff feeling ‘burnt out’. The second most commonly cited reason for low morale was lack of support and/or communication from management (10 comments). Other common reasons for low morale included cancelling of annual leave (7 comments), lack of socialising outside of work (7 comments), lack of staff room (6 comment), anxiety around COVID (6 comments) and isolation from different modality teams (5 comments).

For TRs, the two factors cited most commonly as reducing morale were the lack of social interaction at breaks (9 comments) and increased workload (8 comments). Other common reasons cited for low morale were anxiety around COVID (6 comments), PPE fatigue (4 comments) and lack of socialising outside of work (4 comments).

The majority of DRs (67%) and TRs (63%) felt that the COVID-19 pandemic negatively impacted their mental and physical health and well-being with only 6% of DRs and 4% of TRs reporting an

**Table 1**  
The demographics of the 106 radiographer respondents.

		Diagnostic radiographers	Therapeutic radiographers
		% and number of participants*	
Years in radiography practice	0< years	20% (n = 16)	17% (n = 4)
	5–10 years	17% (n = 14)	21% (n = 5)
	11–15 years	16% (n = 13)	4% (n = 1)
	16–20 years	9% (n = 7)	17% (n = 4)
	>20 years	20% (n = 16)	21% (n = 5)
	No response	18% (n = 16)	21% (n = 5)
Gender	Male	18% (n = 15)	21% (n = 5)
	Female	79% (n = 65)	79% (n = 19)
	Other	1% (n = 1)	
	Preferred not to say	1% (n = 1)	
Age range	20–30 years old	38% (n = 31)	33% (n = 8)
	31–40 years old	35% (n = 29)	46% (n = 11)
	41–50 years old	22% (n = 18)	13% (n = 3)
	51–60 years old	5% (n = 4)	8% (n = 2)
	>61years old	0% (n = 0)	0% (n = 0)

**Table 2**  
Changes to morale due to COVID-19.

		DR	TR	Yes- Better	No- Same	Yes- Worse	No response
Do you feel morale in your department is different since COVID-19?	DR			7% (n = 6)	22% (n = 18)	61% (n = 50)	10% (n = 8)
	TR			4% (n = 1)	13% (n = 3)	62% (n = 15)	21% (n = 5)

**Table 3**  
Impact of COVID-19 on mental and physical health and well-being.

		DR	TR	-3 negative	2	1	0 neutral	1	2	+3 positive	No response
Has the pandemic had an impact on mental or physical health and well-being?	DR			15% (n = 12)	22% (n = 18)	30% (n = 25)	15% (n = 12)	5% (n = 4)	1% (n = 1)	0% (n = 0)	12% (n = 10)
	TR			13% (n = 3)	21% (n = 5)	29% (n = 7)	8% (n = 2)	4% (n = 1)	0% (n = 0)	0% (n = 0)	25% (n = 6)

improvement in their mental and physical health well-being (Table 3).

Of the TR respondents 54% reported that their employers had introduced measures to improve staff well-being and resilience compared with 39% of DRs (Table 4).

Staff were asked what they personally gained from dealing with the pandemic. DRs most commonly (10 comments) cited resilience and the ability to work under pressure as their greatest lesson learned. Other common responses from DRs included an in-depth knowledge of infection control (7 comments), greater professional competency (7 comments) and greater appreciation for the normal things in life (7 comments).

TRs most commonly cited greater professional competency (6 comments) and increased resilience working under pressure (4 comments) as being the most important lessons learned from the pandemic.

*Preparation for future pandemics*

The majority of participants (80% of DRs and 58% of TRs) felt prepared to cope with another wave of the pandemic or a similar pandemic (Table 5).

Opinions surrounding the COVID-19 pandemic and living with the aftermath varied (Table 6). Since last March, the opinions of

39% of DRs and 38% of TRs surrounding COVID-19 have changed as we live with the virus, with a minority of participants feeling it has been blown out of proportion (9% DRs and 4% TRs). 57% of DRs and 38% of TRs were worried about the impact of COVID-19 on the people they loved, whilst 10% of DRs reported feeling threatened when thinking about COVID-19. Only 7% of DRs and 8% of TRs were not worried about COVID-19 with 4% of DRs and 8% of TRs not at all concerned and happy to get on with things as normal.

*Feelings about COVID-19 vaccinations*

At the time of the staff survey (February 2021), the majority of participants (74% of DR and 67% of TR) had received the vaccine with some radiographers expressing wanting to wait for a period before deciding whether to have it or not (4% DR and 4% TR). Concerns about the long-term effects of the vaccine were expressed by 13% of DR and 17% TR, with 6% of DR and 4% of TR concerned about how quick it had been approved, although more participants felt the vaccines were safe to use (12% DR and 29% TR). The deviation between dose times was concerning for 15% of DR and 29% TR with 4% DR and 4% TR preferring to wait longer for doses in line with manufacturer's guidelines. 6% of DR and 8% of TR were happy to wait longer between doses to allow more vulnerable people to be

**Table 4**  
Employer measures during the pandemic.

		DR	TR	Yes	No	No response
Has your employer introduced any measures to help improve your well-being and resilience during the pandemic?	DR			39% (n = 32)	49% (n = 40)	12% (n = 10)
	TR			54% (n = 13)	21% (n = 5)	25% (n = 6)

**Table 5**  
Preparedness for another pandemic.

		Yes	No	No response
Do you feel prepared to cope if there is another wave of COVID-19 or similar pandemic?	DR	80% (n = 66)	9% (n = 7)	11% (n = 9)
	TR	58% (n = 14)	17% (n = 4)	25% (n = 6)

**Table 6**  
Opinions on COVID-19.

	Yes	No	Thinking about COVID-19 makes me feel threatened and vulnerable	I am not worried about COVID-19	I am worried that I or people I love or care about will get sick from COVID-19	I am not remotely concerned and happy to get on with things	I feel it is all blown out of proportion and COVID-19 is just like any other flu/virus	
Has your opinion of the COVID-19 crisis changed since last March as we have learned to live with the virus	DR	39% (n=32)	20% (n=16)	10% (n=8)	7% (n=6)	57% (n=47)	4% (n=3)	9% (n=7)
	TR	38% (n=9)	8% (n=2)		8% (n=2)	38% (n=9)	8% (n=2)	4% (n=1)

vaccinated. Only 7% of DR and 40% of TR had no concerns at all about the vaccine (See Table 7).

*Phase 2: interviews*

Interviews were conducted with eight Diagnostic Radiography managers and two Therapeutic Radiography managers across the five Health and Social Care (HSC) Trusts in Northern Ireland and the Independent sector. A paediatric superintendent diagnostic radiographer, who managed a paediatric radiography team, also provided written information. Table 8 provides an overview of the managers' demographics.

Despite including managers from a variety of diagnostic radiography and therapeutic radiography settings, there was remarkable consistency in the lessons learned between all managers who were interviewed. Five central themes were identified regarding lessons learned from COVID-19. The derivation of these themes is outlined in Table 9.

*Importance of staff*

It was apparent that managers felt that a high-quality service was provided to patients throughout the pandemic, praising staff implicitly for their commitment.

**Table 7**  
Apprehensions about vaccines.

I am already vaccinated	I am in no hurry to get vaccinated. I will wait and see if there are any side effects first	I am concerned that it has been produced and approved so quickly	I am concerned that we do not know the long-term effects of the vaccines	I am concerned about the altered time frame between vaccine doses are not as per the clinical trials	I would prefer to wait longer if it meant I got the doses within the recommended time frame as per the manufacturer's guidelines
DR 74%(n=61)	4%(n=3)	6%(n=5)	13% (n=11)	15%(n=12)	4% (n=3)
TR 67% n=16)	4% (n=1)	4% (n=1)	17% (n=4)	29% (n=7)	4% (n=1)
I worry it may not be effective against the virus mutations	I have no concerns at all	I will get vaccinated as soon as I can	I am happy that all regulatory bodies have approved the vaccines and they are safe to use	I am happy to wait longer between vaccine doses to ensure more people get the first dose and more people are protected	I am happy to delay getting vaccinated until the elderly and more vulnerable are vaccinated first
DR 10% (n=8)	7% (n=6)	2% (n=2)	12% (n=10)	6% (n=5)	5% (n=4)
TR 17% (n=4)	4% (n=1)		29% (n=7)	8% (n=2)	4% (n=1)

Managers discussed how free parking during the pandemic, made a huge difference to morale, indicating that small but important gestures like this are essential in maintaining a happy workforce. Managers suggested that an increase in pay was another important option that should be considered to maintain the radiography workforce.

Whilst managers felt that many DRs did not want the transition of moving to a 24/7 or on-call service, many managers felt that this change had a positive impact on their staff and is necessary for future sustainability. The need to maintain staff competencies in a variety of areas to ensure optimal flexibility and adaptability within the service was acutely apparent to managers.

However, some managers expressed concern that staff may not be as interested in taking on continuous professional development (CPD) modules due to fatigue, potentially impacting their careers and role development within departments. Many specialist staff were mobilized back into clinical settings, with managers noting that there has been an impact on role development and opportunities for staff to diversify.

The need for additional staff to reduce waitlists and return them to pre-COVID-19 numbers was highlighted by managers. This is particularly important with existing staff experiencing fatigue and managers concerned this would translate to more

**Table 8**  
Managers' demographics.

Gender	Band	Number of employees managed	Sectors Managed
Female	8a	27	Mammography
Female	8a	17	CT
Female	8b	243	DEXA, Plain film, CT, MRI, Nuc med, Cath lab, theatre radiography and others
Female	8a	90	Nuclear Medicine, CT, MRI, Cath lab
Female	8a	200	Plain film, Ultrasound, CT and MRI
Female	7b	25	Paediatric Imaging Team
Male	CEO -Private Sector	680	Hospital-wide including multi-modality diagnostic radiography
Male	8a	100	Imaging Service Improvement
Male	Private sector	151	MRI, Plain film, Ultrasound, theatres, wards and OPD - hospital wide management
Female	8a	25	Radiotherapy Treatment Team
Female	8b	113	Radiotherapy Service
Female	8b	40	Radiotherapy Service

\*To maintain confidentiality, the order of the managers in Table 8 are not consistent with the numerical value assigned to managers' quotes in the results section.

**Table 9**  
Themes, subthemes and codes obtained from the data analysis.

Theme	Subtheme	Codes
Importance of Staff	Managers' appreciation of staff	<ul style="list-style-type: none"> <li>• Praising staff</li> <li>• Boosting staff morale</li> </ul>
	Managers' potential future challenges with maintaining staff numbers	<ul style="list-style-type: none"> <li>• Staff competencies</li> <li>• Continuous professional development</li> <li>• Staff numbers</li> <li>• Long-COVID</li> <li>• Staff recruitment</li> <li>• Staff contracts</li> <li>• Changing work hours</li> </ul>
Importance of Equipment, Technology and Physical space	IT Infrastructure	<ul style="list-style-type: none"> <li>• Working remotely</li> <li>• Staff and student training</li> <li>• Virtual reviews</li> <li>• Electronic referrals</li> <li>• Appraisals</li> <li>• Brainstorming time</li> </ul>
	Physical resources	<ul style="list-style-type: none"> <li>• Physical space</li> <li>• Equipment</li> </ul>
	Non-physical resources	<ul style="list-style-type: none"> <li>• Funding</li> <li>• Red tape</li> </ul>
Importance of a Trust/Regional approach to maintaining a flexible, adaptable and transparent COVID-19 response Plan	Creation of adaptable profession specific COVID-19 response plan	<ul style="list-style-type: none"> <li>• Unique aspects of radiography PPE</li> <li>• COVID-19 response planning</li> </ul>
	Collaborative working	<ul style="list-style-type: none"> <li>• Trust and regional communication</li> <li>• Multidisciplinary communication</li> <li>• Communication with Society of Radiographers (SOR)</li> <li>• Communication with private sector</li> </ul>
Importance of aligning workflow to 'new' working practices	Anticipated long-term changes to workflow	<ul style="list-style-type: none"> <li>• Infection control</li> <li>• PPE</li> </ul>
	Anticipated long-term additional support services required	<ul style="list-style-type: none"> <li>• Advanced cancers</li> <li>• Late diagnosis</li> </ul>
	Anticipated long-term increase in radiography workload	<ul style="list-style-type: none"> <li>• Restructuring of services</li> <li>• Increased working hours</li> <li>• Backlog of patients</li> </ul>
Importance of Communicating Effectively with Service Users	Public awareness	<ul style="list-style-type: none"> <li>• Patient complaints</li> <li>• Patient compliance</li> <li>• Patient acceptance of appointments</li> </ul>
	Changes to interactions between staff and patients as a result of COVID-19 restrictions	<ul style="list-style-type: none"> <li>• Restrictions on patients and their family when visiting radiography</li> <li>• Staff experiences with patients and families</li> <li>• Parental involvement in imaging/treatment</li> <li>• Paediatric care</li> </ul>

sick leave, more requests for part-time hour contracts and potentially some staff leaving the profession. It was also expected that pregnant staff would leave patient-facing roles and take maternity leave earlier than pre-COVID-19 times. Furthermore, long-COVID amongst staff was another concern with the full effects of this phenomena unclear at this time. Concerns regarding the future mental health and psychological wellbeing of staff and subsequent service impact was also concerning, not only due to COVID-19 but also due to the increased numbers of advanced diseases being scanned and treated due to COVID-19 waitlists.

Staff recruitment in the NHS and private sectors is an ongoing concern due to the national shortage of radiographers. One manager discussed trying to recruit staff from overseas, but visa applications were held up and the process became impossible due to COVID-19. Managers highlighted the importance of fast recruitment routes, eliminating 'red tape' which slows down the recruitment process. They emphasised the importance of permanent contracts to encourage professionals to join their teams and retain staff, with some managers talking about how 'agency staff' should be eliminated. Table 10 provides comments from managers regarding this theme.

**Table 10**  
Managers discuss aspects relating to the importance of their staff.

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'There's a huge backlog and the implications of this are going to be long term. This isn't going to be a quick fix. And I don't know how much stamina the staff have as it stands at the minute ... I don't think I can ask much more of them ... so that really does worry me.' (Manager 1)

'In my opinion have delivered a service safely. Staff have been exceptional.' (Manager 2)

'... the things our staff are most excited about at the minute are the £500 that they are probably going to get, maybe taxed the life out of ... anything that gives them financial gain that they could then go and do something with. That's what actually spurs people on.' (Manager 3)

'I suppose, certainly with retraining people to do mobile imaging again and stuff, I know it all does come back to you fairly quickly. But I suppose those were competencies that we didn't think about maintaining.' (Manager 4)

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#### *Importance of equipment, technology and physical space*

Managers' experiences of procurement of new equipment and resources throughout the pandemic was inconsistent. Some managers talked about rapid funding being allocated to them for new scanners and equipment at the start of the pandemic. They noted that a lot of the 'red tape', which normally slows down processes within the system, was removed, leading to fast innovative changes with positive results moving forward. However, other department managers noted that none of their equipment was replaced and they do not have the physical space to develop their department. These managers expressed the need for more physical space and up-to-date equipment to manage the future volume of patients and decrease waitlists. For mandatory training which can be delivered online, managers stressed the importance of physical space to enable their staff to complete their training and the importance of having enough workstations to accommodate this delivery. Managers indicated that the lack of physical space during the pandemic often limited students' practical opportunities for learning as 'normal'. Lecture rooms and x-rays rooms which were previously available for student practice, were sometimes shut down and some managers felt they may need to spend more time with the students impacted by the pandemic to ensure that their skills are at the expected level. However, other managers felt that students' training had not been impacted.

Managers describe how the shift to enable some staff to work from home during the pandemic, was largely dependent on the IT infrastructure within that department. They discussed how COVID-19 enabled rapid transition to remote access of software, changing the working practices of radiographers in certain roles. Technology also enabled staff who were vulnerable to COVID-19 to work from home, which was not possible before the pandemic. Managers view this infrastructure as vital to the continued success of their service post-COVID-19.

While virtual/telephone review clinics for patients post-treatment and post-scanning were acceptable during COVID-19, managers generally felt that this was not a sustainable alternative due to patients' preference for face-to-face reviews and subsequently normal reviews would return in the future.

Managers described how electronic referrals have gained momentum throughout the pandemic, avoiding the need for hard copies, often resulting in incomplete information and lost referrals. They highlighted the importance of this system in aiding and easing workflow in the future. They described how Microsoft Sharepoint has been extensively utilised during the pandemic to increase the efficiency of document sharing, aiding the rapid response for changes within departments.

Despite technological advances through the pandemic, managers acknowledge that remote technology has limitations, and is not necessarily a suitable format for staff appraisals and discussing more sensitive matters with staff. Managers felt that moving forward, training in this area is important, particularly if continuing with virtual reviews.

They also felt that in many ways, virtual meeting technology provided them with less time to brainstorm, reflect or assimilate

ideas as meetings are scheduled back-to-back. They reflected on the value of walking or driving to a meeting prior to the pandemic. [Table 11](#) provides comments from managers regarding this theme.

#### *Importance of a trust/regional approach to maintaining a flexible, adaptable and transparent COVID-19 response plan*

Managers felt that future planning relies heavily on strong communication throughout the HSC Trusts and the independent sector. Rather than guidelines being created and implemented, a taskforce including all services need to be involved in COVID-19 response planning from the early stages, as different procedures and areas will require individual guidance and each department needs to be risk assessed in its own right. Following creation, response plans need to be transparent, flexible and regularly reviewed. Whilst guidelines can be helpful from the Trust as a whole, service managers need to be prepared to make ongoing, often daily decisions based on a thorough risk assessment. Managers feel they need to be able to react to changes and modify their department's COVID-19 response plan for various changes in the virus. All managers highlighted the importance of strong communication within the Trust and between staff to ensure success. Managers also indicated the need for radiographers to have a stronger identity to have their concerns heard and understood.

Many managers indicated that the pandemic improved multi-disciplinary interactions and teamwork, providing networking opportunities with other teams. They felt this created a more collaborative working environment and helped all teams to understand each other's role and the impact of the pandemic on various teams. Managers regarded this multidisciplinary team as a key form of peer support during the pandemic, offering brainstorming opportunities and providing assistance when required. They also cited the Society of Radiography (SOR) as an important network during uncertain times and highlighted the important contribution of the local SOR representative. One manager of a mammography team felt that the cross-working practices enabled their team to showcase their skills and change the perception of the mammography service.

Managers indicated that the five HSC Trusts and private sector have never worked so closely together and highlighted the massive contribution of the private sector in facilitating NHS patients to receive essential imaging procedures during the pandemic.

However, frustrations were raised by private sector managers concerning communication with the NHS regarding their contracts with them and future planning. [Table 12](#) provides comments from managers regarding this theme.

#### *Importance of aligning workflow to 'new' working practices*

All managers agreed that awareness of the importance of infection control has been heightened through the pandemic and it is essential to retain these practices in the future. However, there was a lack of consensus regarding the level of PPE which would be required long-term. All managers felt that in the immediate future some PPE would remain and therefore the time

**Table 11**  
Managers discuss the importance of Equipment, Technology and Physical Space.

'I've spent fourteen years trying to access NIECR ... we just couldn't get that. That was a nightmare ... However, things changed when COVID-19 came along. It was about half six and I emailed the people involved. And by the time I got out of bed the next morning, we had NIECR access ... And the same thing, the whole way through Covid,...they found a way to do it and they found a way with no fuss ... So I think that's the biggest thing that I have learned. That there always is a way to do it. (Manager 5)

*'in the future we are just going to need more rooms, more equipment and more staff, because I don't believe we'll ever catch up ... the future challenge really is equipment ... equipment is old, no matter where you look. It's a long time since we had any new equipment, and that is going to be a struggle.'* (Manager 6)

*'It always frustrated me as a manager that we weren't really set up to provide that for some of our team. And now I think it's much easier to do that. And to allow people ... or to support people to work from home.'* (Manager 7)

*'Zoom calls are great, Teams calls are great, but there's some things you can't discuss over Teams. Some sensitive situations, it feels impersonal if I was discussing something like that over Zoom or Teams. You do need to sit down with this person, find a room.'* (Manager 8)

**Table 12**  
Managers discuss the importance of a trust/regional pandemic response plan that addresses the unique needs for radiography.

'Certainly for us in radiography, you'd find that things had been put into place that certainly didn't necessarily meet the needs of the radiographers ... for instance one of the things that happened more recently was the standard introduction of visors. And what was difficult for the radiographers in the treatment sense was, because of the glare off the plastic, it made viewing images online more challenging ... ' (Manager 9)

*'I do feel that maybe my voice wasn't heard loudly enough. And there were lots of decisions being made outside of radiology which affected radiology, and people forgot to let me know. Maybe it was forgetting to let me know so that they could get their own way, I don't know. So I think that probably if I could do it again, I would probably be a stronger voice for radiology at the beginning.'* (Manager 2)

*'I remember being parked outside and I looked over at the hospital and thought, this is probably the only hospital in western Europe that is shut today. There's five ventilators sitting in that hospital and the shutters were down, because we couldn't get a decision from the Health and Social Care Board to say, yes, move patients to [named private site]. And that went on for two weeks. So that was probably the most stressful moment, waiting to see what was actually going to happen'.* (Manager 5)

*'the biggest challenge for us is how do we become part of that and how does the NHS partner with all the independent sector providers in being a solution to that. We account for something like about ten percent of all imaging diagnostics and services in the country. So we are a sizeable chunk of being part of that solution.'* (Manager 5)

needed for each patient procedure would remain longer than pre-COVID-19 times, putting additional pressure on HSC Trusts (see [Table 13](#)).

Managers expressed concern that more advanced cases of cancers are likely to be seen in the future, requiring more intensive ancillary support services and impacting both imaging and cancer centre workload and resources. They felt working practices would not return to pre-COVID-19 and the extended daytime hours and night shifts would need to be maintained indefinitely to meet service needs. Managers discussed how restructuring diagnostic services had been ongoing and is continuing to optimise capacity. Smaller sites commonly perform more non-complex work where radiology support is not needed, while larger sites perform scanning with contrast and Aerosol Generating Procedures.

##### 5. Importance of communicating effectively with service users

Managers stressed the importance of public awareness and support regarding the extra time needed per appointment and hoped that public messages would encourage more people to travel for appointments rather than their appointments being delayed.

They indicated that future planning should involve clear communication with patients around the impact of treatment or scanning delays to reassure them and explain the need for change. They felt that even aspects like removing a breast gown for patients having radiotherapy treatment should be explained to the patient so they were aware of the procedural changes and why they have been implemented.

Managers felt that asking patients to attend treatment on their own, particularly for radiotherapy, was difficult for staff. Paediatric

services found this particularly challenging in the cases of children and their parents (see [Table 14](#)).

One manager discussed the difficulty in achieving diagnostic imaging for children as both parents are often instrumental in aiding their child to complete the procedure. They explained that increased working hours allowed for 'quieter periods' for immunocompromised patients and allowed parents to get parked at the hospital, providing a less chaotic experience. In ultrasound, the new 'early' slots (8am/8:30am) have increased fasting compliance as the child skips breakfast, rather than fasting into the day and is therefore more cooperative. The manager also felt that immunocompromised patients (and accompanying adults) feel safer attending quieter slots, allowing capacity to increase routine imaging (thus improving waiting lists). Overall, they feel the changes introduced during the pandemic led to more coordinated services and efficient pathways. Lastly, this manager expressed concern that there will be an overlap of 'chest' season and 'fracture' season in paediatrics like last year, where prior to COVID-19, these seasons would have been different.

## Discussion

The pandemic has demonstrated that staff are the most valuable asset of the NHS and without them, services would grind to a halt. Staff have, and continue to experience vulnerability, fear and guilt at not being able to save all patients, as well as experiencing lingering COVID-19 symptoms and reporting chronic fatigue. Therefore, it is essential that easy access to emotional support and mental health resources is provided on a permanent basis to

**Table 13**  
One manager discusses their view of the use of PPE in the future.

*'PPE obviously will be at the front of everyone's minds for a long time. If somebody said tomorrow, COVID-19 is finished, people will still be wearing masks. People will still follow PPE. And even from a patient perspective coming in here, even if we are told you don't have to wear PPE, the staff in here don't have to wear it anymore, I think that patients will still expect to see us in PPE because they will be stressed coming into a hospital.'* (Manager 8)



**Table 14**

Managers discuss the impact of health and safety discussions on patients.

'Communications could have been better. And also we have highlighted to the Trust that the risk assessment didn't really consider the psychological impact on the patients of those decisions that we made at the time, which we thought were in everyone's best interests to keep us all safe.' (Manager 7)  
*Occasionally accompanying adults become quite upset, distressed, even angry. This tends to occur at check in (in the waiting area) – which is difficult for staff to manage without causing upset to other service users in the area.* (Manager 10)

reduce the incidence of burnout and post-traumatic stress disorder (PTSD).<sup>21,22</sup>

The Richards report, published in November 2020, indicated that 4000 more diagnostic radiographers are needed within the NHS with therapeutic radiography experiencing a similar shortfall.<sup>23</sup> However, on 9th November 2021, the UK government announced that all frontline NHS staff will be required to be double-vaccinated or face losing their job.<sup>24</sup> Fortunately, this legislation was revoked from the 15th March 2022 as in February 2021, only 70% of radiographers who participated in this study, had been vaccinated. If the legislation was implemented in all NHS hospitals throughout the UK, the risk of radiography staff shortages could have increased further as many radiographers may have decided to move into other professions. The NHS needs to prioritise retention and recruitment to deal with the lengthy waiting lists in the COVID-19 aftermath. This should include fast-tracking visas for qualified radiographers abroad to help to fill the shortfall in radiography staff. The elimination of complex processes and 'red tape' is essential to ensure this happens. Isolation of NHS staff due to contact track and tracing further impacted staff shortages. The elimination of the isolation period for fully vaccinated staff, following a negative PCR test and risk assessment, will reduce this risk of harm on patients and impact on the service.<sup>25</sup>

Despite free parking for staff during the pandemic, this was discontinued on 31st August 2021 in NI.<sup>26</sup> Furthermore, the proposed 3% pay rise to reward NHS staff for their relentless dedication throughout the pandemic is insufficient and essentially a pay cut for staff based on current inflation.<sup>27,28</sup> Buykx et al.'s systematic review provides strong evidence of the importance of remuneration in maintaining staff in their professional roles.<sup>29</sup> Without the allocation of sufficient funds directly to frontline staff within the NHS, attrition rates are likely to increase in the future months and years ahead.

Technology has been invaluable during the pandemic enabling patients to contact their doctors remotely and allowing those self-isolating to connect with their family and friends. It has also provided vulnerable staff the ability to work from home. To enable these practices to continue post-pandemic, investment in telehealth and delivering outpatients services is essential.<sup>30–32</sup> Reliance on technology has also increased due to improvements in electronic health records, reducing the burden of patient data entry and documentation and streamlining the process.<sup>21</sup> This will allow staff to spend more quality time with patients in the future.

At the start of the pandemic, emergency measures were implemented including the cancellation of elective surgeries, screening programmes and routine outpatient appointments as well as redeployment of staff and reemployment of retired staff. This, coupled with a collaboration between the NHS and independent sector, enabled patients to be safely and effectively treated.<sup>33</sup> To ensure maximum effectiveness moving forward, better communication is needed and a plan devised for the long-term role of the independent sector in healthcare provision and recovery of the health and care sector.<sup>34</sup> The unique needs of radiographers relating to establishing risk assessments was evident. Therefore, it is essential that their 'voice' is heard when decisions are being

made on safe service delivery in the future. It is imperative that radiography service managers are consulted in Trust/Regional talks and have "a seat at the table" when decisions affecting their practice are made.

#### What did we learn?

1. The 'red tape' associated with negotiating complex processes can be overcome very quickly when necessary. This "red tape" should be removed permanently.
2. Longer working days helped to coordinate and deliver a more efficient service.
3. The assistance of the independent sector was invaluable at the height of the pandemic to help maintain the NHS service delivery.
4. Specialised staff should be encouraged to rotate through radiology to maintain their skill set.

#### What can we do differently the next time?

1. Imaging academies should be made available across NI with physical space and multiple workstations which can be used at short notice to deliver mandatory training to staff online and/or facilitate remote working.
2. Surgery and treatments should not be cancelled. An emergency response plan should be readily available (devised with input from all NHS Trusts and the independent sector). Hospitals or specific departments can be designated as 'clean' or 'dirty' to enable all services to continue with those patients who are not infectious.
3. Clinical placement of undergraduate students should not be deferred but maintained throughout the pandemic to ensure a consistent flow in the workforce.
4. Continued education should be offered to staff to enhance knowledge on digital technology, telehealth and best use of virtual clinics.

#### Conclusion

It is impossible to predict when the next pandemic will occur, however preparation and planning can help manage the situation more efficiently. Whilst the vaccination programme continues globally it will take some time before herd immunity is achieved and the rise of new variants still pose a real threat for the health service. As the public learn to live with COVID-19, it is important that the NHS achieve optimal management of all patients, not just those with COVID-19, with dedicated hospitals or departments segregated to accommodate all patient types where required.

Clinical areas for expansion and retraction should be identified and access to additional staff should be readily available for immediate training/deployment to meet demand on the service, with CPD opportunities available for staff development.

### Conflict of interest statement

None.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2022.07.006>.

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