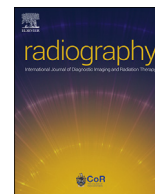


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## Survey of clinical placements within pre-registration diagnostic radiography programmes in the UK and Ireland

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### ABSTRACT

**Introduction:** Placement capacity is a challenge in supporting the clinical education of diagnostic radiography students within the UK at a time where growth in the workforce is required if service delivery needs are to be met. COVID-19 has been one of the catalysts in the growth of innovative and simulated clinical placement models. This survey seeks to understand the current picture of clinical education models and the drivers for it.

**Methods:** A short online MS Forms survey with mixed question types was distributed to higher education institutions (HEIs) delivering pre-registration diagnostic radiography programmes in the UK and Ireland. Descriptive and thematic analysis of data was undertaken to gain insight into the clinical placement models used.

**Results:** Responses related to 24 programmes from 17 HEIs were collated. Capacity issues, increased student numbers and ability to achieve the learning outcomes were the drivers for the model and arrangement of clinical placements. Clinical practice hours varied widely across programmes as did the proportion of simulation-based education. Respondents felt an increase in the use of placements in modalities and other settings could further increase training capacity.

**Conclusion:** Opportunities to further change the clinical placement model have been identified which may alleviate some pressure points on capacity. Guidance around clinical practice hours may facilitate a sustainable approach to workforce training. Innovative placement models will require assessment strategies that align in order that students demonstrate relevant capabilities in a range of settings and value varied learning opportunities.

**Implications for practice:** The collective engagement and innovation of higher education institutions and service providers will be needed to create sustainable quality models of clinical training and assessment to meet diagnostic radiography workforce requirements.

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### Introduction

Placement capacity issues have been a challenge in the training of healthcare professionals in the UK for some years,<sup>1</sup> and is also experienced in other countries.<sup>2,3</sup> In England, the vacancy rate for diagnostic radiographers is on average 11%.<sup>4</sup> The diagnostic radiography workforce deficit combined with the rising demand for diagnostic imaging,<sup>5,6</sup> further compounds the pressure on placement capacity. The 'diagnostics: recovery and renewal' report identified that an additional 4000 diagnostic radiographers are needed by 2025<sup>5</sup> creating challenges around supporting workforce development in the current climate.

The placement capacity needed to support the current and future diagnostic radiography students cannot be easily ascertained. The Health and Care Professions Council (HCPC) and the College of Radiographers (CoR) do not stipulate the minimum practice hours required in pre-registration programmes,<sup>7,8</sup> instead focussing on appropriate curriculum and practice placements to support students to reach the required standards. In contrast, CORU, the regulatory body of diagnostic radiographers in Ireland require approved programmes to have 1200 h of practice placements.<sup>9</sup> Whilst in other health care professions, Regulatory or Professional bodies may stipulate the number of practice hours and in some cases, how many of those can be accounted for by simulation. The Nursing and Midwifery Council (NMC) state a nursing programme must include a minimum of 2300 h of clinical practice<sup>10</sup>; The Royal College of Occupational Therapists (RCOT) requires a minimum of 1000 h of assessed practice-based learning.<sup>11</sup>

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In addition to traditional clinical placements, examples of the use of simulation-based education (SBE) to prepare students for, and replicate practice-based experiences have been reported in diagnostic radiography education.<sup>12–15</sup> The COVID-19 pandemic caused disruption to pre-registration diagnostic radiography programmes<sup>16</sup> and clinical education through loss of placements, reduced capacity due to social distancing, and the postponement of routine examinations.<sup>17,18</sup> This resulted in the need for further innovation by higher education institutions (HEI's) in the way in which student radiographers were supported to develop and meet the standards of proficiency including the substitution of clinical practice with a variety of SBE and virtual activity.<sup>16,19</sup> Respondents of an international audit of simulation use in 72 pre-registration medical radiation science training programmes, conducted in the midst of the COVID-19 pandemic, reported this to be a catalyst for the rapid adoption or expansion in the use of SBE.<sup>20</sup> The majority of programmes using SBE delivered 100 h per year or less, with greater use in year's 1 and 2 of the programme.<sup>20</sup> As seen in other HEI's,<sup>15,21</sup> responses were positive with regards to the future use of SBE and in thinking more innovatively about teaching and learning, though some had faced barriers and lack of support for simulation.<sup>20</sup>

The NMC's COVID-19 recovery programme standards permit up to 600 h of simulated practice learning experience,<sup>22</sup> whilst RCOT guidance limits this to 40 h.<sup>11</sup> CORU offers guidance and flexibility to diagnostic radiography educators in Ireland in adapting practice placement activities to ensure standards of proficiency can be met.<sup>18</sup> However, whilst radiology services mobilise to resume routine operation and commence a plan of recovery, placement capacity issues persist, and therefore the integration of SBE and virtual placements continues to develop.<sup>14,19,23</sup> In those professions where minimum practice placement hours are stipulated, the concept of capacity and demand in the practice placement setting is quantifiable. Despite knowing capacity issues in the practice setting are a barrier to increasing numbers of student radiographers, the scale of the issue can be difficult to determine unless an understanding of the demand higher education institutions place on practice placements is explored. At a time when placement capacity is an issue, workforce training expansion is needed,<sup>5</sup> and SBE and innovation has bloomed, a survey was conducted to gain a current picture of clinical practice education in pre-registration diagnostic radiography programmes within the UK and Ireland.

## Materials and methods

An online survey was created with 19 questions comprising of multiple choice, multiple response, and free text response questions. The survey was piloted by one higher education institution (HEI) delivering diagnostic radiography education outside the author's institution for clarity of instructions and terminology before being distributed. Institutional ethical approval was sought prior to study commencement (EC27030).

Thirty-three HEI's were identified as providing a range of pre-registration diagnostic radiography programmes in the United Kingdom and Ireland, through the Society and College of Radiographers directory of programmes,<sup>24</sup> the UCAS course listings and university webpages. The survey link and participant information were distributed via national professional networks and email addresses obtained from university webpages and professional profiles, to maximise response rate. Microsoft (MS) Forms was used to facilitate anonymised responses. For HEI's delivering more than one type of pre-registration programme, respondents were asked to complete separate surveys to ensure that any different approaches or structure to clinical placements between programmes could be captured.

The survey questions sought to identify the pre-registration programme type, length, and the delivering institution so that any duplicate responses pertaining to the same programme could be identified (Table 1). Multi response options were given to describe the arrangement of clinical placements within the programme, the range of activities used, and the reasons. Free text questions were used to quantify the hours of clinical placement activity and information on student numbers to contextualise the demand for clinical placement hours. Respondents were asked about the evaluation of the current method/s of clinical education within the programme and a final free question invited any additional comments regarding the capacity for, or the methods of, clinical education in meeting the appropriate standards.

Survey responses were exported into MS Excel and descriptive analysis was used. Braun and Clarke's<sup>25</sup> phased approach to the thematic analysis was adopted for the free text responses, and data analysed within the wider context of the survey questions.

## Results

Twenty-five survey responses relating to 24 pre-registration diagnostic radiography programmes were included in the results. This included those from the pilot study as the survey was not altered following the review of the pilot responses. Eighteen of the 33 higher education institutions listed as programme providers in the UK and Ireland responded (54.5%; 17/33), 1 of which was a new education provider yet to commence delivery. When correlating responses to HEI's programme provision, it was identified that not all responding HEI's completed a survey response for each pre-registration diagnostic radiography programme they offered. There were 2 respondents reporting on the same programme from the same HEI and these responses were amalgamated to avoid double reporting.

The majority of responses were for programmes delivered by HEI's in England (n = 17), followed by Scotland (n = 3), Ireland (n = 2) and lastly Wales and Northern Ireland (n = 1 each respectively). The largest proportion (70.8%) were 3 year BSc (Hons) diagnostic radiography programmes (Table 2). The responses represent 47.1% (n = 24/51) of all pre-registration diagnostic radiography programmes in the UK and Ireland. When cross referenced with the list of approved programmes on the HCPC and CORU websites this indicated that 22 of the programmes were approved by the HCPC and 2 by CORU.

The total number of students on the programme in the academic year of 2021/22, excluding 3 new programmes which had yet to recruit students, ranged from 15 to 380, with an average of 148 students. Except for one apprenticeship programme, the BSc (Hons) diagnostic radiography programmes had larger student numbers. Compared to the 2021/22 first year intake, projected student numbers for 2022/23 were greater in 9 programmes, less in 7, static in 4, and 1 was unknown. The largest increase was by 14 BSc students, and the largest decrease by 12 MSc students.

Block weeks of clinical placements were the most common structure within diagnostic radiography programmes: two thirds of programmes used all the hours-of-service operation for placements i.e. 24 h, and slightly more used a 7-day week (Fig. 1). Placement allocation throughout the academic year was used in over half of the programmes to increase clinical placement capacity, as was placing multiple students in one placement by, for example, splitting the week or day (Fig. 2). Other means of increasing capacity were explained with free text responses:

*'Interprofessional placements and some simulation is being used by one trust who have significantly upped their numbers'* [RES 13].

**Table 1**  
Survey questions & response type.

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I have read the participant information sheet and consent to taking part in the survey.

- Yes (Multiple choice)
- No

Please indicate the type of programme your institution delivers, and the rest of the survey answers will pertain to. (Multiple choice)

- Pre-registration BSc (Hons) Diagnostic Radiography Programme
- Pre-registration MSc Diagnostic Radiography Programme
- Pre-registration Apprenticeship Diagnostic Radiography Programme
- Top up Pre-registration BSc (Hons) Diagnostic Radiography programme

How many years is the programme of study? (Multiple choice)

- 1 year
- 2 years
- 3 years
- 4 years

Please state your higher education institution. (Free text response)

How many students were there on this programme in total (all stages) in the academic year 2021–2022? (Free text response)

How many students were in the new intake on this programme in the academic year 2021–2022? (Free text response)

What is the projected intake of new students on the programme in 2022–2023? (Free text response)

What type of activity do students undertake as clinical education on the programme which accounts for their clinical placement hours? (Multi answer)

- Clinical placements in areas of diagnostic imaging/radiography
- Clinical placements in patient facing area's (not in diagnostic imaging/radiography)
- Clinical placements in non-patient facing area's
- Face to face clinical simulation
- Virtual clinical placements
- Peer Enhanced e-Placement (PEEP)
- Other

Please specify 'other activity' if selected. (Free text response)

Please indicate the reasons for the curriculum design in delivering clinical placement education within this programme. (Multi answer)

- Increased student numbers
- Lack of placement capacity
- Quality of educational experience
- Ability to achieve intended learning outcomes
- Issues caused by the Covid 19 pandemic
- Student preference/feedback
- Other

What is the total number of clinical practice hours within this pre-registration diagnostic radiography programme? (Free text response)

Please specify how many clinical placement practice hours on the programme are accounted for by each of the various activities eg placement in imaging departments 1500 h; simulation 100 h; non-patient facing placement 30 h etc. (Free text response)

How are the clinical placements arranged in the programme? (Multi answer)

- Block weeks of clinical placement
- Day/s release every or most weeks
- Use of the 7-day week
- Use of all the hours the service is open ie 24 h
- Other

Are any of the following methods used to increase clinical education capacity within your practice placements? (Multi answer)

- Coaching, or Collaborative Learning in Practice (CLiP)
- Placement allocation throughout the year ie holidays; summer
- Multiple students in 'one placement', for example splitting the week/day between students
- Splitting cohorts
- Other

If you selected 'other' in the question above, please explain further. (Free text response)

Has the current method/s of clinical placement education been evaluated? (Multiple choice)

- Yes
- No

Please summarise the evaluation method and findings for traditional clinical placement in a diagnostic imaging department. (Free text response)

Please summarise the evaluation method and findings for other placement types, stating what type of clinical placement it relates to (ie simulation etc). (Free text response)

Please give any additional comments regarding the capacity for clinical education, or the methods of clinical education in meeting the appropriate standards. (Free text response)

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'Use of dedicated clinical skills facility' [RES 21].

The range of activities used within programmes as a clinical placement varied, as shown in Fig. 3. All programmes had clinical placements in diagnostic imaging, and for 2 BSc (Hons) diagnostic radiography programmes this was the only placement type used.

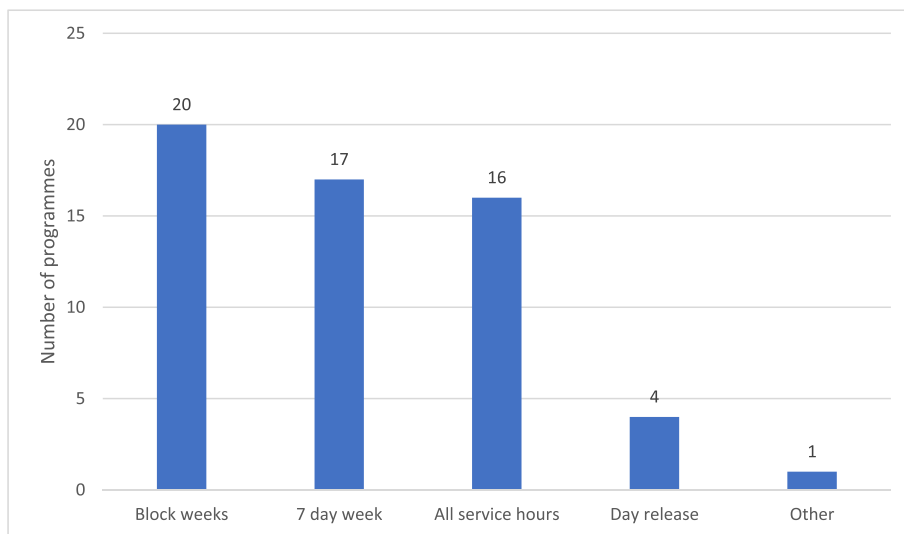
Five programmes used 'other' to describe some of the placement activity and this was expanded upon in the free text comments:

'Other- online clinical simulation' [RES 10; RES 11].

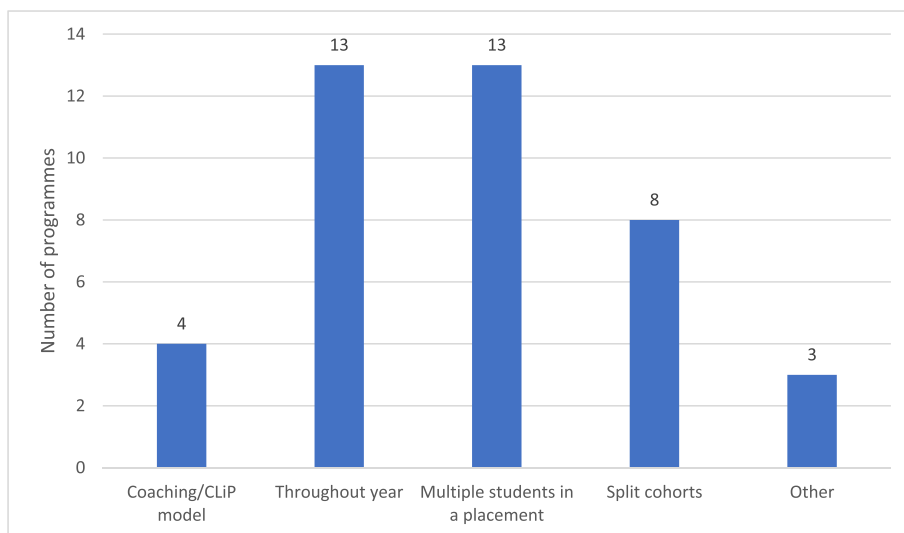
'Our students have placement in wards and care homes at the moment. We are also hoping to expand this into hospices in the future' [RES 20].

**Table 2**  
Clinical placement activity by type and number of programme hours.

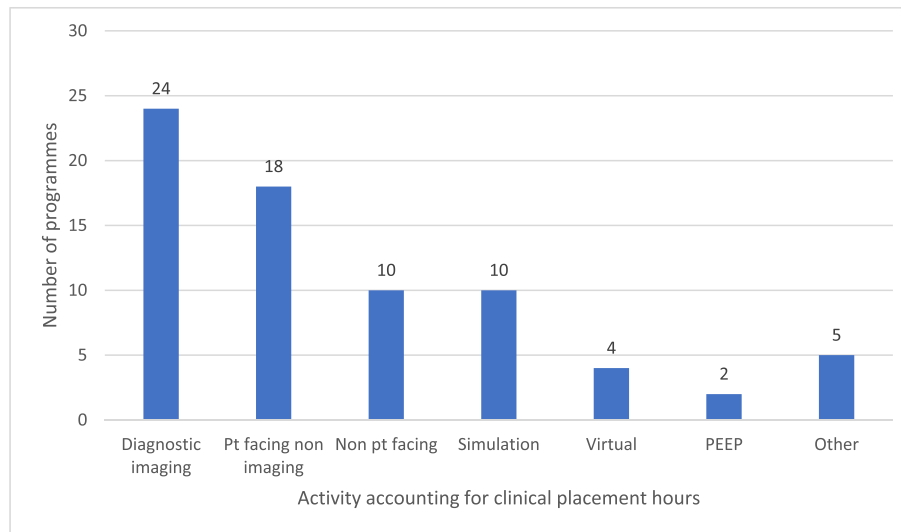
Clinical placement activity	Hours across programme				Number of programmes specifying breakdown of hours for this activity	
	Min hours	Max hours	Median hours	Mean hours		
Total number of clinical practice hours in programme	BSc (all)	1150	2085	1500	1538.3	17
	BSc ≤3 yrs	1325	2085	1537.5	1606.8	14
	BSc 4 yrs	1150	1305	1200	1218.3	3
	MSc Pre Reg 2 yrs	1200	1260	1200	1220	3
	Apprenticeship 3 yrs	1470	4176	1537.5	2180.3	4
Placement in imaging department	1150	2088	1562.5	1532.3	10	
Clinical placement	1150	1628	1270	1342	9	
Non-radiography	30	75	52.5	52.5	2	
Non-patient facing	10	75	42.5	42.5	2	
Work based learning (non- patient facing)	2008	2008	2008	2008	1	
Simulation	30	90	40	48	5	
Face to face simulation	40	225	40	101.7	3	
Online simulation	15	15	15	15	2	
VR/Simulation	225	225	225	225	1	
Virtual placement/PEEP	200	200	200	200	1	



**Figure 1.** Arrangement of clinical placement within the programme.



**Figure 2.** Methods used to increase clinical education capacity within practice placements.



Pt=patient; PEEP = Peer-enhanced e-placement

**Figure 3.** The type of activity students undertake which accounts for clinical placement hours.

*'Electives/optional modules allow student choice of focus/activity in UK and international setting'* [RES 21].

The total number of clinical placement hours within each programme ranged from 1150 to 4176: the 2 year MSc pre-registration programmes had the lowest mean, and the apprenticeship programmes the highest (Table 2). The 2 programmes approved by CORU had 8.7% and 25% more placement hours than the minimum requirement. Hours by placement activity were given for 19 programmes, but not specified by all respondents using the same descriptors as given in a previous survey question, as shown in Fig. 3. The respondents indicated in some cases this was because it varied or was unknown and could depend on how the clinical staff across departments devised student rota's, therefore some activities were amalgamated under one term such as 'clinical placement' (Table 2). In 4 responses the free text indicated that whilst respondents were able to quantify the total clinical placement hours in the programme, they could not always quantify the time spent in each of the separate activities:

*'The total hours are delivered in clinical placement there is no defined division'* [RES 8].

Time in the imaging department accounted for the greatest number of clinical placement hours, and hours allocated to the types of simulation and virtual placements were greater than those in non-radiography and non-patient facing clinical placements. The 12 counts of simulated or virtual placements where hours could be specified (Table 2) came from 10 programmes. The simulated and/or virtual placement activity in those programmes accounted for between 1.6% and 14.8% of the total placement hours, with the mean and median 6.2% and 4.2% respectively. Of the 10 programmes in this group, those with the lowest placement hours tended to have a lower number of SBE/virtual placement hours, though this did not hold true for all programmes.

Respondents indicated numerous reasons had influenced the clinical placement design within the programme, with quality of experience, increased student numbers and ability to achieve learning outcomes each cited in over 50% of the programmes, and lack of placement capacity in 45.8% (Fig. 4).

One third (n = 8) of programmes had evaluated the current method/s of clinical education. The free text responses demonstrated that a variety of methods were used to evaluate the traditional clinical placement in a diagnostic imaging department including placement audits, student feedback and evaluations, meetings with placement providers, link lecturers, and programme committee meetings. The evaluation findings were positive in several responses:

*'Students are happy with our placement model'* [RES 7].

*'While each site has a unique combination of specialities, there are still sufficient learning opportunities and support on each site to fulfil the requirements of the University'* [RES 16].

Whilst some evaluations highlighted challenges, or the consideration of changes to placements:

*'However, Clinical departments .. are now struggling to support the student numbers due to an increase in student numbers, decreased placement capacity due to decreased staff (staff left or on sick) and loss of rooms due to DR upgrades'* [RES 21].

The evaluations that took place for other placement types were captured via module reviews and focus groups, and were related to simulation, both in person and online, and in clinical skills facilities, which evaluated positively overall:

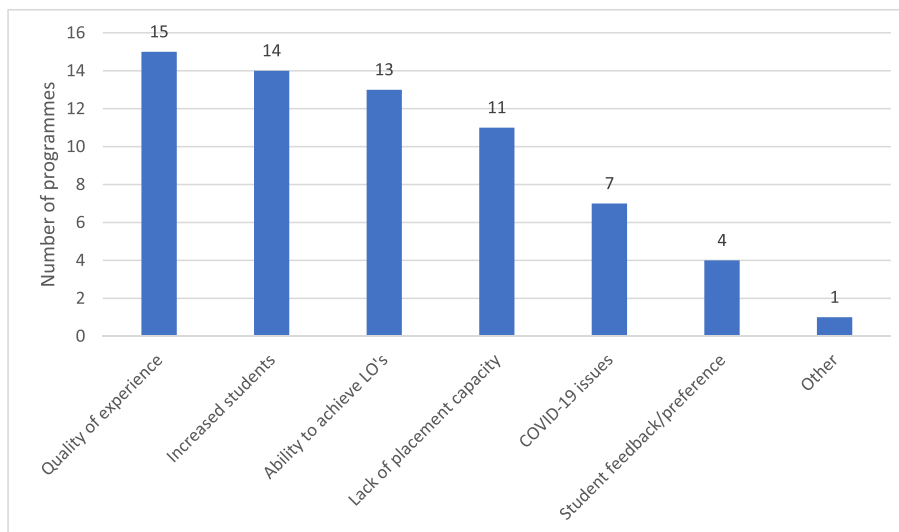
*'Simulation in person and online: Positive in terms of preparation for clinical placements'* [RES 10 & 11].

*'Students generally support this method [simulation] of learning but some do not see the value'* [RES 21].

*'Use of clinical skills facilities feeds back well with students though capacity still an issue'* [RES 22].

Thematic analysis of the additional free text responses in the context of the qualitative data set overall, identified the two main themes of staff resource and varied learning opportunities. A sub-theme of staff resource was assessment burden:





**Figure 4.** Reasons for the design of clinical placements within the programme.

*'It is perhaps not just capacity that is the issue but assessment methods; the more assessment placements are required to be involved in may affect their ability to take more students'* [RES 22].

*'I feel that there will come a point when the number of learners in a department becomes untenable with the increase in providers, and the need for HEI negotiations with Trusts to accommodate different clinical assessments, the workload is increasing for clinical and academic staff'* [R8].

Whilst it was reaffirmed shift patterns had been used to maximise learning opportunities, there was an opinion that more varied learning opportunities could be utilised to increase capacity:

*'If we did not focus so much on plain film imaging, we could significantly increase capacity by using MRI, CT etc. Need more support (in terms of dedicated staff time) to support students in practice. This is critical in increasing capacity'* [RES 13].

*'... we have asked our University Link Radiographers to consider areas that students could be placed in that will allow them to achieve generic healthcare skills as part of their practice assessment document'* [RES 17].

However, the relevance of those varied learning opportunities may not be recognised by staff and students:

*'We find that there is a reduction in student satisfaction with placements when they are not in patient facing areas or spend a long time in modalities which do not enable them to complete their target examinations'* [RES 9].

## Discussion

Whilst COVID-19 has previously been reported as expediting the extent to which SBE and virtual placements have been used in the delivery of clinical education,<sup>14,16,19,20,22</sup> this survey demonstrates that lack of placement capacity, increasing student numbers and the ability to achieve outcomes are key drivers in the use of simulation, varied placement types and models.<sup>14,21</sup> The impact of the COVID-19 pandemic on radiography clinical placements is subsiding as normal services re-establish and social distancing measures cease, however the survey responses demonstrate there

is a need to continue this varied approach as the traditional reliance of placements within an imaging room becomes more challenging. Advancement in innovation and technology enhanced learning (TEL) has seen simulation and immersive technologies embedded in the national strategy and the evolving concept of what a clinical placement is.<sup>26,27</sup> Simulation, virtual or PEEP placements were used in between 41.7% and 8.3% of the programmes, and successfully adopted by other HEIs in the literature.<sup>12–14,20,21,23</sup> Similar to the findings of Bridge et al.<sup>20</sup> the majority of hours for those HEIs who could specify were below 100 h of SBE within a programme. As with other literature there was evidence in the survey that SBE was well received by students.<sup>12–14,28</sup> Whilst curriculum design for the educator starts with the intended learning outcomes before development of appropriate learning activities such as SBE, and assessment, the student perspective is to focus on the assessment first.<sup>29</sup> Diversifying the placement model means assessment strategies will need to be in alignment<sup>29,30</sup> to maintain a pedagogical approach and allow students to value and recognise the relevance of different learning experiences. There is therefore the potential to further expand the complementary role of SBE and TEL within diagnostic radiography clinical education model.

There was variation in the demand for clinical placement hours across programmes in the UK and Ireland, as also seen in other studies<sup>15,31</sup> which impacts on the demand for capacity. Standardisation did not occur across the 2 programmes approved by a regulatory body with existing minimum practice placement requirements.<sup>9</sup> Thus, introducing guidance on practice hours may not improve capacity issues if programmes vary in the amount by which they exceed a minimum requirement. However, if guidance were in place, it might steer expectations for the demand on clinical placement capacity a programme places. As might be expected, the greatest proportion of clinical placement hours still comes from time spent in the imaging department, with some programmes using solely this model for all placement hours. Whilst capacity in some areas of the imaging department has been maximised through shift patterns and extending the weeks of the year placements are used, increasing placements in imaging modalities, non-radiography clinical settings and non-patient facing activities could create capacity. There is opportunity to reflect on the total demand for clinical placement hours, and those areas of high demand in the clinical setting, when seeking out appropriate learning opportunities to support achievement of

relevant outcomes. Care should be taken not to assume quantity equates to quality of learning experiences.

In line with the findings of Williams et al.,<sup>1</sup> the survey found there was a perception that capacity could increase if there was the staff resource (clinical and academic) to support clinical education and assessment. Growth in service demand and the backlog caused by the pandemic is outstripping service capacity, and staff deficits, burnout and attrition are impacting on training capacity.<sup>32</sup> The rise in student numbers, potentially from different HEIs, increases the assessment burden for those staff trained to undertake them. Eight stakeholder groups across the UK felt that a factor affecting the quality and capacity of clinical education was the need to harmonise learning strategies when students from different HEIs were using the same placement.<sup>1</sup> SBE and virtual placements have been used as a setting for assessment in other health care programmes<sup>33,34</sup> and this could reduce some of the assessment burden within clinical placements. The use of a common assessment tool, and the diversification of not only where student placements take place, but how and where students are assessed, could alleviate some of the capacity issues associated with clinical assessment.

### Limitations

It would perhaps have been useful to state a definition for each of the clinical activities in the survey to ensure consistency of understanding of the terms. The proportion of hours for each placement activity was not always categorised in the same way, in some instances because respondents were not able to separate this out, which was perhaps a limitation of the survey tool.

### Conclusion

The rise in student numbers is currently creating placement capacity challenges<sup>1,21</sup> and driving the diversity of placement models, and there is a need to develop this further given the workforce growth outlined over the next few years. The traditional model and definition of diagnostic radiography clinical education is evolving<sup>18,26,27</sup> and this should continue to be explored, challenged, and evaluated. There is recognition that experiences beyond the imaging department and through simulation, virtual and technology enhanced placements can increase learning opportunities, capacity, and support achievement of appropriate outcomes.<sup>12,14,19,23</sup> As a wide variation in clinical practice hours has been identified nationally, there is an opportunity for guidance on the capacity demand from programmes to ensure sustainability. The quality of learning experiences, the ability to support development of the broad range of professional standards and the alignment of teaching and learning to appropriate assessment methods, should however remain at the heart of curriculum design and guidance. Considering the projected workforce requirements,<sup>4,5</sup> if innovations are not implemented there may be a risk of overloading an existing placement model beyond its capacity, which in turn will impact on quality. Given the pressures described it would seem timely to introduce or further embed changes to ensure a sustainable model of delivery.

### Conflict of interest statement

None.

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