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Radiographers' and students' experiences of undergraduate radiotherapy practice placement in the United Kingdom

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ABSTRACT

Introduction: A three-phased, mixed-methods study was conducted to explore the experiences of undergraduate radiotherapy students and their supervising practice educators within U.K. radiotherapy practice placement.

Methods: Qualitative data were gathered from focus groups/interviews with volunteer participants to elicit in-depth perceptions about experiences of practice placement. Data were transcribed, verbatim, and manually coded and analysed by the researcher using the applied research methodology of framework analysis, enabling the investigation of the *a priori* theme 'practice placement model', and recommendations were made for improvement.

Results: Two radiotherapy placement models are confirmed, i.e. the single student model, and the paired student model, and advantages and disadvantages are identified for each. Study findings suggest that neither radiotherapy model is superior to the other in terms of placement education and experience. Previous and current experience of either model appears to bias students and practice educators towards that model, despite recognition of its disadvantages.

Conclusion: The experiences of students and practice educators using the radiotherapy models are consistent with the experiences of other AHPs and nursing using similar practice placement models. It is recommended that all students should have access to peer-assisted learning on placement to improve critical thinking skills, to enable time for reflection, and to consolidate learning.

Introduction

It is recognised by the radiotherapy profession that students' practice placement differs throughout the U.K. in a number of ways, e.g. the size of department, and in the number of students assigned to a team of radiographers (practice educators, PEs). The latter example is the subject of this paper. The term 'PE' is used throughout to refer to *any* healthcare practitioner (HCP) supervising students on placement.

Some years ago political drivers led to the need for some allied health professions (AHPs) to investigate new placement models to improve the efficacy of practice education,[1,2] therefore professions such as physiotherapy, whose normal practice was to supervise one student at a time, carried out research examining the impact of supervising two or more students concurrently and were reassured by their data that no detrimental effects were caused by this 'new' model.[3–7] Although papers have been published relating to radiotherapy practice education[8,9] practice placement *models* have not been examined to date. The purpose of this study, therefore, was to explore the experiences of undergraduate (UG) radiotherapy students and their supervising PEs within U.K. practice placement models to identify the factors impacting on learning experiences within them, and to recommend appropriate changes, if required.

Literature review

In addition to physiotherapy,[3–7] other AHPs have published papers relating to placement models, e.g. occupational therapy (OT),[10–13] speech and language therapy (SALT),[10,14] dietetics,[15,16] as well as the nursing profession.[17] The majority were published during the 1990s and early 2000s, when these professions were investigating how student learning experience varied in terms of the number of students assigned to their PEs. In the AHP and nursing context, the models compared were the 'apprenticeship model', in which one student is assigned to, and taught by, one PE,

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and the 'collaborative learning model', in which two or more students are assigned to, and taught, by a single PE. An alternative name for the collaborative learning model is the peer-assisted learning (PAL) model, and these names are often used interchangeably; the latter nomenclature is used in reference to radiotherapy practice placement, however, for reasons explained later in this paper. Some AHP literature explored the collaborative learning model only,[6,7,10,11,17] or other models such as the 'shared responsibility', and 'designated clinical educator' models.[18]

Several AHP studies suggest that the collaborative learning model confers a number of advantages for students and PEs when compared with the apprenticeship model,[3–5,12,14–16] e.g. peer support, and time for reflection. The apprenticeship model had been the placement norm for many years in physiotherapy,[3–5] OT,[12] SALT,[14] and dietetics,[16] and remained the preference of some PEs[4,16] despite recognition of the former's benefits for students. Interestingly, students from these professions changed preference from the apprenticeship model to the collaborative learning model after experiencing it[4,5,12,16] having recognised the benefit of learning with, and from, other students.

Method

Ethical approval was gained from the Ethics Committee of the School of Health and Life Sciences at Glasgow Caledonian University for the three-phase, mixed-methods study illustrated in Fig. 1; to provide background context, demographics for the whole study are given in Fig. 2, and Phase 1 demographics demonstrating how universities assign their students is illustrated in Fig. 3. This paper relates to Phase 3.

Recruitment to this phase was voluntary. All radiographers were eligible to participate in the study because of the importance of capturing as wide a range of experiences as possible within each model, rather than only the experiences of those trained in the formal assessment of students, since the latter would limit the amount of data gathered. Audio-recorded focus groups (FGs) were conducted with volunteer students and, separately, volunteer PEs where there were sufficient numbers; where not, volunteers agreed to be interviewed. Interviews with pairs of participants were considered to be 'mini' FGs because of the similarity of interaction between pairs and groups in each, and were analysed accordingly. Tables 1 and 2 contain demographic data for students and PEs, respectively.

Ritchie and Ormston[19] advise the qualitative researcher to address the objectives of their study using broad categories of questions, as defined in Table 3. This table includes examples of student and PE questions and illustrates how they were used to provide context for the study's aim, enabled experiences to be evaluated, and aided in the generation of theories to be applied by the Researcher during data analysis.

All Phase 3 data were transcribed verbatim by 1st Class Secretarial Services™ before being manually coded and analysed by the Researcher using framework analysis (FA) methodology. FA is a type of qualitative data analysis suitable for conducting *applied* qualitative research[20] and was deemed to be a suitable methodology to enable any relevant recommendations to be made to the profession for enactment. It is described as being similar to grounded theory (GT), but differs mainly in that it is better adapted to work with specific research questions with defined research participants (e.g. a professional group), or with *a priori* issues that need a solution, such as the *a priori* theme of 'practice placement model' in this study.[21] Furthermore, FA is considered to be a robust methodology, suitable for use by a single researcher, due to the detailed documentation of data analysis within each of its five stages,[22] a reputation that has led to its increasing popularity in health-related research.[23–25]

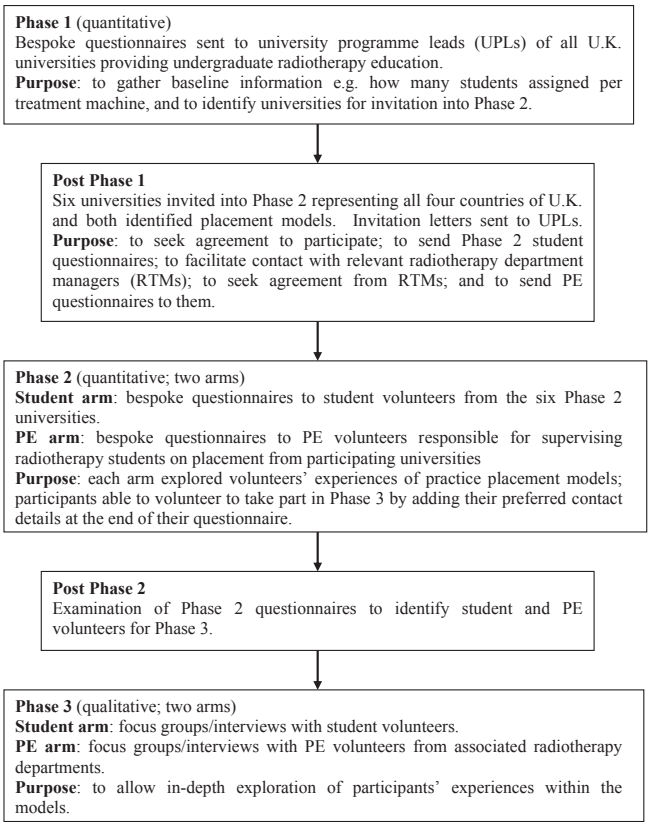

Figure 1. Study design.

Study phase		Questionnaire total	No. returned	Overall response rate
Phase 1		14	13	93%
Phase 2	**Student arm**	231	136	59%
	PE arm	455	184	40%
		Volunteer total	**No. taking part**	**Overall response rate**
Phase 3	**Student arm**	37	13	35%
	PE arm	21	15	71%

Figure 2. Study phases demographics.

Students per machine	No. of universities	Overall frequency
1	4	30.8%
2	6	46.2%
1 or 2	2*	15.4%
More than 2	1*	7.7%
Total	13	100%

*Although three universities stated that the number of students varied, or exceeded two students, no further evidence was identified during Phase 2 of the study.

Figure 3. Phase 1 demographics: students per machine. *Although three universities stated that the number of students varied, or exceeded two students, no further evidence was identified during Phase 2 of the study.

Table 1
Phase 3 student demographic per university, per model, and per year of study.

University unique code	Method	No. of volunteers	No. taking part	Year of study
Paired student model (PSM)				
AA	Focus group	13	7	2
CB	Interview	10	1	3
DA	Interview	1	0	n/a
Single student model (SSM)				
AC	Mini focus group[b]	6	2	2
BC	Mini focus group[b]	5	2	2, 3[a]
CA	Interview	2	1	3
Total		37	13	(35% response)

[a] Students from two different years of study.
[b] Pair of students interviewed together.

Table 2
Phase 3 PE demographic per radiotherapy placement site, per model, and per grade.

University unique code[a]	Method	No. of volunteers	No. taking part	PE grade (no. of participants)
Paired student model (PSM)				
AA	Mini focus group	2	2	Band 6 (2)
CB1	Interview	4	2[b]	Band 7 (1) Band 8 (1)
DA	Focus group	4	3	Band 5 (2) Band 7 (1)
Single student model (SSM)				
AC3	Focus group	4	3	Band 5 (1) Band 6 (1) Band 7 (1)
BC1	Focus group	5	4	Band 4 (1) Band 6 (1) Band 7 (1) Band 8 (1)
CA1	Interview	2	1	Band 5 (1)
Total		21	15	(71% response)

[a] Number indicates radiotherapy placement site number.
[b] Interviewed separately.

Table 3
Study question categories and definitions for applied research.

Category	Definition	Examples of study questions for students	Examples of study questions for PEs
Contextual	Describing the form or nature of what exists	"On a typical day, what is the first thing that strikes you when you enter your radiotherapy placement site?" "Tell me what it is like to be a radiotherapy student at your placement site."	"Have you worked in a department where 'X' student(s) is/are assigned to a treatment machine? If so, how does your current experience differ between these models?"
Explanatory	Examining the reasons for, or associations between, what exists	"Why is it important for you to feel like a member of the treatment team?"	"Why do you think it is important for a student to feel like a member of the treatment team?"
Evaluative	Appraising the effectiveness of what exists	"In what ways do you feel the radiographers (PEs) contribute to your placement learning experience?" "What would be your ideal practice placement?"	"How do you feel you contribute to students' learning on placement?"
Generative	Aiding the development of theories, strategies, or actions	"What is it like to be the only student on a treatment machine?" "How do you think it would change your practice experience if you always had another student assigned to a treatment machine with you?" "If there was only one thing you could change about your practice placement, what would it be?"	"In what ways would your experience differ if you had to supervise more than one student every day?" "If you could change one thing about your role in supervising students on placement, what would it be?"

Adapted from Refs. 19,22.

Results and discussion

Relationships were noted between the SSM and the apprenticeship model, and the PSM and the collaborative learning model,[3–7,10–17] facilitating comparison of the impact of the models on student learning experiences between radiotherapy and other healthcare professions.

SSM

All radiotherapy students could be said to undertake a 'type' of apprenticeship insofar as they begin as novices and journey to expertise, however the difference between the apprenticeship model and the SSM is that radiotherapy PEs generally work in pairs rather than singly, and do not have their own individually assigned

patients such as in physiotherapy, or OT. Nevertheless, the advantages and disadvantages of the SSM are similar to those for the apprenticeship model identified in AHP and nursing literature.

Advantages and disadvantages

Being the only student on a linac is important to SSM students and governs their perception of the success of their placement learning, e.g. working in the treatment room all day enables more hands-on experience, one-to-one support from PEs, and having competencies signed off without competition from another student. Gaining clinical competencies is of utmost importance to these students and, surprisingly, they worry about competition from others even though they are normally the only student:

"*But also, I, I think fighting might be the wrong word, but when you're on placement you feel, I feel that I'm kind of, not fighting, but fighting between the radiographers to have a go at setting up a technique whereas if there's another student then not only are you fighting with the radiographers to set up but you're fighting with the other student to get a bit of time to set up so …*"
(Yr2 student; SSM)

Although students recognise the absence of peer support as a disadvantage they still prefer the SSM, although they have experienced peer support when a second student is assigned to their linac on a service day or during a machine breakdown. In non-radiotherapy studies[4,5,12,16] students often change their preference to collaborative learning after it is experienced.

PEs recognise, too, that students miss out on peer support:

"*Probably, at times, they (students) can be a bit intimidated especially if they're new on the machine, so if they did have another student they knew they could bounce ideas off of them. I know a lot of them say 'I know this may be a stupid question' and they might not ask the radiographers that but they might be happy to ask a peer that.*"
(PE; SSM)

They are more concerned that students of the SSM are left with little time to reflect upon their experiences because of treating patients all day, however, than about them achieving competencies:

"*In some ways if there was that other person (another student) on the machine, you've got that time when you (as a student) can sit down and think about things. Whereas you're constantly in and out of the room, you don't have that time.*"
(PE; SSM)

Consequently, PEs suggest that students should be given small group teaching sessions or time together to think about and discuss their experiences:

"*I think I would maybe give them (students) more, like, group teaching sessions, meaning that if it was just sitting in a classroom bouncing ideas about. They don't get a lot of time taken away from the set even just to discuss things amongst themselves, such as to chat, another sounding board for them if they've got any problems. It's another set of ears for them, the other students or the radiographer that's taking the group. Yes, almost reflection time for them.*"
(PE; SSM)

These suggestions are similar to those of Pearson and Smith,[26] who contend that the experience itself is not enough.

An additional disadvantage recognised by students relates to being able to observe console activities only, rather than gaining experience of them. Despite this, gaining competencies is always more important:

"*… … so whilst it's very important to know about sort of like the admin side and like doing the … the other things as well like calling the dieticians and all that sort of stuff, which I quite enjoy doing, that's not going to help me get everything signed that I need signed to get my degree, which I know is a really bad way to approach it because it's part of the job.*"
(Yr3 student; SSM)

PSM

The PSM is analogous to the collaborative learning model, where either two, three, or four students are assigned to a single PE; these students are encouraged to help and support each other, hence its alternative nomenclature, peer-assisted learning (PAL). Collaborative learning is representative of the way in which students of physiotherapy,[6] OT,[12] and nursing[17] work together and collaborate to deliver treatment and care to the same patients.

In the radiotherapy context, however, pairs of students do not 'collaborate' in the treatment of individual patients because each student works with a different pair of PEs and treats different patients. Additionally, students do not treat patients in the absence of radiotherapy PEs, however they may assist each other in their learning by exchanging experiences and ideas therefore the designation 'PAL' is considered to be more representative of the process that takes place between radiotherapy students in practice. As with the SSM, some advantages and disadvantages of the PSM support the findings of AHP and nursing literature relating to the PAL model.

Advantages and disadvantages

Peer support is the most important advantage and strength of this model, as reported by students and PEs alike. Although aware of having less patient contact, students do not feel disadvantaged; instead, they feel that learning about the activities taking place in the console area of the linac, e.g. collecting patients' investigation results from clinics, arranging patient transport etc., are important experiences that will give them an advantage when newly qualified, in contrast to the views of SSM students who feel competencies are more important.

Evidence exists that collaborative learning, or PAL, fosters critical thinking skills in tertiary-level students in comparison to when students learn alone,[27] and is an important skill for healthcare professionals, confirming a further student benefit of this model, and recognised by PEs. While each student treats around 50% of patients in the PSM, the remaining time spent at the console affords opportunities for thinking and reflection, in addition to engaging with each other when patients are receiving treatment.

From these perspectives alone, paired students can have an 'holistic' experience of the role of the therapeutic radiographer by their involvement in events inside and outside of the treatment room, i.e. they can build technical competence dealing with the linac, as well as developing their communication skills with patients, hospital staff, and patients' families.

Lincoln and McAllister[28] describe PAL as a process having congruence with many of the educational goals in allied health, especially in relation to practice, and postulate that:

> "… peer learning could be thought of as gaining knowledge through study, experience, observation, or teaching of an equal."

Furthermore, it is their contention that peer learning can facilitate deep learning in students, i.e. problem solving, group discussion with peers, self and peer evaluation, and lead students to question knowledge already gained in a superficial way.

Physiotherapy PEs feel their students benefit from peer support, and are more confident in asking questions due to the presence of the other,[5] and pairs of students on placement can experience peer teaching in addition to peer learning.[11] Radiotherapy PEs from the PSM agree, as illustrated by the following:

> "*Erm … I think it's quite good to … for the, the, the more senior student to … can act in a, in a training role as well … in a support role, and all the other roles that we would act in.*"
> (PE; PSM)

Christiansen and Bell[17] acknowledge the teaching element within PAL when pairing final year and first year nursing students to give the final year students experience of mentoring. Their findings support those of other authors[5,11] in that there are benefits to junior students in feeling able to ask 'stupid' questions, and in the comfort from seeing a friendly face who has 'been there before'. The more senior student realises they know more than they thought and become more confident in themselves; the findings of this radiotherapy study support these contentions:

> "*If they aren't the same year group, say at the minute there's first years and third years out, I think it shows them, you know, how, it will be once they settle in and probably is a bit more encouraging than if they were maybe with another first year and they're both not really sure. But, the third year can kind of take them, you know, and show them things that they have learnt.*"
> (PE; PSM)

Generally, radiotherapy students from different year groups are paired during placement and have different requirements in terms of the competencies. PSM students are more interested in the peer support element of this model, and seem less concerned about competencies. The advantage of the 'security' engendered by the other student, even if from the same year group, enables them to ask 'stupid' questions of the PEs, and to feel less intimidated in doing so. When paired with a more senior radiotherapy student, the junior student usually feels more comfortable asking questions of them, rather than of the PE:

> "*I think it's also good when you're with students from other years because you get to meet them, and if you're unsure of something and you're too scared to ask the radiographers you can ask the other student, whatever … if I went downstairs to ask the radiographers I would be too scared to say stupid questions, but you can ask them (other students) …*"
> (Yr 2 student; PSM)

Students of each model often prefer not to ask questions of PEs because they seem intimidating, or are judged too busy to give them attention. Thus, the peer support aspect of being paired with another student in the PSM provides learning advantages as well as opportunities for students to act as teacher and learner,[11] in contrast to students of the SSM.

PSM students appreciate that they treat only half of the patients each day, and recognise this disadvantage, but feel it is outweighed by the supportive presence of the other student. These students should benefit from PAL[11] and learn from each other when paired, although there is no guarantee that they will do so.[29] Radiotherapy PEs are concerned that PAL may not take place if one of the students is shy, or when a less experienced student demonstrates greater clinical skills than a more senior student. That is, a shy student is more likely to stand back and less likely to ask questions, and a more senior student is likely to feel intimidated by the presence of a less experienced but more capable student and is unable, therefore, to teach them. All radiotherapy PEs raising these concerns had witnessed them in practice. In addition, there are challenges for PEs caused by differences between students' personalities, learning styles, and capabilities,[11] and different capabilities observed between pairs of students may lead to problems with intimidation and domination.[10] PEs report that such situations pose difficulties for them, especially the latter example, and relates to their concerns regarding attrition from radiotherapy degree programmes, and their reluctance to add to it by failing less able students when, perhaps, they would prefer to do so.

Some radiotherapy departments in this study do not keep PSM students together on the linac. The student not involved in treating patients is sent to a room within the department where they can access patients' notes and write up case studies or other university assignments; a limited amount of PAL is possible in this case because this student is nearby and available to support the other student.

In other departments, one of the pair of students is sent out of the department when not treating patients, e.g. to the library. Given that the radiotherapy department is their learning environment, it is of concern that students in this circumstance cannot experience PAL, treat only 50% of patients, and lose the advantage of gaining console experience.

Thus, while students and PEs believe that PAL is an advantage of the PSM, it does not appear to take place as often as assumed.

PEs identify competition between students as another possible disadvantage of the PSM, especially if both students are trying to have the same competencies 'signed off'. Interestingly, most PSM students do not seem worried about competition from the other student, despite it being a big concern for SSM students. Nonetheless, it remains a worry for some PEs, and supports the views of PEs from physiotherapy, OT, and SALT.[10]

Model preference

PEs and students appear biased towards the model with which they have most experience, although neither model appears superior to the other in terms of student experience, satisfaction, and preference. This is in agreement with Joffe[30] who, while contending that one placement model would not be suitable for all situations, refers to PEs and students 'aligning to particular philosophies of education' based on previous and current experience, and may help explain why PEs and students were generally satisfied with their model, even though they recognised its disadvantages.

A systematic review of AHP and social work papers[31] concludes there is no evidence that either the apprenticeship model or the collaborative learning model is superior for students' practice placements. O'Connor et al.[13] assert that both have a role in placement education, and suggest further research is undertaken to explore whether the collaborative model should be used early in a programme while students are 'finding their feet' and will benefit from peer support, and the apprenticeship model used at the end to prepare students for autonomy, although this suggestion would be difficult to accomplish in radiotherapy in terms of the capacity within departments to accommodate separate models.

Physiotherapy PEs were unconvinced of the benefits of the collaborative learning model before experiencing it,[3] and it is

postulated that those who preferred the apprenticeship model rather than the collaborative learning model did so because of lack of experience of the latter.[4] Thus, the reluctance to recognise the benefits of an alternative placement model may relate to lack of familiarity in the first place, rather than it being inherently worse.

Radiotherapy PEs have experienced the 'alternative model', e.g. during holiday periods a single student can be assigned to a linac instead of a pair of students, and two students can be assigned to a linac rather than a single student because of a machine service, or machine breakdown. PEs from the PSM are untroubled by having one student instead of two, since they have more time to cater to the student's needs. Those from the SSM are stressed when faced with two students, leading to their assertion that the PSM is not appropriate for placements for either PEs or students. Although machine services follow a pre-determined schedule, an increased workload for other departmental linacs is unavoidable, e.g. the transfer of certain categories of patients to other machines to avoid gaps in treatment. In this example, PEs working on a busier machine with an additional, although expected, student may lead to 'confirmation bias' that the PSM should not be used in radiotherapy because of insufficient time to deal with two students on a regular basis.

In contrast, machine breakdowns are always unexpected and of indeterminate timescale, and lead to an immediate increase in PE workload to prepare all patients for transfer to other linacs for treatment. Again, the transferred student becomes the second student. Understandably, the potential for confirmation bias against the PSM is greater in this case because of the additional pressures on PEs, as well as having to cope with an unexpected 'extra' student under difficult circumstances; were PEs from the SSM able to encounter the PSM under 'normal' conditions, i.e. when there are no machine services or breakdowns, their experiences should be less stressful and, perhaps, more positive.

Recommended improvements

Experience is not enough in learning,[32] in that the individual is usually so involved in it they may not have opportunity to reflect upon it, therefore 'planned debriefing sessions' are recommended in which students are given time to engage with others to reflect with a view to enhancing their learning. Further research indicates that collaborative learning (or PAL) within small group teaching sessions, increases critical thinking skills amongst students.[27] Mann et al.[33] suggest that reflection enhances participants' deep learning, in their systematic review of reflective practice. In order for reflection to be a learning strategy however, they contend it must be guided appropriately.

PEs and students from both radiotherapy models recognise the advantages of PAL. Planned debriefing sessions[26] and time for reflection[33] are similar to the suggestions of radiotherapy PEs and should be encouraged by universities, and facilitated by radiotherapy departments. It is the view of the Researcher that PAL is an invaluable adjunct to radiotherapy practice education, therefore it is recommended that HEIs and PEs work together to agree adjustments to the mechanism of operation of each model in their departments to ensure that PAL takes place for *all* students, regardless of model. It is recognised that universities and radiotherapy departments are using placement learning outcomes for their students, but regular access to PAL for all students should improve critical thinking skills and, thus, learning.

Strengths and weaknesses

The main strengths of this study are that it reveals a previously neglected area of U.K. radiotherapy practice by illuminating the experiences and perspectives of students and their supervising PEs within placement models. By doing so, it answers a criticism in AHP and nursing literature about the dearth of studies relating to students and supervising practitioners.[31] In addition it confirms that neither model is superior to the other in terms of student placement education.

In terms of weaknesses, possible 'volunteer bias' in Phase 3 PE volunteers is acknowledged, because those keen to support students are assumed to be more likely to volunteer, therefore the opinions of others are missing. Fewer students volunteered than expected, so only one focus group was possible therefore some data is missing. Finally, more students took part in Phase 3 from the SSM than the PSM, which may have skewed these findings.

Conclusion

This paper provides an insight into the previously-unexplored experiences of students and PEs within U.K. radiotherapy placement models. Neither model is deemed to be superior but study findings suggest that PEs believe that all students should have access to peer-assisted learning on placement to improve critical thinking skills, to enable time for reflection, and to consolidate learning.

Conflict of interest statement

I confirm that there are no personal or financial conflicts of interest associated with this manuscript.

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Appendix A. Supplementary data

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