




BRIEF REPORT

Empowering trainees through understanding learning theory and changes in medical education [version 1; peer review: 2 approved]

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Abstract

Background: Empowering trainees to think critically about decision making should result in the National Health Service (NHS) being more efficient and cost effective, thereby reducing the wastage of precious NHS resources on unnecessary investigations, treatment, and consequently putting patients at risk. There is a major shift from acquiring knowledge to critical analysis and synthesis of information for decision making. Trainees must understand how healthcare systems function and consequences of their decisions on budgets and patient care. Equally, faculty need to appreciate that their role is changing from information provider to facilitator of learning through feedback and supervision, role modelling, and innovator of learning approaches.



Methods: A survey of 100 postgraduate trainees from the Severn Deanery was conducted on SurveyMonkey in March 2020 and January 2021. The survey consisted of eight questions focusing on trainee responses to participation in clinical decision-making in the inpatient setting. An additional question on communication with the patient was included in the second iteration.

Results: With a response rate of 80, only 35% of trainees had their findings regularly verified by the consultant. One third of trainees reported that decisions were made by the consultant without asking their opinion on investigations or management. It was unusual for trainees to have any interaction with patients on consultant ward rounds and to understand the rationale for the requested investigations.

Conclusion: The poor consultant trainee interaction represents a serious lost opportunity for experiential learning with real time feedback. Training programmes should support trainees being given opportunities to nurture analytical, problem-solving skills, dealing with uncertainty among other attributes of patient management. Trainees need to become competent through the art of critical

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1. **Jan Gutermuth**, Vrije Universiteit Brussel (VUB), Brussels, Belgium

2. **Andrew P. Day**, University Hospitals Bristol NHS Foundation Trust, Bristol, UK

Any reports and responses or comments on the article can be found at the end of the article.

thinking and develop a professional identity. Through this they develop confidence and competence leading to better patient outcomes, and prevention of the depletion of healthcare budgets.

Keywords

Trainee empowerment, medical education, learning theory, critical thinking, healthcare systems, FAIR principles.

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Author roles: **Singhal P:** Conceptualization, Methodology, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; **Craig S:** Investigation, Writing – Original Draft Preparation; **Boyd G:** Data Curation, Investigation; **Sandhu D:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing

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Introduction

Currently, the UK National Health Service (NHS) along with other international healthcare systems function within a spiral of never-ending demand for high quality healthcare delivered efficiently, effectively, and all within a tight financial envelope. Key to this is the healthcare staff who must grapple with the seismic demographic changes as well as the impact of new technology and treatments. In addition, as the COVID-19 pandemic has shown, healthcare along with any other system is fraught with uncertainty, complexity, and chaos¹.

It is even more essential now with the COVID-19 pandemic how front-line staff are skilled and empowered with critical decisions making, which impacts on efficient use of limited resources and achieves better outcomes for patients². The Academy of the Royal Colleges in their publication³ emphasise that up to 20% of all investigations and treatments have no benefit to patient care. The impact of the above study would suggest that a saving of over £1 billion a year could be realised across the NHS with a more judicious approach to clinical evidence and diagnostic testing⁴.

Several reports have highlighted the fact that history taking and clinical examination is increasingly being replaced by investigations, both blood tests and diagnostic imaging without making a clinical diagnosis, along with widespread failure to adhere to the hospital diagnostic guidelines⁵. This is confirmed by data that during recent years the NHS has seen an exponential rise in computerized tomography (CT) and magnetic resonance imaging (MRI) scans (Figure 1)⁶. The NHS audit commission have also reported that over £20 million a year is spent unnecessarily on inappropriate x-rays⁷. The true number of inappropriate x-rays and CT/MR imaging is unknown, but this figure would match common consensus and opinion amongst physicians. If we consider that x-rays alone only make up a proportion of diagnostic requests, and the

comparatively higher price of other imaging modalities, the overall financial burden of unnecessary radiological investigations is going to be much higher than this figure. The King's Fund report submitted to the House of Commons has highlighted that despite significant improvement through innovation, the NHS still needs to increase value and productivity to reach the demands of an ageing and growing population in the UK⁸. Elimination of unnecessary pathology and radiology tests by completing thorough patient examination and exercising critical thinking, could yield significant savings each year across the NHS which could be directly passed back into patient care⁸.

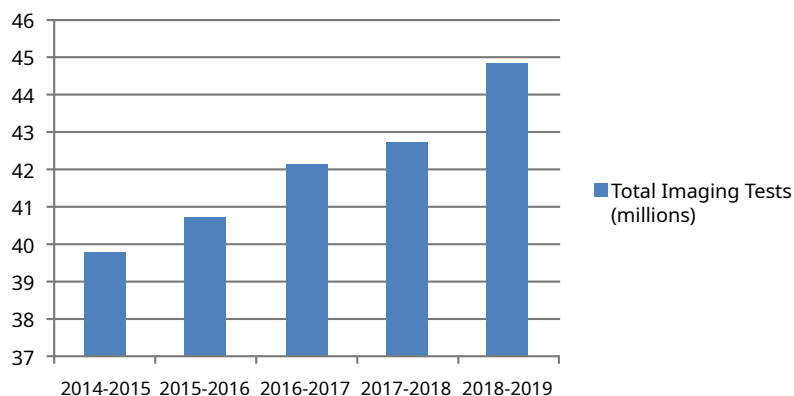
NHS Improvement, the General Medical Council, and Health Education England have been arguing for daily consultant-led ward rounds, to enable early senior decision making to facilitate timely discharge thus reducing length of stay, and to provide closer supervision of trainees. The reduction in the length of stay has not happened for a variety of reasons, but mainly because of delayed transfers of patients with multiple co-morbidities and elderly patients staying in hospital, for non-medical/social reasons.

Although the consultant delivered approach would appear to confer safer working for junior doctors, but if trainees are not involved in understanding clinical thinking and patient management, trainees become disempowered to make independent decisions, and can lack confidence as new Consultants. Such training can lead to an over-reliance on investigations and a vicious cycle with new trainees using this as a management crutch, instead of making a judgement on the differential diagnosis through a critical examination of the traditional history and clinical examination.

Methods

To gauge junior doctor's perception of opportunities to take ownership and responsibility for decision-making an eight

Total Imaging Tests (millions)



Increase in Imaging Across the NHS Over the Last 5 years, Data Taken From the Diagnostic Imaging Dataset Annual Statistical Release

Figure 1. Diagnostic imaging dataset annual statistical release 2017/18. NHS England, 2018, demonstrating an exponential rise in CT and MRI scans⁶.

question survey on SurveyMonkey (<https://www.surveymonkey.com>) of trainees (Foundation Year 1 to higher specialty trainees) was created by the authors and distributed by email to one hundred Severn Deanery trainees in two iterations of 50 trainees in each survey, from the trainee forum groups at the University Hospitals Bristol and Weston NHS Foundation Trust; North Bristol NHS Trust; Musgrove Park Hospital Trust; and Royal United Hospitals Bath NHS Foundation Trust. The survey was not piloted prior to distribution for this study. The survey was twice conducted, in 1–31st March 2020 and in 1–31st January 2021 and can be viewed in Table 1. No one particular group of trainees or hospital was targeted giving a good cross section of doctors in the Southwest of England. Targeting a hundred trainees would give a clear idea about the level of empowerment experienced by the trainees. There was no desire to seek any particular variables amongst the participants such as gender and age. The only variable was the level of trainees which have been captured by the demographic data from question one and discussed in the methods section.

From the experience of the first iteration of the survey in March 2020 an additional question (question nine) was asked in the second survey: ‘how often do you communicate directly with the patient on a consultant ward round?’ This question was added to seek further empowerment of trainee opportunities during the consultant ward round.

Results

The response rate was 80% (n=80) across both survey iterations, n=40 in March 2020 and n=40 in January 2021. No responses were excluded or incomplete. The demographic data from question one demonstrated 16 foundation year 1 doctors (20%), 44 senior house officers (SHO) and trust doctors grade (55%), and 20 specialist registrars (25%). While the majority of trainees (83%) of all levels reviewed patients independently daily (question two); approximately only 35% had their findings regularly verified by a consultant, (question three) (Figure 2). 44% of trainees were not clear on the rationale for the investigations ordered (question four) (Figure 3). One third

Table 1. Empowering trainees questionnaire.

Question 1					
What is your stage of training?					
FY1	FY2	CMT/IMT	ST3-4	ST5+	Non training post/ other please specify
Question 2					
How often do you see patients independently? (without a senior doctor / consultant?)					
daily	most days	sometimes	rarely	never	other please specify
Question 3					
If you see a patient independently, how often would a consultant validate your clinical findings?					
daily	most days	sometimes	rarely	never	
Question 4					
If your consultant requests an investigation for a patient, how often do they explain why?					
always	usually	sometimes	rarely	never	
Question 5					
How often do you feel that your opinion is asked for when reviewing patients with a consultant?					
always	usually	sometimes	rarely	never	
Question 6					
Are you involved in making decisions about investigations or prescribing treatments on a consultant ward round?					
always	usually	sometimes	rarely	never	
Question 7					
Are you involved in making decisions on investigations and treatments when reviewing a new patient on the medical take with a consultant?					
always	usually	sometimes	rarely	never	
Question 8					
Do you think examining patients for physical signs affects your medical management?					
always	usually	sometimes	rarely	never	
Question 9 (asked on the second iteration of the survey)					
How often do you communicate directly with the patient on a consultant ward round?					
always	usually	sometimes	rarely	never	

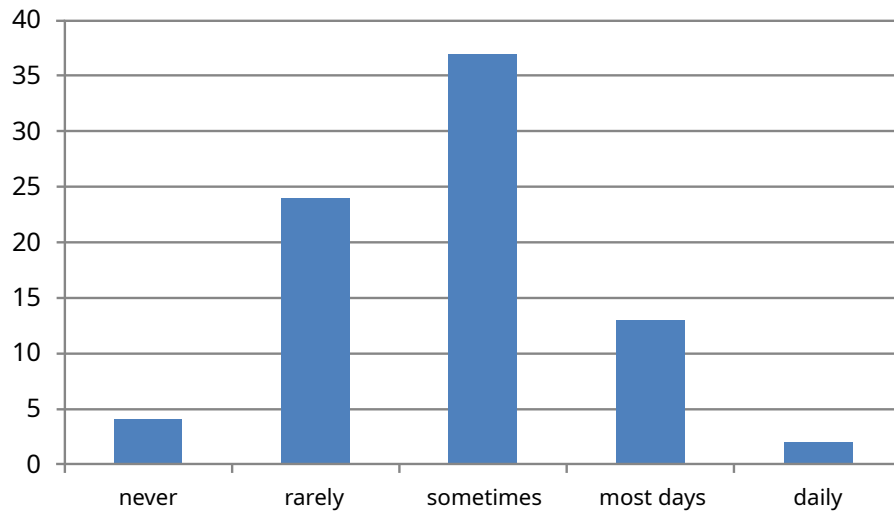


Figure 2. Results for survey question three ‘How often do you see patients with a consultant who validates your clinical examination findings?’ X-axis -absolute number of people who picked each response (n=80).

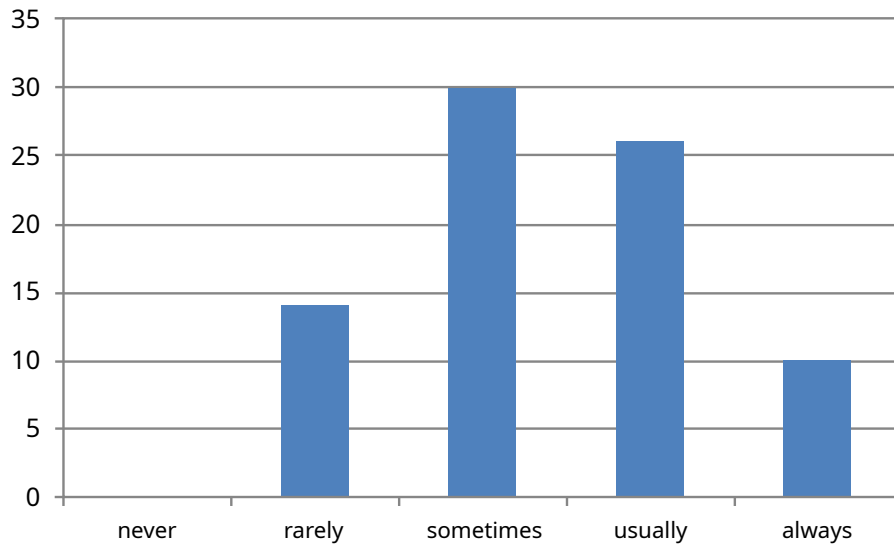


Figure 3. Results for survey question four ‘If asked to organise investigations for a patient how often are you clear on the rationale behind the investigation?’ X-axis -absolute number of people who picked each response (n=80).

of doctors surveyed said that usually decisions were made unilaterally by the consultant, without asking their opinion on investigations or management (question five) (Figure 4). When asked if the trainees were involved in making decisions about investigations or prescribing treatment on a ward round (question six) 59% were involved, while 41% did so sometimes or rarely. (Figure 5). As regards being involved in decision making when reviewing new patients with a consultant (question seven), 56% felt they were involved and 28% said sometimes, 10% rarely, and 5% never. Question eight explored the impact of physical signs in determining the management of patients. It is reassuring that an overwhelming 80% of trainees recognized the importance of examining for

physical signs while 17.5% of trainees felt that such an examination only impacted their management sometimes, and 2.5% surprisingly said rarely. From the second iteration of the survey with the additional question, it was rare for trainees to have any interaction with patients during the Consultant ward round (question nine) as 60% said never, 35% rarely, and 5% said sometimes (n=40).

Discussion

The failure of the consultant supervisor and trainee interaction represents lost opportunities to provide education with real time feedback on clinical examination and critical thinking⁹.

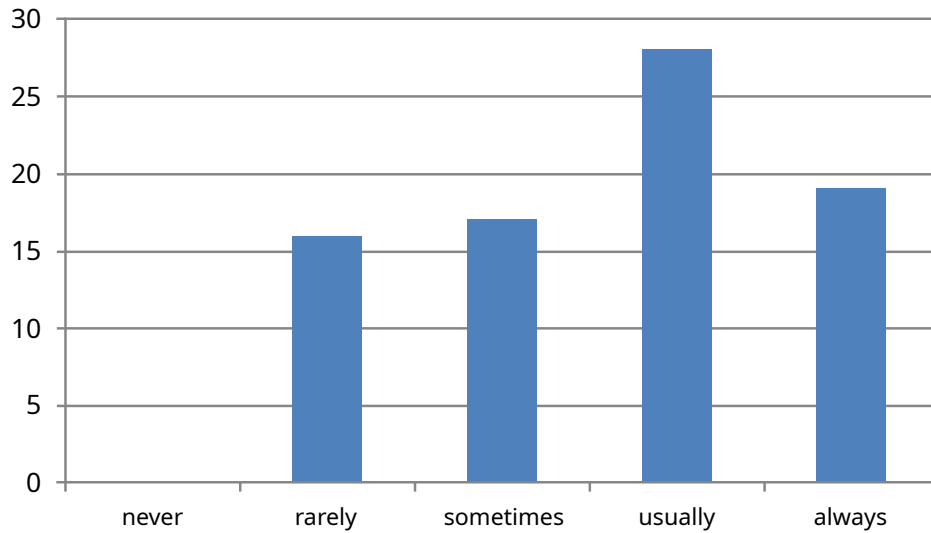


Figure 4. Results for survey question six 'Are you involved in making decisions regarding ongoing patient management?' X-axis -absolute number of people who picked each response (n=80).

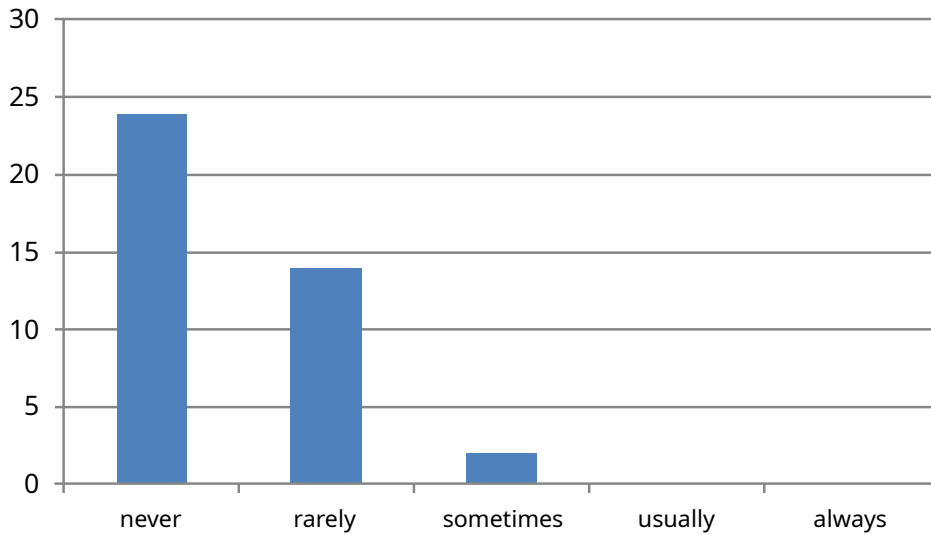


Figure 5. Results for survey question nine 'How often do you communicate directly with the patient on a consultant ward round?' X-axis -absolute number of people who picked each response (n=40) as this question was only asked in second iteration of survey as outlined in methods section.

What needs to change?

An approach which empowers the trainees through taking provisional decisions with consultants validating their clinical findings, diagnosis, and management plans is essential. This should lead to improvements in team working, communication and leadership skills, empowerment, and confidence building¹⁰. In practical terms, trainees should lead the early morning ward rounds and take decisions that are then validated by the subsequent consultant ward round and lead to an improvement in the morale of trainees and a sense of professional responsibility.

As faculty and trainees within our epistemology, we need to understand and study what we see and experience to improve the quality of training and the care of patients. The Royal College of Physicians emphasises good clinical medicine which has a direct impact on patient safety. Clinical decisions are based on multiple skills such as pattern recognition, metacognition, ability to contextualise the patients' needs, health beliefs, and risk perception amongst many other attributes. It is paramount in medical education to nurture high order critical thinking such as analytical and problem-solving skills, dealing with uncertainty or ambiguity, and the interpretation and application

of small and big data. These trainees have to become change agents and come up with solutions for better, safer, cost-effective patient care.

Understanding how learning occurs within a clinical context

Learning is not just content expertise or gaining new knowledge, but involves reflection, attitudes, and behaviours. Learning is a social process and occurs through interaction with each other through shared activities¹¹. There is no one time learning but a continuum of learning which is a social construct built through scaffolding knowledge learnt through our experience¹². However, the pressure of a medical career can create damaged learners. Trainees need to be trained in the art of translating patient care into the unique language, climate and characteristics of the medical setting. In the pressure of service delivery and defensive medicine, such entrustment is lost.

Trustworthiness therefore is a big part of clinical delegation. The complexity of making clinical decisions goes through three main phases. Initially there is clinical reasoning which is the thinking and decision-making processes associated with clinical practice. The next stage is clinical thinking which is based on constructivism¹² where previous knowledge, skills, observation, and judgement is built upon to inform patient management. And finally, critical thinking which consists of analysis of facts to form a judgement, ability to interpret an argument, evidence, or raw information in a logical and unbiased fashion, and thus solve complex problems effectively^{13,14}.

Learning for trainees mainly happens during the acute take, exposure in emergency departments, outpatients and the Consultant ward rounds. Knowledge is contextually situated, and influenced by the activity, content, and culture in which it is used¹⁵. The busy nature of medical practice often requires a need for rapid, senior led assessment and unilateral decision making. The bulk of clinical decisions are then made by the most senior and experienced member of the team. However, this approach has disempowered the trainees, especially the specialist registrars who are our future consultants. This urgency in management leads to a lack of educational discussion and the validation of clinical findings, with again reliance on expensive investigations and moving away from situated learning¹¹.

This means that trainees become invisible and are then dutifully delegated to complete request forms and referrals without the requirement for independent thought. There is little understanding of the process of how clinical decisions are made. Instead, trainees are driven by an unquestionable hierarchy and protocols which can stifle learning if they do not question the reasoning behind them and further, there is a failure to appreciate that each encounter is an educational encounter¹⁶.

In addition, all of us must cope with the huge information explosion of over 60,000 diagnoses in medicine and more than

6,000 interventions¹⁷. Despite this huge expansion in knowledge the time for training has not increased.

Importance of clinical training

How junior doctors are trained will shape the future of the NHS in terms of their critical thinking skills and the need to reduce the burden of unnecessary investigations, treatments, and improve patient outcomes.

This change in training must be profession led. Consultants and the wider NHS, for instance, need to be educated about the key educational pillars of feedback, activity, individualization, and relevance (FAIR) learning.

Feedback is information communicated to the trainee that is intended to modify his or her thinking or behaviour in order to improve learning. The teaching ward round through real time feedback can correct mistakes, demonstrate physical signs, clarify goals, guide further studies, and reinforce good performance which are highly motivating. A trainee centred approach activates prior knowledge and new knowledge is built on to solve patient problems. The trainee is thus engaged in active rather than passive learning. Each trainee is an individual with a different level of mastery, learning preference, multiple intelligences, and personal capability¹⁸. When all this comes together and is relevant to the problem in hand, then it is vastly rewarding and leads to deep learning. Consultants must take time to challenge trainees at the first point of assessment, on call, and on the medical ward rounds. Ward rounds must ensure that junior doctors are empowered and provided opportunity to review patients independently, make an assessment, and present their findings – right or wrong. They must then be engaged in discussion around their clinical findings, planned investigations, and their thought processes as the supervising consultant evaluates their decisions. This will provide positive reinforcement of correct findings and valuable lessons on areas for improvement. Consultants can lead on this by becoming positive role models¹⁷.

Conclusion

To improve their skills in critical thinking, trainees need to feel able to engage and challenge the consultants in discussion around clinical management and diagnostic tests. Consultants can then have confidence in their junior staff, and patients will have less needless investigation, intervention, and treatment such as inappropriate antibiotics which promotes the antimicrobial resistance pandemic¹⁹. This should improve patient outcomes. Such cost-effective care will allow precious funds in the NHS to go a lot further and make the NHS much safer.

Learning points

- Improve the quality of medical training and critical thinking skills of trainees.
- Give trainees the opportunity to problem-solve and make clinical decisions which are then validated by the supervising consultants.

- Raise awareness of the importance of correlating clinical examination and decisions with appropriate investigations.
- Reduce harm to patients from unnecessary or inappropriate investigations and treatment.
- Achieve major financial saving to the NHS from prevention of resources wastage.

- Consultants and education supervisors to be cognisant of the impact of role modelling and the FAIR principles.

Data availability

All data underlying the results are available as part of the article and no additional source data are required.

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Current Peer Review Status:  

Version 1

Reviewer Report 27 May 2022

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Andrew P. Day

Department of Clinical Biochemistry, University Hospitals Bristol NHS Foundation Trust, Bristol, UK

The authors have observed that the ever increasing pressures on the Health Service have driven a consultant delivered approach to healthcare, with potential detrimental effects on the learning environment for trainees, and in particular their development of critical clinical decision making competencies. Lack of confidence in reliance on history and clinical examination in turn potentially leads to wasteful use of resources on expensive investigations.

The authors have used a questionnaire to survey the experiences of medical trainees during consultant ward rounds. The results support the authors' hypothesis.

The method used is clearly stated and the remarkably high response rate of 80% significantly reduces the risk of responder bias. The specialties of the trainees are not stated - were these all internal medicine? It might be instructive to compare the responses in different specialties in the future.

The results are clearly summarised, with some striking findings, particularly around how infrequently trainees participate actively in consultant ward rounds to the extent that they communicate directly with the patient rather than adopting a passive approach.

As the authors correctly point out, failure to capitalise on the opportunities provided by an approach to consultant ward rounds that encourages the development of clinical problem solving skills and the recognition of the importance of clinical correlation is harmful to clinical training, with consequences for both patient safety and efficient use of limited financial resources.

Although consultant clinical and educational supervisors in the UK should all now receive training for these roles, the findings presented and discussed here suggest that further steps need to be taken to embed these principles, and health service managers need to be aware of potential adverse impacts of pushing for an ever more narrowly focussed consultant-provided service.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and does the work have academic merit?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Have any limitations of the research been acknowledged?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical education and assessment

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 20 May 2022

<https://doi.org/10.21956/mep.20404.r31929>

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Jan Gutermuth

Universitair Ziekenhuis Brussel (UZ Brussel), Department of Dermatology, SKIN research group, Vrije Universiteit Brussel (VUB), Brussels, Belgium

The manuscript shows that residency training does often not encourage own critical thinking by trainees. Moreover, residents often do not understand the rationale of orders from their attendings and often there is no room for explanation.

The sample size is sufficient to draw the stated conclusions and the survey is clearly stated.

This manuscript underlines the need to move the previous top-down approach in care processes

in medical training centers, to a partnering approach between trainers and trainees.

The recommendations from the authors have the potential to dramatically improve the training and problem-solving capabilities of future generations of physicians.

Of note, current train-the-trainer programs (such as the compulsory training in Belgium) stress the need for supervisors to engage trainees in critical thinking and shared decision making between trainers and trainees.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and does the work have academic merit?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Have any limitations of the research been acknowledged?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: healthcare delivery

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Comments on this article

Version 1

Reader Comment 18 May 2022

Hassan Waqar, NHS, UK

This is an article looking at encouraging trainees to make better cost effective decisions in a cash strapped health system. There are a few point that could be improved upon. The response rate of 100 is relatively low to make any substantial conclusions from the data and some of the claims may not be fully substantiated by the data. This is a factor that can be improved upon with a larger sample size if a follow up survey was considered. Additionally the use of acronyms such as FY1 and others need to be explained in further detail perhaps through a summary paragraph so that a wider audience can understand the terms used.

Competing Interests: No competing interests were disclosed.

Reader Comment 01 May 2022

Archit Singhal , Imperial College London, UK

As a medical student, this article is very insightful and relevant, emphasising the need for critical thinking in modern medicine.

Competing Interests: No competing interests were disclosed.

Reader Comment 01 May 2022

Tamorish Kole, Healthcare Sector Skill Council, India, New Delhi, India

This article by Singhal et al, which describes an institutional void in practice of medicine, today. Firstly, our practice is based on principles of team dynamics, which includes shared decision making and mutual respect. Both are productive in critical decision-making but are missing globally, not just in UK. Secondly, bedside skills are and will be the main strength of our practice, even if technology such as artificial intelligence will be an enabler in future. So, problem solving skills must be taught at all times. Finally, this has a ripple effect over patient safety in terms of reducing harm, improving outcome and appropriate use of limited health budget.

Competing Interests: No competing interests were disclosed.

Reader Comment 27 Apr 2022

JS Bamrah, BAPIO, UK

This is a seminal article by Singhal *et al* which highlights the challenges of training in modern day medicine but also gives solutions. It's one the HEE and other educational institutes must take note of.

Competing Interests: I'm Chair of BAPIO.
