

regardless of whether the experiential learning model is truly threatened.

Diffusion of technological innovation in healthcare is characteristically slow, which may partly be attributed to long periods of testing.⁵ However, if we assume any rate of improvement to AI systems, even if it is not the exponential rate predicted, it is difficult to envisage a future where the use of AI is not ubiquitous in clinical practice. As anaesthesiology practice evolves in the direction of AI, so must anaesthesiology training.

Declarations of interest

The author declares that they have no conflict of interest.

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Would you trust your loved ones to this trainee? Certification decisions in postgraduate anaesthesia training

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Editor—Postgraduate medical education culminates in the certification of trainees as medical specialists. Certification is a profession's self-regulation process to assure the public that specialists are qualified to deliver safe high-quality care.¹ The high-stakes decision to certify a trainee entails the credentialing of training and its assessment.¹ We recently observed considerable variation in assessment procedures and certification in postgraduate anaesthesia training across Europe.² With the aim to better understand the variation in certification processes and the basis of certification decisions, we performed an interview study and explored whether programmes meet the requirement of public accountability to deliver competent specialists. Ahead of a full report, the focus of this letter is on the competence of trainee anaesthetists at completion of training, framed as

entrustment of care for patients close to the supervisor and summarised as 'Would you trust your loved ones to each trainee you certify?'

This qualitative study used constructivist Grounded Theory principles and followed standards for reporting qualitative research.^{3,4} After approval by the ethics review board of the Netherlands Association for Medical Education (NERB file 847, March 2017) and obtaining informed consent, we conducted semi-structured interviews with 26 senior anaesthetists from 21 European countries. Each participant was directly involved in certification decisions, for example as programme director. We purposively sampled participants to represent the different assessment and certification practices, identified previously,² to ascertain divergent perspectives from a range of countries. Between June 2017 and December 2018, two

Table 1 Sample quotes of responses to questions on the theme ‘Would you trust your loved ones to each one of them?’.

Response	Quote (participant ID number)
Affirmative	I would absolutely have no qualms about them anesthetizing me or my children (12)
	The exams are particularly challenging. If somebody is not up to the job, they will not get through the exams. I have got a lot of faith in the examination system. (13)
	He has been assessed for five years, so we can say: he's safe. [...] We can put our hands on our heart and say he's ready, for sure. (16)
Irresolute	I cannot guarantee you 100% that everyone who passes this final exam will be 100% in their practice. (18)
	Although we have run national courses for supervisors, it might be that we don't have the same idea of the level needed. (11)
	I think in standard deviations. The certification cut-off is not the mean, but at -2 standard deviations. We always try to bring you to the middle. (23)
Negative	There are some strict criteria. If they meet those they pass. Even if I would not like to have them treat me. (7)
	We don't have a bedside evaluation. The examination is just theory. We don't evaluate formally the way of thinking, the way of doing. (6)
	She's a problematic person. We know she'll be a very problematic anaesthesiologist after the exam [...], but the only criterion is knowledge. (22)
	I have no right to forbid a trainee to go to the board exam; pass the oral after five years, and then you're certified. (8)
	The main weakness is the detection of problems with trainees; in other words, to ensure that they are ready is very difficult (25)
My chief advises me to be lenient. Because if I am too strict, my institution will get less money. (5)	

anaesthetists (GJ, APM) and one trainee (AO) conducted the interviews. The initial interview guide reflected our research questions and the literature. A professional service transcribed the audio-recorded interviews. Two authors (GJ and AO) performed open coding individually and axial coding through several discussions. Subsequently, GJ and AO independently established respondents' position with regards to readiness of trainees to be entrusted with the care of loved ones at completion of training, and resolved any discrepancies through discussion. A web-based application (www.dedoose.com) facilitated collaborative analysis. In several iterations of data collection and constant comparative analysis we achieved saturation after 26 interviews. Findings from our prior study² helped to maintain reflexivity regarding our presuppositions.

Questions on the theme ‘Would you trust your loved ones to each trainee you certify?’ equally evoked affirmative, irresolute, and negative responses (see [Table 1](#) for quotes).

Participants who answered affirmatively labelled it the most vital issue in certification. They expressed confidence in their assessment processes to establish competence, relying on ‘big hurdle’ examinations or longitudinal holistic assessment.

Some participants, however, were hesitant to answer this question affirmatively for all trainees and felt unsure whether some trainees met competence standards.

Ten interviewees admitted having certified trainees they did not deem competent enough to anaesthetise their relatives. They blamed deficient evaluation criteria (e.g. assessment focusing solely on knowledge), ignoring important aspects such as clinical competence or professionalism. Other reasons included an inability to stop trainees from getting certified, poor methods of detecting underperforming trainees, staff shortages, and the financial consequences to the department of failing a trainee.

So, although decision-makers were satisfied with the competence level of most trainees they had certified, many admitted to having certified trainees they would not entrust with the unsupervised care of their loved ones. Such ‘false positive’ certification decisions – certified, but not truly competent – are an alarming finding and suggest flawed assessment systems that fail to consider all facets of competence. Failure to take aspects such as professionalism into account may jeopardise professional collaboration and patient safety.⁵

A limitation of our qualitative research approach is that we are not able to quantify the incidence of such ‘false positive’ certifications, nor can we pinpoint the problem to countries or curricular systems. Nevertheless, it is concerning that this experience appears to be common among anaesthetists certifying trainees across Europe. Another limitation is that we have not specifically investigated individual or local tendencies to entrust residents at completion of training with care for loved ones. Furthermore, although our interview study was in anaesthesia only, we suspect that this finding will resonate with colleagues responsible for certification in both surgical and non-surgical specialties. Finally, although we did apply researcher triangulation, we did not triangulate with data from other sources. A future study could build on our findings with data from surveys or focus groups.

To fulfil the profession's promise of societal accountability, the assessment and certification processes should be optimised to ensure adequate competence of all trainees at the time of certification. All patients, including our own loved ones, justifiably deserve to trust every new medical specialist that our training programmes deliver.

Authors' contributions

Concept and design of study: GJ, AO, APM, CJK, OtC, RGH

Data collection: GJ, AO, APM

Data analysis: GJ, AO

Data interpretation: GJ, AO, CJK, OtC, RGH

Drafting of the manuscript: GJ

Critical revision of the manuscript: AO, APM, CJK, OtC, RGH

Declarations of interest

The authors declare that they have no conflicts of interest.

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Impact of stress management strategies and experience on electrodermal activity during high-fidelity simulation of critical situations

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Initial results of this study were presented at the 2019 annual meeting of the Society for Neuroscience, Chicago, IL, USA, November 2019 and at the 1st International Conference for Multi-Area Simulation, Angers, France, October 2019.

Keywords: critical situations; electrodermal activity; high-fidelity simulation; medical education; phasic; tactics to optimise potential; tonic

Editor—Acute stress has been shown to decrease performance of cognitive tasks. Health professionals are often required to make cognitive decisions during stressful situations. Residents trained in stress management strategies (tactics to optimise potential [TOP]) show improved performance when coping with critical situations during high-fidelity simulation (HFS).¹ Performance enhancement might result from the effect of TOP on stress regulation, leading to a more controlled biological stress reaction or balanced arousal with the subject being better prepared for action. Separating electrodermal activity (EDA) into its tonic (i.e. slow variation) and phasic (i.e. fast variation) components identifies the arousal phenomenon and sympathetic nervous system activity.² These EDA components are under the influence of two neuroanatomical networks.³ The tonic component is

influenced by the orbitofrontal and ventromedial prefrontal cortices, whilst the phasic component is influenced by various brain areas, including the thalamus, hypothalamus, striate and extra-striate cortices, anterior cingulate and insular cortices, and some lateral regions of the prefrontal cortex.³ Both are mobilised during stress: tonic EDA increases, whilst the phasic EDA bursts increase in both amplitude and frequency.⁴ Both stress dimensions were better controlled in senior residents, indicating that experience reduces perceived stress.⁵ As TOP decreases perceived stress in residents,¹ we wanted to explore the impact of TOP on the EDA components.

The effect of TOP on the performance of 128 anaesthesia residents facing a critical situation in HFS was studied in a prospective RCT.¹ Assessment of the mechanism of action of