

## Agreement between trainees and supervisors on first-year entrustable professional activities for anaesthesia training

Adrian P. Marty<sup>1</sup>, Sarah Schmelzer<sup>2</sup>, Reto A. Thomasin<sup>3</sup>, Julia Braun<sup>4</sup>, Marco P. Zalunardo<sup>1</sup>, Donat R. Spahn<sup>1</sup> and Jan Breckwoldt<sup>1,\*</sup>

<sup>1</sup>Institute of Anaesthesiology, University of Zurich and University Hospital Zurich, Zurich, Switzerland, <sup>2</sup>Zurich University of Applied Sciences, School of Management and Law, Winterthur, Switzerland, <sup>3</sup>Institute of Anaesthesiology, Kantonsspital Winterthur, Winterthur, Switzerland and <sup>4</sup>Epidemiology, Biostatistics and Prevention Institute of the University of Zurich, Zurich, Switzerland

\*Corresponding author. E-mail: [jan.breckwoldt@usz.ch](mailto:jan.breckwoldt@usz.ch)

### Abstract

**Background:** Entrustable professional activities (EPAs) are commonly developed by senior clinicians and education experts. However, if postgraduate training is conceptualised as an educational alliance, the perspective of trainees should be included. This raises the question as to whether the views of trainees and supervisors on entrustability of specific EPAs differ, which we aimed to explore.

**Methods:** A working group, including all stakeholders, selected and drafted 16 EPAs with the potential for unsupervised practice within the first year of training. For each EPA, first-year trainees, advanced trainees, and supervisors decided whether it should be possible to attain trust for unsupervised practice by the end of the first year of anaesthesiology training (i.e. whether the respective EPA qualified as a 'first-year EPA').

**Results:** We surveyed 23 first-year trainees, 47 advanced trainees, and 51 supervisors (overall response rate: 68%). All groups fully agreed upon seven EPAs as 'first-year EPAs' and on four EPAs that should not be entrusted within the first year. For all five remaining EPAs, a significantly higher proportion of first-year trainees thought these should be entrusted as first-year EPAs compared with advanced trainees and supervisors. We found no differences between advanced trainees and supervisors.

**Conclusions:** The views of first-year trainees, advanced trainees, and supervisors showed high agreement. Differing views of young trainees disappeared after the first year. This finding provides a fruitful basis to involve trainees in negotiations of autonomy.

**Keywords:** anaesthesia training; competency-based medical education; entrustable professional activities; medical education; postgraduate training; workplace-based assessment

#### Editor's key points

- Entrustable professional activities (EPAs) are a promising concept to advance competency-based medical education.
- First-year trainees, advanced trainees, and clinical supervisors evaluated 16 EPAs as to whether they were appropriate for unsupervised practice within the first year of anaesthesia training.

- For 11 out of the 16 EPAs, there was full agreement between all three groups.
- First-year trainees considered that five EPAs were appropriate for unsupervised practice earlier than did advanced trainees and supervisors.
- This general agreement provides support to include trainees in the negotiation of autonomy in training programmes.

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Entrustable professional activities (EPAs) have received increasing attention over the last decade,<sup>1–3</sup> and are regarded as a promising concept to advance competency-based medical education (CBME).<sup>4–7</sup> Entrustable professional activities have predominantly been developed by groups of experts, such as curriculum developers or programme directors,<sup>8–12</sup> omitting the perspective of trainees.

Recently, the conceptualisation of postgraduate medical training as an educational alliance between trainee and supervisor has been proposed,<sup>13</sup> applying the concept of the therapeutic working alliance between patients and physicians<sup>14</sup> to medical education. This implies that educational goals should be mutually agreed on, and that the level of autonomy might be negotiated between trainee and supervisor in the case of EPAs.<sup>15</sup>

In contrast, one may argue that trainees are unable to adequately judge professional activities they have not fully mastered. This is why supervisors may be reluctant to involve younger trainees in decisions on autonomy. It has been shown that trainees may feel the pressure to present themselves in a more favourable light to preserve their own credibility,<sup>16</sup> adding to the dilemma.

As the trainees' perspective is important when negotiating the level of autonomy of practice,<sup>13 15</sup> knowledge as to whether and to what extent perspectives of trainees and supervisors differ in the case of EPAs could help to address this issue. Large differences or discrepancies would support the exclusion of trainees from negotiating autonomy, while small differences would conversely support inclusion. To our knowledge, there has been no such investigation to date.

We compared the views of trainees and supervisors regarding the expected time until entrustment for unsupervised practice. We hypothesised that differences would be largest between first-year trainees (postgraduate year-1 [PGY-1]) and more advanced trainees (PGY  $\geq 2$ ) or fully trained anaesthetists (supervisors) on the one hand, and less pronounced between PGY  $\geq 2$  and supervisors on the other. Our specific study question was, 'Do PGY-1, PGY  $\geq 2$ , and supervisors agree as to whether specific (simple) EPAs can be performed without supervision within the first year of training?'

## Methods

### Framework of entrustable professional activities

We used the definition of EPAs by Ten Cate and colleagues<sup>4</sup> as 'unit(s) of professional practice that can be fully entrusted to a trainee, as soon as he or she has demonstrated the necessary competence to execute this activity unsupervised'. The framework of Ten Cate and colleagues describes five levels of decreasing supervision.<sup>4 17</sup> In our context, it is relevant to distinguish between Level 3 ('allowed to practice only under reactive/on-demand supervision') and Level 4 ('allowed to practice unsupervised').<sup>17</sup> For each EPA, the aim for a trainee is to reach at least Level 4a ('... with remote monitoring')<sup>17</sup> (i.e. 'supervision not readily available, but with distant supervision and oversight'),<sup>4</sup> or even Level 4b ('... without monitoring').<sup>17</sup> For this level, it should still be considered that some kind of backup supervision is inherent to any trainee–supervisor relationship.

### Study population/setting

Postgraduate anaesthesia training in Switzerland takes 5 yr and is regulated by a national board (Swiss Society for

Anaesthesiology and Resuscitation and Swiss Medical Association [Foederatio Medicorum Helveticorum]). The goals and objectives of the programme are outlined by the Swiss Catalogue of Objectives in Anesthesia and Reanimation (SCOAR),<sup>18</sup> which served as a blueprint for the European anaesthesia curriculum.<sup>19</sup> The SCOAR follows CBME principles defining competency levels for specific tasks. Entrustable professional activities are not explicitly incorporated into the concept; however, the SCOAR relates tasks and competency levels to two phases (the first 2 yr and the following 3 yr of postgraduate training), thereby providing defined expectations of achievements by the end of the second year. Trainees enter the programme directly after graduation from a 6 yr undergraduate curriculum, including 1 yr of full-time clinical clerkships.<sup>20,21</sup> Distinct promotion decisions from one PGY to the next do not exist, and therefore, individual pathways of trainees may slightly differ according to the institutions they work in. A change in the teaching institution is mandatory at least once during training.

The survey was conducted at the anaesthesia departments of two major tertiary teaching hospitals in the canton of Zurich, which together perform ~50 000 anaesthesia procedures per year.

### Survey

In August 2015, all physician trainees and supervisors were invited to participate in a voluntary survey using online survey software (SurveyMonkey® Palo Alto, CA, USA), presenting 16 EPAs potentially eligible to be entrusted for unsupervised practice within the first year of training. For each EPA, the participants were asked whether they consider it relevant to the field of anaesthesia (introductory question to ascertain acceptance, according to the approach of Hauer and colleagues<sup>22</sup>), and whether the EPA should be mastered without supervision within the first year of training (Supplementary file 1: Lines 3–45). As the framework of EPAs was not familiar to all participants, we included informational text at the beginning of the survey, including an introduction to EPAs (Supplementary file 1: Lines 49–60). To increase the response rate (RR), we sent three weekly reminders to non-responders, and entered respondents into a raffle to win a tablet computer.

The 16 EPAs had been prepared in advance by the working group for medical education of the departments involved, with additional members selected for their specific background (four trainees, seven supervisors, and one curriculum developer). All tasks to be mastered without supervision within the first 2 yr of training according to the SCOAR (Phase 1; competency level C tasks)<sup>18</sup> were selected, discussed, and refined to meet EPA quality criteria as described by the EQUAL framework.<sup>5</sup> This resulted in drafts for 16 EPAs, shown in Table 1. To secure a group of clinicians highly knowledgeable and engaged in education, we also invited all trainees and supervisors within the working group (n=11) to complete the survey.

### Statistical analysis

The principal investigator (APM) de-identified the data before further analysis. Respondents were grouped according to training status (PGY-1, PGY  $\geq 2$ , and supervisor, i.e. physicians after postgraduate training), and each group was then tested for homogeneity using  $\chi^2$  tests. Differences in opinion as to whether specific EPAs can be performed at a level of unsupervised practice within the first year of training between PGY-

**Table 1** List of the 16 drafted entrustable professional activities (EPAs), potentially suitable for unsupervised practice within the first 2 yr of anaesthesiology training.

EPA	Description
1	Preoperative assessment of an ASA <sup>1</sup> 1/2 patient undergoing scheduled low-risk surgery
2	Preoperative assessment of an ASA 3/4 patient undergoing scheduled low-risk surgery
3	Induction of anaesthesia for a fasted ASA 1/2 patient without a known difficult airway
4	Induction of anaesthesia for an ASA 1/2 patient with an increased risk of pulmonary aspiration (rapid sequence induction)
5	Intraoperative management of anaesthesia for an ASA 1/2 patient undergoing scheduled low-risk surgery
6	Prescription of postoperative medication for an ASA 1/2 patient undergoing scheduled low-risk surgery
7	Emergence from general anaesthesia of a fasted ASA 1/2 patient without a known difficult airway following scheduled low-risk surgery
8	Transfer of a critical care patient (without further intervention)
9	Handover of an ASA 1/2 patient after surgery to the next/following care team
10	Performing night and weekend shifts
11	Basic airway management ASA 1/2 patient without a known difficult airway
12	Providing acute pain service
13	Performing lumbar regional anaesthesia
14	Performing a simple peripheral nerve block
15	Placing an arterial line
16	Placing a central venous line

<sup>1</sup> ASA, American Society of Anesthesiologists physical status classification.

1, PGY  $\geq 2$ , and supervisors were also compared by  $\chi^2$  tests; in cases of expected frequencies below  $n=5$ , Fisher's exact tests were used. As the number of tests per outcome variable was limited, no correction for multiple testing was applied.

### Data safety and ethics approval

For analysis, we only used de-identified survey data. Only the principal investigator had access to the personal data of the participants. The study was granted exemption by the ethics committee of the canton of Zurich, Switzerland (Registry no. 15-2016).

### Results

The survey was sent to 178 physicians (ranging in position from first-year trainees to department chairs), of whom 121 completely answered the survey, leading to an overall RR of 68%. In particular, these were 23 of 27 (RR: 85.2%) PGY-1 trainees, 47 of 74 (RR: 63.5%) PGY  $\geq 2$  trainees, and 51 of 77 (RR: 66.2%) supervisors; detailed information is provided in Supplementary file 2.

All of the 16 initially drafted EPAs were rated 'relevant' or 'very relevant' to anaesthesiology training by more than 80% of the participants (mean: 85%; range: 80.2–91.8%); see Supplementary file 3.

We sorted the responses into the three groups (PGY-1, PGY  $\geq 2$ , and supervisor), and tested those in the PGY  $\geq 2$  and supervisor groups for homogeneity of responses to account for

potential disparities resulting from different years of experience. We found homogeneity among responses from supervisors for 13 of 16 EPAs (inhomogeneous answers for EPA 4 ( $\chi^2$  [1;  $n=60$ ]=5.984;  $P=0.029$ ), EPA 10 ( $\chi^2$  [1;  $n=60$ ]=9.690;  $P=0.005$ ), and EPA 12 ( $\chi^2$  [1;  $n=60$ ]=15.654;  $P<0.001$ ). Likewise, responses from the PGY  $\geq 2$  group for 13 of the 16 EPAs were homogeneous, although with a slightly different distribution (inhomogeneous answers for EPA 2 ( $\chi^2$  [1;  $n=38$ ]=5.712;  $P=0.041$ ), EPA 4 ( $\chi^2$  [1;  $n=38$ ]=9.886;  $P=0.005$ ), and EPA 10 ( $\chi^2$  [1;  $n=38$ ]=5.397;  $P=0.046$ ).

For seven EPAs (EPAs 1, 3, 5, 6, 7, 9, and 11), all three participant groups agreed that these should be entrusted for unsupervised practice within the first year of training. No statistical differences between the groups could be shown (Table 2). Full agreement among all participant groups was present concerning three EPAs, which were considered to be entrustable at the level of unsupervised practice only beyond the first year (EPAs 8, 14, and 16). For EPA 13, there was overall agreement amongst the three groups, but similar disagreement within the groups as to the time until entrustment: there was an almost even distribution between 'entrustment within the first year of training' and 'entrustment only beyond the first year of training' (mean: 58%) (Table 2). There were no statistical differences between responses from advanced trainees (PGY  $\geq 2$ ) and supervisors.

For the remaining five EPAs (2, 8, 12, 15, and 16), statistical differences could be shown between the PGY-1 and supervisor groups for EPAs 4, 8, 12, and 15, and between the PGY-1 and PGY  $\geq 2$  groups for EPAs 4, 8, 15, and 16. Additionally, grouping all trainees and comparing these with supervisors showed a statistical difference for the judgement of EPA 4. In each of these comparisons, the probability to rate the EPA as suitable for unsupervised practice within the first year of training was higher if the participant group was earlier in career. Table 2 provides the specific comparisons and levels of significance.

### Discussion

The main goal of this study was to evaluate the extent to which first-year trainees, more advanced trainees, and supervisors agreed as to whether specific EPAs could be entrusted at the level of unsupervised practice within the first year of training. To our knowledge, this is the first study to show how the views of trainees and supervisors on EPAs relate to each other. Based on the findings, we argue that trainees could be included into the negotiation of autonomy.

We found full agreement between all participant groups for 11 of 16 EPAs: of these, seven EPAs were uniformly considered suitable for the first year of training, three only beyond the first year of training, and one EPA was attributed to the first year or later years with a roughly equal distribution. This generally high agreement between all groups indicates a quite homogeneous perspective on professional activities and provides a solid basis for an educational alliance.

For the remaining five EPAs, we found significant differences between the views of the three groups, interestingly with the same tendency in all comparisons towards a higher proportion of first-year trainees proposing entrustment for unsupervised practice within the first year of training. We think these differences may be explained by two principle mechanisms: (i) the way in which expertise develops over time, and (ii) the nature of the trainee-supervisor relationship.

**Table 2** Percentage of respondents per group who found that the specific entrustable professional activity (EPA) was manageable without supervision by the end of the first year of training in anaesthesiology

EPA Description	Trainees		Supervisors	Full agreement <sup>1</sup>	Agreement for first year*
	PGY 1	PGY ≥2			
	n=23	n=38	n=60		
1 Preoperative assessment ASA <sup>2</sup> 1/2	1	0.97	1.00	X	X
2 Preoperative assessment ASA 3/4	0.57	0.37	0.37	X	
3 Induction ASA 1/2 (simple airway)	1	0.95	0.90	X	X
4 Induction: RSI <sup>3</sup>	0.87 <sup>4</sup>	0.55 <sup>‡</sup>	0.43 <sup>‡</sup>		
5 Intraoperative management ASA 1/2	1	0.97	0.97	X	X
6 Postoperative medication	0.96	1	1	X	X
7 Emergence from general anaesthesia ASA1/2	0.96	0.84	0.83	X	X
8 Transfer of a critical care patient	0.39 <sup>4</sup>	0.05 <sup>‡</sup>	0.13 <sup>‡</sup>		
9 Handover of patient ASA 1/2	1	0.95	0.99	X	X
10 Night and weekend shifts	0.65	0.50	0.68	X	
11 Basic airway management	1	0.95	0.88	X	X
12 Acute pain service	0.78 <sup>4</sup>	0.55	0.47 <sup>‡</sup>		
13 Lumbar regional anaesthesia	0.57	0.53	0.63	X	
14 Simple peripheral nerve block	0.26	0.21	0.27	X	
15 Arterial line placement	0.96 <sup>4</sup>	0.61 <sup>‡</sup>	0.57 <sup>‡</sup>		
16 Central venous line placement	0.39 <sup>4</sup>	0.13 <sup>‡</sup>	0.20		

Statistics,  $\chi^2$  tests: PGY-1 compared with PGY ≥2: EPA 4 ( $\chi^2$  [1; n=61]=5.172; P=0.011); EPA 8 ( $\chi^2$  [1; n=61]=11.118; P=0.001); EPA 15 ( $\chi^2$  [1; n=61]=9.136; P=0.003); and EPA 16 ( $\chi^2$  [1; n=61]=5.466.136; P=0.019).

PGY-1 compared with supervisors: EPA 4 ( $\chi^2$  [1; n=83]=12.807; P<0.001); EPA 8 ( $\chi^2$  [1; n=83]=6.794; P=0.015); EPA 12 ( $\chi^2$  [1; n=83]=6.718; P=0.013); and EPA 15 ( $\chi^2$  [1; n=83]=11.514; P=0.001). PGY ≥2 compared with supervisors: no significant differences. All trainees compared with supervisors: EPA 4 ( $\chi^2$  [1; n=121]=6.980; P=0.008).

<sup>1</sup> Full agreement between all groups of respondents.

<sup>2</sup> ASA, American Society of Anesthesiologists physical status classification.

<sup>3</sup> RSI, rapid sequence induction.

<sup>4</sup> Significant differences between the groups (see the following  $\chi^2$  test).

From the perspective of expertise development,<sup>23,24</sup> the distinct differences between PGY-1 and PGY ≥2 respondents likely reflect the process of gradually stepping into the profession; this process appears to happen rather early in training. According to the Dreyfus model of expertise development,<sup>23</sup> first-year trainees mainly rely on rule-based reasoning and may have perceptions of an EPA that everything would go according to plan. In contrast, more advanced trainees already integrate pattern recognition into their view and rather think of the more complex cases if the activity does not go smoothly. Pattern recognition and experience may lead to a more anticipating and cautious view by advanced trainees.

From the perspective of the trainee–supervisor relationship, the findings that younger trainees consider EPAs suitable for unsupervised practice earlier are in line with concerns related to trainees given autonomy too early. Yet, the different perspectives may also reflect that supervisors tend to judge trainees' competencies in a more safety-driven fashion, considering the fact that supervisors often lack the resources for comprehensive 'all-over' observation of each trainee.<sup>25–27</sup> In this sense, trainees may be regarded as experts for their state of training. Interestingly, the overall difference in our sample was very small, suggesting that trainees will not be profoundly overconfident. However, this should not distract from the fact that underperforming trainees who might not be aware of their lack of expertise need special attention within the supervisory relationship.<sup>6,28</sup>

### Negotiating autonomy at the workplace

Our data support the notion that there is space for negotiation within the educational alliance, and justify including all parties into a dialogue on autonomy. Trainees' overconfidence may be present early during training, but the discrepancy of views seems to disappear rather quickly; this gap may be a very fruitful starting point to negotiate the level of autonomy.<sup>13</sup> Involving trainees could strengthen the educational alliance and promote a more authentic feedback culture and a trustworthy learning climate.

As it cannot be said to which extent trainees or supervisors contribute to the gap, there clearly is a need for the assessment of EPAs, including probes into trainees' decision-making and anticipating capabilities. At this point, clinical teaching could draw on making the balance between rule-based reasoning and pattern recognition explicit to the trainee.

More data on the integration into the profession could help provide a basis for correct timing and adjustment of expectations. Further research should be devoted to this process, and EPAs might serve as a powerful model.

### Basis for co-creation of entrustable professional activities

Our results provide a rationale for co-creating EPAs by trainees together with supervisors. The implementation of EPAs needs to be well prepared in times of constrained resources and change fatigue,<sup>29,30</sup> and most change strategies recommend

involving all stakeholders as early as possible to create a sense of ownership.<sup>31–33</sup> Co-creation of EPAs may provide an institutional facet of the educational alliance and help facilitate future implementation. As our data suggest, the involvement of trainees would not substantially change the resulting set of EPAs, nor the time until unsupervised practice.

In this context, one should consider the main advantage of EPAs in terms of learner centredness: EPAs allow each trainee to progress at his or her own pace,<sup>2–4,7</sup> and provide an orientation for trainees to compare their progress with average expectations. Entrustable professional activities should hence be implemented without strictly tying their attainment to a specific stage of training.

### Limitations

As a first limitation, the data were collected at two large teaching hospitals in the German-speaking part of Switzerland. Whilst learning the basics of a specialty is somewhat uniform, there still are variations between different training programmes.<sup>34</sup> It is therefore not clear whether the results could be transferred to smaller hospitals or to other cultures. As a second limitation, the RRs did not reach fully representative levels. However, this is common for online surveys; on this basis, a bias towards more motivated respondents is likely. We also found higher RRs for participants who were younger in their career, which may reflect a higher interest in one's own training. As a third limitation, two groups of respondents (PGY  $\geq 2$  and supervisor) provided inhomogeneous answers for three EPAs each, two of which were found in both groups (EPAs 4 and 10). We view this as an indication for more global definitions of the respective EPAs not taking into account the variation of the EPAs. However, the data do not provide enough insight into the reasons, but further studies should address this aspect.

### Conclusions

For 11 of 16 EPAs, first-year trainees, advanced trainees, and supervisors fully agreed upon the time of entrustment for unsupervised practice. For the five remaining EPAs, a significantly higher proportion of PGY-1 found these EPAs should be entrusted at the level of unsupervised practice within the first year of training. No differences, however, were found between advanced trainees and supervisors. Whilst there may be a slight overconfidence of young trainees, the rather early change from first-year to advanced trainees may justify including trainees in discussions on autonomy. Further research should explore how the differing views could be utilised to support the educational alliance.

### Authors' contributions

Study conception/design: APM, DRS, JBre  
 Recruitment of participants: APM, RAT, MPZ, DRS  
 Data collection: APM, RAT, MPZ  
 Data analysis: SS, RAT, JBre  
 Data interpretation: APM, SS, RAT, MPZ, JBre  
 Statistical workup: JBra  
 Writing of first draft: APM  
 Revision of manuscript: APM  
 Critical revision of manuscript: JBra, MPZ, DRS, JBre  
 Critical revision of paper: SS, RAT  
 Critical revision of final version: JBre

### Declarations of interest

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bja.2020.04.009>.

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