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Research Article

Validation of core competencies during residency training in anaesthesiology

Validierung von Kompetenzzielen für den Facharzt für Anästhesiologie

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Abstract

Background and goal: Curriculum development for residency training is increasingly challenging in times of financial restrictions and time limitations. Several countries have adopted the CanMEDS framework for medical education as a model into their curricula of specialty training. The purpose of the present study was to validate the competency goals, as derived from CanMEDS, of the Department of Anaesthesiology and Intensive Care Medicine of the Berlin Charité University Medical Centre, by conducting a staff survey. These goals for the qualification of specialists stipulate demonstrable competencies in seven areas: expert medical action, efficient collaboration in a team, communications with patients and family, management and organisation, lifelong learning, professional behaviour, and advocacy of good health. We had previously developed a catalogue of curriculum items based on these seven core competencies. In order to evaluate the validity of this catalogue, we surveyed anaesthetists at our department in regard to their perception of the importance of each of these items. In addition to the descriptive acquisition of data, it was intended to assess the results of the survey to ascertain whether there were differences in the evaluation of these objectives by specialists and registrars.

Methods: The questionnaire with the seven adapted CanMEDS Roles included items describing each of their underlying competencies. Each anaesthetist (registrars and specialists) working at our institution in May of 2007 was asked to participate in the survey. Individual perception of relevance was rated for each item on a scale similar to the Likert system, ranging from 1 (highly relevant) to 5 (not at all relevant), from which ratings means were calculated. For determination of reliability, we calculated Cronbach's alpha. To assess differences between subgroups, we performed analysis of variance.

Results: All seven roles were rated as relevant. Three of the seven competency goals (expert medical action, efficient collaboration in a team, and communication with patients and family) achieved especially high ratings. Only a few items differed significantly in their average rating between specialists and registrars.

Conclusions: We succeeded in validating the relevance of the adapted seven CanMEDS competencies for residency training within our institution. So far, many countries have adopted the Canadian Model, which indicates the great practicability of this competency-based model in curriculum planning. Roles with higher acceptance should be prioritised in existing curricula. It would be desirable to develop and validate a competency-based curriculum for specialty training in anaesthesiology throughout Germany by conducting a national survey to include specialists as well as registrars in curriculum development.

Keywords: clinical competence, physicians, medical education, questionnaires, attitude of health personnel, curriculum

Zusammenfassung

Hintergrund und Fragestellung: Die Curriculumsentwicklung für die Facharztweiterbildung ist aufgrund eingeschränkter zeitlicher und finanzieller Ressourcen eine immer größere Herausforderung. International wird als Vorbild für Curriculumsreformen das Kanadische CanMEDS Modell verwendet. Ziel dieser Untersuchung war es, die mit Rückgriff auf CanMEDS abgeleiteten Kompetenzziele der Klinik für Anästhesiologie und Intensivmedizin der Charité Universitätsmedizin mit einer Mitarbeiterbefragung zu validieren. Diese Ziele für die Ausbildung von Fachärzten schreiben nachweisbare Kompetenzen in sieben Bereichen vor: Expertenhandeln, Effiziente Zusammenarbeit im Team, Kommunikation mit Patienten und Angehörigen, Management und Organisation, Lebenslanges Lernen, Professionelles Verhalten, Gesundheitsfürsorge. Zusätzlich zur deskriptiven Erfassung sollen die Ergebnisse der Befragung dahin gehend geprüft werden, ob es Unterschiede in den Bewertungen der Ziele durch Weiterbildungsassistenten und Oberärzte gibt.
Methodik: Die Kompetenzziele wurden allen ärztlichen Mitarbeitern vorgelegt. Die Bewertung wurde anhand einer Likert-ähnlichen Skala von 1 (sehr relevant) bis zu 5 (gar nicht relevant) im Mai 2007 durchgeführt und Mittelwerte der Zustimmung berechnet. Zur Bestimmung der Reliabilität wurde Cronbachs alpha als gängiges Maß für die interne Konsistenz berechnet. Zum Vergleich zwischen den verschiedenen Gruppen wurde eine Varianzanalyse durchgeführt.
Ergebnisse: Es wurden alle sieben Kompetenzziele als relevant erachtet. Drei der sieben Kompetenzziele (Expertenhandeln, Effiziente Zusammenarbeit im Team, Kommunikation mit Patienten und Angehörigen) erreichten besonders hohe Werte. Unterschiede im Vergleich der Bewertung von Weiterbildungsassistenten und Oberärzten betrafen nur wenige Items.
Schlussfolgerungen: Kompetenzziele für die Facharztweiterbildung an unserer Institution konnten validiert werden. Die schnelle internationale Verbreitung des CanMEDS Modells ist ein deutlicher Hinweis auf die Nützlichkeit des kompetenzbasierten Modells. Kompetenzziele, die besonders hohe Akzeptanzwerte erreichten, sollten prioritär in schon bestehende Curricula eingearbeitet werden. Eine Erstellung eines kompetenzbasierten deutschen Curriculums für die Facharztweiterbildung im Fach Anästhesiologie durch einen bundesweiten Konsensus- und Validierungsprozess wäre wünschenswert. Sowohl Weiterbildungsassistenten als auch Weiterbilder sollten in die Curriculumsentwicklung einbezogen werden.

Schlüsselwörter: kompetenzbasierte Ausbildung, Facharzt, medizinische Weiterbildung, Fragebögen, Verhalten von medizinischem Fachpersonal, Curriculum

Introduction

Both quality and quality management of residency training are currently being discussed in several medical associations in Germany. Within recent years, a number of surveys addressing quality of residency training in anaesthesiology were conducted among registrars and specialists working at German hospitals [1], [2], [3], [4]. A survey among 770 registrars at German hospitals revealed that only a third of the participating registrars were trained according to a structured curriculum [4]. This situation is unacceptable, especially since it is assumed that well-structured residency curricula facilitate more effective learning, followed by enhanced clinical practice in future generations of physicians [5], [6]. In 2009, the German Medical Association (*Bundesaerztekammer*) initiated evaluation of residency training in all medical subspecialties. The low response rate of 32.8% (with anaesthesiology approx. 40%) has been criticised. In order to improve reliability, a future evaluation will be compulsory for all hospitals training registrars [7]. Quality was rated analogously to German school marks: i.e., from 1, for very good to 6, for poor. Although the low response rate restricts interpretation, this evaluation revealed a relatively good overall rating of 2.54 (e.g., "I'm happy with my working environment", and "I would recommend my

training program"). Nevertheless, registrars trained in anaesthesiology rated their training worse than average in the following seven out of eight global factors: global rating, teaching of expert medical knowledge, learning culture, leadership, decision-making, workplace environment, and application of evidence-based medicine. Only the eighth global factor – management of medical errors – received higher-than-average ratings from registrars in anaesthesiology [8], [9].

Many countries have developed a structured curriculum for various levels of training (e.g., for specialties and subspecialties) in order to assure high quality of future health care [10], [11], [12], [13]. Such curricula focus on outcomes and their description. These outcome-based curricula describe competencies to be achieved by registrars by the end of their training. Processes resulting in these outcomes may vary individually and among institutions [14].

Various groups should be included in the process of curriculum development, and should at least involve registrars and specialists – since they are the ones who will transfer curriculum content into practice. Additionally, patients as well as representatives of other professions delivering health may likewise be involved in curriculum planning. Participation in curriculum development enhances the transparency of outcomes expected from future specialists [15], [16], [17]. It remains unknown whether registrars and specialists are equally capable of evaluating outcomes and learning objectives.

To develop a competency-based curriculum, we initially defined learning outcomes of anaesthesiology residency training at our institution. The process of curriculum development is described in detail elsewhere [18]. The group that defined the initial version of the outcomes involved registrars and specialists. Based on the CanMEDS framework (the Canadian competency model), we defined and agreed on outcomes that we adapted to our German system of medical training in anaesthesiology. Outcomes were developed in order to structure future residency training at our institution; for the list of outcomes, please see Table 1 [12]. The seven CanMEDS Roles of the medical expert, scholar, collaborator, communicator, manager, professional, and health advocate were adapted and further defined by describing factors (i.e., outcomes). These roles and outcomes were adapted in order to structure, complete, and integrate the learning objectives defined by the local medical board.

In 2007, we conducted a survey among all the physicians working at our institution to validate these adapted roles and outcomes. With this validation process we intended to achieve broader acceptance of outcomes and greater involvement of both registrars and specialists. Additionally, we investigated whether there were any differences in ratings between consultants, fellows, and registrars as well as male and female physicians.

Methods

Instruments

The survey was conducted according to a structured questionnaire based on the outcomes defined at our institution as described above. The questionnaire included all outcomes (see Table 1). The survey was shown to all consultants of our institution before the survey was initiated, in order to explain content and assure its understanding. Consultants gave their feedback, which included highlighting some items as too complex. They also recommended separation of some items, commented on unclear formulations, and decided on the process of how items should be rated. We then reviewed and optimised the questionnaire. Items of outcome were rated analogously to German school marks, on a 5 point Likert-like scale from 1 (highly relevant) to 5 (not at all relevant). The survey and questionnaire were approved by the Local Ethics Committee, and the survey was conducted over a four-week period during May of 2007.

Participants

All 231 physicians of the Department of Anaesthesiology and Intensive Care Medicine at the Charité University Medical Centre in Berlin, at Campus Mitte and Campus Virchow, were asked to complete the questionnaire. Of these, 39 were consultants, 44 fellows and 148 registrars (see Table 2). Medical students and other temporary staff were excluded. The survey was announced verbally and by e-mail. During the period the survey was conducted, physicians were reminded by weekly e-mails.

Statistical analysis

Descriptive and exploratory statistical analysis was performed with SPSS 12.0. Mean values and standard deviations of agreement ratings on the Likert-like scale were calculated for each item. To explore the internal consistency of the questionnaire, we calculated Cronbach's alpha for the items of each of the CanMEDS Roles. Cronbach's alpha >0.7 was defined as acceptable and Cronbach's alpha >0.8, as satisfactory. We conducted analysis of variance to evaluate differences between groups.

Results

A total of 123 out of 231 physicians completed the questionnaire, yielding a response rate of 53.2%. According to chi-square-tests, groups of responders did not differ significantly in regard to status (number of consultants, fellows, and registrars) or gender, indicating a representative survey (see Table 2: Comparison of all physicians and survey participants). Eleven physicians completing the survey had not specified their qualification, and twelve physicians completing the survey had failed to indicate

Table 1: List of roles and competencies

Competencies for the role of medical expert
Demonstrates patient-centred care
Applies relevant medical knowledge
Applies sufficiently differentiated specialist knowledge
Synthesises patient information and procedures and/or situations
Effectively initiates diagnostic and therapeutic procedures
Shows competent use of skills and methods defined by the Board of Anaesthesia
Applies skills and methods according to current standards
Practices evidence-based medicine
Spreads knowledge
Teaches obtained knowledge (e.g., conducts bedside teaching, gives comprehensible lectures, etc.)
Competencies for the role of scholar as part of lifelong learning
Keeps medical knowledge up to date
Has developed and implemented a strategy for lifelong learning
Pursues a strategy for lifelong ongoing qualification
Is able to conduct Internet and literature searches
Evaluates Internet and literature searches critically
Is capable of presenting own cases at morbidity and mortality conferences
Critically evaluates content of ongoing medical education and other sources of medical information
Knows his/her abilities and limitations (e.g., through simulator classes, European exam, CME questionnaires, etc.)
Competencies for the role of the collaborator
Teamwork
Gives and follows instructions depending on the situation
Respects roles and competencies of other team members
Decides together with the team
Constructively discusses team strengths and weaknesses
Listens to questions and concerns of others
Reflects on his behaviour with others
Effective team communication
Closes communication loops [26]
Communicates effectively with all colleagues
Ensures consistent information flow to patients
Competencies for the role of communicator
Applies a patient centred interview approach
Provides a preferably calm setting appropriate to the situation
Can establish a satisfactory course of interview
Listens effectively and integrates information from more than one participant where necessary
Communicates verbally and nonverbally and thereby establishes a therapeutic relationship
Ensures patient intimacy and discretion
Assures patient understanding, respect, empathy, and trust as the basis of doctor-patient relationships

(Continued)

Table 1: List of roles and competencies

Practices shared decision making
Communicates understandably and practices shared decision making
Discusses information appropriately with patients, relatives, and colleague team (e.g., negative prognoses, ethical dilemmas, etc.)
Competencies for the role of manager and organiser
Can effectively employ resources
Uses existing resources effectively in the balance between patient care and ongoing qualification (especially his/her own time and existing staff)
Works economically
Works ecologically
Provides the structural basis for responsible working
Keeps track of the clinical situation and is present
Shows good decision-making skills
Gives clear instructions
Prevails in patient care if necessary
Discusses procedures in advance (e.g., in briefings)
Anticipates situations
Manages time efficiently
Is an effective role model
Competencies for the role of professional
Reliable team member
Is able to accept responsibilities and correctly delegate responsibilities to other team members
Is punctual and reliable and gives and takes feedback with colleagues and superior physicians
Knows and accepts the limitations of others
Accepts responsibility for his/her own errors
Quality management
Benchmarks his/her own performance and that of the department
Practices techniques of quality assurance and improvement
Provides logically intelligible documentation
Creates an optimal working environment
Assesses and corrects his/her own actions, according to the current situation and by means of a review of the day's work
Error management
Reports critical incidents to the central critical incidents reporting system (CIRS)
Regularly reviews teamwork in discussions with the team concerning collaboration and incidents, or takes parts in such discussions
Criticises constructively
Accepts criticism

(Continued)

Table 1: List of roles and competencies

Responsibility
Acts according to ethical principles
Knows medicolegal constraints
Satisfactorily prepares for work
Knows and reflects on his/her own limits; promptly asks colleagues for help or assistance
Acts responsibly with respect to himself/herself
Professional manner
Makes a professional appearance with respects to patients, families, an, and expertise; uses appropriate words and language
Competencies for the role of health advocate
Has sufficient knowledge of the healthcare system
The doctor actively pursues patient-centred interdisciplinary care (e.g., clinical pathways, pain management, substitution doctors, outpatient facilities, etc.)
Knows structures of the healthcare system, uses them and judges them critically
Promotes individual healthcare
Considers various influences on patients' health status (e.g., biological, psychological, social, environmental, and cultural influences)
Detects anaesthesiological and non-anaesthesiological risk factors; addresses behavioural change: e.g., during premedication visits
Is a satisfactory role model

Table 2: Comparison of all physicians and survey participants

	All physicians	**Survey participants**	**Physicians not participating in the survey**	**Significance (chi-square)**
Number of physicians	231	123 (53.2%)	108 (46.8%)	0.32
Status:		Not included 11		
Consultants (m + f)	**39**	**20 (51.3%)**	**19 (48.7%)**	**0.87**
Male	23	9 (39.1%)	14 (60.9%)	0.3
Female	16	10 (62.5%)	6 (37.5%)	0.32
Fellows (m + f)	**44**	**22 (50%)**	**22 (50%)**	**1.0**
Male	24 (m)	8 (33.3)	16 (66.6%)	0.1
Female	20 (w)	11 (55%)	9 (45%)	0.66
Registrars (m + f)	**148**	**70 (47.3%)**	**78 (52.7%)**	**0.51**
Male	85 (m)	37 (43.5%)	48 (56.5%)	0.23
Female	63 (w)	33 (52.4%)	30 (47.6%)	0.7
Gender		Not included 12		
Female	99	55 (55.6%)	44 (44.4%)	0.27
Male	132	56 (42.4%)	76 (57.6%)	0.082

their gender. Their questionnaires were therefore excluded from data analysis.

Cronbach's alpha was acceptable for the role of medical expert and satisfactory for all other roles; see Table 3: Calculation of Cronbach's alpha. Calculated values ranged between 0.75 and 0.95.

Table 3: Calculation of Cronbach's alpha

Role	Cronbach's alpha	Number of items
Medical expert	0.75	8
Scholar	0.85	7
Collaborator	0.92	9
Communicator	0.92	8
Manager	0.91	11
Professional	0.95	19
Health advocate	0.88	5

Mean values were calculated from the sum of items for each role. Owing to incorrect questionnaires, we were able to include only 108 of 123 questionnaires. Average agreement ranged between 1.44 and 2.07 on a Likert-like scale. The low value indicates high overall agreement regarding relevance of the described roles and items (see Table 4).

Table 4: Mean value of roles (n=108)

Role	Mean value	Standard deviation
Medical expert	1.44	0.35
Scholar	1.86	0.54
Collaborator	1.5	0.44
Communicator	1.45	0.41
Manager	1.63	0.41
Professional	1.64	0.39
Health advocate	2.07	0.62

In order to prioritize items, we identified relevant and less relevant items. Items were considered as highly relevant once ≥70% of responders rated an item as very relevant. Very relevant items in the role of the medical expert were "Applies relevant medical knowledge" (84.6%, n=123), "Applies sufficiently differentiated specialist knowledge" (69.9%, n=123), "Synthesises patient information and procedures and/or situations" (81.3%, n=123), "Effectively initiates diagnostic and therapeutic procedures" (74%, n=123).

Further items rated as very relevant derived from the role of collaborator: "Gives and follows instructions depending on the situation" (69.9%, n=123); from the role of manager: "Shows good decision-making skills" (74%, n=123) and "Gives clear instructions" (78.9%, n=123); and from the role of professional: "Accepts responsibility for his/her own errors" (70.7%, n=121), as shown in Table 5.

Items that were rated as indifferent, less relevant, or not at all relevant from more than 30% of responders were the following items from the role of manager: "Works ecologically" (32.5%, n=123), from the role of professional: "Reports critical incidents to the central critical incidents reporting system (CIRS)" (32.5%, n=122); and from the role of health advocate: "The doctor actively pursues patient-centred interdisciplinary care (e.g., clinical pathways, pain management, substitution doctors, outpatient facilities, etc.)" (32.8% n=122) as well as, "Knows structures of the healthcare system, uses them, and judges them critically" (39.3%, n=122), see Table 6.

Comparison of different groups of survey participants

To detect differences among groups of responders, we conducted analysis of variance (ANOVA). We observed significant differences ($p<0.05$) among the registrars, consultants and fellows for the following items: For the role of medical expert:" "Applies sufficiently differentiated specialist knowledge"; for the role of professional: "Acts according to ethical principles" and "Satisfactorily prepares for work". See Table 7.

Comparison of fellows and registrars: fellows rated the following items as significantly more relevant than registrars ($p<0.01$): From the role of professional: "Acts according to ethical principles", "Satisfactorily prepares for work". Additionally, all specialists (with and without supervising duty) rated the following items as significantly more relevant than registrars ($p<0.05$): From the role scholar: "Pursues a strategy for lifelong ongoing learning", "Is capable of presenting own cases at morbidity and mortality conferences"; from the role of manager: "Discusses procedures in advance". See Table 8.

The following items were rated as significantly more relevant from consultants vs. fellows ($p<0.05$): for the role of medical expert: "Applies sufficiently differentiated specialist knowledge"; for the role of communicator: "Communicates understandably and practices shared decision making"; for the role of manager: "Shows good decision-making skills" and "Anticipates situations". See Table 9.

Male responders rated the following items as significantly more relevant than did their female colleagues: From the role of scholar: "Is able to conduct Internet and literature searches". Female responders rated the following items as significantly more relevant than did their male colleagues ($p<0.05$): from the role of manager: "Prevails in patient care if necessary"; from the role of professional: "Considers expectations based upon their achievability". See Table 10.

Table 5: Very relevant items

Role	Item	% agreement very relevant	Number of participants
Medical expert	Applies relevant medical knowledge	84.6%	123
Medical expert	Applies sufficiently differentiated specialist knowledge	69.9%	123
Medical expert	Synthesises patient information and procedures and/or situations	81.3%	123
Medical expert	Effectively initiates diagnostic and therapeutic procedures	74%	123
Collaborator	Gives and follows instructions depending on the situation	69.9%	123
Manager	Shows good decision-making skills	74%	123
Manager	Gives clear instructions	78.9%	123
Professional	Accepts responsibility for his/her own errors	70.7%	121

Table 6: Less relevant items

Role	Item	% undecided, less relevant, not at all relevant	Number of participants
Manager	Works ecologically	32.5%	123
Professional	Reports critical incidents to the central critical incidents reporting system	32.5%	122
Health advocate	The doctor actively pursues patient-centred interdisciplinary care (e.g., clinical pathways, pain management, substitution doctors, outpatient facilities, etc.)	32.8%	122
Health advocate	Knows structures of the healthcare system, uses them and judges them critically	39.3%	122

Table 7: Comparison of all groups

n=111 apart from *	Mean value consultants (sd)	Mean value fellows (sd)	Mean value registrars (sd)	Significance analysis of variance ANOVA
Medical expert: Applies sufficiently differentiated specialist knowledge (n=112)*	1.1 (0.31)	1.5 (0.67)	1.33 (0.47)	0.036
Professional: Acts according to ethical principles	1.2 (0.41)	1.18 (0.4)	1.49 (0.59)	0.015
Professional: Satisfactorily prepares for work	1.35 (0.6)	1.45 (0.6)	1.71 (0.57)	0.025

Table 8: Comparison of all specialists (consultants and fellows) vs. registrars

n=111 apart from *	Mean value all specialists (sd)	Mean value registrars (sd)	Significance analysis of variance ANOVA
Scholar: Pursues a strategy for lifelong ongoing qualification	1.88 (0.78)	2.24 (0.86)	0.028
Scholar: Is capable of presenting own cases at morbidity and mortality conferences	1.76 (0.77)	2.19 (0.97)	0.017
Manager: Discusses procedures in advance	1.46 (0.55)	1.73 (0.68)	0.036
Professional: Acts according to ethical principles	1.19 (0.4)	1.49 (0.59)	< 0.01 (0.004)
Professional: Satisfactorily prepares for work	1.4 (0.59)	1.71 (0.57)	< 0.01 (0.008)

Table 9: Comparison of consultants vs. fellows

n=42 apart from *	Mean value consultants (sd)	Mean value fellows (sd)	Significance analysis of variance ANOVA
Medical expert: Applies sufficiently differentiated specialist knowledge	1.1 (0.31)	1.5 (0.67)	0.019
Communicator: Communicates understandably and practices shared decision making	1.2 (0.41)	1.5 (0.6)	0.036
Manager: Shows good decision-making skills	1.05 (0.22)	1.6 (0.9)	0.013
Manager: Anticipates situations	1.15 (0.37)	1.5 (0.1)	0.033

Table 10: Comparison between male vs. female participants

n=111 apart from *	Mean value male (sd)	Mean value female (sd)	Significance analysis of variance ANOVA
Scholar: Is able to conduct Internet and literature searches	1.54 (0.63)	1.82 (0.67)	0.024
Manager: Prevails in patient care if necessary	1.79 (0.68)	1.51 (0.54)	0.02
Professional: Considers expectations based upon their achievability (n=110)*	1.75 (0.82)	1.47 (0.54)	0.042

Discussion

To develop a competency-based curriculum for residency training, we adapted the Canadian CanMEDS Roles to our needs and validated the adapted items by conducting a survey [12]. Until now, many countries have adopted the CanMEDS framework for their curriculum development in residency training: e.g., Denmark, the Netherlands, Switzerland, Australia, and New Zealand. The CanMEDS framework was developed in Canada. Its rapid international acceptance indicates effective applicability in European countries. Ringsted and coworkers conducted a survey among Danish physicians that showed good acceptance of the CanMEDS framework in their country [19], [20], [21], [22]. Our adaptation of the CanMEDS framework for residency training in anaesthesiology was considered as relevant by all anaesthetists working at that time at our institution, which indicates broad acceptance of this model at an anaesthesiology department in Germany. The Danish survey showed greatest relevance for communicating with patients and relatives, which is similar to our data showing the high relevance of this role as well. In the Danish survey, the role of collaborator was rated as second least relevant. In contrast to their findings, this role was considered as relevant in our survey. This finding might be explained by specialty-related differences. The survey in Denmark was conducted in all medical specialties. However, our survey was conducted in the field of anaesthesiology, where interdisciplinary and inter-professional collaboration – particularly with nursing staff – is extremely important. In both surveys the role of the health advocate was considered as least relevant [19]. A Canadian survey documented uncertainty about teaching and assessment of the role of health advocate [23]. This could partially explain the low ratings observed in our survey. Additionally, both the Danish survey and our work involved physicians only, which could indicate another possible reason for the low rating of this particular role.

The definition of roles and their competency outcomes is an instrument for organization of the process of specialist training to render it more effective and transparent. A key challenge to this process is posed by scarce resources regarding time and staff, which highlights the importance of employing resources as effectively as possible. The roles of medical expert, collaborator, and communicator were considered in our survey as the three most important. Owing to prevailing limitations of resources, these roles should be integrated on a highest-priority basis in the curriculum, with similarly relevant items likewise enjoying respective priority. Interpretation of our data is limited because we conducted our study at one institution with a selected group (anaesthetists). Response rate of 53% is acceptable in light of other surveys in the field [1], [2], [3], [4], [7], [19]. In addition, our data were collected in 2007, and a new generation of doctors and patients may generate other results. It is therefore necessary to conduct an updated German survey on these roles and their competencies with respect to the future specialist in anaesthesiology. A survey among members of the German Association of Anaesthetists and Intensive-Care Specialists (*Deutsche Gesellschaft fuer Anaesthesie und Intensivmedizin, DGAI*) could represent a possibility for generation of more valid data.

In our survey, only a few significant differences among the different groups of responders were observed: e.g., between registrars and specialists. The Danish survey disclosed similar results, but differences in relevance of

roles were observed among the various specialties [19]. This indicates that relevance of curriculum content can be established by both registrars and specialists. Both groups should therefore be involved more actively in curriculum planning in Germany, as currently pursued in many other countries [12], [21]. Future evaluations of the relevance of the various roles or competency-based outcomes should also involve other health-care professionals as well as patients [24].

We calculated Cronbach's alpha to assess internal consistency of the roles. There was a relatively low value for the scale of the medical expert. All other scales showed good results. Ringsted and coworkers found similar values for internal consistency [19]. These results may be due to the fact that the role of the medical expert involves items of knowledge (basic and specialty) as well as skills. Separation of these items could possibly lead to better results, but international comparison of roles would be more difficult.

Adopting a competency-based model is intended to enhance the structure and transparency of our residency curriculum. The survey showed broad acceptance for all roles and underlying items. Various learning activities (e.g., lecturing, practical training, on-the-job feedback, literature search, etc.) must be evaluated for efficiency. Learning in practice should receive priority, since it typically offers more satisfactory learning than does lecture-based components [25].

Notes

Competing interests

The authors declare that they have no competing interests.

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