ORIGINAL ARTICLE

Resuscitation competencies in paediatric specialist registrars

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Postgrad Med J 2007;83:265–267. doi: 10.1136/pgmj.2006.050377

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Revised 3 October 2006
Accepted 5 October 2006

Background: Despite the increased availability of resuscitation courses and guidelines requiring optimal training for acute situations, little is known on the actual qualification of house staff with in-hospital on-call duties for critically ill newborns and children.

Objective: To assess (1) the characteristics of education and training; (2) the level of experience; and (3) factors that may hamper optimal performance of paediatric specialist registrars caring for acute critically ill newborns and children.

Methods: A structured questionnaire was completed by a national cohort of all paediatric specialist registrars in their fourth year (ie pre-final) of training.

Results: Important shortcomings in training and assessment of actual qualifications of resuscitation competencies were identified in paediatric specialist registrars. In 17 of 57 (30%) specialist registrars, competencies in acute care had never been assessed or reconfirmed when starting on-call duties while in the others, 40 (70%), substantial heterogeneity was found regarding the type of assessment of qualifications for on-call duties. In acute situations, occasionally untrained and unsupervised resuscitation procedures were performed. Individual responsibility was the most important stressor that may hamper optimal performance. Despite these findings, adequate reported levels of self-confidence were found; self confidence was higher in newborns as compared to children (7.8 and 7.0 respectively on scale 1–10, $p < 0.05$).

Conclusions: Successful completion of a resuscitation course does not ensure adequate qualifications by on-call residents, unless regular refresher sessions are provided. Teaching hospitals should establish and implement uniform guidelines for training and assessment of competencies regarding acute care for critically ill children and newborns.

Care for acute critically ill newborns and children is often primarily and/or solely provided by junior physicians—for example, (specialist) registrars during on call shift. As adequate training is crucial, most teaching hospitals have replaced the old adagium “see one, do one, teach one” by intern courses and/or the possibility of sending specialist registrars (SpRs) to (inter) nationally certified courses (eg, advanced paediatric life support (APLS), 3 day course, originally developed by the British Advanced Life Support Group; European paediatric life support (EPLS), 2 day course, developed under auspices of the European Resuscitation Council, replacing the PALS course, that originated from the USA; and newborn life support (NLS), 1 day course for health care professionals involved in care for newborns, developed under auspices of the British Resuscitation Council). Although in the UK, national guidelines require that all new staff members receive training for acute situations including theory and skills lab training, implementation of these guidelines is not unequivocal.¹ Subsequently, supervised practice and assessment of competencies is essential to verify that an adequate learning curve has developed to ascertain state-of-the-art care for critically ill patients. Some studies have shown the effectiveness of certified courses, although retention of knowledge and skills appeared to be a problem.^{2–4} Few studies have assessed the methods of training and actual experience of residents who are responsible for the care for acute critically ill newborns and children.^{5–6} The aim of the present study was to assess (1) characteristics of education and training (2) the level of experience and (3) factors (particularly stressors) that may hamper optimal performance of paediatric specialist registrars (Paed SpRs) caring for acute critically ill newborns and children.

METHODS

During a national course, mandatory for all Dutch Paed SpRs in their 4th (ie, pre-final) year of training, a structured questionnaire on their previous training and their actual experience in caring for acute critically ill children was completed. Firstly, questions were asked whether formal training courses (APLS, EPLS, NLS) had been completed. Secondly, items comprising the frequency and type of education (theory, skills lab or a combination of both) and supervised practice, the phase of the Paed SpRs' training in which these were provided, and whether competencies were assessed before the actual responsibility for the care of acute critically ill children for residents started (eg, during on call shifts). Thirdly,

Table 1 Self-confidence, stress (and its attributes) and feedback provided to SpRs (n = 57) caring for acute critically ill children vs newborns

Acute care for critically ill	Children	Newborns	p Value
Responsibility and experience, n (%)	56 (98%)	55 (96%)	NS
Feedback, n (%)	46 (81%)	45 (79%)	NS
Feedback frequency	5.3 (2.3)	5.1 (2.1)	NS
Self-confidence (on scale 1–10)	7 (0.7)	7.8 (0.8)	<0.05
Stress (on scale 1–10)	6.5 (1.6)	5.1 (1.9)	<0.05
Determinants of stress (on scale 1–5)			
Performance of procedure	2.5 (0.9)	2.3 (0.9)	NS
Fear of bad outcome	3.2 (1)	3.1 (0.9)	NS
Individual responsibility	3.6 (0.9)	2.9 (1)	<0.05
Inadequate training	2.1 (1.1)	1.8 (1)	<0.05
Training too long ago	2.4 (1)	2 (0.9)	<0.05

Values are expressed as mean (SD), unless stated otherwise.

questions soliciting the level of experience of SpRs were posed, including items on whether SpRs were actually responsible for acute care for critically ill newborns or children (eg, in the accident and emergency department, neonatal ICU, paediatric ICU or ward), whether acute care was (initially) supervised and, if so, whether and how frequent feedback was provided by supervisors or consultants. Finally, stress and self-confidence were assessed on a scale of 1–10. The relevance of 5 attributes of stress on a scale of 1 (no attribution) to 5 (maximal attribution) were asked. These attributes comprised (a) fear of poor outcome, (b) fear of inadequate performance of procedures, (c) being individually responsible, (d) inadequate training and (e) training too long ago. The questions on the responsibility for training and experience, self-confidence, stress (and its determinants) and feedback were asked separately for acute care for critically ill newborns and children (ie, beyond the newborn period), respectively, as these comprise different patients groups. T tests were used to assess significance of differences ($p < 0.05$).

RESULTS

Of a total of 68 Dutch 4th year Paed SpRs, 60 participated in the mandatory national course and 57 (95%) completed the questionnaire. Overall, 45 (79%) had passed an APLS providers course <2 years ago, 7 (12%) had passed an EPLS course and 0 an NLS course. In all, 38 (67%) of SpR's working in a General Teaching Hospital had received local training with a mean frequency of 4.5 (SD 4.4) sessions as compared to 42 (74%) in University Medical Centers with a mean frequency of 4.1 (SD 2.9) sessions (both NS). In the large majority, training comprised theory and skills lab.

Most importantly, 17 (30%) SpRs reported that, regardless their level of training, their competencies in acute care had never been assessed (or reconfirmed eg, in APLS graduates) when starting on-call duties for acute critically ill newborns and children in the accident and emergency department, neonatal ICU or paediatric ICU. In the others, 40 (70%) SpRs, assessment of the qualifications for on call duties was performed, yet heterogeneity was found regarding the type of testing that was used for this purpose (skill station, observed structured clinical examination, mini-clinical examination). In table 1, the proportion of SpRs having experience and responsibility regarding acute critically ill children and newborns, the level of self-confidence, the level of stress and its most important attributes, the proportion of SpRs receiving feedback and the frequency of feedback on their clinical performance are shown.

Nearly all respondents were responsible for and had experience with acutely ill newborns (55/57) and older children (56/57). Self-confidence of SpRs was higher with newborns

than with older children (mean (SD) 7.8 (0.8) and 7 (0.7), respectively; $p < 0.05$), while overall stress was lower with newborns than with older children (mean (SD) 5.1 (1.9) and 6.5 (1.6), respectively, $p < 0.05$), both on a scale of 1–10. In decreasing order, most important attributes of stress were (1) individual responsibility, (2) fear of poor outcome, (3) inadequate performance of the required procedures, (4) training too long ago and (5) inadequate training. Significant differences were found regarding the attribution of items (1), (4) and (5) to stress in treating newborns and older children, respectively. For a number of frequently performed clinical procedures the number (%) of SpRs that had subsequently experienced (a) theory, (b) training in skills lab, (c) supervised practice and (d) unsupervised practice are shown (table 2). Most importantly, the last column shows the frequency in which SpRs commenced unsupervised practice without theory, skill lab and supervised practice and without prior assessment of qualifications. This varied from 2 (4%) for neonatal CPR and endotracheal intubation, to 5 (9%) for initial resuscitation of children in shock.

DISCUSSION

In the last decade, attention for the competencies of Paed SpRs caring for acute critically ill children and newborns has increased. Despite this, we found important shortcomings in the training and assessment of competencies of SpRs with potential adverse consequences for the quality of care and education.⁷ Among 57 Dutch Paed SpRs in the 4th year of their residency (ie, 1 year before anticipated certification as a pediatrician), a large proportion (79%) had completed an APLS provider course within the previous 2 years and adequate levels of self-confidence were found. Notably, Paed SpRs were significantly more confident and experienced less stress in resuscitating newborns than children. We regard this clinically relevant as this corresponds to the clinical experience of the authors, to the more frequent exposure and to the more homogeneous character of neonatal resuscitation as compared to (older) children. Competencies of 17 (30%) SpRs in acute care had not been assessed before starting on-call duties nor reconfirmed in those who were APLS graduates at that time. In the other 40 (70%) SpRs, assessment of competencies was performed, although substantial heterogeneity was found regarding the type of tests that were used for this purpose. Sometimes SpRs provided unsupervised care for acute critically ill children and newborns without prior adequate training. We suggest that in Paed SpRs successful completion of an APLS providers course within the previous 2 years does not ensure adequate resuscitation competency, unless there are regular refresher sessions (eg, at least every 6 months). We conclude that teaching hospitals should establish uniform guidelines for

Table 2 Number (%) of a total of 57 SpRs that had experienced certain procedures ≥ 1 x in theory, ≥ 1 x as skill station, ≥ 1 in supervised and ≥ 1 x in unsupervised practice, respectively

	Theory	Skill lab training	Supervised experience	Unsupervised practice	Unsupervised and unassessed
Bag+mask ventilation	22 (39)	26 (46)	25 (44)	28 (49)	3 (5)
Endotracheal tube	22 (39)	19 (33)	25 (44)	10 (18)	2 (4)
Start mechanical ventilation	15 (26)	8 (14)	19 (33)	18 (32)	3 (5)
Central line placement	8 (14)	2 (4)	10 (18)	8 (14)	3 (5)
Arterial line placement	5 (9)	1 (2)	13 (23)	18 (32)	6 (11)
Cardiopulm resuscitation	20 (35)	19 (33)	18 (32)	17 (30)	2 (4)
Stabilisation of shock	20 (35)	17 (30)	22 (39)	19 (33)	5 (9)
Status epilepticus	18 (32)	8 (14)	22 (39)	20 (35)	4 (7)

The values are represented as n (%).

The last column shows the number (%) of SpRs that started unsupervised practice without preceding theory, skills lab training and experience with supervised practice, respectively and in whom competency had not been assessed.

training and assessment of competencies regarding acute care for critically ill children and newborns. Implementation of these guidelines will contribute to the quality and safety of patient care and specialists' training.

ACKNOWLEDGEMENTS

We thank prof Dr JAAM van Diemen, Institute for Medical Education, VU University Medical Center for critical comments on the manuscript.

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Competing interests: None.

REFERENCES

- 1 **Rangaraj S**, Rangaraj J, Scholler I, *et al*. A survey of neonatal resuscitation training provided to general professional trainees at neonatal units in England and Wales. *Arch Dis Child Fetal Neonat Ed* 2001;**85**:F225.
- 2 **Jewkes F**, Philips B. Resuscitation training of paediatricians. *Arch Dis Child* 2003;**88**:118–21.
- 3 **Durojaiye L**, O'Meara M. Improvement in resuscitation knowledge after a one-day paediatric life-support course. *J Paediatr Child Health* 2002;**38**:241–5.
- 4 **Quan L**, Shugerman RP, Kunkel NC, *et al*. Evaluation of resuscitation skills in new residents before and after paediatric advanced life support course. *Paediatrics* 2001;**108**:110.
- 5 **White JR**, Shugerman R, Brownlee C, *et al*. Performance of advanced resuscitation skills by pediatric housestaff. *Arch Pediatr Adolesc Med* 1998;**152**:1232–5.
- 6 **Nadel FM**, Lavelle JM, Fein JA, *et al*. Assessing pediatric senior residents' training in resuscitation: fund of knowledge, technical skills, and perception of confidence. *Pediatr Emerg Care* 2000;**16**:73–6.
- 7 **Patel D**, Piotrowski ZH, Nelson MR, *et al*. Effect of a statewide neonatal resuscitation training program on Apgar scores among high risk neonates in Illinois. *Pediatrics* 2001;**107**:648–54.