

European Training Requirements in Neonatology 2021: The ESPR, EAP, and UEMS Accredited European Syllabus for Neonatal Training

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Keywords

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Abstract

Introduction: The European Union stipulates transnational recognition of professional qualifications for several sectoral professions, including medical doctors. The Union of

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European Medical Specialists (UEMS), in its “Charter on Training of Medical Specialists,” defines the principles for high-level medical training. These principles are manifested in the framework for European Training Requirements (ETR), ensuring medical training reflects modern medical practice and current scientific findings. In 1998, the European Society for Paediatric Research developed the first ETR for Neonatology. We present the ETR Neonatology in its third iteration (ETR III), ratified by the European Academy of Paediatrics (EAP), and approved by UEMS in 2021. **Methods:** In generating the ETR III, existing European policy documents on training requirements, including national syllabi and the European Standards of Care for Newborn Health were considered. To ensure the ETR III meets a pan-European standard of expertise in Neonatology, input from representatives from 27 European national paediatric/neonatal societies, and a European parent organisation, was sought. **Results:** The ETR III summarises the requirements of contemporary training programs in Neonatology and offers a system for accrediting trainers and training centres. We describe the content of the ETR III training syllabus and means of gaining and assessing competency as a medical care provider in Neonatology. **Conclusion:** Graduates of courses following the ETR III Neonatology will obtain a certificate of satisfactory training completion which should be accepted by all European member states as a baseline qualification to practice as a specialist in neonatal medicine, enabling mutual recognition of status throughout Europe.

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Introduction

High-quality postgraduate training programmes are indispensable to achieving high standards of patient care [1]. The Union of European Medical Specialists (UEMS) and the European Board of Paediatrics (EBP), the Paediatric Section of UEMS, endeavour to optimise training programmes in Paediatrics and recognised subspecialties throughout the European Union (EU) [2]. Professional qualifications obtained in one EU country can be recognised in other EU countries. Provisions for this are made under EU Directive 2005/36/EC, as amended by EU Directive 2013/55/EU for Mutual Recognition of Professional Qualifications [3]. It is therefore fundamental for specialist doctors to receive a comparable level of high-quality specialist training, which follows commonly agreed standards of education and practice, in every EU member state to facilitate the mutual recognition of training throughout the EU.

Neonatology, a hospital-based, multifaceted, highly technical paediatric sub-speciality has evolved at great speed over the past 50 years [4, 5]. Contemporary neonatal medicine encompasses the care for healthy term born babies as well as acutely ill term to extremely preterm infants. Modern neonatal medicine further includes the pre- and postoperative care for infants with surgical, cardio- and neurosurgical conditions, in-depth perinatal consultation, postnatal clinical examination and prescription of recommended prophylactic medication, interpretation of newborn screening tests and, last not least, the conduct of complex long-term follow-up programs [6]. Present day Neonatologists work within a multidisciplinary team of doctors and nurses from different specialities, psychologists, allied health care professionals, and social co-workers [7]. Their work includes the care for the dying sick neonate at all gestational ages and knowledge of providing appropriate palliative care. Consequently, specialists in Neonatology recognise the needs of the parents and families of newborn infants as a whole and care for these compassionately often in culturally complex contexts [5–9]. Increasing specialisation of care and its provision through highly specialised teams has helped improve the outcome of ill newborns and their families [6]. However, owing to a global increase in critically ill newborns, neonatologists world-wide are in high demand [9, 10].

Recognising the disparities of training opportunities as well as the many challenges of providing a comparable standard of neonatal care within Europe [11, 12], the European Society for Paediatric Research (ESPR) issued the 1st and 2nd editions of the European Training Requirements (ETR) in Neonatology [13, 14]. The ETR I (1998) and ETR II (2007) were considered to be in line with the recommendations of several European National Training Authorities (NTAs) and in line with the recommendations of the European Common Trunk Syllabus, as approved by the EAP-UEMS [15]. We herewith present the updated, 3rd edition of the ETR (ETR III), defining the current common standard for core Neonatal Training in Europe [16]. The 2021 ETR III in Neonatology comprises a curriculum and assessment framework which may be utilised to:

- Harmonise training in Neonatology between different European countries;
- Establish a roadmap with clearly defined minimum standards of knowledge and skills required to practice Neonatology at tertiary care level;
- Foster the development of a European network of proficient tertiary care centres for neonatology;

- Through these measures, the ETR III curriculum and assessment framework aims to:
 - Optimise neonatal care
 - Improve and harmonise the quality of care for severely ill newborn babies, and
 - Enhance European contributions to international scientific progress in the field of Neonatology.

Consequently, the ETR III defines the aims of training, the content and the duration of the training programme, the basic requirements for entering such a programme and a spectrum of required qualifications for training centres and tutors.

Methodology for Generating the ETR III Neonatology

To define the minimum standard for contemporary training requirements for neonatologists, the 2nd Edition of the ETR Neonatology (Version 2007) [13], national European syllabi, and the European Standards of Care for Newborn Health [17–20] were consulted. Further, 33 representatives from 27 European national neonatal societies and members of international parent organisations were engaged during the completion of the syllabus. A modified Delphi process was followed up with a final in-person meeting to ensure alignment with regional and national requirements. The full list of attendees is listed in online supplement 1 (for all online suppl. material, see <https://doi.org/10.1159/000536247>).

Composition of the Syllabus Subcommittee and Working Pattern

The ESPR review subcommittee for the ETR Neonatology 2021 comprised of board examined specialists in neonatal medicine with extensive knowledge in medical and education policy development from several European countries. Between March and September 2018, three members of the European Society for Paediatric Research (ESPR) and the European Board of Neonatal & Child Health Research (EBNCHR) composed the first ETR III draft, based on the 2007 version [14]. With input from the European Academy of Paediatrics, the updated version of the ETR was crafted. This document was reviewed by the European Board of Paediatrics (EBP), as the Paediatric Section of the Union of European Medical Specialists (UEMS). After incorporating feedback from the EBP, the document was reviewed by representatives of European neonatal societies and European professional paediatric organisations, including the European Foundation for the Care of the Newborn Infant (EFCNI). Following a final revision, the ETR-Draft was presented to the above-mentioned representatives

at an in-person meeting in September 2019, where it was consented at EU national Neonatal Society level. The ETR-Draft was then submitted to the EAP Secondary-Tertiary Care Council to provide further comments and to be tabled for approval by the EAP. The ETR Neonatology was formally ratified by the EAP Secondary-Tertiary Care Council and the EAP General Assembly in January 2021. As the final step of the revision process, UEMS approval was given in April 2021. The official document was subsequently published on the UEMS and ESPR websites [21, 22].

Key Components of the 2021 ETR Neonatology

The Aims of Sub-Speciality Training

Neonatal sub-speciality training, like other sub-speciality training [15, 23], should equip doctors with knowledge, skills (procedure-related), competences (solving problems or managing situations), and attitudes to provide high-quality neonatal care. The ETR's aim was to define the minimal level of detailed specialist knowledge of neonatal medicine and the minimal mandatory practical skill sets and competencies as the common denominators for practicing neonatal medicine at specialist level in neonatal units, under senior supervision, to enable unrestricted professional movement of medical professionals throughout the European Union (EU) [3]. The core principles of knowledge, competencies, and procedures in Neonatology are listed in online supplement 2.

Endpoint of Training

The endpoint of training is to enable ETR compliant doctors to practice largely independently as neonatal specialist doctors. National regulations specify whether the specialist may practice fully independently or whether a degree of consultant supervision remains until full consultant level is reached. The minimum denominator of completeness of training is to be able to care for newborn infants in accordance with their specific gestational age and disease progression. With completion of training, the neonatal specialist doctor will be capable of identifying the infant in need of medical attention, to formulate a diagnosis, to develop a plan for appropriate investigations, and to create a concise treatment plan. The neonatal specialist doctor also recognises the social and psychological needs of families, whilst valuing the parents as partners in care and their role in shared responsibility for the wellbeing of the child. Recognition of the, at times, ultimate futility of medical intervention and knowledge of how to compassionately initiate a palliative care pathway is also expected.

Duration of Training

The UEMS training syllabus for Paediatrics advises the basic duration of training for General Paediatricians to be at least 3 years and that basic paediatric training should be completed before the commencement of specialist neonatal training [15]. The recommended minimum training period as a neonatal specialist is 3 years (36 months) of full-time equivalent training. It is strongly advised that at least 1 year of neonatal training should be completed in a tertiary academic centre and that work exposure at all levels of neonatal care (i.e., intensive care, high- and low-dependency care). At the end of training, the graduate will need to have gained sufficient proficiency in all the aspects of Neonatology. The knowledge base and procedural skills required to gain proficiency in neonatal practice are outlined in the ETR III [22]. To gain exposure to all areas of Neonatology, trainees might have to temporarily be placed with units offering specific skills not available at the primary training institution.

Key Competencies and Cross-Cutting Skills in Neonatology

The multi-faceted nature of training requirements for a modern-day neonatologist includes detailed knowledge of pathophysiological processes, diagnostic tools, and procedural expertise [23–25]. A structured overview on the training components, key competencies, and cross-cutting skills for becoming a specialist in neonatal medicine are also detailed in the ETR III [22]. It is acknowledged that some of the most advanced diagnostic and training concepts had to be deliberately left aside in order to maintain applicability of the ETR III across all EU member states.

Research and Quality Improvement Training

It is recommended that trainees in specialist neonatal training should contribute to quality improvement projects, clinical audit, and, preferentially, devote a period of time out of clinical training for conducting a dedicated research project. Training in methods and practice of evidence-based practice should be mandatory. Trainees should be familiar with using the PICO approach (patient, intervention, comparison, outcome) to define the key words for a (re-)searchable clinical scenario [26–28]. Thus, trainees should be competent in effective literature search and the critical appraisal of medical literature and its applicability to clinical practice. Participation in, for instance, the Neonatal Online Training and Education (NOTE programme) offering a Master of Science in Neonatology in collaboration of the Eu-

ropean School of Neonatology (ESN, the educational arm in Neonatology of the ESPR) together with the University of Southampton [29], or ESN courses in methods of evidence-based neonatology, quality improvement, and basic understanding of clinical trial design is advised [30].

Requirements for Providing Training in Neonatology Training Institutions and Training Units

The requirements for qualifying as a training institution and the process of cognition as a training unit are specified in the ETR III. Importantly, these need to be part of a joint process involving National Training Authorities (NTAs), UEMS, and the national specialist society. A detailed outline on the expectations and requirements of training centres is outlined in the ETR III [22]. Whilst the governance process around training accreditation remains to be further clarified, the ESPR/ESN offers to act as an agent for the European Board and Paediatrics and UEMS in assessing training centres.

Training units are institutions providing training in one or more aspects and areas of neonatal care such as: paediatric surgery, neurosurgery, and paediatric cardiac services, including cardiac surgery. It is further recommended that the training unit has access to other paediatric specialist services, like paediatric radiology, paediatric cardiology, and paediatric neurology and endocrinology. Where institutions cannot offer the required training, trainees should be allowed to spend time in neighbouring hospitals/institutions where they can acquire specialists' skills.

Individual Training Centres

Each training region should have an ETR Training Programme Director (TPD). The TPD must have been practising Neonatology for at least 5 years. Training centres, based on the formal national training structure, should be able to tailor an individualised training programme for trainees and the trainee should be encouraged to generate a personal development plan. Trainers are expected to provide formal appraisal and assessment of progress with the PDP.

Requirements for Trainees

The trainee should have completed core training in paediatrics: i.e., common trunk of a minimum of 3 years before commencing specialist training in Neonatology [21]. At the outset of specialist training, the trainee formulates, together with the TPD or a deputy, a detailed PDP which will capture the core and additional

requirements of neonatal speciality training. The PDP will be regularly reviewed by the trainer, or TPD, and may be amended according to the trainees further training requirements.

Training Programme

Structure of the Programme

The execution of the training programme, based on the principles as laid out in the ETR III, may vary from centre to centre. It is recommended that local programmes are designed to ensure that the trainees acquire competencies in several of the key areas [see ETR III, 22]. Each trainee should be allocated to a trainer at the commencement of training. The trainee records the training components in the log-book and the trainer endorses the competences (see ETR III) [22].

Briefly, each of the below areas of competency comprises an area of practice specific to Neonatology. The more general areas of competency, for example, ward organisational skills, clinical governance, and audit, should be embedded within the general training programmes of the institutions undertaking training. These areas should be identified from the local curriculum. In addition to the training necessary to support the development of the competencies, it is recommended that trainees develop expertise in specific areas relevant to the practice of tertiary Neonatology, for example, fetal medicine or perioperative care in neonatal surgery and neonatal cardiac surgery. To gain the necessary depth of experience to develop from novice to expert, the trainee should be involved in the care of a range of patients during the whole period of speciality training [15, 23, 24]. Use of the CanMEDS framework and competency-based assessment, as an adjunct to knowledge assessment and portfolio completion, are encouraged as important aspects of education and evaluation [25].

Documentation: The Training Log-Book

The log-book should be at minimum bi-lingual (national language and English). Recordings in the log-book include patients treated, procedures conducted, and diagnosis and therapeutic interventions instigated and followed up, and lists attendance at local, regional, and national meetings. This will constitute part of the trainee portfolio. Electronic versions of the portfolio and log-book are preferred. Completion of the log-book should be endorsed by the TPD.

Knowledge-Based Assessment

Knowledge-based assessment may follow the below formats:

- Evaluation of practical abilities as described in the log-book
- Theoretical multiple-response questionnaire
- Debate of a practical case
- Research interests and performance, incl. copies of posters and/or published articles.

Competency Assessment

Competencies should be evaluated throughout the training period. There are a number of different tools for this, describing different aspects of training. Some of these are set out below with a recommendation for the number of competencies to be completed per each year of training (see ETR III – assessing neonatal competencies) [22]. Formal and informal reflection on these assessments is an important aspect of their success.

Monitoring of Training

The neonatal TPD will designate a trainer as a supervisor to the trainee at the beginning of the training programme. The trainer will monitor the trainees progress with help of the evidence provided in the training log-book. The trainer, with or without the TPD, provides advice to the trainee on important training issues and reviews the trainee's progress at least at yearly intervals.

The trainee maintains a personal portfolio (the log-book, including the assessment framework) as described above, where they document relevant training experiences. This portfolio and the trainee's progress through various levels of competency are regularly reviewed by mentor and trainee (we suggest 3 monthly intervals). Successful achievement of competency is certified by the neonatologist trainer. Accompanying the assessment framework, the certification should be detailed and state.

- The duration of training
- The centres in which the trainee received their education
- Acquired knowledge and skills, and accurately quantify extent of theoretical and practical experience accumulated by the trainee over and above that recorded in the assessment framework.

We recommend that each national body maintains a register of trainees and provides or is provided with suitable certification of satisfactory training. Furthermore, we suggest that national bodies develop systems for the regular review of neonatal training centres using suitable measures such as the minimum scheme, as recommended in the ETR III [22].

Discussion and Future Directions

The ESPR, EAP, EBN, and UEMS aim to continuously improve the ETR Neonatology and keep it at the cutting edge of medical practice and education in Europe. The ETR Neonatology seeks to define minimum requirements for training in neonatal medicine, and, through these, foster the harmonisation of neonatal education in Europe. Despite many years of European collaboration and vast achievements in harmonising postgraduate education, the topic of medical sub-speciality training and recognition is far from solved.

The fast pace at which the practice of, and teaching in, medical specialities move forward necessitates constant adaptation of sub-speciality training programs, and their standards. The ETR authors acknowledge this and, together with the ESPR and other leading European organisations dedicated to the advancement of medical science for an improvement in medical care, have taken the decision to update the Neonatal Training Recommendations on a 5-year cycle. This way, significant advances in medical care, including procedural advances, and further optimisation of sub-speciality training formats (online, hybrid, and in person) can be accounted for in future iterations.

Strengths and Limitations

One of the cornerstones of the ETR Neonatology is its adherence to the principles of Competency-Based Medical Education (CBME) [30, 31]. This is an outcome-based approach to the development, realisation, and review of educational initiatives and the assessment of trainees using competencies. In other words, this approach focuses on the transfer into practice of competence profiles (knowledge, skills, and attitudes), where the majority of teaching, learning and assessment should take place in a real-life, medical environment.

For the next revision of the ETR Neonatology, we envision to further strengthen the ETR III by the application of the CBME concept, and, in particular, the inclusion of advanced assessment instruments such as “Entrustable Professional Activities (EPAs)” [32, 33]. The EPA framework does currently not take competences as a starting point, but rather a task or action from everyday medical practice. This allows the EPA system to assess not one, but several competences that make up a situation and is thus even closer to real-life scenarios.

In total, there are five “types of supervision” according to the EPA concept. These stipulate the level of independence at which a trainee can carry out a given task. EPAs are tested by having different observers assess the

trainee at different times in different situations, in accordance with the EPA scaling framework.

- Level 1: Observed.
- Level 2: Works under direct proactive supervision (supervisor in the room).
- Level 3: Works under indirect supervision (supervisor on call at all times).
- Level 4: Works without supervision (supervisor available but not on site).
- Level 5: Can supervise younger colleagues.

The American Board of Pediatrics has defined 13 EPAs with which to assess capability to practice clinical neonatology [34, 35]. Based on these EPAs, the ESPR/ESN is developing its curriculum and evaluation grid for European countries. In the coming years, this EPA framework will be refined together with the national societies and by gathering data through ESPR/ESNs educational initiatives. This dataset will then provide the foundation for the next revision of the ETR Neonatology, so that it can be updated and restructured according to EPA principles.

Political Relevance

Is a pan-European ETR Neonatology really required? We believe it is! For example, in Spain there is currently no recognition of the sub-speciality of Neonatology by the Ministry of Education, which is responsible for the national recognition of the specialities and sub-specialities in Medicine. There, training in Paediatrics is done by accessing a National Residency Training Program which allocates all nationwide training positions for all the medical specialities in Spanish hospitals. Doctors who attain a Residency Training Position in Paediatrics enter a 4-year training program, which includes 3 years of general Paediatrics and a final year of sub-speciality (e.g., Neonatology). Following completion of training, the Spanish Neonatal Society then confers the title of “Neonatologist,” after scrutinising the applicants’ achievements, including a mandatory presentation of a scientific communication at a Spanish National Paediatric Conference. However credible the achievements of individuals obtaining this title, the lack of government recognition of Neonatology as a designated training pathway and thereby the lack of structured postgraduate professional training, lead to unnecessary inhomogeneity of specialist status in Europe. Other examples of lack of structured speciality and sub-speciality training in other European countries, for instance Poland or Norway, further emphasise the need for an accredited minimal standard of sub-speciality training.

Conclusion

Neonatologists provide expert care to newborn infants and their families. Since 1998, the European Society for Paediatric Research, tasked by the UEMS, develops specific recommendations for a structured Neonatology training curriculum. These ETR for Neonatology define the content of contemporaneous training programs in Neonatology. The presented ETR III (2021) constitutes the currently most advanced, unanimously consented roadmap for specialist training in Neonatology, to serve as the template for structured national and supra-national Neonatology training programmes. The pan-European relevance of the ETR III is that it defines the common training standard for European national training programmes in Neonatology and also offers a system for accrediting trainers and training centres. Graduates of training programmes according to the ETR III, in line with the UEMS framework of European Training Requirements, should be eligible for recognition of equality of training in Neonatology throughout Europe. The authors believe that the presented work thus aids calls for official recognition of Neonatology as an important Paediatric sub-speciality in all EU membership states, where this is currently not the case. The ETR III therefore marks a significant step towards unified standards of care for infants and their families throughout Europe.

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Statement of Ethics

No ethical board review was required for this non-experimental consensus paper.

Conflict of Interest Statement

None of the authors has a conflict of interest to declare.

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Author Contributions

C.C.R., M.V., and T.S. wrote the first draft, T.S., A.H., B.K., R.R.-R., P.H., and S.W. contributed equally to the final manuscript.

Data Availability Statement

The data supporting the findings of this expert consensus on the content and delivery of contemporaneous sub-speciality training in Neonatology are openly available, as cited in reference numbers [9–22].

References

- 1 Van den Berghe G. Paediatric training in the European community. Confederation of European Specialists in Paediatrics (CESP). *Eur J Pediatr*. 1991;150(9):619–22. doi: [10.1007/BF02072619](https://doi.org/10.1007/BF02072619).
- 2 Confédération Européenne des Spécialistes en Pédiatrie (CESP/UEMS). Charter on training of medical specialists in the EU: requirements for the specialty paediatrics. UEMS no. 9415. 1990.
- 3 [Internet] cited 2023 Dec 31. Available from: https://single-market-economy.ec.europa.eu/single-market/services/free-movement-professionals/recognition-professional-qualifications-practice/automatic-recognition_en.
- 4 Council of Pediatric Subspecialties – COPS [Internet] cited 2023 Oct 31: Available from: <https://www.pedsubs.org/about-cops/subspecialty-descriptions/>.
- 5 NHS England [Internet]. E08. Neonatal critical care; cited 2023 Oct 17. Available from: <https://www.england.nhs.uk/commissioning/spec-services/npc-crg/group-e/e08/>.
- 6 Morgan AS, Mendonça M, Thiele N, David AL. Management and outcomes of extreme preterm birth. *BMJ*. 2022; 376:e055924. doi: [10.1136/bmj-2021-055924](https://doi.org/10.1136/bmj-2021-055924).
- 7 Trzaski JM, Kiefer AS, Myers P; ONTPD Fellowship Directors Writing Group, Johnston LC. Essentials of neonatal-perinatal medicine fellowship: careers in neonatal-perinatal medicine. *J Perinatol*. 2022;42(8):1135–40. doi: [10.1038/s41372-022-01315-7](https://doi.org/10.1038/s41372-022-01315-7).
- 8 Enciso JM. Teaching culturally competent healthcare in neonatal-perinatal medicine. *Semin Perinatol*. 2020;44(4):151239. doi: [10.1016/j.semperi.2020.151239](https://doi.org/10.1016/j.semperi.2020.151239).

- 9 British Association of Perinatal Medicine [Internet]. Enhancing shared decision making in neonatal care: a framework for practice. Version 2; 2019. [cited 2023 Oct 17]. Available from: <https://www.bapm.org/resources/158-enhancing-shared-decision-making-in-neonatal-care>.
- 10 World Health Organization. Survive and thrive: Transforming care for every small and sick newborn. 2019.
- 11 Obladen M. Neonatology in Europe training, accreditation, and research. *Eur J Obstet Gynecol Reprod Biol.* 1997;75(1):75–80. doi: [10.1016/s0301-2115\(97\)00196-6](https://doi.org/10.1016/s0301-2115(97)00196-6).
- 12 Breindahl M, Blennow M, Fauchère JC, Lluch MT, De Luca D, Marlow N, et al. The European database for subspecialist training in neonatology - transparency achieved. *Neonatology.* 2013;103(1):74–82. doi: [10.1159/000342932](https://doi.org/10.1159/000342932).
- 13 Stiris TA, Carnielli V. European Society for Neonatology: training program for the neonatologist in Europe. *Acta Paediatr.* 2002;91:604–5. doi: [10.1080/080352502753711768](https://doi.org/10.1080/080352502753711768).
- 14 The European Society for Paediatric Research—Section on Neonatology [Internet]. EUROPEAN CURRICULUM AND SYLLABUS FOR TRAINING IN NEONATOLOGY; 2007 Jan 2 [cited 2023 Oct 20]; Available from: https://www.espr.eu/_download/ETRNeonatologyv2007.pdf?m=1692169102&.
- 15 UEMS [Internet]. Training Requirements for the Specialty of Paediatrics. European Standards of Postgraduate Medical Specialist Training; cited 2023 Oct 20; Available from: https://www.uems.eu/_data/assets/pdf_file/0016/44440/UEMS-2015.30-European-Training-Requirements-in-Paediatrics.pdf.
- 16 The European society for paediatric research—section on neonatology [internet]. European Requirements for Training in Neonatology; 2020. [cited 2023 Oct 21]; Available from: https://www.espr.eu/_download/EuropeanTrainingRequirementsNeonatology-EBPapprovedv2021.pdf?m=1619537386&.
- 17 British Association of Perinatal Medicine. Standards for hospitals providing neonatal intensive care. London: BAPM; 1996.
- 18 British Association of Perinatal Medicine [Internet]. Optimal arrangements for Local Neonatal Units and Special Care Units in the UK (2018) – A BAPM Framework for Practice. Version 2. 2018 Nov 1. [cited 2023 Oct 23]; Available from: https://hubble-live-assets.s3.amazonaws.com/bapm/attachment/file/10/LNU_doc_Nov_2018.pdf.
- 19 Gemeinsame Stellungnahme der Deutschen Gesellschaft für Perinatale Medizin, der Gesellschaft für Pränatal- und Geburtsmedizin, der Deutschen Gesellschaft für Gynäkologie und Geburtshilfe, der Deutsch-Österreichischen Gesellschaft für Neonatologie und pädiatrische Intensivmedizin und der Deutschen Gesellschaft für Kinderheilkunde. Aufgaben des Neugeborenen-Notarztdienstes. *Monatsschr. Kinderheilkd.* 142: 1994;77.
- 20 EFCNI [Internet]. Cited 2023 Aug 07; Available from: www.newborn-health-standards.org.
- 21 European Union of Medical Specialists [Internet]. European requirements for training in neonatology; 2020. [cited 2023 Oct 24]; Available from: www.uems.eu/_data/assets/pdf_file/0018/134109/UEMS-2021.18-European-Training-Requirements-in-Neonatology.pdf.
- 22 The European Society for Paediatric Research [Internet]. European requirements for training in neonatology; 2020. [cited 2023 Oct 24]; Available from: https://www.espr.eu/_download/EuropeanTrainingRequirementsNeonatology-EBPapprovedv2021.pdf?m=1619537386&.
- 23 McCrindle BW, Starfield B, DeAngelis C. Subspecialization within pediatric practice: a broader spectrum. *Pediatrics.* 1992;90(4):573–81. doi: [10.1542/peds.90.4.573](https://doi.org/10.1542/peds.90.4.573).
- 24 Persky AM, Robinson JD. Moving from novice to expertise and its implications for instruction. *Am J Pharm Educ.* 2017;81(9):6065. doi: [10.5688/ajpe6065](https://doi.org/10.5688/ajpe6065).
- 25 Frank JR, Jabbour M, Tugwell P, et al. Skills for the new millennium: report of the societal needs working group, CanMEDS 2000 Project. *Annals of the Royal College of Physicians and Surgeons of Canada.* 1996. Vol. 29. p. 206–16.
- 26 Mouradian WE, Huebner CE. Future directions in leadership training of MCH professionals: cross-cutting MCH leadership competencies. *Matern Child Health J.* 2007;11(3):211–8. doi: [10.1007/s10995-006-0170-3](https://doi.org/10.1007/s10995-006-0170-3).
- 27 Evidence-Based Medicine Working Group. Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA.* 1992;268(17):2420–5. doi: [10.1001/jama.1992.03490170092032](https://doi.org/10.1001/jama.1992.03490170092032).
- 28 Eriksen MB, Frandsen TF. The impact of patient, intervention, comparison, outcome (PICO) as a search strategy tool on literature search quality: a systematic review. *J Med Libr Assoc.* 2018;106(4):420–31. doi: [10.5195/jmla.2018.345](https://doi.org/10.5195/jmla.2018.345).
- 29 Hall MA, Cuttini M, Flemmer AW, Greisen G, Marlow N, Schulze A, et al. European online postgraduate educational programme in neonatology-the way forward? *Eur J Pediatr.* 2009;168(4):449–56. doi: [10.1007/s00431-008-0770-6](https://doi.org/10.1007/s00431-008-0770-6).
- 30 Wellmann S, Künzel M, Fentsch P, Fauchère JC, Rabe H, Szczapa T, et al. Opinion paper: rationale for supra-national training in neonatology. *Front Pediatr.* 2022;10:899160. doi: [10.3389/fped.2022.899160](https://doi.org/10.3389/fped.2022.899160).
- 31 Santoro D, et al. Meeting the need for effective and standardized training and education in neonatal medicine: the European School of neonatology master of advanced studies curriculum. *Ped Res.* (in press).
- 32 Parker TA, Guiton G, Jones MD Jr. Choosing entrustable professional activities for neonatology: a Delphi study. *J Perinatol.* 2017;37(12):1335–40. doi: [10.1038/jp.2017.144](https://doi.org/10.1038/jp.2017.144).
- 33 CPS [Internet]. NEONATAL-PERINATAL MEDICINE COMPETENCIES (2021) [cited 2023 Nov 22]; Available from: <https://cps.ca/en/sections/neonatal-perinatal-medicine>.
- 34 The American Board of Pediatrics [Internet]. Entrustable Professional Activities for Subspecialties; cited 2023 Oct 28; Available from: <https://www.abp.org/content/entrustable-professional-activities-subspecialties>.
- 35 Carbajal MM, Dadiz R, Sawyer T, Kane S, Frost M; ONTPD Fellowship Directors Writing Group, et al. Part 5: essentials of neonatal-perinatal medicine fellowship: evaluation of competence and proficiency using milestones. *J Perinatol.* 2022;42(6):809–14. doi: [10.1038/s41372-021-01306-0](https://doi.org/10.1038/s41372-021-01306-0).