Models for Intensive Care Training
A European Perspective

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Abstract

The diversity of European culture is reflected in its healthcare training programs. In intensive care medicine (ICM), the differences in national training programs were so marked that it was unlikely that they could produce specialists of equivalent skills. The Competency-Based Training in Intensive Care Medicine in Europe (CoBaTrICE) program was established in 2003 as a Europe-based worldwide collaboration of national training organizations to create core competencies for ICM using consensus methodologies to establish common ground. The group's professional and research ethos created a social identity that facilitated change. The program was easily adaptable to different training structures and incorporated the voice of patients and relatives. The CoBaTrICE program has now been adopted by 15 European countries, with another 12 countries planning to adopt the training program, and is currently available in nine languages, including English. ICM is now recognized as a primary specialty in Spain, Switzerland, and the UK. There are still wide variations in structures and processes of training in ICM across Europe, although there has been agreement on a set of common program standards. The combination of a common "product specification" for an intensivist, combined with persisting variation in the educational context in which competencies are delivered, provides a rich source of research inquiry. Pedagogic research in ICM could usefully focus on the interplay between educational interventions, healthcare systems and delivery, and patient outcomes, such as including whether competency-based program are associated with lower error rates, whether communication skills training is associated with greater patient and family satisfaction, how multisource feedback might best be used to improve reflective learning and teamworking, or whether increasing the proportion of specialists trained in acute care in the hospital at weekends results in better patient outcomes.

Keywords: critical care medicine; intensive care medicine; education; pedagogic research; quality improvement

At a Glance Commentary

Scientific Knowledge on the Subject: Postgraduate training programs in intensive care medicine (ICM) vary widely between countries and between partner specialities, particularly in Europe. This variation in "product specification" is likely to be associated with similar variation in capabilities between doctors at the point of specialist accreditation and consequently in the quality of patient care.

What This Study Adds to the Field: Using consensus techniques and a grounded approach, the Competency-Based Training in Intensive Care Medicine in Europe (CoBaTrICE) project and program has developed core competencies, syllabus, assessment methods, and standards for programs of training, which have now been adopted by 15 European region countries, with another 12 countries planning to adopt them. This common platform harmonizes training outcomes, facilitates free movement of ICM professionals across national borders, offers important opportunities to link pedagogic research to better patient care, and provides the foundation on which primary speciality status for ICM can be achieved.

The diversity of Europe's history, culture, language, legal systems, and social structures is also reflected in national approaches to medical education and training. Substantial international differences in pedagogic structures, processes, and governance are likely to result in differences in outcomes. Some of these are "surface" variations (for example, organizational responsibility for training), whereas others reflect more fundamental attitudes toward the nature of medicine and role of the physician, such as perceptions of the relative importance of laboratory science versus bedside clinical practice, or the status of doctors versus that of patients and patients' families. Developments in laboratory science during the late 19th century were seen in central Europe as the key to training young doctors, whereas in Britain and Anglophone countries there was stronger emphasis on practical apprenticeships (1–3), a difference that reappears today in tensions between clinical competence and research excellence (4). Historical variations in responsibility for the production and quality assurance of doctors (universities, hospitals, or the state) and for practice standards and regulation (professional bodies and regulators) persist in modern structures. The European Union (EU)'s legislative program facilitates free movement of professionals and mutual recognition of qualifications (5) but has not yet addressed competencies or continuing professional development.

Worldwide Survey of Training in Intensive Care Medicine

Given this background and setting, one would expect some degree of variation in models of training in intensive care medicine (ICM) across Europe. However, in an international survey of ICM training programs conducted during 2003 to 2005 (6), we found such wide disparities in the structures, content, processes, and outcomes of training in ICM that it seemed improbable that these programs could produce intensive care specialists trained to a common and universally high standard. Of the 54 different programs identified in 42 countries worldwide, 37 were within the European Region; these varied in duration from 3 to 72 months, with formal workplace-based assessment being performed in only 50% and a mandatory examination in 76%. Worldwide, only three programs (6%) were described in terms of training outcomes or competencies.

Specialty Status and European Regulation

At the time of this survey, ICM was a primary specialty in only two countries (Spain and Switzerland). The lack of primary specialty status at the national level prevented ICM from being recognized as a specialty within the European Directive on recognition of professional qualifications (7), which requires recognition by at least two-fifths of Member States and concurrent approval by a weighted ("qualified") majority vote in the European Commission. However, the Directive also requires that EU member states recognize each other's basic (and some specialist) professional qualifications and diplomas, so as to permit free movement of professionals across national borders. This presented a particular problem for ICM, in that countries were now obliged automatically to accept each other's evidence of training in several medical specialties but had no benchmark with which to assess the highly variable programs of training in ICM.

This survey and the challenge posed by the Directive generated a number of questions. If the nature of critical illness does not vary across international borders, why should the training of intensive care specialists? Could variations in training explain some of the differences in patient outcomes and resource use (8)? Are structured outcomes-based training programs better than implicit programs? Is the absence of specialty status for ICM problematic in terms of creating a professional identity? And most fundamentally—what is an "intensivist"? Without a common international definition of an intensive care specialist—a "product specification"—it would be difficult to make the case for specialty status, with its potential to transform attitudes to self-regulation and professional confidence (9), or to implement with confidence the principles of free movement of professionals as defined in the European Directive.

Competency-based Training in Intensive Care Medicine in Europe

We chose to deal with the last of these questions first. Despite receiving initial

reservations that this approach could not succeed in the European context, we considered that a common outcomes-based framework for ICM training could be devised, based on the fact that those countries that offered multidisciplinary access to ICM training shared many features in common. We therefore convened through the European Society of Intensive Care Medicine an international collaboration of national training organizations in ICM, to create an internationally acceptable competency-based training program in ICM (Competency-Based Training in Intensive Care Medicine in Europe [CoBaTrICE]) to harmonize outcomes of training across national borders while remaining congruent with variable national structures. The project was supported by two grants from the EU's Leonardo Program.

Two approaches were considered. One was to use the Canadian CanMEDS model (10), in which seven domains of professional practice provide a conceptual framework for the medical expert, or the six-domain framework developed by the Accreditation Council for Graduate Medical Education in the United States (11). These approaches define roles or high-level tasks and then develop outcome descriptors for each role. The alternative was to develop an empirical competency-based approach rooted in everyday practice at the bedside, incorporating the opinions of and feedback from practitioners, patients, and relatives, with the competencies acting as the foundation for roles and the syllabus. We chose the latter as being closest to the patient.

Clinicians worldwide were invited through national coordinators (senior intensivists) to propose competencies that they considered essential for an intensive care specialist. This secured 5,241 suggestions from 536 respondents in 57 countries, with as many relating to attitudes and behaviors as to technical skills, a unique demonstration of the importance that intensivists attach to aspects of professionalism. A concurrent questionnaire survey of patients and families was conducted in 70 intensive care units (ICUs) in eight European countries, which produced 1,938 responses (12). The material generated by these two surveys was synthesized through an editorial process into 164 items, which were then ranked by an expert ("nominal") group. The final set

of 102 competencies was presented in 12 domains (13) and then linked to the background knowledge required, derived from published syllabi of eight countries. Guidance was developed on the assessment of competence in the workplace (14, 15), and the whole was presented via the program's website (16).

Impact and Further Developments of the CoBaTrICE Program

To assess uptake of the program, we have updated the 2009 data on European models of training in ICM with information current for June 2013 (Table 1). Since the original survey, five more countries have joined the EU, bringing the denominator (EU + Turkey + Israel) to 33. Fifteen (45%) of countries have adopted the CoBaTrICE model, and a further 12 are considering or planning to follow suit, with translations into eight national languages—a remarkable transformation, particularly as this was entirely voluntary. The UK has adopted it as the platform for that country's primary specialty training program in ICM (17); competence mapping enables training to be conducted in parallel with another primary specialty leading to dual

certification. The UK has also used CoBaTrICE as the foundation for advanced critical care practitioners (nonphysician grade) (18) and for generic acute care competencies for all healthcare staff in hospital (19). It has also been used as a template for international competencies in adult (20) and pediatric (21) respiratory medicine, in anesthesia (22, 23), and in critical care and pulmonary medicine in the United States (24). A similar methodology was also used recently to define core competencies in mechanical ventilation (25).

Specialty Status of ICM

ICM is now a primary specialty in Spain, Switzerland, and the UK; France is considering a similar approach. In 10 countries ICM is accessible only through anesthesia, in 5 ICM is a subspecialty of multiple base specialties, and in 15 it is a "supraspeciality"—a common program for multiple base specialties. Some countries have mixed models. In the UK, the primary specialty ICM program can be undertaken in parallel with a partner specialty to obtain dual certification in both. In Spain, anesthesia contributes importantly to postoperative and trauma

intensive care outside the defined specialty of ICM. Although these ownership issues are influential, the CoBaTrICE approach creates the potential for different models of training to produce a consistent "product."

Quality Assurance and Recertification

Having developed a competency-based definition of an intensivist, the program then examined the educational environment in which intensivists are being produced. This demonstrated wide variations in standards and quality assurance processes, in resources for training and support for trainers, and in adoption of workplace-based assessment of competence (26). These findings provided the justification for developing international standards for programs of training in ICM, again using consensus methodologies. The 29 standards cover training centers (hospitals and ICUs), programs, competitive entry to training, and trainer support (27) (see Table E1 in the online supplement). Most European countries require trainees to complete an examination, although in those where ICM is a subspecialty it may be integrated with the base specialty examination, usually anesthesia. The format and content vary widely. The European Diploma of Intensive Care Medicine offered by the European Society of Intensive Care Medicine is the only international examination available; it consists of two parts: a 2-hour multiple choice paper, followed (for the successful candidates) by an objective structured clinical examination. There is as yet no formal international framework for continuing professional development and recertification in ICM in Europe. The UK has recently published guidance on revalidation in ICM (28), which is integrated with its partner disciplines, including anesthesia and internal medicine.

Strengths of the CoBaTrICE Approach: Implications for Other Training Programs

The European experience shows that it is possible to change diverse and deeply entrenched systems of training and to harmonize them across national borders by creating an international collaboration of

Table 1: European Models of Training in Intensive Care Medicine, 2009 and 2013

	2009*	2013[†]
Response rate (%)	28/28 (100)	33/33 (100)
ICM a primary specialty	2 (7)	3 (9)
National ICM program formally adopted CoBaTrICE	7 (25)	15 (45)
National ICM program considering or planning to adopt CoBaTrICE	—	12 (36)
Formal national standards for postgraduate training in ICM		
Written standards only	18 (64)	27 (82)
External visiting program	15 (54)	18 (55)
Mandatory national examination	24 (86)	32 (97)
National examination is EDIC	10 (36)	12 (36)
EDIC pass required for certification of completion of specialist training	6 (21)	6 (18)

Definition of abbreviations: CoBaTrICE = Competency-Based Training in Intensive Care Medicine in Europe; EDIC = European Diploma of Intensive Care; ICM = intensive care medicine.
Data are presented as n (%) unless otherwise noted.
*Data from Reference 26. The 28 countries surveyed in 2009 included Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK, and Turkey and Israel.
[†]The 2013 survey also includes responses from Georgia, Iceland, Lithuania, Malta, and Romania.

training organizations using consensus methodologies to establish common ground. Framing the project as grant-funded pedagogic research with peer-reviewed publications gave the group a social identity that facilitated change. The competency framework was also well received, as it adapts easily to different training structures, and it permits the core competencies to be supplemented by additional skills where national systems require this. Incorporating the voice of patients and relatives has given the program additional validity (12).

Free movement of professionals is a central element in the EU's philosophy. The EU Directive on recognition of professional qualifications requires automatic recognition of basic medical qualifications and of a number of medical specialties with their prior agreement (29). ICM is not recognized as a specialty at the EU level and cannot therefore be included in the list of disciplines with automatic recognition. However, anesthesia is one of the specialties with automatic recognition, and as ICM is combined with anesthesia in 10 countries, it is possible for anesthetic intensive care specialists to have their training mutually recognized despite substantial differences in the ICM component. The CoBaTrICE framework facilitates the assessment of these equivalence applications, because the European Commission's code of conduct on applying the Directive states (30) that "The applicant may be asked to provide a copy of the attestation of professional competence or of the evidence of formal qualifications giving access to the profession." The competency framework makes this task easier and more transparent, and safer for patients, because automatic recognition in the absence of harmonized systems of training and quality assurance brings substantial risks (31).

Challenges and Opportunities: From Competence to Quality

Does defining the intensive care specialist in terms of competencies and learning outcomes (the product specification) produce "better" doctors than implicit programs in which training is defined solely by a terminal examination? Alternatively, could the approach be worse, by overspecifying and removing the aspiration to excellence, by

creating a "tick-box" approach to acquiring a vocation, creating a technician rather than a "professional"? Although it seems unlikely that similar questions would be asked of other high-stakes industries, such as aviation, they deserve a response.

Competencies make explicit the links between knowledge, skills, behaviors, and attitudes, and between the outcomes of training and the underpinning research, permitting rapid updating in light of new evidence. They enable trainees and trainers to establish shared expectations and to monitor progress, rather than discovering deficiencies only at the end of the trainee's program, or later in specialist practice. Importantly, they place the responsibility for acquiring evidence of competence on the trainee, and this encourages reflective learning through explicit discussions between trainer and trainee.

Whether the benefits of a competency-based approach are realized depends on the quality assurance framework and pedagogic context in which they are acquired. We have already shown the willingness of national ICM training organizations to consider adopting common standards for quality assurance frameworks across Europe (26, 27). This framework will need to be buttressed by a deeper understanding of those factors that most influence the acquisition of professional attitudes and behaviors: scholarship, reflective learning, and nontechnical skills. We consider these next, along with methods of assessment.

Professionalism: Scholarship

CanMEDS defines scholarship as "a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of medical knowledge" (32). This emphasis on critical thinking, self-understanding, and the search for, and implementation of, new knowledge, is the essence of professionalism and high-quality care. Conventionally expressed through research and audit, several national ICM training programs require their trainees to undertake peer-reviewed research projects (33), extended case histories (34), or dissertations (35) as part of their qualifying examinations.

The challenge lies not in mandating training in techniques of critical inquiry but in ensuring that it can be delivered. This requires not only supportive and research-

experienced trainers and mentors but an environment in which clinical research can flourish, supported by health service managers who understand the need to balance training and service delivery. The ICU nursing staff also may be an underestimated element in supporting an ethos of critical inquiry through research (36, 37). Trainers need to take into account local attitudes toward these wider aspects of quality as important influences on the total pedagogic experience.

Professionalism: Reflective Learning and Nontechnical Skills

Behavioral factors underlie 59% of referrals of doctors in difficulty to the UK's National Clinical Assessment Service (38) and predominate in studies of clinical error and deficiencies in teamworking, which impact on patient safety (39, 40). The emphasis given to professionalism and behaviors by respondents to the original CoBaTrICE prioritization exercise was therefore impressive. Almost 20% of proposed competencies were related to aspects of professional behavior, attitudes, relationships, communication and teamworking, and self-governance, irrespective of respondents' country or world region. The supporting knowledge elements are presented in the syllabus (41). The empiricism of CoBaTrICE to defining professionalism bears comparison with the higher-level CanMEDS or Accreditation Council for Graduate Medical Education frameworks.

Trainees learn most about professional behavior through apprenticeship-based role models in the workplace (42, 43), highlighting the importance of the pedagogic environment and the "hidden curriculum" of staff or faculty behaviors (44). A curriculum based on training in emotional intelligence has been proposed (45), but it is by no means clear that theoretical systems are better than the grounded and outcomes-based design of CoBaTrICE.

Training the trainers is essential not just to develop their assessment skills but to enhance trainers' awareness of the impact they have on trainees in everyday practice as positive or negative role models: every interaction has potential educational usefulness. Trainee assessment of their trainers and the overall educational

experience also brings benefits (46). Clinical reflection (47), audit of performance (48), ethnographic observation (49, 50), the use of video techniques to capture behaviors for subsequent feedback (51), and patient and family satisfaction surveys (52) all have potential to improve individual and institutional reflective learning to create a culture focused on the quality of care that justifies the privilege of professional self-regulation.

Assessment of Professionalism

Workplace-based assessment of skills and behaviors is essential to support training (formative assessment) and to supplement conventional examinations as tests of knowledge (summative assessment). Indeed, workplace-based assessment not only drives learning but also helps to reinforce what is learned (53, 54). However, giving and receiving feedback is a skill that has to be learned (55, 56). Behavioral competencies must be assessed by a broad range of individuals, including nurses, support staff, relatives, and, where feasible, by patients, or through simulation (57). Multisource feedback properly applied can be a useful tool for reflective learning and performance improvement (58).

Feedback and formative assessment are still not standard in many programs.

Although all countries except one (Spain) require their trainees to take an examination, in the 2009 survey (26) only 50% of countries used workplace-based assessment, and the extent to which this is formalized and documented is uncertain and likely very variable. This suggests at the very least a missed opportunity in the development of reflective learning for ICM trainees across the European region. It also offers an opportunity for mixed-methods research comparing countries that have adopted the CoBaTrICE platform but vary in their adoption and use of workplace-based assessment.

Outcomes: A Research Framework

Physician education is predicated on the assumption that investment in training will result in better patient care. In the UK, it is estimated to cost £564,112 to train a doctor from undergraduate to specialist (59); multiplied across the 1,673,000 doctors in the EU, this impressive expenditure demands systematic evaluation. However, pedagogic research is less well-funded than biomedical research, and although there have been several calls for enhanced research into healthcare education, there is less agreement on the specific aims or focus (60, 61).

We propose that research in healthcare education should focus in particular on human factors (62), on the interplay between educational interventions, healthcare systems and delivery, and patient outcomes. We base this on the evidence that healthcare delivery is unreliable (63, 64), that physicians are key agents in determining treatment pathways, and that both error (65) and mortality (66) rates increase in circumstances when physician input is diminished. Examples of research inquiry might include whether competency-based program are associated with lower error rates, whether communication skills training is associated with greater family satisfaction in the ICU, how multisource feedback might best be used to improve reflective learning and teamworking, or whether increasing the proportion of specialists trained in acute care in the hospital at weekends results in better patient outcomes. The difficulty of answering these and many other questions is reduced if core training outcomes are standardized along the lines of the CoBaTrICE model. The variation in European health systems to which we referred at the beginning of this article then becomes a rich source of inquiry for large-scale longitudinal research. ■

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