Educational Programs for Students: What Can China Learn from the United States, the United Kingdom, and France?

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Designed to explore a suitable way to develop nurse anesthetist education in China, this article introduces 3 educational models for nurse anesthesia education in 3 countries, which all are members of the International Federation of Nurse Anesthetists (IFNA). In addition, this article carries out the comparison from 4 areas: program admission requirements; structure and length; content; and delivery mode. Healthcare leaders in China can learn from the United States, France, and the United Kingdom regarding how to develop nurse anesthesia educational programs and how to design a standardized nurse anesthesia educational program, which is consistent with the national need.

Keywords: China, nurse anesthesia, nurse anesthesia educational program.

The United States, France, and the United Kingdom are 3 countries that lead the world in terms of nurse anesthetist (NA) education. Of 107 countries, these countries comprise 70%-80% of the nurse anesthesia workforce, one-third of which provides nurse anesthesia education. In addition, NAs provide vital care such as preoperative, intraoperative, and postoperative care.1

Currently, there are about 37 member countries of the International Federation of Nurse Anesthetists (IFNA), among which 11 countries have their own specific nurse anesthetist education.2 The United States, France, and the United Kingdom are 3 of the first countries to develop nurse anesthesia education with specific developed educational systems. Therefore, this article will discuss education programs in these 3 countries.

In the United States, there are hundreds of accredited programs providing NA education. Graduates of these programs will be awarded national certification diplomas after passing the examination, which is organized by the Council on Certification of Nurse Anesthetists (CCNA).3 The United States is one of the earliest countries to develop the role of NA. In fact, NA education in the United States is extremely developed because of the early recognition of its importance and great regulation in nursing.3

Many different terms are used in a great number of countries to refer to NAs: Certified Registered Nurse Anesthetists (United States), Infirmier Anesthésiste Diplômé d’Etat (France), operating department assistants (United Kingdom), and so on. Among programs in various national contexts, differences do exist in terms of the focus and finer distinctions. For the purpose of this article, nurse anesthetists are defined as registered nurses who received the required professional training in anesthesia delivery and received a direct diploma. This article will make reference to their role in each country.

There are 2 important mechanisms worldwide to regulate admission into the practice of anesthesia nursing: registration and licensure. Registration refers to the process whereby NAs apply to get into the roster of national NAs maintained by the government after meeting all specific regulatory requirements. Licensure refers to the process whereby NAs obtain legal licenses to practice anesthesia nursing through examination. United States applies a registration system, whereas the regulatory mechanism in France is licensure.

In this article, NA educational programs in the United States, France, and the United Kingdom are examined in terms of admission requirements; structure and length; content; and delivery mode. It attempts to answer the major question: What can China learn from other countries regarding NA? Because the United States, France, and the United Kingdom are 3 leading countries for NA education, no separate description is given about other members of IFNA.

CRNA Educational Programs in the United States

With a population of approximately 300 million, the United States has approximately 47,000 nurse anesthetists and about 50,000,000 anesthesia cases every year.4 As the first country to define the role of Certified Registered Nurse Anesthetist (CRNA), the United States also has developed a perfect regulatory mechanism for CRNA education.

To practice as a CRNA in the US, a student regis-
tered nurse anesthetist must receive training from an accredited program and pass the national certification examination for the corresponding diploma. The CRNA education includes theoretical courses, clinical courses, and research. Only upon successful completion of CRNA educational programs and the documented verification can a student registered nurse anesthetist be allowed to register. CRNA education in the US is a kind of graduate-level education, where student registered nurse anesthetists can be awarded with a master’s degree, practice-oriented doctoral degree, or research-oriented doctoral degree. Different levels of educational programs have different requirements. Descriptions about the general standards of CRNA educational programs in the US are given in the following text.

• Program Admission Requirements. CRNAs are required to submit some evidence to the CRNA educational programs: being a registered nurse with 1 minimum critical care nursing experience; having been awarded an undergraduate degree in nursing or other majors. In addition, passing the Graduate Record Examination (GRE) is sometimes also necessary.

• Structure and Length. The CRNA educational programs can be divided into: theoretical curriculum, clinical learning, and research. The theoretical curriculum, which is given in the classrooms, is intended to make a systematic knowledge of nurse anesthesia foundational for student registered nurse anesthetists. The student registered nurse anesthetists are required to complete at least 550 cases in a variety of areas. During clinical learning, the students are assigned to clinical sites corresponding to relevant programs and must be supervised by registered CRNAs. The supervisor is liable to coach, support, and evaluate performance of the student registered nurse anesthetist to determine whether they meet the expected standards at the end of the clinical learning period.

Research requirements are determined by the universities, which are the basis for student registered nurse anesthetist graduate degree granting. The length of these programs is about 24–36 months, including theoretical and clinical courses, and all graduates are awarded graduate degrees from the universities.

• Content. The education component of CRNA educational programs and the expected performance are derived from the current US preregistration student registered nurse anesthetist role. Similarly, these would be gained within the context of the professional field of CRNA practice.

As for the theoretical curriculum, courses are set in relation to major areas such as professional aspects of nurse anesthesia; anatomy, physiology, pathophysiology; basic and advanced principles of anesthesia; pharmacology of anesthetic agents and adjuvant drugs.

During clinical learning, students must complete at least 550 cases in anesthesia nursing care and about 705 contact hours in anesthesia.

• Delivery Mode. CRNA education is delivered by accredited educational programs and clinical sites, which cooperate with education institutions. This approach enables CRNA applicants to access formal and excellent education of CRNAs.

The lecture is the typical way to deliver the theoretical curriculum, the most important advantage of which is that the educators can provide systematic knowledge to the student registered nurse anesthetists. However, every coin has 2 sides. In this way, there are fewer opportunities for students to learn by themselves actively. Thus, the problem-based learning is given as a supplement.

With a focus on patient safety, simulation-based learning became a popular teaching method for anesthesia nursing instruction, during which the students are put in realistic situations to act as registered CRNAs. The wireless SimMan has a wide range of applications as a main teaching tool.

Evaluation is another factor necessary for education, which can be divided into 3 components: evaluation of students, evaluation of educators, and evaluation of programs. Examination papers are the norm, and usually the OSCE is used as integrated evaluation of students. In the United States, the clinical instructor evaluation instrument is now a tool to assess the teaching quality of educators while the Logic Model Process is used to evaluate programs.

The United Kingdom’s Nurse Anesthesia Educational Programs

With a population of 59 million, the United Kingdom has approximately 5,400 nurse anesthetists and about 6,000,000 anesthesia cases every year. In the UK, anesthetic nurses are the “assistants” to the anesthetists, with roles viewed as collaborative and supportive with the emphasis on multidisciplinary teamwork. To practice anesthesia nursing, the student should complete an appropriate educational program to ensure that he/she is qualified. Accreditation of nurse anesthetists in the UK can be used as part of a degree pathway.

• Program Admission Requirements. The necessary requirement that student educational programs demand students to meet is the “post registration,” if they plan to be trained. Some programs also require students to obtain a baccalaureate degree in nursing and have at least 1 year of working experience as a registered nurse in a critical care setting for admission.

• Structure and Length. Nurse anesthesia educational programs in the UK have 2 integrated components: classroom curriculum and clinical practicum. Before beginning clinical practicum, the student should complete all foundational courses in the classroom. Almost all the educational programs require full-time learning.
The whole study comprises about 63 semester hours of didactic learning and nearly 52 semester hours of clinical practicum. Each student is provided with a mentor who will supervise them in their training situation and assess their competencies.¹⁰

The educational program lasts for 9 months at a minimum.⁹

• **Content.** There are about 14 courses in the educational programs for students and the curriculum mainly involves the following 3 areas: basic knowledge of medicine, anesthesia knowledge, and professional nursing courses in nurse anesthesia. Each area contains several courses such as research methods and statistics, gross anatomy, advanced pathophysiology, medical physiology, anesthesia pharmacology, professional aspects, legal issues, practice management and so on.¹⁰

During the period of clinical practicum, the students are ordered to perform many kinds of anesthesia cases including local anesthesia, general anesthesia, etc.

• **Delivery Mode.** The education of student anesthetists in the UK is regulated by the Nursing and Midwifery Council (NMC). Students should handle registration procedures if they plan to practice anesthesia nursing.

Teaching methods in the UK are similar to that in the US. Lecture and problem-based learning are popularly used in the educational programs.

Clinical mentors are important for students during their study of anesthesia nursing. At the end of the training programs, their performance is partly assessed by their clinical supervisors.

**France’s IADE Educational Programs**

With a population of 60 million, France has about 8,500 registered nurse anesthetists and there are nearly 8.5 million anesthesia cases occurring every year. A nurse anesthetist in France is called “Infirmier Anesthésiste Diplômé d’Etat” (IADE), which refers to the certified nurse anesthetist with national diploma. The ratio between IADE and anesthesiologists is approximately 1:1. The IADE in France is a role which requires a specific national diploma in nurse anesthesia, as defined in the National Law Public Health Code.¹¹

The educational program of IADE is regulated by the Ministry of Health. Students who plan to practice as an IADE should receive training from these programs. At the end of the study, everyone should pass a national final examination with satisfactory academic results, in order to obtain the national diploma of nurse anesthetist.¹²

• **Program Admission Requirements.** Students are not qualified to apply and enroll in IADE educational programs until receipt of a basic nursing education with 3 years post baccalaureate and 2 years of experience in caring for patients, preferably including at least 1 year of experience in intensive or critical care units. The students shall also pass an admission examination in order to start a nurse anesthesia program of education. In addition, they are also required to present a dossier containing a curriculum vitae and an employer’s recommendation.¹²

• **Structure and Length.** The IADE educational program is a combination of theoretical, clinical, and practical studies and training. These educational programs have an average length of about 2 years, which include 700 hours for theoretical studies, 70 weeks for clinical training, and 4 weeks for personal research work.¹¹ In France, there are about 27 civil programs and 3 military programs. The nurse anesthesia program of education is a national one. Clinical experience is an integral part of these programs.¹²

• **Content.** Educational programs include theoretical, clinical, and practical course.

A theoretical course comprises basic medical knowledge and a professional anesthesia nursing course. Via practical course, the student can learn skills that registered IADE generally have. During clinical studies, students are sent to clinical sites that are cooperating with educational programs and put the theoretical knowledge learned into practice. All major areas are separated into 3 sequences per year, and the objectives are put forward in order to assess students’ achievements at the end of learning.¹²

• **Delivery Mode.** The educational programs are run by the Ministry of Health, whereas the theoretical and practical courses are given by faculty from higher educational institutions. Qualified clinical agency nursing staff teach the clinical courses.

Popular teaching methods of theoretical studies are lectures and workshops. In practical courses, the students are required to learn skills of using anesthesia equipment and principles of anesthesia practicum. Practical courses may be given in a simulated situation while clinical studies happen in a real one. Each student has one clinical mentor.¹²

As for evaluation, examination is the typical way to assess students’ theoretical achievements. Clinical traineeship evaluation is made by the anesthesia department head anesthesiologist, the department head nurse anesthetist, and the nurse anesthetist in charge of the student.¹²

At the end of IADE programs, students shall pass a national final examination, which is held by the Ministry of Health. Those with satisfactory academic results obtain the National Diploma of Nurse Anesthetists.¹¹

**Typology of Nurse Anesthesia Educational Programs**

Based on the aforementioned literature and descriptions, nurse anesthesia educational programs can be classified into 3 categories by admission requirements and structure: (a) short-term continuing education programs represented by those in the United Kingdom; (b) middle-term continuing education programs exempli-
Differences and Similarities of Nurse Anesthesia Educational Programs in These 3 Countries

- **Differences.** These 3 countries exhibit a major difference in the short-term continuing educational programs vs middle-term graduate educational programs. While France currently has middle-term continuing educational programs, the developing trend is graduate-level education. Significant implications stem from the major differences. Some key points: (a) Student nurse anesthetists are registered nurses with clinical experiences and receive continuing education; (b) nurse anesthesia education focuses on transitioning general nursing into specific nursing. Short-term educational programs effectively make up for the shortage of human resource while middle-term educational programs provide systematic education; (c) because clinical practicum requires student nurse anesthetists to work daily in clinical sites, there is more exposure in the real world that will help them to face the challenges of independent practice; (d) educational programs in the US are evidence-based. The development and refinement of the programs are based on a periodic review of existing research evidences, as well as consultations with various stakeholders, gaining credibility and support across agencies and sectors.

- **Similarities.** Despite cross-national differences, shared characteristics among those programs exist in the 3 countries. The structure of these programs is the first and foremost feature. As for the education of nurse anesthetists in France and the UK, the structure of education comprises the following 2 aspects: theoretical and clinical studies. The theoretical curriculum aims at fostering a student's capability and modeling the knowledge system of anesthesia nursing. Clinical practicum gives opportunities for students to apply theory in practice. The combination of such 2 components narrows the gap between educational institution and social work. This relationship is designed to (a) ensure the quality of the theoretical studies and (b) make sure that only qualified clinicians are evaluators. Second, the assessments of students are competency-based and are subject to the national standards. This approach ensures they are objective and are measured against established standards. It is more conducive not only to transparency but also consistency across
clinical situations and evaluators; besides, it promotes fairness, objectivity, accurateness, and accountability to both the nursing profession and the public. For instance, NAs working in the UK meet “Standards of Practice,” which is made by the British Anesthetic and Recovery Nurses Association (BARNA), while CRNAs in the US should be eligible according to “Standards for Accreditation of Nurse Anesthesia Educational Programs” formulated by the Council on Accreditation of Nurse Anesthesia Educational Programs (COA).

However, some major issues should be addressed. First, little evidence is given to support the current or suggested length of educational programs. Secondly, there is no research evidence cited to justify why the nurse anesthesia educational program in the UK was set for 9 months while those in the US and France were set for about 2 years. Second, although the final certification is regulated by national organization, the clinical mentors assume a critical role for competency assessment of student’s practicum during training, and their training and selection are of significant importance. Standard training should be provided for these clinical mentors in order to achieve rigorous and fair evaluation. Moreover, the specific qualifications or selection criteria are unclear.

**What Can China Learn?**

With the trend of globalization, China is facing a challenge of keeping pace with developments in anesthesia nursing. There is still a great demand for nurse anesthesia in the anesthesia department. First and foremost, China should regard anesthesia nursing as a regulatory issue. No administrative authorities in China have been set for anesthesia nursing, which has resulted in no laws to legalize the practice. Nurses practicing anesthesia in China are supervised by anesthesiologists, who receive almost no formal training and have no specific diploma. Because a growing body of fact suggests regulatory importance of nurse anesthetists, it is a necessary to formulate policies in China. Furthermore, given that emphasis is put on developing clinical nurse specialists, it is an opportune time to implement reform and the development of anesthesia nursing now. If enacted nationally, the regulatory requirement may facilitate standardization of nurse anesthesia programs, thus ensuring quality and safety of anesthesia nursing. There is an international trend: That regulatory efficiency may be increased by striving for national-level regulation, as the US, UK, and France do.

Second, similarly to the UK, short-term continuing education should be the beginning of anesthesia nursing in China. It is unbalanced in China between the supply and demand of nursing resources, so the key point is how to satisfy the need in a short time efficiently. Considering the actual situation, healthcare professionals in China could make nurse anesthesia education a short-term project. But that still leaves a problem to be solved. Finding evidence for the structure and length of educational programs is urgent. In the US, the program was initially designed to last for about 4 months in 1933, and was a continuing education program rather than graduate-level education, which suggests an experience that we can learn from.

Third, the admission requirements, structure, content, and delivery model of nurse anesthesia programs in these countries are of reference value for nurse managers and clinical mentors in staff development in China. For example, the partnership model between clinical agencies and educational institutions to achieve objective, fair, and reliable assessments of student performance is of merit in that such a relationship maximizes the strength of connection of both sides. In addition, the merit of using assessment models for a student’s competency are multifaceted because this approach exposes students to the real world and gives chances for them to put knowledge into practice.

**Conclusion**

It is critical not only to conduct performance assessments of students for guaranteeing public safety, but also to uphold the accountability to anesthesia nursing as a regulated profession. Nurse anesthesia programs are needed by reason of the required proficiency of practicing principle, as well as differences in anesthesia nursing education and the national healthcare system. Healthcare leaders in China can learn from those countries regarding how to develop nurse anesthesia educational programs, as the current approach is greatly inadequate and inconsistent with the international trend to deal with nurse anesthesia educational programs systematically. As considered, the question is not whether such a program is needed or not, but how to design a standardized nurse anesthesia educational program that is consistent with national conditions.

**REFERENCES**


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