INTERNATIONAL COUNCIL OF NURSES

GUIDELINES ON ADVANCED PRACTICE NURSING

NURSE ANESTHETISTS

2021

Cover photo: Nurse anesthetist Si Lee, Laos. Credit: Richard Henker, PhD, CRNA, FAAN

All rights, including translation into other languages, reserved. No part of this publication may be reproduced in print, by photostatic means or in any other manner, or stored in a retrieval system, or transmitted in any form, or sold without the express written permission of the International Council of Nurses. Short excerpts (under 300 words) may be reproduced without authorisation, on condition that the source is indicated.

Copyright © 2021 by ICN - International Council of Nurses,
3, place Jean-Marteau, 1201 Geneva, Switzerland

ISBN: 978-92-95099-85-2

INTERNATIONAL COUNCIL OF NURSES

GUIDELINES ON ADVANCED PRACTICE NURSING

NURSE ANESTHETISTS

2021

AUTHORS

ICN Lead

David Stewart, MHM, BNRN
Associate Director (Consultant)
Nursing and Health Policy
International Council of Nurses

Contributing Authors

Betty J. Horton, PhD, MA, MSN, CRNA, FAAN
IFNA Associate/Consultant
Co-Chair, IFNA/ICN Task Force for the development of Guidelines for Advanced Practice Nursing: Nurse Anesthesia

Rebecca L. Madsen, DNP, MS, CRNA, APRN
IFNA Education Committee Chair
Co-Chair, IFNA/ICN Task Force for the development of Guidelines for Advanced Practice Nursing: Nurse Anesthesia

Jacqueline S. Rowles, DNP, MBA, MA, CRNA, ANP-BC, NSPM-C, FNAP, FAAN
IFNA President and Council of National Representatives USA

Leulayehu Akalu, MSC, BSC, Assistant Professor
IFNA Council of National Representatives Ethiopia
Ethiopian Association of Anesthetists, President

Christophe Debout, RN, MSN, MPhil, PhD, IADE
Académie des sciences infirmières-France, Vice Chair

Hui-Ju Yang, PhD, MS, NA, Assistant Professor
IFNA Second Vice President and Council of National Representatives Taiwan
Taiwan Association of Nurse Anesthetists, President

Quality Assurance

Madrean Schober, PhD, MSN, ANP, FAANP
President, Schober Global Healthcare Consulting
International Healthcare Consultants

Other Contributors

Sue Turale, RN, DEd, FACN, FACMHN
Editor/Consultant
International Council of Nurses

TABLE OF CONTENTS

LIST OF TABLES 6

GLOSSARY OF TERMS 6

FOREWORD 7

PURPOSE OF THE ICN APN GUIDELINES: NURSE ANESTHETISTS 8

ABSTRACT 8

CHAPTER ONE: INTRODUCTION 9

1.1 Background of the Nurse Anesthetist 9

1.2 History of Nurse Anesthesia 9

1.3 Practice Settings 11

1.4 Need for Nurse Anesthetists 11

CHAPTER TWO: DESCRIPTION OF NURSE ANESTHETISTS 12

2.1 Characteristics of Nurse Anesthetists 12

CHAPTER THREE: NURSE ANESTHETISTS' SCOPE OF PRACTICE 14

3.1 Nurse Anesthetist Competencies 16

3.2 Titles 16

CHAPTER FOUR: EDUCATION FOR THE NURSE ANESTHETIST 17

4.1 Prerequisites for entry into a Nurse Anesthetist education programme 17

4.2 Post graduate education requirements for the Nurse Anesthetist 17

4.3 Programme length 18

4.4 Accreditation or recognition of Nurse Anesthetist educational programmes 18

CHAPTER FIVE: ESTABLISHING A PROFESSIONAL STANDARD FOR THE NURSE ANESTHETIST 19

5.1 Certification, credentialing and regulation for the Nurse Anesthetist 19

5.2 Title protection for the Nurse Anesthetist 20

5.3 Experience, Lifelong Learning/Continuous Professional Development 20

5.4 Increase awareness and clarification of the role of Nurse Anesthetist 20

CHAPTER SIX: NURSE ANESTHETISTS' CONTRIBUTIONS TO HEALTHCARE SERVICES 21

CHAPTER SEVEN: SAFE PRACTICE OF ANESTHESIA 23

7.1 Systematic reviews 24

7.2 Research evidence 24

7.3 Summary of findings on safe Nurse Anesthetist practice 26

REFERENCES **27**

APPENDICES **33**

Appendix 1: IFNA Standards of Practice and Graduate Competencies **33**

Appendix 2: IFNA Educational Standards for Preparing Nurse Anesthetists **39**

Appendix 3: Credentialing terminology **43**

Appendix 4: The international context and country examples **44**

LIST OF TABLES

Table 1: Characteristics identifying a Nurse Anesthetist
Table 2: Nurse Anesthetists' Scope of Practice
Table 3: Example of Nurse Anesthetists' contributions to healthcare services

GLOSSARY OF TERMS

Advanced Nursing Practice (ANP)

Advanced Nursing Practice is a field of nursing that extends and expands the boundaries of nursing's scope of practice, contributes to nursing knowledge and promotes advancement of the profession. ANP is characterised by the integration and application of a broad range of theoretical and evidence-based knowledge that occurs as part of graduate nursing education (ICN 2020a).

Advanced Practice Nurse (APN)

An Advanced Practice Nurse (APN) is a generalist or specialised nurse who has acquired, through additional graduate education (minimum of a master's degree), the expert knowledge base, complex decision-making skills and clinical competencies for Advanced Nursing Practice, the characteristics of which are shaped by the context in which they are credentialed to practice (ICN 2020a).

Advanced Practice Nursing (APN)

Advanced Practice Nursing, as referred to in this paper, is viewed as advanced nursing interventions that influence clinical healthcare outcomes for individuals, families and diverse populations. Advanced Practice Nursing is based on graduate education and preparation along with the specification of central criteria and core competencies for practice (ICN 2020a).

Advanced Practice Registered Nurse (APRN)

APRN, as used in the USA, is the title given to a nurse who has met education and certification requirements and obtained a license to practice as an APRN in one of four APRN roles: Certified Registered Nurse Anesthetist (CRNA), Certified Nurse-Midwife (CNM), Clinical Nurse Specialist (CNS), and certified Nurse Practitioner (CNP) (ICN 2020a).

Nurse Anesthetist (NA)

A Nurse Anesthetist is an Advanced Practice Nurse who has the knowledge, skills and competencies to provide individualised care in anesthesia, pain management, and related anesthesia services to patients across the lifespan, whose health status may range from healthy through all levels of acuity, including immediate, severe, or life threatening illnesses or injury.

FOREWORD

In 2015, the World Health Assembly (WHA) adopted the resolution WHA68.15 “Strengthening emergency and essential surgical care and anesthesia as a component of universal health coverage (UHC).” This was the first-time governments worldwide acknowledged and recognised surgery and anesthesia as key components of UHC and health systems strengthening. By adopting this resolution, governments have made a political commitment to develop and address the gaps arising from the lack of safe, affordable and accessible surgical and anesthetic services. The aim of this commitment is to ensure that by 2030, five billion people will be able to access safe and affordable surgical and anesthesia care around the world.

The International Council of Nurses (ICN) is committed to supporting this ambitious but essential goal. As part of our vital role as the voice of nursing, ICN is pleased to release these Guidelines on Nurse Anesthetists.

The aim of these guidelines is to provide clarity on Nurse Anesthetists practice and to ensure that, as a result, the role continues to develop to support safe and affordable anesthetic care to people across the world. It is our hope that through the development of these guidelines, some of the barriers and walls that have hindered Nurse Anesthetists can be broken down. We are convinced that Nurse Anesthetists are one of the solutions to making UHC for surgical and anesthetics services a reality.

It is acknowledged that for some countries, the requirements outlined in this guidance paper may be aspirational. There are numerous mechanisms and strategies that can be implemented as part of a bridging process to achieve this standard. Nursing and the Nurse Anesthetists role will continue to evolve. This guidance paper seeks to provide the best currently available evidence to support and optimise this role moving forward.

During the COVID-19 pandemic, the role of Nurse Anesthetists, as other Advanced Practice Nurses, has been critical to the care, treatment and very survival of patients. We want to acknowledge their essential role, their sacrifice and commitment to protecting health.

As we begin the *International Year of the Health and Care Worker*, and as we continue to battle the global COVID-19 pandemic, we hope that these guidelines will serve to strengthen the understanding of the role of Nurse Anesthetists, build the educational preparation of these nurses, and contribute to the evolution of Advanced Practice Nursing in order to ensure quality nursing care for all.

Annette Kennedy
ICN President

Howard Catton
ICN Chief Executive Officer

PURPOSE OF THE ICN APN GUIDELINES: NURSE ANESTHETISTS

These guidelines need to be understood in the context of the ICN Guidelines on Advanced Practice Nursing 2020. They follow a similar structure and purpose in order to align with them.

The purpose of these guidelines is to facilitate a common understanding of the Nurse Anesthetist's practice for the public, governments, healthcare professionals, policy makers, educators and the nursing profession. It is envisioned that the Guidelines will support these stakeholders to develop policies, frameworks and strategies supportive of Nurse Anesthetists. Those countries that have implemented the Nurse Anesthetist role can review their current state of practice against these recommended guidelines. This will support consistency and clarity of Nurse Anesthetists internationally and enable further development of this role to meet the healthcare needs of individuals and communities. The development of these Guidelines is also important to the progression of research in this field of nursing both within and across countries.

It is recognised that the identification and context of nurses working in anesthesia varies in different parts of the world. It is also acknowledged that the profession is dynamic with changes to education, regulation and nursing practice as it seeks to respond to healthcare needs and changes to the provision of healthcare services. However, these guidelines provide common principles and practical examples of international best practice.

ABSTRACT

The *Guidelines on APN: Nurse Anesthetists* have been developed in collaboration with the International Federation of Nurse Anesthetists (IFNA). The recommendations outlined herein provide guidance on the development of Nurse Anesthetists for professional organisations, healthcare providers, regulators, policymakers and the public for maintaining and improving the quality and safety of anesthesia care. The guidelines address the professional role of Nurse Anesthetists as advanced practice nurses.

CHAPTER ONE
INTRODUCTION

These guidelines form part of a series on Advanced Practice Nursing (APN). They align with the ICN Guidelines on Advanced Practice Nursing 2020 (ICN 2020a) in that *"an Advanced Practice Nurse (APN) is one who has acquired, through additional education, the expert knowledge base, complex decision-making skills and clinical competencies for expanded nursing practice, the characteristics of which are shaped by the context in which they are credentialed to practice."*

The guidelines have been written to support the professional development of Nurse Anesthetists, as APNs, across the world to address the global issues of Universal Health Care (UHC) for surgical services. The Lancet Commission on Global Surgery (Meara et al. 2015) estimates that "*5 billion people do not have access to safe, affordable surgical and anesthesia care when needed. Access is worst in low-income and lower-middle-income countries, where nine of ten people cannot access basic surgical care*." The authors argue that surgical and anesthesia care should be an integral component of a national health system in countries at all levels of development. It is essential then, that nurses working in this field have the skills and expertise to provide safe anesthetic care. These guidelines help to achieve this goal by establishing a common understanding of the nurse anesthesia role and promoting international best practice.

1.1 Background of the Nurse Anesthetist

Nurses have been administering anesthesia for over 170 years. The specialty of nurse anesthesia began when nurses were chosen by surgeons to care for anesthetised patients soon after the discovery of an effective anesthetic drug. The need for nurses to provide anesthesia care and related services for patients has continued to grow throughout the years (Robb 1893; Thatcher 1953; Komnenich 2005).

1.2 History of Nurse Anesthesia

The discovery of the drug ether in the middle of the 19th Century was one of most important events in human history. For the first time, an effective anesthetic agent was available to relieve the suffering of people who desperately needed pain relief for surgery and childbirth. News of this breakthrough spread rapidly throughout the world resulting in the performance of pain-free surgeries; however, surgeons quickly realised that patient safety demanded a trained person to administer the anesthetic and remain devoted to the patient throughout the procedure. Nurses were often selected for this responsibility and, as early as 1893, a chapter was included in a nursing textbook providing details on how to administer an ether anesthetic as part of basic nursing education (Robb 1893). Thus, the practice of nurses administering anesthesia began in many parts of the world (Thatcher 1953; Bankert 1989; Horton 1998; Tenedios et al. 2018; Umutesi et al. 2019).

During the late 1800s, nuns from Catholic nursing orders trained nurses as anesthetists in many countries including Burundi, Serbia, Switzerland and the United States. Other nurses outside of religious orders were often trained by physicians. Both lay nurses and nuns who were nurses continued to administer anesthesia during the late 19th Century and early 20th Century in several countries including the Congo, Croatia, Ghana, Nigeria, Norway, the Netherlands, Spain, Sweden and Turkey.

Nurses have willingly accepted responsibility for administering anesthesia in times of peace and war (Bankert 1989; Kelly 1994; McAuliffe & Henry 1996; Thatcher 1953; Rowles & Meeusen 2021). They have often been the main providers of anesthesia care to military personnel on the front lines including civil wars, world wars and conflicts throughout the world. Nurse Anesthetists serve in combat areas,

navy ships, aircraft, and evacuation teams around the globe (AANA 2020a; Gunn 2015).

For over a century, most Nurse Anesthetists were not aware of their counterparts practicing in other regions of the world. As late as the 1980s, many felt nurse anesthesia practice was unique to their countries. Through the work and vision of a Nurse Anesthetist from Switzerland, Hermann Löhnert, nurse anesthesia associations discovered each other. He organised a meeting of representatives from 11 countries that became charter members of the International Federation of Nurse Anesthetists (IFNA) in 1989. As IFNA members, they shared common goals to advance educational standards and practice, promote the science of anesthesia and promote quality patient care throughout the world (IFNA 2016a; Löhnert & Ouellette 2021).

One year after IFNA was founded in 1989, Educational Standards were adopted, followed by the adoption of Practice Standards in 1991, and by a Code of Ethics and Monitoring Guidelines a few years later. Since that time, the standards have undergone several revisions in an effort to provide transparency and accountability to learners, policy makers and other stakeholders (IFNA 2016b). The *International Federation of Nurse Anesthetists Code of Ethics, Standards of Practice, Monitoring, and Education* was published in 2016 as one volume for easy reference. By advancing educational standards and practices that enhance quality anesthesia services, it contributes to the promotion of UHC worldwide.

Prior to the creation of IFNA, little was known about the major contributions to healthcare that Nurse Anesthetists made worldwide. In search of answers, IFNA and the USA-based Council on Recertification of Nurse Anesthetists sponsored a three-phase research study to identify scientifically the countries where anesthesia was administered by nurses and to document information about nurse anesthesia care in sections of the world designated by the World Health Organization (WHO). The researchers contacted ministries of health and nursing organisations in 191 countries and interviewed individual Nurse Anesthetists from various countries. The study discovered that nurses were administering anesthesia in 107 countries of the world and in many countries nearly all anesthesia was provided by nurses. Furthermore, nurses administered anesthesia in all resource settings and all regions. (McAuliffe & Henry 1996; McAuliffe & Henry 1998; Henry & McAuliffe 1999).

Much more is known about the global presence of Nurse Anesthetists since this research was conducted. This can be attributed to an active exchange of information between IFNA members and the World Congresses for Nurse Anesthetists that brings the international community together in pursuit of continuing professional development. The Federation has grown to include 41 nurse anesthesia associations and two affiliate members. The associations represent a total of 162,900 individuals identifying as Nurse Anesthetists in 41 countries that are located across the six WHO regions (Rowles & Rod 2019). The numbers of nurses administering anesthesia in the remaining 154 out of 195 countries in the world are unknown but believed to be substantial.

Although the history of nurse anesthesia began following the first successful demonstration of an ether anesthetic for surgery in 1846, research confirming Nurse Anesthetists' contributions to global healthcare has only existed since the middle of the 20th Century. Historically, it is known that nurses were chosen to be anesthetists because of their knowledge and experience in caring for diverse patient populations including those who were unconscious. In the 21st Century, their services are widely used when anesthesia is needed for surgery or to alleviate pain for other procedures. Throughout history, Nurse Anesthetists have demonstrated an ability to respond to rapid changes in healthcare and anesthesia practice as needed to meet the needs of the patients they serve. They are competent advanced practice nurses with a long history of making positive contributions to global health.

1.3 Practice Settings

Nurse Anesthetists practice in public, private and military hospitals; ambulatory surgical centres; pain clinics; offices; obstetrical units; military facilities and in other locations where anesthesia services are needed. For example, Nurse Anesthetists also participate in ambulance and helicopter transport and at disaster sites.

In low-income countries, Nurse Anesthetists are often the sole healthcare professionals providing anesthesia for surgical procedures. The African countries of Benin, Burundi, Ethiopia, Kenya and Liberia are examples of where Nurse Anesthetists typically practice independently (Rowles & Meeusen 2021). In high-income countries, Nurse Anesthetists may also work alone, but commonly work with physicians who specialise in anesthesia. In these settings, Nurse Anesthetists may not be allowed to work to their full potential due to government laws or regulations, institutional requirements or guidelines for payment of anesthesia. In any practice setting, Nurse Anesthetists work to meet all practice requirements in accordance with professional standards and regulatory guidance for supervision, medical direction, or collaboration. The United States is an example where Nurse Anesthetists are not required by federal or state law (except for New Jersey) to work with physician anesthesiologists although many do work together (AANA 2020b).

1.4 Need for Nurse Anesthetists

Although a ratio of Nurse Anesthetists to population has not been calculated, there is a disparity in the number of Nurse Anesthetists available in each country (Lipnick et al. 2017; Rowles & Meeusen 2021). For example, in the high-income countries of the United States and France, there were 54,661 Nurse Anesthetists for a population of 331.6 million in the US and 10,648 Nurse Anesthetists for a population of 66.8 million in France. This contrasts starkly with low-income countries. For example, Nigeria had 738 Nurse Anesthetists for a population of 190.9 million; and in Liberia, there were 90 Nurse Anesthetists, and no physician anesthesiologists, for a population of 4.73 million (Rod 2019). Anesthesia is also desperately needed for obstetrical cases where an estimated 808 women die each day due to complications of pregnancy and childbirth that needed surgical intervention (WHO 2017). Many low- and middle-income countries have a critical need for both physicians and nurses specialising in anesthesia (LeBrun et al. 2012; Vreede, Bulamba & Chikuba 2019). It is estimated that there is only one physician anesthesiologist per 100,000 people in countries with limited resources (Meara et al. 2015). There is a critical need to provide access to anesthesia and surgery for people who are needlessly suffering, disabled and dying. One solution to this problem is increasing access to Nurse Anesthetists (Barash & Newton 2018).

CHAPTER TWO

DESCRIPTION OF NURSE ANESTHETISTS

A Nurse Anesthetist is an APN who has completed a basic generalist nursing education programme and a recognised anesthesia educational programme at the post-graduate level (minimum of master's degree) including a didactic and clinical curriculum. Nurse Anesthetists demonstrate a commitment to continuous professional development to improve and broaden their knowledge, expertise and competence. Nurse Anesthetists deliver anesthesia and anesthesia related services to patients of all ages and conditions (AANA, 2020c; IFNA 2016b).

As advanced practice nurses, Nurse Anesthetists provide an expanded level of care beyond the practice of a generalist or specialist nurse as detailed in their scope of practice (Table 2). They are clinicians who provide direct anesthesia care to patients for surgery; delivery of a newborn; trauma and emergencies; diagnostic procedures; the management of pain; and related anesthesia services. Patients can depend on Nurse Anesthetists to be present and provide them with safe individualised, high-quality care. Some Nurse Anesthetists are also responsible for education, management and scholarly activities (AANA 2016; AANA 2020b; ICN 2020a; IFNA 2016b).

2.1 Characteristics of Nurse Anesthetists

The characteristics listed in Table 1 are associated with the advanced practice role of nurse anesthesia. These characteristics provide guidance in developing the role to its full potential based on educational preparation, practice and regulation. For some countries, the attainment of specific characteristics are aspirational due to limited resources, so these characteristics serve to identify goals to be achieved over time (AANA 2020b; ICN 2020a; ICN 2020b; IFNA n.d.; ICN 2006).

Credit: Marja-Liisa Yitalo-Airo, Finland

Table 1: Characteristics identifying a Nurse Anesthetist[1]

EDUCATIONAL PREPARATION
• Basic education as a generalist nurse • Minimum of a master's degree level nurse anesthesia education including a curriculum involving theory and clinical experiences *(It is acknowledged that for some countries, the requirement of a master's degree may be an aspiration as they strive to achieve this standard)* • Formal recognition of the educational programme[2] • Licensure, registration, certification, or credentialing
NATURE OF PRACTICE
• Integrates research, education, clinical management and ethical judgement • Delivers anesthesia care with a high degree of autonomy in both independent and collaborative practices • Collaborates with patients, doctors and a variety of healthcare professionals • Utilises advanced assessment, critical thinking and decision-making skills • Possesses advanced clinical competency • Provides consultant services to other health professionals • Commits to continuing professional development
REGULATORY MECHANISMS
• The title is legally protected • Legislation specific to advanced practice and nurse anesthesia exists • Has the authority to deliver anesthesia, pain management and related care to patients of all ages and conditions • Has the authority to formulate a diagnosis or diagnoses • Has the authority to prescribe medication and treatments • Has the authority to refer to other professionals • Has the authority to admit to hospitals • Has the authority to practice to the full scope of nurse anesthesia practice

Notes:

1 The characteristics of a Nurse Anesthetist guides governments or any public and private organisation developing the role. They also serve as a model for further development of nurse anesthesia practice where it already exists.

2 Formal recognition refers to external approval by a public, private, government or professional organisation. Examples are a Ministry of Education or IFNA's Anesthesia Program Approval Process.

CHAPTER THREE

NURSE ANESTHETISTS' SCOPE OF PRACTICE

A Nurse Anesthetist effectively applies advanced knowledge to the utilisation of the clinical, technical and nontechnical skills that are needed to provide anesthesia care to patients.

> "Nurse Anesthetists are involved in preoperative, intraoperative, and postoperative anesthesia care. They prepare and check anesthesia machines, monitors, drugs, materials, and equipment for all anesthesia procedures, and they administer or participate in the administration of general and regional anesthesia to all ages and categories of patients and surgical procedures. They are familiar with a broad variety of anesthesia techniques, anesthetic agents, adjunctive and accessory drugs, as well as with pain management and safe sedation procedures. They understand the effective analysis and utilization of invasive and non-invasive monitoring data. In order to work in close collaboration with physician anesthetists, surgeons and other healthcare professionals in the perioperative domain, Nurse Anesthetists need good communication and cooperation skills. Nurse Anesthetists recognize and take appropriate action when complications occur and immediately consult with appropriate others if patient safety requires it or if the incidence exceeds their scope of practice. They serve as resource persons in cardiopulmonary resuscitation, respiratory care, and other acute care needs."
>
> (IFNA 2016b, p. 10)

Table 2 further delineates the Nurse Anesthesia scope of practice.

Table 2: Nurse Anesthetists' Scope of Practice

Nurse Anesthetists are Advanced Practice Nurses who plan and deliver anesthesia and anesthesia related services to patients of all ages and conditions. Nurse Anesthetists collaborate with the patient and a variety of healthcare professionals in order to provide patient-centred high-quality, holistic, evidence-based and cost-effective care. Nurse Anesthetists accept responsibility and accountability for practice and engage in continuous professional development.
PREOPERATIVE/BEFORE THE PROCEDURE
• Ensure a safe working environment • Provide patient education and counselling • Perform a comprehensive history and physical examination, assessment and evaluation • Conduct a pre-anesthesia assessment and evaluation • Develop a comprehensive patient-specific plan for anesthesia, analgesia, multimodal pain management and recovery • Obtain informed consent for anesthesia and pain management • Select, order, prescribe and administer preanesthetic medications, including controlled substances • Identify potential complications, plan and execute individualised interventions to prevent their occurrence • Maintain comprehensive and accurate healthcare records

INTRAOPERATIVE/DURING THE PROCEDURE
• Implement a patient-specific plan of care, which may involve anesthetic techniques, such as general, regional and local anesthesia, sedation and multimodal pain management • Select, order, prescribe and administer anesthetic medications, including controlled substances, adjuvant drugs, accessory drugs, fluids and blood products • Select, insert, manage, and analyse invasise and non-invasive monitoring modalities • Recognise and appropriately manage complications that occur during the provision of anesthesia services • Maintain comprehensive and accurate healthcare records
POSTOPERATIVE/AFTER THE PROCEDURE
• Facilitate emergence and recovery from anesthesia • Assess, analyse and evaluate adequacy of the patient's condition before transferring care • Provide a comprehensive report regarding the perioperative period to personnel in charge of the next level of care • Select, order, prescribe and administer postanesthetic medications, including controlled substances • Conduct post-anesthesia evaluation • Educate the patient related to recovery, regional analgesia and continued multimodal pain management • Discharge from the post-anesthesia care area or facility
PAIN MANAGEMENT
• Provide comprehensive patient-centred pain management to optimise recovery • Provide acute pain services, including multimodal pain management and opioid-sparing techniques • Provide anesthesia and analgesia using regional techniques for obstetric and other acute pain management • Provide advanced pain management, including acute, chronic, and interventional pain management
OTHER SERVICES
• Serve as leaders, clinicians, researchers, educators, mentors, advocates and administrators • Respect human rights, values, customs and beliefs of patients and their families • Prescribe medications, including controlled substances • Provide emergency, critical care, and resuscitation services • Perform advanced airway management • Serve as a resource for airway and ventilatory management • Perform point-of-care testing • Order, evaluate and interpret diagnostic laboratory and radiological studies • Use ultrasound, fluoroscopy and other technologies for diagnosis and care delivery • Provide sedation and pain management for palliative care • Order consults, treatments or services related to the patient's care

Modified, with permission from the American Association of Nurse Anesthetists *Scope of Nurse Anesthesia Practice* (2020c) and the International Federation of Nurse Anesthetists *Code of Ethics, Standards of Practice, Monitoring, and Education* (2016b).

3.1 Nurse Anesthetist Competencies

Nurse Anesthetists who have completed a theoretical and clinical curriculum in a formal school of anesthesia are competent to meet the demands of the position. To support the roles and responsibilities of Nurse Anesthetists, countries may have developed individual competencies or broadly defined categories such as pre-anesthesia care, intra-operative care, post-anesthesia care, and anesthesia related activities. International standards developed by IFNA, in collaboration with its country members, include detailed competencies that are expected of graduates (IFNA 2016b). The IFNA Standards of Practice and Graduate competencies for Nurse Anesthetists can be found in Appendix 1.

3.2 Titles

Nurse Anesthetists are advanced practice nurses, recognised by various titles in different parts of the world. The title “Nurse Anesthetist” is often used as a unique designation; however, Nurse Anesthetists may be identified as anesthesia nurse, nurse specialist in anesthesia, advanced practice nurse in anesthesia or other titles to define the specialty (IFNA n.d.). Nurses providing anesthesia care may also be called by their legal title, licensure and/or certification such as Certified Registered Nurse Anesthetist (CRNA), a title that is commonly recognised by State Boards of Nursing that regulate Advanced Practice Registered Nurses (APRN) in the USA (AANA 2019). This differs in Sweden where nurses educated as anesthetists are awarded the legal title of Registered Nurse with Graduate Diploma in Specialist Nursing in Anesthesia Care by the Ministry of Health and Welfare, but are commonly referred to in English as Nurse Anesthetists (K Björkman Björkelund, personal communication, 19 March 2020).

Credit: Simulation Lab, Kijabe Hospital, Kenya

CHAPTER FOUR

EDUCATION FOR THE NURSE ANESTHETIST

Globally, nurse anesthesia education lacks uniformity (Bjorkman Bjorkelund et al. 2021; Henry & McAuliffe 1999). Recognising a need for consistency, IFNA adopted Educational Standards consistent with its mission to advance the art and science of nurse anesthesia and the quality of anesthesia care worldwide. The 2016 *International Federation of Nurse Anesthetists Code of Ethics, Standards of Practice, Monitoring, and Education* contains the Educational Standards which focus on the outcomes expected of a quality education. The conceptual framework for the Standards addresses the domains of the Nurse Anesthetist as an Expert, Professional, Communicator, Collaborator, Manager, Health Advocate, and Scholar. For each of the domains, outcome-based Graduate Competencies are identified (see Appendix 1). Leadership is a crucial aspect of each competency. Additionally, each of the domains is reflected in the required curricular content outlined in the Educational Standards (see Appendix 2).

4.1 Prerequisites for entry into a Nurse Anesthetist education programme

Nurse anesthesia practice requires complex decision-making skills and clinical competencies. Nurse anesthesia education builds upon basic generalist nursing education, generalist or specialist nursing practice, and the competencies acquired during acute/critical care nursing practice. The IFNA *Educational Standards for Preparing Nurse Anesthetists* describe minimum prerequisites to enter a nurse anesthesia programme and include:

- the completion of a generalist nursing programme, of at least 36 months in length
- a minimum of one-year nursing experience, preferably in acute care.
  (IFNA 2016b)

Acute/critical experience is necessary prior to entering a nurse anesthesia education programme because the lack of standardised educational preparation for generalist nurses impacts the knowledge, skills and abilities of graduates. A 2015 study, conducted by the National Council of State Boards of Nursing in the USA, found that new graduate nurses who were enrolled in a structured, evidence-based, precepted, transition programme at their place of employment made fewer errors, developed fewer negative safety practices and had increased competence compared to those who were not enrolled in such a programme. It was suggested that transition programmes for graduates of generalist nursing programmes be a minimum of six months in length (Spector et al. 2015). It is reasonable to require a minimum of one year of acute/critical care experience to develop the necessary competencies to succeed in a nurse anesthesia programme.

4.2 Post graduate education requirements for the Nurse Anesthetist

The minimum standard for the educational preparation of Nurse Anesthetists is a master's degree. For some countries, this is an aspirational goal, as country specific issues currently prevent this minimum standard for master's level education to be realised. To that end, it has been suggested that countries, "*Make available a level of advanced education that is realistic considering the country's needs and availability of human and financial resources*" (ICN 2006, p. 123).

4.3 Programme length

It is essential that nurse anesthesia post-graduate education be of sufficient length to allow for a rigorous didactic and clinical curriculum that prepares students to master the IFNA Graduate Competencies (IFNA 2016b). In the USA, 2,000 hours of clinical experience are required in the curriculum (Council on Accreditation 2019). It is expected that to graduate, students must actually perform, not just observe or participate in the performance of, the competencies (IFNA 2016b). To achieve this goal, a master's degree or higher must be at least 24 months in length (IFNA 2016c).

4.4 Accreditation or recognition of Nurse Anesthetist educational programmes

The authorisation to practice as a Nurse Anesthetist requires completion of an educational programme that is publicly recognised. The goal of public recognition is to promote educational standards that are reviewed over time to ensure that they are contemporary and align with national and international best practice; improve the quality of education; and provide assurance to all parties of interest that graduates of the programme have met the required competencies to practice as Nurse Anesthetists.

The International Council of Nurses guidelines for the educational preparation of advanced practice nurses include formal recognition (accreditation, approval, or authorisation by governmental or nongovernmental agencies) of educational programmes (ICN 2020a). IFNA's Educational Standards also advise that nurse anesthesia expertise is obtained through a professionally approved advanced education programme that leads to a recognised qualification (IFNA 2016b).

Some countries have developed a process for approving nurse anesthesia education; however, such a process is lacking in many countries. In response, IFNA recognised a need to "*improve the health and welfare of humanity by promoting international educational standards*" through the development of the Anesthesia Program Approval Process (APAP). To qualify for IFNA Accreditation, a programme must require "*an education in nursing that prepares a student to succeed in the programme*" as part of its admission requirements (IFNA 2017, pp. 2–3).

Nurse anesthesia education programmes throughout the world can earn IFNA Accreditation by meeting the standards on curriculum and programme content, and substantially meeting all other requirements in the standards (Horton et al. 2014). The accreditation process includes submission of a written self-study, faculty and student evaluations, and evaluation by a team of IFNA's onsite visitors.

APAP also offers two other levels of approval, IFNA Registration and IFNA Recognition. These levels of approval are available to programmes that may not have the resources to meet all IFNA's Educational Standards. (Further information on APAP can be found in Appendix 4).

CHAPTER FIVE

ESTABLISHING A PROFESSIONAL STANDARD FOR THE NURSE ANESTHETIST

Professional standards are critical in that they define the education, roles, scope of practice, ethics, and credentialing of a profession. In doing so, they provide transparency and inform Nurse Anesthetists, other healthcare professionals, the public, policymakers, and other parties of interest. Standards for nurse anesthesia practice should be used globally. Ideally, professional nurse anesthesia associations and nurse anesthesia leaders should influence and lead the strategies for developing nurse anesthesia guidelines since they are the most familiar with what is needed to support quality anesthesia services.

The IFNA developed standards for global nurse anesthesia practice in 1991, in an effort to establish requirements for safe nurse anesthesia care and to advance nurse anesthesia worldwide. The *Standards* document defines IFNA's code of ethics, role definitions, standards of practice, graduate competencies, monitoring standards and educational standards.

> "IFNA's standards are provided to serve as global references for national, regional and local validation of nurse anesthesia's scope of practice."
>
> (IFNA 2016b, p. 4)

5.1 Certification, credentialing and regulation for the Nurse Anesthetist

Credentialing is an essential function to support the practice of Nurse Anesthetists. It is used to recognise the qualifications, skills, expertise and experiences of nurses who are working in an advanced practice role in anesthesia. A credentialing process demonstrates to the public, healthcare systems and healthcare professionals of a professional standard for practice in nurse anesthesia. It can also be used to demonstrate the contribution of Nurse Anesthetists to the wider health community.

The credentialing process for the Nurse Anesthetist should be led by a nationally recognised organisation. These organisations should be accountable for the methods of designating credentialing. Credentials should be reviewed periodically and the requirements for renewal must be clear and transparent (ICN 2020a).

As APNs, Nurse Anesthetists must continue to maintain licensure. This ensures that there is a regulatory body responsible for the oversight of practice to protect patient safety. The primary purpose of regulation is public protection and safety. As such, regulation authorises a legal scope of practice for a nurse, provides a legal use of a title, and explicates standards of practice. If nurses fail to practice within their scope of practice, they could be subject to disciplinary actions by their regulatory body (Chornick 2008).

Prescriptive authority is a component of Nurse Anesthetists practicing to their full potential. This authority is governed by country, state, or provincial regulation (ICN 2020a).

5.2 Title protection for the Nurse Anesthetist

Title protection for the Nurse Anesthetist should be considered a requirement for the regulatory and credentialing process. The title should be designated to highlight those nurses working in anesthesia who are working at an APN level. The overall purpose of these protections is to safeguard the public from unqualified clinicians who neither have the education nor the competencies implied by the title (ICN 2020a).

5.3 Experience, Lifelong Learning/Continuous Professional Development

Advances in technology and science are rapidly changing the competencies required for nurse anesthesia practice. Mechanisms that support a culture of inquiry, practice scholarship, and allow for the rapid translation of new knowledge into practice are needed for Nurse Anesthetists. To practice at an advanced level, it is a fundamental requirement that Nurse Anesthetists engage in lifelong continuous professional development to demonstrate competence (IFNA 2016b). For example, in the USA, continuous professional development is mandatory as part of the certification process. To remain certified, a certified registered Nurse Anesthetist is required to complete assessed continuing education credits; professional development credits and specific assessed education modules related to airway management, applied clinical pharmacology, physiology/pathophysiology and anesthesia equipment and technology. Every eight years, an assessment examination is also required (NBCRNA 2019).

5.4 Increase awareness and clarification of the role of Nurse Anesthetist

Globally, Nurse Anesthetists are making significant contributions to healthcare. However, lack of consistency in licensure, recognition and regulation of nurse anesthesia programmes, recognition and certification of Nurse Anesthetists, and national professional standards hamper international and national awareness of the role of Nurse Anesthetists. To address this issue, it is important that the international and national professional nurse anesthesia associations develop position statements, standards and guidelines for nurse anesthesia education, practice and research (IFNA 2016b).

Recognising a need to increase awareness, the IFNA (IFNA 2016b, p. 7) recommends that Nurse Anesthetists must:

- “Establish and implement standards of nurse anesthesia practice and education that promote quality care by practicing within the national legislation and regulation that define this advanced role in nursing.
- Articulate and promote the advanced practice role in clinical, political, and professional contexts.
- Promote and engage in participation in national nurses associations in order to create a beneficial socioeconomic climate for nurses and influence policy making in healthcare.
- Advocate for and take part in obtaining public, legal, and employer recognition of their specialist qualification, title protection, and scope of practice.”
(IFNA 2016b, p. 7)

CHAPTER SIX

NURSE ANESTHETISTS' CONTRIBUTIONS TO HEALTHCARE SERVICES

Nurse Anesthetists have a long history of working as members of a multidisciplinary team. On a daily basis, Nurse Anesthetists work in collaboration with physicians, nurses and other healthcare professionals to provide anesthesia care in hospitals, surgery centres, offices, pain management clinics, and in times of war, conflicts, disasters and health emergencies. Nurse Anesthetists are managers, hospital administrators, educators, researchers and university officials. Professional organisations and individual Nurse Anesthetists engage with leaders and policy makers to improve access to quality care.

Nurse Anesthetists contribute to global healthcare in multiple ways. Table 3 provides examples of contributions made by Nurse Anesthetists. The following examples demonstrate the benefits of nurse anesthesia services:

Table 3: Examples of Nurse Anesthetists' Contributions to Healthcare Services

- Nurse Anesthetists increase access to surgery, obstetrical care, diagnostic procedures and pain management in all types of healthcare settings that are located in urban, underserved, rural and remote areas (Vreede, Bulamba & Chikuba 2019; Blair 2019).
- Healthcare facilities in medically underserved areas are able to offer obstetrical, surgical, pain management and trauma stabilisation services that would otherwise be impossible without nurse anesthesia services (Lipnick et al. 2017).
- Nurse Anesthetists provide anesthesia care to military personnel on front lines, navy ships and aircraft evacuation teams around the globe (AANA 2020a; Gunn 2015; Lockertsten & Fause 2018).
- Nurse Anesthetists help reduce needless death and disability in low- and middle- income countries where nine out of ten people have no access to basic surgery (Barash & Newton 2018; Umutesi et al. 2019; Vreede, Bulamba & Chikuba 2019).
- Anesthesia that is required to meet an urgent need for surgical care in the world's poorest regions can be provided by Nurse Anesthetists in an affordable and timely manner that ensures good outcomes, as reported in Rwanda and Sierra Leone (Needleman & Minnick 2009; Rowles & Meeusen 2021).
- Appropriately educated Nurse Anesthetists can serve as resources and consultants to colleagues, teachers and communities based on their nursing background and expanded competencies, as has been reported in Kenya (Rowles & Meeusen 2021; Umutesi et al. 2019).
- The training of nurses to provide anesthesia care has tremendously improved the health status of women and decreased maternal and infant mortality in some low-income regions, as reported in Sierra Leone (Sobhy et al. 2016; Rowles & Meeusen 2021).
- A nurse anesthesia school in Kenya has produced sufficient graduates to meet local needs and has now expanded the training programme to nurses from other African countries. This serves as a role model for other countries to increase the anesthesia manpower necessary for patients needing surgery (Umutesi et al. 2019).
- Nurse Anesthetists contribute to the safety of patients under their care. Anesthesia care given by Nurse Anesthetists or physician anesthesiologists is nearly 50 times safer in high income countries than it was in the early 1980s (IOM 2000; Pine, Holt & Lou 2006; Umutesi et al. 2019).
- Nurse Anesthetists have contributed to the development of emergency preparedness programmes and provided care during mass casualties based on their anesthesia education and expertise (AANA 2020d).
- Because of their knowledge in rapid assessment, airway management, management of vital cardiac and respiratory functions, and a nursing background in critical care units, some Nurse Anesthetists have assumed critical care responsibilities as licensed nurses during the COVID-19 pandemic (AANA 2020e).

Credit: American Association of Nurse Anesthetists

CHAPTER SEVEN

SAFE PRACTICE OF ANESTHESIA

High quality anesthesia education is essential because anesthetic complications remain a cause of surgical death in the world despite safety and monitoring standards that reduce unnecessary deaths and disabilities significantly in high income countries (Enright 2018; Cometto, Buchan & Dussault 2019). It is of great concern, however; that mortality and morbidity rates from anesthesia have not been reduced for poorer countries that lack adequate resources. In view of this problem, WHO initiated a campaign in 2008 to save lives worldwide through a system wide approach to safer surgical care. This included the development of a Safe Surgical Checklist (WHO 2008) with Nurse Anesthetists from IFNA serving as consultants during its development (P Rod 2020, personal communication, 10 August). The Safe Surgical Checklist is now widely used throughout the world as an essential objective for safe anesthesia and surgery.

Importantly, appropriately educated and well-trained Nurse Anesthetists have contributed significantly to world health by providing safe anesthesia care when needed. Safety is a hallmark of nurse anesthesia practice. This characteristic can be best seen where there are sufficient resources to provide adequate training of competent graduates. Most high-income countries have national curricula that prepare students extensively for anesthesia practice, while mid- or low-income countries often do not. IFNA's international standards for education and practice of Nurse Anesthetists fill this void by describing graduate competencies upon which an educational curriculum can be built that promotes the development of safe clinicians (IFNA 2016b).

The process offered by IFNA for approval of anesthesia programmes and schools is of value in developing competency-based curricula because it gives students, governments, the public and others some assurance that quality educational standards set by an international professional association have been met. Scientific validation that the IFNA Standards of Practice are a relevant and valid international framework to define national standards of practice for Nurse Anesthetists was published in 2019 (Herion et al. 2019). The IFNA standards advise that Nurse Anesthetists be competent to:

- Develop, improve, monitor and evaluate environmental safety in the workplace
- Take part in creating mechanisms to monitor and respond to situations where patient safety may be compromised
- Engage in the development of patient safety systems including utilisation of safe and well-maintained equipment and supplies in advance of procedures
- Recognise and take appropriate action when complications occur and immediately consult with appropriate others if patient safety requires it or if the incidence exceeds their scope of practice
- Collect and/or advocate for the collection of cumulative anesthesia data to facilitate the progressive enhancement of safety, efficiency, effectiveness and appropriateness of anesthesia care
- Identify potential risks to patient safety during preanesthetic patient assessment.
- Be continuously present during anesthetic management
- Use critical thinking and clinical judgement to interpret data obtained when monitoring patients and take appropriate action that ensures patient safety
- Assess the patient's readiness to be transferred to another qualified individual at the termination of anesthesia

- Maintain knowledge of and adhere to national and/or institutional standards of infection control to protect the patient and healthcare workers from infectious disease (IFNA, 2016b, pp. 6, 10–14).

7.1 Systematic reviews

Evidence is also found in systematic reviews and research studies that demonstrate the safe practice of Nurse Anesthetists.

- A systematic review was conducted in 2017 that examined six research studies to determine the possible superiority of physician anesthetists versus non-physician providers of anesthesia (NPA) for surgical patients (Lewis et al. 2014). Clinical outcomes were evaluated when physician anesthetists were compared with non-physicians, either working alone or in teams of various combinations.[1]

  In this systematic review several comparisons were made:

  - Comparisons between NPAs working independently with physicians working independently
  - Comparisons between NPAs working independently versus NPAs working in teams supervised or directed by a physician anesthetist
  - Unsupervised NPAs versus directed NPAs.

  All of the research studies that were examined in this systematic review failed to show differences in outcomes between anesthesia providers. Some reports indicated risks were lower for anesthetics administered by NPAs. The reviewers noted some evidence that the risk of mortality and failure to rescue was higher in the undirected versus directed NPA group, but concluded the number of confounding variables accounted for the increase.

- Another systematic review and meta-analysis of anesthesia-related maternal mortality in low-income and middle-income countries was conducted by Sobhy and a team of colleagues from the UK (Sobhy et al. 2016). They found that anesthesia contributed disproportionately to a high maternal mortality rate in these countries with the administration of anesthesia by non-physician anesthetists being one of the major factors, especially for those with no training. About two-thirds of reported deaths from anesthesia were due to preventable complications related to airway management and pulmonary aspiration.

  The findings were compared to high-income countries such as the USA, where there were no measured differences found in anesthetic complications between physician and non-physician anesthetists. It was suggested that the rigorous anesthesia training for non-physicians in high income countries contributed to better patient outcomes. A conclusion was made that targeted efforts are needed to provide safe obstetric care in low-income and middle-income countries by improving training, infrastructure and resources.

7.2 Research evidence

Most research on the safety and quality of anesthesia care has been conducted in the USA where anesthesia is primarily provided by physician anesthesiologists and Nurse Anesthetists. There are nearly 54,000 Nurse Anesthetists in the country who administer more that 49 million anesthetics each year. They have contributed to making anesthesia 50 times safer than it was in the early 1980s (AANA 2020a). Studies related to the safety of nurse anesthesia care have included access to care, comparison of anesthesia outcomes between Nurse Anesthetists and physician anesthesiologists, adherence to safe practices, and supervision of Nurse Anesthetists by physician anesthesiologists.

1 In the studies, the terms physician anesthetist or anesthesiologist and non-physician provider of anesthesia (NPA) were sometimes used to compare practices. (Non-physician providers included both nurses and other anesthesia care givers such as medical officers.)

Access to anesthesia:

- Data were collected by researchers from the Department of Anesthesiology at Vanderbilt University Medical Center (USA) for the purpose of analysing the impact of Nurse Anesthetists working at government hospitals in western Kenya. Methods included interviews of medical directors and Nurse Anesthetists who had been trained at the Kenya Registered Nurse Anesthetist (KRNA) programme in Kijabe. Hospital administrators were surveyed with a tool developed for this purpose that captured information on personnel, infrastructure, supplies, medications, procedures and outcomes. Data obtained from nine rural hospitals with KRNA graduates were compared to similar hospitals with no KRNA graduates. None of the hospitals had physician anesthesiologists working in the facilities.

  Data analysis using descriptive statistics provided evidence that KRNAs were positively impacting access to anesthesia care in a country that has a severe shortfall of skilled anesthesia providers. The presence of KRNAs in the rural hospitals resulted in an increase in emergency surgical and obstetric cases that could not have been done without anesthesia. The researchers found that the KRNA programme had successfully trained competent Nurse Anesthetists from Kijabe and had expanded the training to other geographic areas needing anesthesia services. They suggested that the competency-based education available for Nurse Anesthetists in Kijabe could be used as a model for other countries to increase access to safe anesthesia for surgery (Umutesi et al. 2019).

- In another study, Rosseel et al. (2010) reported on the success of a nurse anesthesia programme in Haiti that was developed by Médecins Sans Frontières (Doctors Without Borders). They reported that graduates from the programme provided increased access to safe anesthesia in Haiti following their education. An incident where the nurse anesthesia graduates provided critically needed anesthesia during 330 post-hurricane emergencies was presented as an example of the programme's success. The anesthesia care the graduates gave during the incident had a low 0.3% mortality rate that was not associated with lack of anesthesiologist supervision.

  The completion rate of this training programme was high, and the majority of graduates continued to work as Nurse Anesthetists in Haiti. Based on this report, a successful training programme needed to be in a setting with a sufficient volume and diversity of cases, appropriate anesthesia equipment, and a structured and comprehensive training programme. It was noted that preliminary outcomes of this study supported findings elsewhere that show Nurse Anesthetists can be a safe and effective alternative to physician anesthesiologists. A conclusion was drawn that successful training of Nurse Anesthetists is a feasible and important way to scale up surgical service resources in limited settings (Rosseel et al. 2010).

Comparison of anesthesia outcomes:

There are research studies that demonstrate the safety of nurse anesthesia care in a variety of practice settings.

- A study conducted by economists from the Research Triangle Institute concluded that anesthesia care is as equally safe when administered by a Certified Registered Nurse Anesthetist (CRNA) working solo, a CRNA supervised by a physician anesthesiologist, or a physician anesthesiologist working alone (Dulisse & Cromwell 2010).
- A study conducted by Needleman and Minnick (2009) examined anesthesia provider models related to deaths, anesthesia complications, other complications, and obstetrical trauma. They found that hospitals using only CRNAs or a combination of CRNAs and anesthesiologists do not have poorer maternal outcomes than hospitals using only anesthesiologists.
- Dony et al. (2018) compared physician anesthesiologists, working alone, and anesthesiologists, working with nurse anesthetics, in Belgium. They found that anesthesia given by teams

of anesthesiologists and Nurse Anesthetists were associated with decreased mortality and shorter length of stays as compared to solo anesthesiologists.

- Research was conducted in the USA by Pine, Holt and Lou (2006) on surgical mortality and type of anesthesia provider. They found that differences by type of provider were not statistically significant. Evidence showed that hospitals with Nurse Anesthetists but without anesthesiologists, had results similar to hospitals where anesthesiologists provided or directed anesthesia care.

Adherence to safe anesthesia practices:

Various practices are recommended to minimise occupational exposure to waste anesthetics gases.

- A survey was conducted in 2011 by the USA-based National Institute for Occupations Health, Centers for Disease Control and Prevention to determine if Nurse Anesthetists, physician anesthesiologists and anesthesiologist assistants adhered to the recommended precautionary work practices. The survey results revealed that almost all groups used scavenging systems; however, the lack of adherence to other recommended practices, such as not using high gas flows or starting anesthesia gas flow before application of face masks, caused exposure risks for workers. Compliance with the recommended work practices was higher amongst Nurse Anesthetists as compared to the other anesthesia providers (Boiano & Steege 2016).

Supervision of Nurse Anesthetists:

- A governmental agency in the USA, Centers for Medicare and Medicaid Services, allows states to opt out of a requirement for physicians to supervise Nurse Anesthetists for purposes of payment. To determine if there was a difference in anesthesia related outcomes in states that did not require physician supervision of CRNAs (opting out), Dulisse and Cromwell (2010) analysed Medicare data from 1995–2005. They found no evidence of increased inpatient deaths or complications when anesthetics were administered by solo Nurse Anesthetists in states opting out of the supervision requirement.

7.3 Summary of findings on safe Nurse Anesthetist practice

Research studies have been conducted that provide evidence of the safety and quality of nurse anesthesia practice. This evidence demonstrates that improved access to effective safe anesthesia care can be attained by fully utilising the experience, knowledge and skills of well prepared and educated Nurse Anesthetists. As clinicians with additional education and clinical experience in administering anesthesia, Nurse Anesthetists have demonstrated they utilise appropriate safety precautions and skills to ensure the safe administration of anesthesia to patients under their care.

REFERENCES

American Association of Nurse Anesthetists (2020a). Certified registered Nurse Anesthetists fact sheet. Available from: www.aana.com/docs/default-source/pr-aana-com-web-documents-(all)/crna-fact-sheet.pdf?sfvrsn=faeb4c2a_4. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2020b). *CRNAs:* We are the answer. Available from: https://www.aana.com/we-are-the-answer/position-statement. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2020c). Scope of nurse anesthesia practice. Available from: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/scope-of-nurse-anesthesia-practice.pdf. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2020d). Guidelines regarding the role of the certified registered Nurse Anesthetist in mass casualty incident preparedness and response. Available from: www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/guidelines-regarding-the-role-of-the-crna-in-mass-casualty-incident-preparedness-and-response.pdf. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2020e). Utilizing CRNAs unique skill set during the COVID-19 crisis. Available from: https://www.aana.com/news/hot-topics/news-detail/2020/03/21/utilizing-crnas- unique-skill-set-during-covid-19-crisis. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2019). Certified registered Nurse Anesthetists, Advanced practice registered nurses. Available from: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/crna-advanced-practice-registered-nurses.pdf?. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2018). Code of ethics for the certified registered Nurse Anesthetist. Available from: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/code-of-ethics-for-the-crna.pdf. [Accessed 4 February 2021].

American Association of Nurse Anesthetists (2016). Professional Attributes of the Nurse Anesthetist. Available from: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-attributes-of-the-nurse-anesthetist.pdf. [Accessed 4 February 2021].

APRN Consensus Work Group & NCSBN APRN Advisory Committee (2008). Consensus model for APRN regulation: Licensure, accreditation, certification and education. Available from: https://www.ncsbn.org/aprn-consensus.htm. [Accessed 4 February 2021].

Bankert M (1989). Watchful care: A history of America's Nurse Anesthetists. The Continuum Publishing Company, New York.

Barash D & Newton M (2018). The world needs more anesthesia providers. Here's why. Available from: https://www.devex.com/news/opinion-the-world-needs-more-anesthesia-providers-here-s-why-93237. [Accessed 4 February 2021].

Björkman Björkelund K, Horton B, Riesen M, Yang H & Anang S (2021). The history of the IFNA education committee. In: Ouellette, S., Horton, B., & Rowles, J. (eds.) The Global Voice for Nurse Anesthesia: History of the International Federation of Nurse Anesthetists (1989–2021).

Blair J (2019). Fellowship program trains Nurse Anesthetists to treat chronic pain. *Texas University Magazine (TCU)*. Available from: https://magazine.tcu.edu/winter-2019/fellowship-program-trains-nurse-anesthetists-to-treat-chronic-pain. [Accessed 4 February 2021].

Boiano JM & Steege AL (2016). Precautionary practices for administering anesthetic gases: A survey of physician anesthesiologists, Nurse Anesthetists and anesthesiologist assistants. *Journal of Occupational and Environmental Hygiene*. 13(10), 782–793. Available at: http://dx.doi.org/10.1080/15459624.2016.1177650. [Accessed 4 February 2021].

Chornick N (2008). APRN licensure versus APRN certification: What is the difference? *JONA'S healthcare law, ethics and regulation,* 10(4), 90–93.

Cometto G, Buchan J & Dussault G (2019). Developing the health workforce for universal health coverage. *WHO Bulletin,* 98(2), 77–148. Available from: https://www.who.int/bulletin/volumes/98/2/19-234138/en/. [Accessed: 4 February 2021].

Council on Accreditation of Nurse Anesthesia Educational Programs (2019). Standards for Accreditation of Nurse Anesthesia Programs – Practice Doctorate. Available from: https://www.coacrna.org/download/standards-for-accreditation-of-nurse-anesthesia-programs-practice-doctorate-revised-october-2019/. [Accessed 4 February 2021].

Dony P, Seidel L, Pirson M & Forget P (2018). Anesthesia care team improves outcomes in surgical patients compared with solo anaesthesiologist. *European Journal of Anaesthesiology*, 36(1) 64–69. Available from: www.researchgate.net/publication/328178255_Anaesthesia_care_team_improves_outcomes_in_surgical_patients_compared_with_solo_anaesthesiologist_An_observational_study. [Accessed 4 February 2021].

Dulisse B & Cromwell J (2010). No harm found when Nurse Anesthetists work without supervision by physicians. *Health Affairs*, 29, 1469–1475. Available from: https://doi.org/10.1377/hlthaff.2008.0966. [Accessed 4 February 2021].

Enright A (2018). Leading the world: Perspectives of a Female President of WFSA. *International Anesthesiology Clinics*, 56(3), 128–140. Available from: http://doi.org/10.1097/aia.0000000000000194. [Accessed 4 February 2021].

Frank JR, Ed. (2005). The CanMEDS 2005 Physician Competency Framework. Better standards. Better physicians. Better care. Ottawa, Ontario, Canada: The Royal College of Physicians and Surgeons of Canada.

Gombkoto RLM, Walker JR, Horton BJ, Martin-Sheridan D, Yablonky MJ & Gerbasi FR (2010). The Council on Accreditation of Nurse Anesthesia Educational Programs adopts standards for the practice doctorate and post-graduate CRNA fellowships. *AANA Journal*. 82(3), 2–8. Available from: https://pubmed.ncbi.nlm.nih.gov/25109154/. [Accessed 4 February 2021].

Gunn I (2015). Nurse anesthesia: A history of challenge. In Horowitz, J., McAuliffe, M. & Rupp, R. (eds.) *Ira P. Gunn, Nurse Anesthetist*, American Association of Nurse Anesthetists, 3–58.

Henry B & McAuliffe M (1999). Practice and education of Nurse Anesthetists. *Bulletin of the World Health Organization*, 77(3). 267–270. Available from: https://www.who.int/bulletin/archives/77(3)267.pdf?ua=1. [Accessed: 4 February 2021].

Herion C, Egger L, Greif R & Violato C (2019). Validating international Can MEDS-based standards defining education and safe practice of Nurse Anesthetists. *International Nursing Review*, 66(3). Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/inr.12503. [Accessed 4 February 2021].

Horton B, Anang S, Björkelund K, Riesen M & Yang H (2019). Promoting patient safety through an international approval process for anesthesia schools. *AANA Journal Online*. Available from: https://www.aana.com/docs/default-source/aana-journal-web-documents-1/education-news-online-content-august-2019.pdf?sfvrsn=ef5e1249_6. [Accessed 4 February 2021].

Horton B, Anang S, Riesen M, Yang H & Björkelund K (2014). International Federation of Nurse Anesthetists' anesthesia program approval process. *International Nursing Review*, 61(2): 285–289. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/inr.12089. [Accessed 4 February 2021].

Horton B (1998). Nurse anesthesia as a subculture of nursing in the United States. Unpublished doctoral dissertation, pp. 1–2; 238–240. Rush University, Chicago.

Institute of Medicine (2011) The future of nursing: Leading change, advancing health. *The National Academies Press.*

Institute of Medicine (2000) To err is human: Building a safer health system. Washington, DC: *The National Academies Press*.

International Council of Nurses (ICN) (2020a) Guidelines on advanced practice nursing. ISBN: 978-92-95099-71-5. Available from https://www.icn.ch/system/files/documents/2020-04/ICN_APN%20Report_EN_WEB.pdf. [Accessed 4 February 2021].

International Council of Nurses (2020b). Nurses: A voice to lead, nursing the world to health. Available from https://2020.icnvoicetolead.com/resources/. [Accessed 2 February 2021].

International Council of Nurses (2009). ICN Framework of Competencies for the Nurse Specialist. Geneva, Switzerland: International Council of Nurses.

International Council of Nurses (2006). Advanced Nursing Practice. By Schober M & Affara F. Blackwell Publishing.

International Federation of Nurse Anesthetists (n.d.). Application for membership. Available from: ifna.rod@wanadoo.fr.

International Federation of Nurse Anesthetists (2017). IFNA's anesthesia program (school) approval process. *APAP Operational Policies*. Available from: http://ifna.site/ifna-accreditation-program/approval-process-for-nurse-anesthesia-programs. [Accessed: 4 February 2021].

International Federation of Nurse Anesthetists (2016a). *Bylaws*: Available from: https://ifna.site/about-ifna/ifna-objectives. [Accessed: 4 February 2021].

International Federation of Nurse Anesthetists (2016b). *Code of ethics, standards of practice, monitoring, and education.* Available from: https://ifna.site/download/ifna-standards-of-education-practice-and-monitoring. [Accessed 24 March 2020].

International Federation of Nurse Anesthetists (2016c). *Model curriculum, 24 month master's degree program*. Available from: https://ifna.site/download/masters-model-curriculum. [Accessed 24 March 2020].

Kelly J (1994). An international study of educational programs for nurses providing anesthesia care. *AANA Journal*. 62(6).

Kollmer M (2014). A day in the life of Sister Margaret Kollmer (2014) American Association of Nurse Anesthetists. Available from: http://sharepoint.aana.com/ceandeducation/becomeacrna/Pages/A-Day-in-the-Life-Sister-Margaret-Kollmer.aspx. [Accessed 29 September 2020].

Komnenich P (2005). The evolution of advanced practice nursing. In Stanley, J. (ed.) *Advanced Practice Nursing*, 2nd. ed. F.A. Davis Co.

LeBrun DG, Saavedra-Pozo I, Agreda-Flores F, Burdic ML, Notrica MR & McQueen KAK (2012) Surgical and anesthesia capacity in Bolivian public hospitals: Results from a national hospital survey. *World J Surg* 36, 2559–2566 (2012). Available from: https://doi.org/10.1007/s00268-012-1722-x. [Accessed 4 February 2021].

Lewis S, Nicholson A, Smith A & Alderson P (2014). Physician anesthetists versus non-physician providers of anesthesia for surgical patients. *Cochrane Systematic Review - Intervention Version*. 7, 1–16. Available from: https://doi.org/10.1002/14651858.CD010357.pub2. [Accessed 4 February 2021].

Lipnick M, Bulamba F, Ttendo S & Gelb A (2017). The Need for a Global Perspective on Task-sharing in Anesthesia. *Anesthesia and Analgesia*, 125(3). 1049–1051. Available from: http://doi:10.1213/ANE.0000000000001988. [Accessed 4 February 2021].

Lockertsen J & Fause A (2018). The nursing legacy of the Korea sisters. *Nursing Open*. 5. 94–100. Available from: http://doi.org/10.1002/nop2.117. [Accessed: 2 February 2021].

Löhnert H & Ouellette S (2021). The beginning of IFNA. To be published in: Ouellette S, Horton B & Rowles J (eds.) *The Global Voice for Nurse Anesthesia: History of the International Federation of Nurse Anesthetists (1989–2021).* International Federation of Nurse Anesthetists.

McAuliffe M (1999) Practice and philosophy of Nurse Anesthetists. *Image: the Journal of Nursing Scholarship*, 29(3). Available from: http://dx.doi.org/10.1111/j.1547-5069.1997.tb01001.x. [Accessed: 4 February 2021].

McAuliffe M & Henry B (1998). Survey of nurse anesthesia practice, education, and regulation in 96 countries. *AANA Journal*, 66(3). 273–286. Available at: https://pubmed.ncbi.nlm.nih.gov/9830854/. [Accessed: 4 February 2021].

McAuliffe M & Henry B (1996). Countries where anesthesia is administered by nurses. *AANA Journal*. 64(5). 469–479. Available from: https://pubmed.ncbi.nlm.nih.gov/9124030/. [Accessed: 4 February 2021].

Meara J, Leather AJM, Hagander L, Alkire BC, Alonso N, Ameh EA, Bickler SW, Conteh L, Dare AJ, Davies J, Dérivois Mérisier E, El-Halabi S, Farmer PE, Gawande A, Gillies R, Greenberg SLM, Grimes CE, Gruen RL, Ismail EA, Kamara TB, Lavy C, Lundeg G, Mkandawire NC, Raykar NP, Riesel JN, Rodas E, Rose J, Roy N, Shrime MG, Sullivan R, Verguet S, Watters D, Weiser TG, Wilson IH, Yamey G, Yip W (2015). Global Surgery 2030: evidence and solutions for achieving health, welfare and economic development. The Lancet Commissions. *Surgery*, 157(5), 834–835. Available from: https://globalsurgery.ucsf.edu/media/8062913/Meara-2015.pdf. [Accessed: 4 February 2021].

Merry A, Johnson W, Mets B, Morris W & Gelb A (2019) The SAFE-T Summit and the International Standards for a Safe Practice of Anesthesia. *Anesthesia Patient Safety Foundation Newsletter.* Available from: https://www.apsf.org/article/the-safe-t-summit-and-the-international-standards-for-a-safe- practice-of-anesthesia. [Accessed 4 February 2021].

Meeusen V, van Zundert A, Hoekman J, Kumar C, Rawal N, Knape H. (2010). Composition of the anaesthesia team: a European survey. Eur J Anesthesiol. 2010; 27(9):773–779.

Ministry of Solidarity and Health in France (2018) La médecine d'urgence. Available from: www.ars.sante.fr/la-medecine-durgence-0?parent=381. [Accessed 4 February 2021].

National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) (2019). CPC Handbook. Available from: https://www.nbcrna.com/docs/default-source/publications-documentation/handbooks/cpc_hb.pdf?sfvrsn=941c170c_8. [Accessed 4 February 2021].

National Council State Boards of Nursing (NCSBN) (2020a). A global profile of nursing regulation, education, and practice. *Journal of Nursing Regulation*, 10(4), 1–116. Available from: https://www.journalofnursingregulation.com/article/S2155-8256(20)30039-9/fulltext. [Accessed 4 February 2021].

National Council State Boards of Nursing (2020b). *APRNs in the U.S.* Available from: https://www.ncsbn.org/aprn. [Accessed 4 February 2021].

Needleman J & Minnick A F (2009). Anesthesia provider model, hospital resources, and maternal outcomes. *Health Services Research*, 44(2 Pt 1), 464–482. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1475-6773.2008.00919.x. [Accessed 4 February 2021].

Pine M, Holt K & Lou Y (2006). Surgical mortality and type of anesthesia provider. *AANA Journal*, 71. 109–116. Available from: https://www.aana.com/docs/default-source/aana-journal-web-documents-1/109-116.pdf. [Accessed 4 February 2021].

Robb I (1893). *Nursing its principals and practice for hospital and private use*. Toronto: J.S. Carveth and Company.

Rod P (2019). *Professional titles of Nurse Anesthetists in IFNA member countries*. (Unpublished survey) International Federation of Nurse Anesthetists.

Rosseel P, Trelles M, Guilavogui S, Ford N & Chu K (2010). Ten years of experience training non-physician anesthesia providers in Haiti. *World J Surg*. 2010; 34(3), 453–458. Available at: doi:10.1007/s00268-009-0192-2. [Accessed 4 February 2021].

Rowles J & Meeusen V (2021). The history of nurse anesthesia in IFNA member countries. To be published in: Ouellette, S., Horton, B. & Rowles, J. (eds.) *The Global Voice for Nurse Anesthesia: History of the International Federation of Nurse Anesthetists (1989–2021).* International Federation of Nurse Anesthetists.

Rowles J & Rod P (2019). *Number of Nurse Anesthetists in IFNA member countries*. (Unpublished survey). International Federation of Nurse Anesthetists.

Sobhy S, Zamora J, Dharmarajah K, Arroyo-Manzano D, Wilson M, Navaratnarajah R, Coomarasamy A, Khan K & Thangaratinam S (2016). Anaesthesia-related maternal mortality in low-income and middle-income countries: A systematic review and meta-analysis. *The Lancet Global Health*. 4(5), 320–327. Available from: http://dx.doi.org/10.1016/s2214-109x(16)30003-1. [Accessed 4 February 2021].

Spector N, Blegen M, Silvestre J, Barnsteiner J, Lynn M, Ulrich B, Fogg L & Alexander M (2015). Transition to practice study in hospital settings. *Journal of Nursing Regulation* 5(4). Available from: https://www.ncsbn.org/Spector_Transition_to_Practice_Study_in_Hospital_Settings.pdf. [Accessed 4 February 2021].

Tenedios C, O'Leary S, Capocci M & Sukumar P (2018) Nurse anaesthesia practice in the G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States of America). *European Society of Anaesthesiology*. 35(3). Available from: https://europepmc.org/article/med/29381592. [Accessed 4 February 2021].

Thatcher V (1953). *History of nurse anesthesia with emphasis on nurse specialist*. Lippincott, Philadelphia.

Umutesi G, McEvoy M, Starnes J, Sileshi B, Atieli H, Onyango K & Newton M (2019). Safe anesthesia care in western Kenya: A preliminary assessment of the impact of Nurse Anesthetists at multiple level government hospitals. *Anesthesia and Analgesia.* 120(5). Available from: https://pubmed.ncbi.nlm.nih.gov/31206426/. [Accessed 4 February 2021].

Vreede E, Bulamba F & Chikuba E (2019). Developing the anesthesia workforce: The impact of training Nurse Anesthetists (Editorial). *Anesthesia and Analgesia.* 129(5). Available from: https://journals.lww.com/anesthesia-analgesia/Fulltext/2019/11000/Developing_the_Anesthesia_Workforce__The_Impact_of.6.aspx. [Accessed 4 February 2021].

World Health Organization (2017). Maternal and reproductive health. *Global Health Observatory (GHO) Data.* Available from: http://www.who.int/gho/maternal_health/en/. [Accessed 4 February 2021].

World Health Organization (2008). Safe surgery saves lives. *WHO Press.* Available from: https://apps.who.int/iris/bitstream/handle/10665/70080/WHO_IER_PSP_2008.07_eng.pdf;jsessionid=BF28C036E345ADFC6C5D922191F5A983. [Accessed 4 February 2021].

WHO Regional Office for Africa (2020) *Universal health coverage*. Available from: https://www.afro.who.int/health-topics/universal-health-coverage. [Accessed: 4 February 2021].

APPENDICES

Appendix 1: IFNA Standards of Practice and Graduate Competencies

ANESTHESIA EXPERT	
Domain	**Graduate Competencies (Expert)**
Preanesthetic patient assessment	Nurse Anesthetists A. Perform and/or participate in the performance of preanesthetic interviews by eliciting comprehensive histories and performing physical examinations based on patients presenting symptoms. B. Assess and evaluate multiple variables (drugs taken, pre-existing diseases, allergies, previous anesthetic experiences) that may affect the course of anesthesia. Identify potential risks to patient safety. C. Formulate an anesthetic care plan based on current knowledge, concepts, available evidence, and nursing principle. D. Provide accurate and understandable information to assist patients in giving informed consent. E. Integrate evidence to explain possible anesthetic and/or postanesthetic risks.
Anesthetic management	Nurse Anesthetists A. Are continuously present during anesthetic management. B. Administer and/or participate in the administration of general and regional anesthesia to all patients for all surgical and medically related procedures. C. Prepare, administer, and adapt anesthetic medications, anesthetic procedures, and other interventions according to pre-existing disease and surgical procedure, demonstrating advanced knowledge of human sciences, pharmacology, surgical, and anesthesia procedures. D. Provide psychological support to help patients through the perioperative experience by using advanced communication skills to improve patient outcomes and design strategies to meet the patient's needs. E. Use a broad variety of techniques, anesthesia agents, adjunctive and accessory drugs, and equipment when providing anesthesia care and pain management. Exhibit a comprehensive knowledge of pharmacology and pharmacokinetics related to anesthesia practice. Select, administer, and prescribe appropriate medication based on accurate knowledge of patient characteristics, anesthesia technique, and surgical procedure.
Risk management	Nurse Anesthetists A. Take appropriate safety precautions including documentation to ensure the safe administration of anesthesia care. B. Prepare anesthetic plans, equipment, and drugs according to standard operating procedures and globally recommended checklists. C. Recognize and take appropriate actions during anesthesia management by rapidly assessing a patient's situation through synthesis and prioritization of historical and available data. Advanced knowledge and experience are demonstrated at all times. Nurse Anesthetists demonstrate confidence in their own abilities to identify normal and abnormal states in anesthesia. D. Engage in the development of guidelines, standard operating procedures, and checklists for equipment and drug use.

ANESTHESIA EXPERT	
Domain	**Graduate Competencies (Expert)**
Monitoring	Nurse Anesthetists A. Monitor, analyse, and utilize data obtained from the use of current invasive and non-invasive monitoring modalities using critical thinking and clinical judgment. Identify priorities quickly using context-specific knowledge and accurately identify parameters for the safety of patients to ensure decisions are justified in the specific context. Respond constructively to unexpected or rapidly changing situations and develop flexible and creative approaches to manage challenging clinical situations.
Advanced Life Support	Nurse Anesthetists A. Take corrective action to maintain or stabilize the patient's condition and provide advanced life support care. B. Assess and provide adequate advanced life support. Use advanced communication skills to inform the interdisciplinary team, organize and collaborate with appropriate experts, and use adequate medications and equipment. C. Provide regular education in basic life support and advanced resuscitation procedures to health professionals, as needed. D. Adhere to the latest international guidelines and accept responsibility for their own regular certified training in advanced life support.
Equipment	Nurse Anesthetists A. Select, prepare, use, and clean, the appropriate equipment in routine and critical incident situations.
Termination of anesthesia	Nurse Anesthetists A. Assess, analyse, and evaluate adequacy of the patient's condition before transferring care. Evaluate patient responses for readiness to move to next level of care by identifying patient situation, and take appropriate action in the immediate postoperative period. B. Report all essential data regarding the perioperative period comprehensively and completely to the personnel in charge of the next level of care.
Postoperative care and pain management	Nurse Anesthetists A. Serve as a resource person in pain management and adequate postoperative care. B. Demonstrate advanced knowledge in pharmacology and pharmacokinetics of analgesic drugs in assessing and providing pain management. C. Assess and manage common postoperative complications such as respiratory, hemodynamic, neurological dysfunctions, and postoperative nausea and vomiting. D. Develop or participate in developing and revising standard operating procedures for all personnel covering postoperative care.
Infection control	Nurse Anesthetists A. Apply practices such as proper hand hygiene and cleansing or sterilization of equipment. B. Maintain knowledge of and adhere to national and/or institutional standards of infection control to protect the patient and healthcare workers from infectious diseases. C. Adapt or participate in adaptation and revision of infection control standards for all anesthesia procedures, and adhere to national standards for storing, handling, prescribing, and administering drugs.

ANESTHESIA EXPERT	
Domain	**Graduate Competencies (Expert)**
Documentation	Nurse Anesthetists A. Provide prompt, complete, and accurate recording of pertinent information and action of care on the patient's record. B. Facilitate, through accurate recording, comprehensive patient care. Provide information for retrospective review and research data, and establish a medical-legal record.

PROFESSIONAL	
Domain	**Graduate Competencies (Professional)**
Professionalism	Nurse Anesthetists A. Provide safe and patient-centred care based on available evidence. The Nurse Anesthetist recognizes the responsibility of professional practice and maintains a high level of quality in knowledge, judgment, technological skills, and professional values prerequisite to deliver patient-centred care. B. Accept responsibilities and correctly delegate responsibilities to other team members or healthcare professionals. C. Demonstrate self-appraisal activity. D. Identify opportunities for generating and using research and/or continuous professional development activities.
Advancement of anesthesia care	Nurse Anesthetists A. Demonstrate leadership by disseminating outcomes of nurse anesthesia practice through presentations and publications and participation in local and national nurse anesthesia organizations. Promote and facilitate the awareness of public and professional policy issues that affect nurse anesthesia practice. Serve as a role model for nurse anesthesia practice and encourage and support staff in professional achievements. B. Use quality, satisfaction, and cost data to modify patient care, nurse anesthesia practice, and systems. Accept accountability for own errors. Identify and handle critical incidents by entering them into critical incident reporting systems.
Accountability	Nurse Anesthetists A. Maintain credentials in nurse anesthesia, as mandated by national legislation or regulation. B. Respect the confidentiality of information about patients learned in clinical relationships, demonstrate overall respect, and maintain the basic rights of patients, showing concern for personal dignity and human relationships. C. Are aware of individual, ethnic, cultural, and religious differences, and provide appropriate care to deliver the best possible patient outcomes.

COMMUNICATOR	
Domain	**Graduate Competencies (Communicator)**
Communication and situation awareness	Nurse Anesthetists A. Communicate in a calm, confident, and effective approach that brings comfort and emotional support to patients and their family, and create a climate that supports mutual engagement and establishes partnerships with patients. B. Engage in effective interpersonal and intraprofessional communication using advanced communication skills suitable for the interdisciplinary domain of the workplace. C. Create awareness of specific and overlapping functions and the potential for interdisciplinary tensions and demonstrate strategies of conflict management, if necessary. D. Display crisis intervention skills when required and assure patient understanding, respect, empathy, and trust by maintaining confidentiality and discretion.

COLLABORATOR	
Domain	**Graduate Competencies (Collaborator)**
Collaboration and teamwork	Nurse Anesthetists A. Collaborate with others to identify innovative solutions to clinical and system problems. Advance patient care standards by partnering with interdisciplinary healthcare team members in research and educational activities. B. Implement new technologies that enhance patient care and promote patient safety goals. C. Establish effective, collegial relationships with other health professionals that reflect confidence in the contribution that Nurse Anesthetists make to the system. D. Encourage cooperative relationships between Nurse Anesthetists, physician anesthetists, and other members of the medical profession, the nursing profession, hospitals, and agencies representing a community of interest in nurse anesthesia. E. Respect roles and competencies of other team members and demonstrate joint decision-making skills to achieve the best possible patient outcome. F. Provide feedback and constructively discuss team strengths and weaknesses, listen to others, and ensure consistent information flow to patients and colleagues. G. Demonstrate effective solutions to problems concerning team issues.

MANAGER	
Domain	**Graduate Competencies (Manager)**
Task management	Nurse Anesthetists A. Anticipate and make decisions in advance for challenges by allocating appropriate time frames, organizing appropriate staffing, and preparing equipment and materials. B. Use existing resources effectively and efficiently by designing or participating in designing evidence-based strategies to meet the multifaceted needs of patients. C. Consider fiscal and budgetary implications in decision-making regarding practice and system modifications. D. Organize and plan for the correct ecological handling of wastes such as gases, drugs, sharps, and infectious materials. E. Evaluate and optimize the use and impact of products, services, and technologies on high quality patient care.
Quality management	Nurse Anesthetists A. Measure or participate in measuring patient satisfaction, cost, clinical outcomes, nurse satisfaction, and retention by applying methods of quality assurance and improvement. B. Foster an interdisciplinary approach to quality improvement, evidence-based practice, research, and transition of research into practice.

HEALTH ADVOCATE	
Domain	**Graduate Competencies (Health Advocate)**
Patient information	Nurse Anesthetists A. Consider and evaluate various influences on patients' health status. Detect health related and anesthetic risk factors through anesthetic assessment, and promote individual health by addressing behavioural change.
Patient education	Nurse Anesthetists A. Participate in the education of patients, other members of the health team and members of the community before, during, and after the operative period. B. Design or select health information and patient education appropriate to developmental level, health, literacy level, learning needs, readiness to learn, preferred learning style, and cultural values and beliefs. C. Facilitate patient and family understanding of the risks, benefits, and outcomes of proposed anesthesia regimen to promote informed decision-making.
Patient advocacy	Nurse Anesthetists A. Support and preserve the rights of patients for privacy by protecting information of a confidential nature from those who do not need such information for patient care. Support the rights of patients for independence of expression, decision, and action.

SCHOLAR	
Domain	**Graduate Competencies (Scholar)**
Continuous professional development	Nurse Anesthetists A. Commit to continuous professional development. B. Accept responsibility and accountability for practice and engage in lifelong professional educational activities. C. Engage in a formal self-evaluation process, seeking feedback regarding their own practice from patients, peers, professional colleagues, and others. Develop and implement strategies for lifelong learning. D. Are aware of and address individual needs for clinical inquiry through continuous professional development activities. E. Demonstrate knowledge of and adherence to the national legal regulations, accepting the respective responsibility and accountability of nurse anesthesia and others.
Research	Nurse anesthetists A. Incorporate evidence-based techniques and knowledge, as well as international guidelines and standards in clinical performance. B. Protect the rights of patients or animals involved in research projects and conduct the projects according to ethical research and reporting standards.
Education	Nurse anesthetists A. Facilitate and teach based on national and international standards of education and practice. B. Contribute to learning experiences for all professionals and students within their spheres of influence, and interact with colleagues at the local, national, governmental, and regulatory levels to enhance professional practice. C. Assist healthcare professionals in identifying their educational needs related to anesthesia and acute care needs. D. Provide peers, colleagues, students, and staff with constructive feedback regarding practice with the goal of facilitating improved outcomes and professional development.

Appendix 2: IFNA Educational Standards for Preparing Nurse Anesthetists

Purpose of the Standards of Education

Nurse Anesthetists are educated into clinical nurse specialists (ICN 2009) in many countries throughout the world (Meeusen et al. 2010; McAuliffe & Henry 1998) to provide or participate in the provision of services to patients requiring anesthesia, respiratory care, cardiopulmonary resuscitation, and/or other emergency life-sustaining services. The educational standards for preparing Nurse Anesthetists are based on the CanMEDS role model (Frank 2005) (see section on Conceptual Framework for Nurse Anesthesia Practice). The model was chosen because it is well suited to picture the various roles Nurse Anesthetists have to fulfil and to prepare students for the actual anesthesia practice in a complex interdisciplinary environment. IFNA's Educational Standards incorporate the seven CanMEDS roles (expert, communicator, collaborator, professional, manager, health advocate, and scholar) in the curriculum. The education standards are based on the international standards for safe practice in anesthesia (Merry et al. 2019). They are part of the integrated expert role, and reference to them is made in the graduate and practice standards where applicable.

Nurse anesthesia practice is sufficiently complex and advanced to be beyond the scope of general nursing practice (McAuliffe & Henry 1998). Specialty expertise is obtained through a professionally approved advanced education program that leads to a recognized qualification. Practitioners in all member countries are organized and represented within a specialty association or a branch of the relevant national nurse association.

Credit: The Liberian Association of Nurse Anesthetists

DOMAIN	TOPIC
I. Standard: Prerequisites	Minimum prerequisites for applicants/candidates for nurse anesthesia programs are completion of a basic nursing education program of at least 36 months in length and nursing experience of at least 1 (one) year, preferably in an acute care setting.
II. Standard: Selection process	All candidates for nurse anesthesia educational programs must be evaluated on the basis of a qualifying procedure such as: • Professional dossier, portfolio, or professional resume • Examination (this depends on national legislation issues and may not be mandatory) • Interview and review of candidates' knowledge base of anatomy, physiology, pathophysiology, chemistry, physics, biochemistry, pharmacology, ethics, communication and collaborator skills, and philosophy of nursing • It is recommended that the selection of candidates be performed by a committee of academic and clinical teachers that include Nurse Anesthetists
III. Standard: Curriculum	**Program content** As a minimum, the program curriculum will contain the following topics or courses as they relate to the practice of Nurse Anesthetists.
	Expert role: A. Advanced anatomy, advanced physiology, and pathophysiology of all ages and pre-existing diseases related to anesthesia practice and the perioperative period B. Advanced pharmacology including anesthesia agents such as hypnotics, analgesics, sedatives, neuromuscular blocking agents and their antagonists, volatile anesthetics, local anesthetics, adjunctive and accessory drugs, as well as all drugs that may have an impact on the effect of any anesthetic agent being used C. Chemistry and physics in anesthesia related to respiration, circulation, monitoring, and ventilation techniques D. General anesthesia techniques E. Regional anesthesia techniques F. Monitoring techniques, non-invasive and invasive (see section on Monitoring Standards) G. Functioning principles of monitors, ventilators, and other medical devices and materials H. Operation, maintenance, troubleshooting ability, and checking of ventilators, monitors, and all medical devices and materials used in anesthesia I. Patient assessment, evaluation, and management preoperatively, intraoperatively, and postoperatively J. Anesthesia techniques for different ages (pediatrics to geriatrics) and categories (healthy to morbid) of patients and the full range of surgical and medically related procedures when anesthesia is required K. Resuscitation (basic and advanced cardiac life support) and other life-sustaining procedures such as intubation, ventilation, arterial and intravenous punctures, administration and monitoring of vasoactive substances, catecholamine, and blood-fluid resuscitation L. Perioperative fluid and blood therapy such as crystalloids, colloids, blood, and coagulation products M. Preoperative, intraoperative, and postoperative pain management (assessment and adequate treatment according to WHO guidelines) N. Infection control and hygiene (WHO and national standards of infection control) O. Record keeping and documentation

DOMAIN	TOPIC
III. Standard: Curriculum	**Professional role:** A. Leadership, team building, negotiation, and conflict resolution skills B. Utilization and dissemination skills of research and practice outcomes C. Reflective practice D. Presentation skills E. Information on the function and tasks of the national association and IFNA F. Legal aspects of practice and ethical issues in practice (see Code of Ethics) G. Principles of education to support nurse anesthesia students in participating in continuous professional development H. Theories of quality assurance and improvement I. Management of critical incidents and the critical incident reporting system (CIRS) J. Cultural safety (consideration toward culture, race, gender, religion, and other possible differences) K. Stress management and self-management
	Communicator role: A. Communication between Nurse Anesthetists, physician anesthetists, surgeons, theatre nurses, and other members of the medical profession, the nursing profession, hospitals, and agencies representing a community of interest (e.g., patient associations), and the national nurse anesthesia association B. Communication and negotiation skills in the environment of operating theatres C. Conflict management strategies concerning the overlapping functions and the potential for interdisciplinary tensions in operating theatres D. Crisis intervention strategies suitable for patients facing anesthesia and surgery and for interdisciplinary tensions and problems
	Collaborator role: A. Systems and subsystems in healthcare (e.g., hospital systems, operating room systems) B. Means of collaboration with all disciplines involved in the perioperative period C. Disciplinary and interdisciplinary issues of patient safety D. Collaboration with interdisciplinary team members in research and educational activities and the implementation of new technologies that enhance patient care
	Manager role: A. Methods to provide direction and leadership to increase staff participation in professional development B. Assessment and evaluation of protocols, regimens, and guidelines using best practice evidence to improve patient outcomes and enhance effectiveness of care C. Teaching and mentoring skills D. Organization and planning skills E. Cost and implementations of ecological issues (e.g., anesthetic gases, disposal of sharps, toxic waste, etc.) F. Decision-making and anticipation skills G. Performance evaluation skills

DOMAIN	TOPIC
III. Standard: Curriculum	**Health Advocate role:** A. Health promotion B. Risk assessment on various influences of patients' health status (e.g., biological, psychological, social, socioeconomic, environmental, and cultural influences) C. Organization and change management of health related and anesthetic risk factors (e.g., instruction of smoking cessation, risks of obesity) D. Patient education methods E. Principles of ethics (see Code of Ethics)
	Scholar role: A. Research principles and evidence-based practice (strongly recommended) B. Application of measurement instruments that are critiqued for effectiveness and clinical applicability to evaluate interventions C. Analysis and participation in analysis of sources of evidence-based guidelines D. Presentation and publication skills E. Utilization of research in practice F. Self-learning skills
	Clinical practicum requirements: A. The clinical practicum requirements shall be designed to provide the students with clinical experience inherent in the list of the graduate standards for nurse anesthetists for which they are being prepared. B. It is recommended and strongly encouraged that at least 50% of the program be devoted to clinical learning experiences involving direct patient care. C. The curriculum for clinical practice should mirror the theory curriculum and include all the skills and techniques required for competent practice.
IV. Standard: Graduate competencies	For providing competent, safe anesthesia care to patients requiring such services, only those nurses who have completed a program of instruction in nurse anesthesia, or who are supervised nurse anesthesia students within such educational programs, should be allowed to perform or participate in the performance of anesthesia services. At the end of the educational program, students must be able to demonstrate the competencies described as graduate standards.
V. Standard: Location	Ideally, these programs should be conducted in the university setting or its equivalent, while assuring adequate access to clinical resources for the clinical practicum.
VI. Standard: Length of the program	The length of the program shall be based on the actual competencies for which the Nurse Anesthetist is prepared. Fulfilment of optimal competencies (such as to perform rather than participate in the performance) may require 24 or more months. A program of 18 to 24 months is strongly endorsed by the IFNA Education Committee.
VII. Standard: Faculty/teaching personnel requirements	A. The nurse anesthesia component of the educational program for preparing Nurse Anesthetists shall be directed by a Nurse Anesthetist. B. Other faculty/teachers may include other Nurse Anesthetists, physicians, physiologists, pharmacologists, and other professionals. C. Clinical education of nurse anesthesia students shall be provided by Nurse Anesthetists, anesthesiologists, and other qualified specialists.

DOMAIN	TOPIC
VIII. Standard: Evaluation	Regular evaluation of the student's academic and clinical progress is required in order to make adaptation and changes. Aspects of evaluation should contain: A. Achievement of the learning objectives B. Appropriateness of the program's content C. Course administration and venues D. Learning support (theory) E. Adequate clinical practice opportunities F. Learning support (clinical practice) G. Support provided by faculty/teachers H. Achievement of the graduate competencies
IX. Standard: Graduation	Upon graduation, based on a final theoretical and clinical evaluation, the graduate will be provided a certificate, diploma, or degree appropriate to the education, designating the graduate as qualified to provide nurse anesthesia services.

Appendix 3: Credentialing terminology

ACCREDITATION	A process of review and approval by a recognised agency by which an institution or programme is granted time-limited recognition of having met established standards.
CERTIFICATION	The formal recognition of knowledge, skills and experience demonstrated by the achievement of the professional standard set for the Nurse Anesthetist. Recognition of competence for a Nurse Anesthetist who has met pre-established eligibility requirements and standards.
EDUCATION	The formal preparation of the Nurse Anesthetist: at a master's degree or beyond that of a generalist nurse.
LICENSURE	The granting of the authority to practice. The process, sanctioned by law, of granting exclusive privilege to Nurse Anesthetists meeting established standards, which allows the Nurse Anesthetist to practice and to use the specifically protected title of Nurse Anesthetist.
REGISTRATION	In a basic sense registration means that an individual's name has been entered into an official register for persons who possess the specific qualifications for Nurse Anesthetist. The register is maintained by a regulatory or another official governmental body and usually provides title protection. The register is not a validation of competence for the Nurse Anesthetist but simply a listing or registration of the position.

Appendix 4: The international context and country examples

IFNA: Accreditation of Nurse Anesthesia Schools

Betty J. Horton, PhD, CRNA, FAAN

Many places in the world do not have access to anesthesia and surgery that can prevent unnecessary disabilities and save lives. Contributing to this problem is an acute shortage of individuals with the knowledge and skills needed to provide these services. Recognising that an appropriate education is critical for an individual to provide safe anesthesia care, the International Federation of Nurse Anesthetists (IFNA) developed a process known as the Anesthesia Program Approval Process (APAP) to accredit schools of nurse anesthesia based on the ability of a school to meet the *Educational Standards for Preparing Nurse Anesthetists* (standards). These standards reflect the work of professional nurse anesthesia educators and practitioners who represent nurse anesthesia associations from more than 40 countries that are members of the federation. The main purpose of accrediting schools of nurse anesthesia is to encourage the use of the standards in developing competency-based curricula for the preparation of well-educated graduates prepared to administer safe anesthesia.

IFNA also recognised a need to offer an approval process for schools of anesthesia unable to qualify for accreditation due to limited resources. The idea was to reward schools for their achievements although they were unable to meet all of the standards for justifiable reasons. Many obstacles existed to the creation of such a process due to global differences in faculty preparation, student qualifications, curricula, resources and cultures. The solution to overcoming these differences was to expand the accreditation process to a three-tiered approval system that uses one set of standards while taking national or regional differences into consideration.

This unique system offers three categories of approval that recognise the "(1) diversity of nurse anesthesia schools throughout the world; (2) the economic stage of development of a country; (3) the resources available to individual schools; (4) and a commitment of diverse schools to a common standard of educational quality" (IFNA 2017, p.1). The categories of approval are Accreditation, Recognition and Registration.

- IFNA Accreditation is awarded to a school of nurse anesthesia that has met all of the standards which include the admission of nurses. Accredited schools have successfully completed a thorough paper review and an onsite visit by a team of IFNA representatives. A local expert familiar with the cultural aspects of education is part of the team.
- IFNA Recognition is awarded to a school of anesthesia that has successfully completed an audit to demonstrate compliance with selected standards on curriculum, programme content, and graduate competencies.
- IFNA Registration designates a school that has submitted a signed pledge to comply with the standards to the best of its ability. The pledge includes the signature of the anesthesia school director and the highest institutional official. As with all other levels of approval information about the school is posted on the IFNA website (IFNA 2017, pp. 1–2).

Ten years after APAP was launched, there are currently 30 schools approved by IFNA through APAP. There are two schools registered, 16 schools recognised, and 13 that have earned accreditation. The first school approved for Accreditation was the Ecole des Infirmiers Anesthésistes Hôpital Salpetrière in Paris, France. IFNA's APAP has also reached beyond its member countries. Four schools in non-member countries have been approved.

Approving various categories of schools of anesthesia ranging from those with abundant resources to those with limited resources promotes the use of competency based education where all students can attain the necessary knowledge and skills that are essential for administering safe anesthesia care. The success of IFNA's efforts to assure that students receive an appropriate anesthesia education can be seen in the diversity of APAP approved schools of anesthesia located in Africa, Asia, the Caribbean, Europe and North America.

France: NAs' contribution in the prehospital emergency team

Emmanuel Dinot, RN, IADE
Christophe Debout, RN, MSN, MPhil, PhD, IADE

In France, the nurse anaesthetist (infirmier anesthésiste diplômé d'État - IADE) serves the public not only in the operating theatre but also contributes to the pre-hospital care of patients in emergency situations. The organisation of prehospital emergency services in France consists of two teams: the Fire Brigade for the rescue of victims and the Emergency Medical Assistance Service (Service d'Aide Médicale d'Urgence - SAMU) for the medical care of the patient at the site of his distress. The French model includes providing medical care "outside the hospital" by a multi-professional SAMU team that intervenes on the spot as the patient's condition requires.

The SAMU crews are composed of a nurse or nurse anaesthetist, an ambulance driver, and a physician specialised in emergency medicine. This organisation has about 700 teams spread over the territory and performs about 800,000 interventions per year. These are divided between primary interventions (at the call of the patient, family or witness) and secondary interventions (inter-hospital transport).

The IADE's advanced education and training enables him/her a higher level of skills necessary in pre-hospital emergency services. These skills include advanced pharmacology knowledge for resuscitation/pain management, and technical expertise in airway management. The addition of IADEs to the SAMU team provides them with an experienced nurse whose critical thinking skills and advanced clinical expertise add value in a setting without the traditional hospital structure and resources. The IADEs must be on any inter-hospital team which transfers patients whether the patient is stable, sedated or intubated. In recent years, there has been an increase in the frequency of these types of transport due to the restructuring of hospitals.

Kenya: Increasing Surgical Capacity

Mary Mungai, Kenya Association of Nurse Anesthetists

Kenya has a population of 46 million and it has been reported that 80% of anesthesia need within the country is unfulfilled. The 240 physician anesthetists are mainly practicing within the big cites while the sickest patients are located in the rural areas without access to care. A lack of anesthesia care and services has been reported to be the most common reason for referral out of peripheral hospitals.

Physician Anesthetists from the US and Europe were helping with anesthesia services in Kenya. They established Nurse Anesthetist training in 1990 as an in-house anesthesia training programme for nurses who were already working in the operating room. This programme was based on Nurse Anesthetist education in the US and was the beginning of bridging the gap to the existence of safe anesthesia in Kenya.

After ten years of in-house training, the Nursing Council of Kenya (NCK) recognised and accredited the educational programme after strong efforts by the hospital physician anesthetist. The first formalised cohort of Nurse Anesthetists was trained in 2006–2007.

Students may rotate to training sites in neighbouring countries. The educational curriculum begins with two months of intensive didactic education including anatomy, physiology and pharmacology, followed by clinical practice and stepped examinations every three months until graduation. Clinical experiences include general anesthesia and intubation, sedation techniques, mask ventilation, SAD and regional anesthesia (spinals, epidurals, axillary, bier blocks, ankle blocks, wrist, interscalene, supraclavicular, etc.). The 18-month curriculum is competency based and offers students a great deal of clinical experience prior to graduation.

This programme has successfully expanded to serve not only the Kenyan population, but also is training nurses from neighbouring South Sudan. Further, a yearly Scientific Conference is held and there are refresher courses that bring together all graduates for continuing education. To date, over 160 graduates, licensed by the NCK, are providing

anesthesia care in 37 different counties in Kenya, Somaliland and South Sudan. These Nurse Anesthetists are increasing access to surgical services through the provision of anesthesia care mainly in rural government hospitals where there previously was no specialist anesthesia provider.

An article published in *Anesthesia and Analgesia* (2019) highlighted the success of this programme in increasing surgical capacity, decreasing out of hospital referrals, and increasing the economic situation of hospitals with the Nurse Anesthetist providers versus equivalent hospitals without KRNAs (Umutesi et al. 2019). This success of this programme is a promising testimony for other countries in need of safe and qualified anesthesia providers.

South Korea – Post War Founding of an Advanced Practice Nursing Role for Anesthesia

Gye Seon Jeong, Korean Association of Nurse Anesthetists
Jackie Rowles, IFNA President

After the Korean War, South Korea found itself in a dire position. The limited number of physician anesthesiologists could not meet the need for anesthesia services. In 1961, the Korean military began training Nurse Anesthetists in an effort to decrease the gap in services. Sister Margaret Kollmer, an American CRNA, was deployed in 1964 to the Maryknoll Hospital in Pusan, South Korea by the Maryknoll Sisters congregation. There was a lack of anesthesia providers in South Korea and Sister Margaret was asked to help. She partnered with the government to create an 18-month programme to train registered nurses as Nurse Anesthetists, with the first programme in the Maryknoll Pusan Hospital. By 1969, she had implemented training programmes in 11 hospitals and graduates were certified by the hospital in which they trained. In 1973, the Ministry of Health and Welfare formally recognised anesthesia practice by Nurse Anesthetists. Sister Margaret remained involved with nurse anesthesia in South Korea for 29 years. During her tenure, she helped with the implementation of a national certifying exam and was the catalyst for the founding of the Korean Association of Nurse Anesthetists. Her leadership led to government recognition of certified registered Nurse Anesthetists as advanced practice nurses as defined in national law (2003), and the requirement of a master's degree for nurse anesthesia education (2005) (Kollmer 2014).

Taiwan – From Humble Post War Beginnings to Recognition and Competency Validation

Hui Ju Yang, IFNA 2nd Vice President and Council of National Representatives Taiwan

Due to a general shortage of post war anesthesia providers, The Taipei Veterans General Hospital commissioned the National Defense Medical Center to start Taiwan's first nurse anesthesia training programme in 1958. On 4 May 1959, seven Nurse Anesthetist graduates began to practice in the just founded Taipei Veterans General Hospital and also initiated the nurse role in anesthesia in Taiwan. Since then, Nurse Anesthetists have been the main anesthesia primary care givers, who are indispensable in surgical medicine development. To promote the professional development of nurse anesthesia, the sub-association of Nurse Anesthetists was founded in the Taiwan Society of Anesthesiologists in 1976. Based on the same ideals and with the same members of the sub-association of Nurse Anesthetists, the Taiwan Association of Nurse Anesthetists (TANA) was founded in 1999 as an independent professional organisation with a current estimated 4,400 anesthetists.

For over several decades, Nurse Anesthetists cooperated with anesthesiologists, surgeons, gastroenterologists, and obstetricians all over the country. However, the need of Nurse Anesthetists was unfairly ignored by the government and the public. In 1995, Taiwan implemented the National Health Insurance (NHI), which recorded reimbursement data for 97% of the country's medical procedures. The claim data of NHI indicated that every anesthesiologist in the country was performing at least four anesthetics at the same time. These results brought the role of the Nurse Anesthetist to the forefront and highlighted the anesthesia manpower need. The Minister of Health and Welfare recognised the need

to develop a national educational programme standard for Nurse Anesthetists and consigned the task to TANA. In 2019, TANA accomplished the mission. Furthermore, TANA has worked to promote recognition of the valuable role Nurse Anesthetists play in the provision of anesthesia care. Proving its commitment to public safety, TANA has just successfully completed its extensive and multiyear work to establish a national certification exam. The written exam was first offered on 6 November 2020 and the oral portion was offered on 28 March 2021. They will provide validation of competency for certificants.

United States of America: Fighting Pain

Jackie Rowles, IFNA President and Council of National Representatives USA

Development of Certified Registered Nurse Anesthetists specialty education, training, and certification in Non-Surgical Pain Management (NSPM)

Nurse Anesthetists were recognised as the first advanced practice nursing role in the United States (US). The provision of anesthesia care Nurse Anesthetists in the US is traced back to the civil war (1861–1865) with the first formal nurse anesthesia educational programme established in 1909. A national certification examination began in 1945 with the resultant credential *Certified Registered Nurse Anesthetist (CRNA)*. Educational programme accreditation was instituted in 1952; mandatory continuing education in 1978; a bachelor's degree requirement in 1986; master's degree requirement in 1986; and by 2022, all 124 nurse anesthesia programmes must be at the doctoral level for entry to practice. The history of challenges and successes for the US Nurse Anesthetist is well documented throughout the last 159 years.

In the early 2000s, there were a handful of CRNAs working in pain management practices throughout the US despite challenges from the medical community. In 2004, the Council on Accreditation for Nurse Anesthesia Educational Programs formed a task force to develop guidelines for a fellowship education in pain management. At this time no fellowships existed for CRNAs. Push back from the medical community affected the ability for a CRNA programme to start a pain fellowship.

In 2008, the American Association of Nurse Anesthetists (AANA) recognised the need for advanced pain management education for CRNAs. At that time, the effects of opioid monotherapy were beginning to show and the CRNAs who were practicing in pain management were eager for formalised education and to demonstrate the benefits of multiple therapies in treating chronic pain. In October 2008, the AANA held its first Advanced Pain Management Seminar. Seminar were held twice each year and by 2010, there were dedicated seminars for basic and advanced pain management and a day dedicated to physical assessment was added in 2013. Each seminar offered didactic education on pharmacology, pain pathophysiology, imaging and radiation safety, patient assessment/differential diagnosis and treatment plan development as well as cadaveric training in therapeutic injection techniques utilising fluoroscopic and ultrasound imaging guidance.

By 2011, it was evident that the specialty training needed to evolve to an academic level. The AANA helped to secure University based education by partnering with its CRNA pain experts and Hamline University (Minneapolis, MN) to offer a certificate in Advanced Pain Management for CRNAs. In 2014, this programme was accredited as Fellowship in Advanced Pain Management by the Council on Accreditation of Nurse Anesthesia Educational Services – the first fellowship programme for CRNAs. The programme was 3 semesters long and began in 2012. In 2015, the advanced pain management fellowship programme was moved to Texas Christian University's School of Nurse Anesthesia with a cohort starting in August of 2016. In 2017, the University of South Florida attained fellowship status for its advanced pain management educational programme, and the Middle Tennessee University was awarded fellowship status for its acute pain management educational programme.

A specialty CRNA board certification examination in Non-Surgical Pain Management was implemented in 2015 by the National Board for Certification and Recertification of Nurse Anesthetists. Certificants earn the credentials

NSPM-C. In a country where 100 million people suffer from chronic pain (IOM, 2011), CRNAs have demonstrated and validated their expertise as advanced pain management providers. For more than 12 years, CRNAs have been actively promoting multi-modal pain care and working to decrease the use of opioids. We are proud to be serving our patients while helping to change the landscape of the opioid crisis within our country.

COVID-19 and the International Federation of Nurse Anesthetists (IFNA)

Jackie Rowles, IFNA President
on behalf of the IFNA Council of National Representatives

The International Federation of Nurse Anesthetists (IFNA) was founded in 1989 with 11 country members and has now grown to 43 country members. In this unprecedented time of the COVID-19 pandemic, the 41-member Council of National Representatives were quick to establish regular electronic communication beginning in February 2020. Information shared included the status of the virus in member countries including detection, transmission, current treatment, complications, prognosis, spread, prevention, known best practices and personal protection equipment challenges. Further information was disseminated concerning Nurse Anesthetists expertise and flexibility in multiple provider roles to benefit patient care and optimise the use of personnel to meet the vastly increased demand for urgent and emergent patient care.

The value of current and sustained efforts of the IFNA, IFNA members, and all Nurse Anesthetists is enormous. Globally, Nurse Anesthetists have risen to the challenge, utilised critical and forward-thinking skills to creatively ensure coverage of crucial patient care services were available to help their hospitals meet the demand of serving their patients while putting themselves in a prime position of vulnerability to contract the disease. The value of the breadth of knowledge, skills, expertise and competencies of Nurse Anesthetists throughout the world was quickly recognised and mobilised to deliver safe, timely and individualised care within an advanced practice nursing role context. The scope of frontline essential services provided by Nurse Anesthetists during this unprecedented global pandemic is courageous and demonstrated a commitment to saving lives.

Utilisation of a critical care nursing background coupled with advanced anesthesia training allowed the Nurse Anesthetist to function in roles outside of traditional anesthesia services such as: critical care nursing, house intubation teams, repurposing anesthesia machine ventilators for long term use, ventilatory management consults, emergency room triage, respiratory therapy roles, ICU proning teams, patient intake screening, consultation/direction of other nursing personnel, and the management of acute urgent/emergent patient care. The information shared and gained through the experiences of global nurse anesthesia colleagues allowed benefit in geographic areas whose disease spread followed that of Asia and the early areas of Europe. Global communication in anesthesia related considerations gave a much needed “heads-up” to the rest of the world, bringing providers closer together in efforts to optimise care, slow the viral spread and equip member colleagues with the best evidence for use of available or make-shift personal protective equipment.

COVID-19 demonstrated just how closely connected the world is. It also showed the benefit of global organisations who have an established communication system and a sense of duty of care for one another. The IFNA believes the timely and continuous update of information shared among member countries helped to optimise care and possibly even helped save lives – maybe the providers as well as the patients.

Spotlight: COVID effects IFITS student nurse anaesthetists

Raja Fardel, Hélène Gauducheau, and Christophe Debout
Nurse anesthesia programme, IFITS, Neuilly sur Marne, France

The COVID pandemic forced the French Ministry of Health to increase the number of critical care nurses in order to meet the increased demand for ICU patient care, and to enable the provision of intensive care services outside

of the traditional critical care units. Like other countries, France experienced challenges of insufficient resources in the number and availability of critical care beds, ventilators, medications, personal protective equipment, and staff.

This health crisis has had a significant impact on the activity of nurse anaesthetists (NAs) but also on NA students. Due to the limitations on elective surgery many nurse anaesthetists were reassigned to ICUs or to units converted into ICUs. Nurse anaesthesia educational programmes were interrupted as students were sent back into hospitals to decrease the gap of critical care nursing providers. Nurse anaesthetists and students had to reorient themselves to the critical care environment and quickly adapt to new equipment and a different practice model structure than what they were used to working within.

The impact to the student anaesthetists was significant. They were deployed from March 16-July 15, 2020, which resulted in challenges to their education and their personal lives. Studying was difficult after long days of work and increased fatigue. Clinical training in anaesthesia was stopped but the didactic work continued via online education. Isolation requirements were difficult and stressful for their families. In the end, there were also positive outcomes as students reported an increase in their coping skills and resilience.

Credit: American Association of Nurse Anesthetists

International Council of Nurses
3, Place Jean Marteau
1201 Geneva, Switzerland
+41229080100
icn@icn.ch
www.icn.ch