

Countries where anesthesia is administered by nurses

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Nurse anesthetists make significant contributions to healthcare worldwide. A little known fact is that, in many countries of the world, nearly all anesthesia is provided by nurses. This international survey, in five languages, was done to provide information about nurse anesthesia care delivered in countries in the regions of the world designated by the World Health Organization.

Phase I, reported here, of a three-phase project, determined that nurses administer anesthesia in at least 107 of the world's nearly 200 countries. They administer anesthesia in developed, developing, and least developed countries, as well as in all regions of the world. A goal of disseminating data in this article is to further validate these 1992-1994 study findings. Readers are encouraged to contact the authors with follow-up information.

Support for the study was provided by the American Association of Nurse Anesthetists, Council on Recertification of Nurse Anesthetists, and the International Federation of Nurse Anesthetists.

Key words: Anesthesia, international, nurse anesthesia, World Health Organization.

Introduction

In many countries anesthesia is administered primarily by nurses. Yet few, including many in nursing, are aware of the major contribution to health that nurses, functioning as anesthetists, make. Even some history books overlook nurses in anesthesia, and little has been written about the education, practice, and legal regulation of nurse anesthetists worldwide.

Two significant occurrences provided the impetus for this study. First, in 1978, the World Health Organization (WHO) proclaimed its goal of health for all by the year 2000, in which nurses are viewed as major contributors and anesthesia as an essential service. Second, the idea for an international professional organization took root through which nurse anesthetists from all countries could collaborate, culminating, in 1989, in the formation of the International Federation of Nurse Anesthetists (IFNA).

The IFNA was founded by nurse anesthetists from the 11 countries of Austria, Germany, Finland, France, Iceland, Norway, South Korea, Sweden, Switzerland, United States, and the then Yugoslavia.* In 1993, IFNA reported that nurses may be practicing anesthesia in many other countries.¹

Our study was supported by the IFNA, in support of its charter, and because of such regional events as the formation of the European Economic Community in which reciprocity between professionals from about 40 countries is a goal.

Data suggesting that many of the world's na-

*Today there are 22 member countries of the IFNA, and several others have petitioned for membership.

tions have nurses performing as anesthetists have been communicated from nurse anesthetists in the United States and Europe who have visited countries or served in their country's military, or who have gone abroad with charitable organizations. However, it has been difficult to confirm this observation or to supplement it with factual information. Thus IFNA thought it essential that a study be done of nurse anesthetists worldwide.

Study background, purpose, aims

The main strategy in health for all is the development in every country of a health system infrastructure, starting with primary healthcare for the delivery of countrywide services that reach the entire population. Primary healthcare is essential healthcare based on practical, scientifically sound, and socially acceptable methods made accessible to all individuals and families in communities.²

Primary healthcare is intended to be flexible, adaptable to local cultural conditions, and applicable to all nations—developed and developing alike.³ It includes maternal and child healthcare, prevention of common diseases, appropriate treatment of common injuries and diseases including the provision of certain surgical procedures—for which the administration of anesthetics such as ether, halothane, ketamine, nitrous oxide, thiopental and bupivacaine is essential.⁴ Achieving health for all requires special training to safely administer these anesthetics, and in many countries nurses as well as physicians receive this training.

In an effort to ensure health for all, policy makers in many nations are using cost-effective strategies including the efficient use of their nation's human resources for health.⁵ Proceedings of the conference of WHO and Pan American Health Organization entitled *Health Manpower Out of Balance: Conflicts and Prospects* address a concern about the worldwide overproduction of physicians.⁶⁻⁹ Policy makers at the conference agreed that cost-efficient strategies for healthcare manpower planning avoid the use of expensive medical practitioners in work where less costly, properly trained† personnel can produce as efficiently and reserve physicians to perform primary medical care. In many places nurses who have received special training are providing much of the obstetrical and anesthesia care. Roemer predicts, in countries where the demand for primary care physicians is rising, the need for nurse anesthetists will also rise.¹⁰

The purpose of our study was to provide base-

line information about nurse anesthesia in countries in all regions of the world and at four levels of national development (least developed, developing, developed, and countries in transition) as categorized by WHO. The information could then serve as a basis for an in-depth study assessing the commonalities and differences in nurse anesthesia context, practice, and education worldwide. This knowledge, in turn, could be used as a basis for decisions about human resources and education.

In 1992, although there was some data about the utilization of nurse anesthetists, little systematic information could be found about nurses in anesthesia for the majority of the world's countries. Therefore the first aim of our study was to determine in which countries‡ nurses are providing anesthesia services and to locate nurse anesthetists in these countries for inclusion in Phase II. Our second aim was to describe the practice, education, and regulation of the nurses identified in Phase I. These were ascertained through a Phase II study which is reported elsewhere.

Methodology

An exploratory descriptive design and survey methodology was used. Review of the literature failed to reveal any previous comprehensive study. There were two parts to the survey. In the first part, respondents were asked "In your country, do nurses give or help with the giving of anesthesia?" In the second part, participants were asked to provide names and addresses of nurses who give anesthesia in urban and rural areas and to provide the names and addresses of others in their respective countries who may have data about nurses who give anesthesia. We also included an area for any comments respondents wished to include. The survey was translated by language specialists, from English into French, German, Portuguese, and Spanish.

In 1992-1994, the surveys, in five languages, were sent to individuals or organizations in 191 countries; of these 177 were member-states of WHO, two were associate members, and 12 were sent to other areas or countries. After 3 months, all nonrespondents received a second survey, and 3 months following that a third follow-up survey was mailed. The request in the surveys for names of others knowledgeable about nurse anesthesia produced 91 additional names from 43 countries. Each was sent a survey. A total of 914 surveys (including follow-up surveys) were mailed to the following in 191 countries:

†While there has been much debate on the use of the terms "trained" as opposed to "educate," in this article, the two words will be used interchangeably.

‡Member states of WHO based upon a WHO July 6, 1992 listing of member states.

1. National Nursing Organizations in 154 countries of which 43% responded (addresses provided by the International Council of Nurses (ICN); 104 were ICN members and 50 were nursing organizations from countries in contact with the ICN).

2. Ministries of Health in 164 countries from which 49% responded (addresses of 164 of the 177 member states and two associate members of WHO were provided by WHO).

3. Nursing administration leaders (n = 119) in 76 countries of which 50% responded (addresses provided through the University of Illinois at Chicago WHO Collaborating Center).

4. Nurses (n = 22) from 16 countries of which 72% responded (addresses provided by the American Association of Nurse Anesthetists (AANA)).

5. Nurses (n = 48) from 38 countries of which 48% responded (addresses provided by IFNA, 12 from countries that were IFNA member states, 26 from countries that were not).

6. *AANA NewsBulletin* announcement which generated the name of one nurse anesthetist in Zaire.§

Findings

Of the 191 countries contacted, respondents from 107 countries reported that nurses provide anesthesia care in their country—these represent 59% of WHO member states.¶ Only 16 countries, (8.4%) of the 191 countries contacted, reported that nurses do *not* administer anesthesia; the majority of these were developing countries in South America. As shown in Table I when analyzed by level of development, it was found that 69% of developed

countries, 47% of developing countries, 67% of least developed countries, and 59% of countries in transition reported that nurses administer anesthesia.

By world region (as shown in Table II), our data reflect that nurses administer anesthesia in 76% of the countries in the African region; 57% of the American region, 67% of the European region; 27% of the Eastern Mediterranean region; 36% of the Southeast Asia region; and in 41% of the countries in the Western Pacific region. Respondents from 10 countries reported that nurses assist in the administration of anesthesia, and in 18 countries, the evidence was incomplete or conflicting. (In the 12 countries of Afghanistan, Algeria, Bermuda, Chile, Cyprus, Kuwait, Lebanon, Malta, Morocco, Peru, Somalia, and Tunisia, the evidence for the existence of nurse anesthetists was inconclusive.) However evidence from secondary sources, including programs of international conferences, led us to believe that nurses may be administering anesthetics in some of these countries. In five countries—Argentina, Belgium, Hong Kong, Portugal, and Saudi Arabia*—the evidence for nurse anesthetists was unclear.

Some respondents reported that nurses do give or assist with the giving of anesthesia and others reported they do not. Since we were not provided the names and addresses of nurse anesthetists in these countries, we classified these countries as undetermined. In addition to the above Phase I survey results, we found that nurses provide anesthesia services in Borneo, Croatia, Eritrea, Faeroes Islands, New Caledonia, and St. Lucia.

The findings to date are summarized in Table III. Selected comments of respondents are also pro-

Table I

Administration of anesthesia by nurses by level of development of country

	Give anesthesia	Assist	Undetermined	Do not give anesthesia	No information
Developed countries (N = 26)	18 (69%)	3	2	1	1
Developing countries (N = 88)	42 (47%)	4	11	15	16
Least developed countries (N = 46)	31 (67%)	0	3	0	12
Countries in transition (N = 17)	10 (59%)	0	0	0	7
Other areas (N = 14)	6 (43%)	2	2	0	4
N = 191	N = 107	N = 9	N = 18	N = 16	N = 41

§An announcement of the study was published in the *AANA NewsBulletin* in December 1992 requesting that the membership of the AANA contact the primary investigator should they have knowledge of nurses who practice anesthesia in other countries.

¶Response rate of countries by region: African region, 82%; American region, 78%; Eastern Mediterranean region 54.5%; European region, 76%; Southeast Asia region 45.4%; Western Pacific region, 83%.

*We have subsequently conversed with a nurse anesthetist who works in Saudi Arabia.

Table II**Administration of anesthesia by nurses by countries within world regions**

	Give anesthesia	Assist	Undetermined	Do not give anesthesia	No information
African region (N = 45)	34 (76%)	1	1	1	8
American Region (N = 35)	20 (57%)	0	3	8	4
European region (N = 42)	28 (67%)	1	3	0	9
Eastern Mediterranean region (N = 22)	6 (27%)	1	8	3	4
Southeast Asia region (N = 11)	4 (36%)	1	1	0	5
Western Pacific region (N = 22)	9 (41%)	3	0	4	6
Other areas (N = 14)	6 (43%)	2	2	0	4
N = 191	N = 107	N = 9	N = 18	N = 16	N = 40

vided. As a result of the initial survey, 624 names and addresses of nurse anesthetists in 112 countries were generated for future communication.

It was apparent in some respondents' comments that there is a lack of recognition of nurse anesthetists which may be due to their lack of visibility and at least three other factors. First, in some countries, such as Algeria, the Netherlands, Tunisia, and Paraguay, it was reported that anesthesia is given by nurses as well as technicians. Although some training may take up to 3 years to complete, the extent to which the educational programs are based on a nursing framework is unclear. Second, in some countries when nurses graduate from anesthesia school, they change their title. For example, we understand that in Turkey and Sudan, they become "medical assistants." In Uganda, their title is "anesthetic officer," and reports from China are that "Once the nurse completes anesthesia school, she changes her role to physician." Third, judging from respondents' comments, nurse anesthetists' contribution to healthcare may not be fully recognized because nurse anesthesia is marginalized by physicians, who are often more influential and control healthcare systems in many countries.

Discussion and analysis

A strength of the survey is that the entire 1992 population of member states in WHO was used by contacting all 164 Ministries of Health in member states and associate member states. Another strength is that all 104 ICN nursing organizations in 1992, plus the national nursing organizations from an additional 50 countries, were included.

The study was also strengthened with the

translation and back-translation of the survey in five languages by language specialists. All returned materials and data from participants were translated to English by the same specialists for analysis.

A study limitation is the variance in reporting data for some countries. For example, the Ministry of Health and the national nurses association in one developing European country both reported that nurses do *not* function as anesthetists, and yet we located the names and addresses of three nurse anesthetists who practice anesthesia in that country and reported that they have for several years.

A second example is that in 1993 the Ministry of Health from a developed European country reported that nurses do *not* give anesthesia, and yet in 1994 that same country became a member of IFNA. For membership in IFNA, a prospective country must have nurse anesthetists, meet the requirements set by IFNA, and have a professional organization. The nurse anesthetists demonstrated that this particular European country met all prerequisites, and it was admitted as a full member in 1994.

A third example is in a developed county in the Americas where the Ministry of Health and National Nurses Organization both reported in 1993 there were *no* nurse anesthetists, reality was that the first class of nurse anesthetists was graduated from a "pilot" program of study a year earlier in a major city in that country.

In view of the variance in reporting, the findings should be considered conservative estimates. Every reasonable attempt is being made to validate the findings, including dissemination of study findings and solicitation of feedback with this arti-

Table III**Administration of anesthesia by nurses in 107 countries.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Afghanistan	Undetermined	(Reports of Nurse Anesthetists in Afghanistan have reached IFNA.)
Algeria	Undetermined	(The extent to which anesthesia training is built upon a nursing base is unknown; however, nurse anesthetists from Congo report being trained in Algeria.)
Angola	Yes	"In Angola all the work performed in anesthesia is carried out by nurses with intermediate training in anesthesia and some senior personnel trained by foreign technicians. Nurses perform anesthesia without a doctor."
Argentina	Undetermined	"Anesthesiology is a specialization of Medical School. Only doctors (anesthesiologist doctors) who specialize in this field can perform anesthesia services."
Armenia	Yes	
Australia	Assist	(There is interest in starting a program of nurse anesthesia.)
Austria	Yes	(There are at least 135 nurse anesthetists. Member of IFNA.)
Bahamas	No	
Bahrain	No	"Technicians are employed by anesthesia departments. Plans are underway to replace the technicians with Nurses."
Barbados	No	
Belarus	Yes	"They help the physician anesthetist in 90% of the cases (5% do alone)."
Belgium	Undetermined	
Belize	Yes	"Nurse anesthetists work independently."
Benin	Yes	"In Benin nurses are alone when they give anesthetics and such is the case in most African countries." (Member of IFNA.)
Bermuda	Undetermined	
Bolivia	Yes	"Until 1960, nurses use [sic] to administer anesthesia. When the specialization of doctor anesthetists was created, they were the people in charge of these services."
Botswana	Yes	"Nurse anesthetists give anesthesia with little or no supervision—especially in rural areas."
Brazil	No	"The conclusions of your study will be very important and bring a big contribution to the Latin American nurses, mostly if you publish it in this part of America."
Brunei Darussalam	No	"The nurses only prepare the equipments [sic]."
Bulgaria	Yes	"The practice of anesthesia is done by physician anesthetists with nurse anesthetists as a team."
Burkina Faso	Yes	"We have an anesthesia school, since 1984. It takes 2 years to complete. It requires a nurse diploma. Some anesthetists are educated on site." (The number of anesthetists is unknown, there are 4 anesthesiologists and 7 million inhabitants.)
Burundi	Yes	"There are 6 anesthesiologists and 61 nurse anesthetists. The nurse anesthetists give over 90% of all anesthetics. They give anesthesia for major and minor surgeries. The training takes 18 months and is offered at three hospitals."
Bylorussia	Yes	
Cambodia	Yes	"Until 1975 nurses were in charge of anesthesia departments. They trained in France, Belgium and Canada. Since 1980 (after Red Khmers had taken over), the training became 'on the job.' In 1991 a 2-year course was started; 16 nurses will graduate in 1993."

Comments in " " are direct quotes from respondents in Phase I of the study.

Table III – cont'd.**Administration of anesthesia by nurses in 107 countries. – cont'd.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Cameroon	Yes	"97% of all anesthetics are carried out by nurses." "There are two schools, one English, one French. It requires 3 years training to become an RN, then 2 years experience in the ICU, then 2 years of anesthesia training."
Canada	Yes	(Reports of new "pilot" program to educate nurse anesthetists)
Central African Republic	Yes	"After their specialization, the nurse anesthetists obtain better status and salary conditions. They are educated in France, Ivory Coast or Togo. Some still educated on site." (There are 40 nurse anesthetists, no anesthesiologists, 3 million inhabitants.)
Chad	Yes	"All anesthetists are nurses. We have only one doctor anesthetist. They train abroad or learn in the operating room from nurses who trained abroad." (Senegal reports that they train nurses from Chad.)
Chile	Undetermined	(There are reports that nurse anesthetists here have a professional organization.)
China	Yes	"As soon as a nurse begins to give anesthesia, she changes her role to physician."
Colombia	No	"Before 1960 there were trained nurses who worked in this field—but now, anesthesia administration is the responsibility of an 'anesthesiologist doctor'."
Congo	Yes	"There is a shortage of anesthesiologists—5 for the whole country. We have 40 nurse anesthetists. There is one nurse anesthesia school in Brazzaville— takes 2 years to complete." (Some nurse anesthetists are educated in Cuba, France and Algeria.)
Cook Islands	No	
Costa Rica	Yes	"In 1978 nurse anesthesia programs were discontinued because there were too many doctors. Nurses now administer anesthesia under supervision of anesthesiologists." "Nurses do administer anesthesia independently; University of Costa Rica trains them."
Cote d'Ivoire	Yes	"We have > 50 nurse anesthetists who perform > 90% of the anesthetics; 15 anesthesiologists; 12 million inhabitants. One anesthesia school since 1968, takes 2 years to complete. Some train in France." (Member of IFNA.)
Cuba	Yes	"There is a 1-year program and 1,002 nurses have the anesthesiology specialization. They administer or help [doctors] in the administration of anesthesia."
Cyprus	Undermined	"Help with the giving of anesthesia only. Training on the job. There are 2-3 nurses with postgraduation course in England."
Czechoslovakia (Bohemia/ Czech Republic)	Yes	"Nurses are giving anesthesia everywhere and there is postgraduate specialization study in Institute for Postbasic Study."
Denmark	Yes	"In all hospitals where anesthesia is performed nurses assist to or give anesthesia."
Djibouti	Yes	"There is only one hospital and it has nurse anesthetists." (Senegal reports they train nurse anesthetists from Djibouti.)
Ecuador	No	"At present, nurses do not give anesthesia. Some years ago, two nurses received training in the BARCO HOPE, but the associations of anesthesiologist doctors prohibited it."
Egypt	No	
Equatorial Guinea	Yes	(A subject in Phase II sent copies of the anesthesia records.)
Estonia	Yes	"Most anesthesia is done by physician anesthetists with nurse anesthetists. Sometimes nurse anesthetists work alone."
Ethiopia	Yes	"95-97% of anesthesia service is covered by nurse anesthetists. There is one national school. The school takes 30 students every 2 years. There are no anesthesiologists outside the Capital, the population is 50 million."
Fiji	No	

Table III— cont'd.**Administration of anesthesia by nurses in 107 countries.— cont'd.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Finland	Yes	"The anesthesiologist starts anesthesia with help of nurse anesthetist. The nurse always works with the doctor, they help with the giving of anesthesia, special educational programs take 1 year. There are at least 730 nurse anesthetists." (Member of IFNA.)
France	Yes	"There are 2-year programs with mandatory hospital internships. There are 17 schools, nurses give anesthesia on their own or under physician supervision." There are at least 4,500 nurse anesthetists. (Member of IFNA.)
Gabon	Yes	"There are more than 50 nurse anesthetists; 5 physician anesthetists (1st in 1980) for 1.3 million people. An anesthesia school since 1982 in Libreville, must be RN with 2 years experience. Program is 2 years long and leads to a diploma." (Member of IFNA.)
Gambia	Yes	"The anesthesia services in this country are run entirely by nurses."
Germany	Yes	There are at least 290 nurse anesthetists in the former West Germany. (Member of IFNA.)
Ghana	Yes	"Over 90% of all anesthetics are given by nurse anesthetists in Ghana." (Member of IFNA.)
Greece	Yes	"Assist by protocol, no schools, just on-the-job training. Use RNs to maintain anesthesia." "No legislation to support the practice, but nurses are giving anesthesia." "To be an RN can take 2, 3, or 4 years and anesthesia nurse can be any level."
Grenada	Yes	(Trained in Jamaica)
Guatemala	Yes	"Both physician anesthetists and nurse anesthetists give anesthesia either alone, or as a team. Doctors are taking the place of the nurse."
Guinea-Bissau	Yes	"Nearly 100% of anesthetics given by nurse anesthetists." There is 1 doctor anesthetist.
Guyana	Yes	(A nurse anesthesia program has been started by Health Volunteers Overseas.)
Haiti	Yes	"There are few anesthesia providers in Haiti—both physician anesthetists and nurse anesthetists work independently."
Honduras	Yes	"They are called 'technicians in anesthesia', there are some nurses" (the extent to which the education is built upon a nursing model is not known.)
Hong Kong	Undetermined	
Hungary	Yes	"Nurse anesthetists often work together with doctor anesthetists, sometimes they work alone."
Iceland	Yes	(67 nurse anesthetists administer more than 90% of the anesthetics. (Member of IFNA.)
India	Yes	"Nurse anesthetists give anesthesia without the help of physician anesthetists. Physician anesthetists work mostly in the city."
Indonesia	Yes	"Most anesthesia in rural areas done by nurse anesthetists, most doctor anesthetists stay in the city."
Iran	Yes	(A nurse anesthetist participated as a subject in Phase II.)
Ireland	Assist	
Israel/Palestine	Yes	(Nurse anesthetists have been practicing in Gaza for many years. Some participated in Phase II)
Italy	Yes	"Nurses help the doctor perform anesthesia. There is a special course 1 year. They monitor patients' vital signs and report on the progress of anesthesia." (Sent job descriptions for nurse anesthetists)
Jamaica	Yes	"We have a school of nurse anesthesia." "Nurse anesthetists administer 90% of all anesthesia."
Japan	No	"Although prohibited, with 10,000 hospitals (each 20-1,200 beds), doctors may be using nurses. There is the possibility of starting a program."
Jordan	No	

Table III – cont'd.**Administration of anesthesia by nurses in 107 countries. – cont'd.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Kenya	Yes	"There are clinical officers of anesthesia (nonphysician/nonnurse), the surgeon trains them. The nurse anesthetists are foreign trained."
Kiribati	Yes	"Nurses mostly assist the doctor anesthetist, occasionally they may give anesthesia without a doctor anesthetist."
Kuwait	Undetermined	
Laos People's Democratic Republic	Yes	(Nurse anesthetists from here participate in Phase II.)
Latvia	Yes	"Anesthesia care is rendered simultaneously by nurses and doctors."
Lebanon	Undetermined	(Letters to the investigators strongly suggest that nurses administer anesthesia here.)
Lesotho	Yes	(They train in Mozambique and Zimbabwe.)
Liberia	Yes	"Training program not functioning since war in 1990." Still "over 95% of anesthetics given by nurses."
Liechtenstein	Yes	"One hospital with 90 beds, nurse anesthetists get their training in Switzerland, Austria or Germany."
Lithuania	Yes	"They are always supervised by a physician."
Luxembourg	Yes	(They have an official organization of nurse anesthetists.)
Malawi	Yes	
Malaysia	Yes	"Over 90% of all anesthetics are given by nurse anesthetists in some states."
Maldives	Undetermined	(Reports from the IFNA)
Mali	Yes	
Malta	Undetermined	(IFNA has reports that nurses give anesthesia here.)
Marshall Islands	Yes	"Nurse anesthetists give all the anesthesia."
Mauritius	Assist	
Mexico	Yes	"We have military nurse anesthetists only, no civilian."
Monaco	Yes	(Nurse anesthetists from here participated in Phase II of the research.)
Morocco	Undetermined	(Senegal reports that they have sent nurses here to receive anesthesia training.)
Mozambique	Yes	"There is one specialized doctor anesthetist and 76 trained (active) nurse anesthetists. 15 million inhabitants. We have a nurse anesthesia training program. Nurses from Lesotho train here."
Namibia	No	
Nepal	Yes	"In many places nurse anesthetists take primary responsibility, in others they work with physician anesthetists."
Netherlands	Yes	"It takes 3 years of training" (it may be that 70% of anesthetics are given by nurses and 30% by technicians). (Member of IFNA.)
New Zealand	Assist	
Nicaragua	Yes	"There are a few doctor anesthetists—the main category of people performing anesthesia are nurse anesthetists."
Nigeria	Yes	"Nurses give >90% of all anesthetics." (Member of IFNA.)
Norway	Yes	"We have over 1,200 nurse anesthetists. Educational program lasts 18-24 months." (Member of IFNA)
Oman	Assist	
Pakistan	Yes	"One college of nursing provides a diploma in anesthesia."
Panama	Yes	(Sent job descriptions)
Papua New Guinea	Yes	"Many nurses give anesthesia, they are called anesthetic technical officers." (The extent to which their education is based upon a nursing model is not known.)

Table III – cont'd.**Administration of anesthesia by nurses in 107 countries. – cont'd.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Paraguay	Yes	"There are some nurses, mostly technicians and doctors." "It takes 1 year to become an RN, 3 years to become an anesthetist."
Peru	Undetermined	
Philippines	Yes	"There are a few, they work in district hospitals."
Poland	Yes	"There is a 2-year specialization of anesthesia nursing. Nurse anesthetists work closely with physician anesthetists."
Portugal	Undetermined	"There is no anesthesia specialty, some operating room nurses work for anesthesiologists and there is no shortage of anesthesiologists."
Puerto Rico	Yes	"In all hospitals where surgery is practiced, nurse anesthetists administer anesthesia with or without the supervision of a doctor. Nurse anesthetists play a critical role."
Republic of Korea	Yes	"The nurse anesthesia program has 200 class hours, 1,300 hours of practicum including local and general anesthesia." There are 350 nurse anesthetists and six nurse anesthesia programs. (Member of IFNA.)
Romania	Yes	
Russian Federation	Yes	(Current literature documents presence of nurse anesthetists. IFNA has reports that nurses provide anesthesia services here.)
Rwanda	Yes	"Nurse anesthetists are the main category of people to perform anesthesia. There is a tremendous need for some doctor anesthetists."
Saint Lucia	Yes	(Reports from Health Volunteers Overseas)
Saint Vincent and the Grenadas	Yes	(They train in Jamaica.)
Saudi Arabia	Undetermined	(There are 1-year diploma courses as Anesthesia Technicians; do not have to be a nurse to attend. Some of the nonnurse anesthetists wish to attend nursing school. Job descriptions suggest that technicians do administer anesthesia.)
Senegal	Yes	"We have 75 nurse anesthetists; 15 physicians; 7 million people. Program 2 years duration (After RN + 4 years experience), Diploma. Receive students from Djibouti, Somalia, Chad. Some have trained in Morocco."
Seychelles	Yes	"They work both independently and with physician anesthetists."
Sierra Leone	Yes	(They have an association of nurse anesthetists. They can work independently or with a physician anesthetist.)
Singapore	Assist	"Nurses assist in intubation and monitoring during surgery."
Slovenia (See Yugoslavia)	Yes	(Nurse anesthetists from here participate in Phase II of the research. Member of IFNA.)
Somalia	Undetermined	(Mail returned, service temporarily suspended. Senegal reports that they have educated nurse anesthetists from Somalia.)
South Africa	Yes	"There are 8 nurse anesthetists registered on books."
Spain	Yes	(Member of IFNA.)
Sri Lanka	Assist	(They wish to begin a formal program.)
Sudan	Yes	"Nurses are trained for 2 years to give anesthesia unhelped. Once graduated, they are called anesthetic medical assistants."
Suriname	Yes	
Swaziland	Yes	"Anesthesia is practiced primarily by nurse anesthetists."
Sweden	Yes	(Approximately 2,300 nurse anesthetists. Member of IFNA.)
Switzerland	Yes	(There are approximately 1,200 nurse anesthetists; the program takes 2 years to complete. Member of IFNA.)
Thailand	Yes	"Anesthesia is mostly given by nurse anesthetists by themselves. There is a 1-year postgraduate course. The physician anesthetist is the consult for the nurse anesthetist. Many hospitals do not have a physician anesthetist."
Togo	Yes	"There is a program in Lome. Must be RN with 5 years experience. It is 3 years long, Diploma of Anesthesia Medical Assistant. There are students from Benin, Burkina-Faso, and Central Africa."

Table III – cont'd.**Administration of anesthesia by nurses in 107 countries. – cont'd.**

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Participant comments and commentary</i>
Tonga	Assist	
Trinidad and Tobago	No	
Tunisia	Undetermined	(Anesthesia assistants perform much of the anesthesia, some of these may be nurses. The extent to which anesthesia training is built upon a nursing base is unknown.)
Turkey	Yes	"Nurses give 80% of all the anesthetics and they call themselves anesthesia technicians, they are mostly nurses, attend 1-year course."
Uganda	Yes	"Their title is Anesthetic Officer. There is a 2-year curriculum. There are 8 doctors, 58 nurses and 65 paramedics (nurse, nonnurse, nondoctor anesthetists)." The extent to which the education is based upon a nursing model is not known.
United Kingdom and Northern Ireland	Assist	(There is interest in starting a program.)
United Republic of Tanzania	Yes	"Anesthesia is mainly given by nurses in most hospitals all over the country."
United States of America	Yes	(More than 27,000 nurse anesthetists who perform over 65% of all anesthetics; over 85% of all rural hospitals staffed solely by nurse anesthetists. Member of IFNA.)
Uruguay	No	"In the past, nurses administered anesthesia, but no longer now."
Vanuatu	Yes	(They study in Fiji, Papua New Guinea, New Caledonia.)
Venezuela	No	
Viet Nam	Yes	"Until recently very few doctors specialized in anesthesia and almost all anesthesia was given by nurses. The nurse anesthesia training lasts two and one-half years."
Yemen	Yes	(Sent job descriptions)
Yugoslavia (former)	Yes	(Charter Member IFNA. Nurse anesthetists from Slovenia participated in Phase II of the study.)
Zaire	Yes	"We have a school since 1972; must be RN with 3-4 years experience. Program is 4 years and university based. We also have an association of nurse anesthetists."
Zambia	Yes	"They train abroad."
Zimbabwe	Yes	(Lesotho nurses are trained in Zimbabwe.)

Yes=107
 Undetermined=18
 Assist=9

Other areas

<i>Country</i>	<i>Nurse anesthetists?</i>	<i>Comments</i>
Borneo (Indonesia)	Yes	(Reports from the IFNA)
Croatia	Yes	
Eritrea	Yes	(Reports from Health Volunteers Overseas.)
Faeroes Islands	Yes	(Attended the 3rd World Congress of Nurse Anesthetists)
New Caledonia	Yes	
American Samoa (Pago Pago)	Yes	(Advertised a position for a nurse anesthetist in the <i>AANA NewsBulletin</i>)
St. Lucia	Yes	(Reports from Health Volunteers Overseas)

cle. No attempt has been made to analyze the effect of nonrespondents.

Because of the data generated, it can be reported for the first time that nurses are providing anesthesia services in more than 100 countries. In some countries they administer much, and in others virtually all anesthetics. For example, in the United States, more than 65% of all anesthetics are given by nurses. And, in rural United States, nurses are the sole providers of anesthesia in about 85% of all rural hospitals.¹¹ Without nurses or other providers available to provide anesthesia to rural populations, many surgical and obstetrical services cannot be provided. This may also be true in other countries. Respondents' comments suggest that nurses may be providing as much as 90% of all anesthetics in a fairly high number of countries.

The use of nurses to administer anesthesia does not appear to be related to a country's level of development. The data indicate that nurses are providing anesthesia for about two thirds of the countries in both the developed and least developed groupings. And, at least half of the countries in the developing countries and countries in transition groupings report using nurses.

There does, however, appear to be some variation in the regional distribution of countries that utilize nurses to provide anesthesia. Fifty percent or more of countries in the African, American, and European regions report that nurses administer anesthesia, and 41% of countries in the Western Pacific report doing so. In contrast, only 27% of the Eastern Mediterranean and 36% of the Southeast Asian countries reported using nurses to provide anesthesia care. Whether these regional variations reflect the lower response rate from countries in those regions is unclear.

Comments by respondents indicate there is variance in the amount of governmental support nurse anesthetists receive. In some places nurse anesthetists have always received governmental support, while in others increasing support for practice and education may be more recent.¹² In some countries, especially in South America, reportedly a lack of legislative support has led to a decline in the practice of nurse anesthesia. In other countries in which anesthesia is currently provided by physician anesthetists only, health officials are expressing a desire to develop future nurse anesthesia educational programs that will produce graduates prepared to make a significant contribution to health for all.

A basic right of all citizens of the world is the provision of a level of healthcare that will enable them to enjoy an economically and socially productive life.¹³ To ensure health for all, policy mak-

ers in every country must make efficient use of their resources, especially their nation's human resources for health. Many believe that once high-priority services are available to prevent the killing diseases of childhood, the next highest priority should be the provision of simple surgical services. The performance of surgical procedures requires, at least, surgeons and properly trained anesthetists, most usually nurse or physician anesthetists. In many countries of the world, nurse anesthetists are the primary providers of anesthesia.

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