



RESEARCH NEWS

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Developing a Health Services Research Agenda in Nurse Anesthesia Using a Modified Delphi Method

The authors sought to formalize a process and ascertain research priorities for nurse anesthesia, which resulted in a new Health Services Research (HSR) Agenda. After formation of an 8-member ad hoc committee (representing different stakeholders from the American Association of Nurse Anesthetists [AANA]), a modified Delphi technique was used to determine the top 3 HSR research priorities for the 2016 fiscal year. The committee identified 24 high-priority HSR questions/topics specific to policy, education, or practice. An anonymous, web-based survey was distributed to the committee to rank and prioritize the 24 identified research questions using a 5-point Likert scale. Two consensus meetings and a second anonymous, web-based survey were con-

ducted to prioritize the top 3 HSR questions. Through this systematic method, an HSR agenda was created based on the research questions initially submitted by the committee. The method used ensured that the new research agenda is relevant and reflects the priorities of Certified Registered Nurse Anesthetists. This agenda was incorporated into the updated AANA and AANA Foundation Joint Research Program as suggested areas of research. This agenda is intended to focus investigators and funding organizations on highest priority areas in nurse anesthesia research.

Keywords: Consensus, Delphi technique, health services research.

The mission of the American Association of Nurse Anesthetists (AANA) Foundation is to advance the science of anesthesia through education and research. One of the goals of the AANA Foundation is to support novice and seasoned investigators in nurse anesthesia through grants, fellowships, and postdoctoral fellowships. These programs are designed to develop researchers across a broad spectrum of research initiatives, which includes healthcare policy, anesthesia science, education, clinical practice, and leadership.

The generation of research has continued to evolve with innovations occurring in a variety of areas, such as instrument development, patient management, and policy related to anesthesia workforce and delivery models. The introduc-

tion of these events generates new research questions about value, effectiveness, cost-effectiveness, and other outcome metrics, which require scientifically valid answers. Given the constant changes in our environment, an updated focused research agenda in the context of health services research (HSR) for nurse anesthesia was warranted. To guide investigators and funding agencies, the AANA and the AANA Foundation approved broad research objectives in 2016 that inform the research community of the top research priorities in the field of nurse anesthesia.¹

In September 2015, the AANA Foundation and key stakeholders were tasked with exploring and making recommendations regarding 1 to 3 HSR questions for the

2016 fiscal year, which would be supported by an AANA Foundation grant through a generous contribution from the National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA). The purpose of the grant was to provide funding for selective critical research questions to further the nurse anesthesia profession. According to the action, the agenda had to include research questions that fell under one of the following domains:

1. **Policy**—replicating studies similar to the 2010 studies that support nurse anesthesia practice and policy
2. **Education**—exploring the value of credentialing and life-long learning in advancing patient safety through enhancing provider quality
3. **Practice**—examining critical initiatives to secure the future of

high-quality anesthesia care provided by Certified Registered Nurse Anesthetists (CRNAs) in tomorrow's healthcare environment.

To meet this deliverable, the AANA Foundation developed a phased plan and timeline to facilitate and support the initiation, planning, and execution of 1 to 3 HSR projects for the 2016 fiscal year. During this process, a Health Services Research Ad Hoc Committee (HSR-AHC) was formed to identify research questions for a new HSR agenda.

Although the initial intent of the HSR-AHC was to derive key research questions under the funding opportunity, the questions derived from the method used by the HSR-AHC proved to be suitable for promoting an HSR agenda adopted by the AANA and AANA Foundation for the nurse anesthesia profession. The objective of this publication is to delineate the process used to establish the HSR Agenda and to outline the AANA and AANA Foundation HSR Agenda for nurse anesthesia, which is based on a consensus model and systematic method.

Materials and Methods

Four nurse anesthesia stakeholders (listed below) identified experts in research and nurse anesthesia to be represented in the development of the HSR Agenda:

- AANA Foundation Board of Trustees
- AANA Board of Directors
- Council on Accreditation of Nurse Anesthesia Educational Programs
- National Board of Certification and Recertification for Nurse Anesthetists

Each stakeholder nominated 2 committee members to represent each organization, which resulted in an 8-member HSR-AHC.

To develop the HSR agenda, a modified Delphi method consisting of 3 stages was used. This modified Delphi method emulated similar methods used by other medical specialty groups and associations.²⁻⁷

The Delphi technique is generally described as a method used to solicit opinion by experts through the use of structured questionnaires and open feedback mechanisms to “arrive at an agreed-upon group position.”^{8,9} An introductory meeting was held via teleconference to review roles and responsibilities and to outline the method used to develop the HSR agenda.

In stage 1, each HSR-AHC member was tasked with identifying 2 to 3 research questions based on a set of criteria that addressed at least one of the policy, education, or practice HSR Agenda domains (described in the Introduction section). The following criteria were provided as a guide for formulating the research questions:

- Is the question scientifically well posed (ie, is it stated in a hypothetical form that leads to a research design and analysis with scientific credibility)?
- Does the research question require data that are accessible or attainable at a reasonable cost or effort?
- Is the research question posed in a way that can explain variability—different outcomes under different conditions?
- Are the units of analysis (observation) clearly identified?
- Does the research extend our understanding of the phenomena being investigated; does it elaborate, extend, or fill in gaps in our present knowledge?

In stage 2, the question submitters were deidentified, and the questions were collated by research domain and redistributed to the entire HSR-AHC in the round 1 survey (Table 1). The purpose of deidentifying the questions was to reduce bias during the question prioritization phase. For distribution of the questions to the HSR-AHC, an electronic survey tool (SurveyMonkey.com) was used so the HSR-AHC would anonymously evaluate each research question based on the level of agreement.

The level of agreement was identified regarding 3 separate statements: addresses gaps in knowledge, potential research design feasibility, and overall impact (Figure 1). A mean composite score of the 3 statements was calculated using a 5-point Likert scale (1 indicated disagree; 2, somewhat disagree; 3, neutral; 4, somewhat agree; and 5, agree). The research questions, along with their respective priority rankings and scores, were sent back to the entire HSR-AHC for review.

As part of stage 3, the HSR-AHC was then asked to select 1 of the top 8 ranked research questions and provide rationale, justification, and evidence using a prepared template and the S.M.A.R.T. research criteria¹⁰ (specific, measurable, achievable, relevant, and time-bound; Figure 2). A consensus meeting was then scheduled for the HSR-AHC to discuss and defend the research questions that each member selected as a top agenda priority. A second-round survey (via SurveyMonkey.com) was conducted to rank the importance of the 8 questions followed by a final consensus meeting to confirm the prioritization of HSR questions for 2016 (computed according to mean scores). The top research questions were collectively analyzed during the final consensus meeting to eliminate redundancy and establish clarity of topics. There were 2 questions posed that were similar in nature of which the HSR-AHC agreed to combine. The 2 separate consensus meetings were conducted virtually via videoconferencing (GoToMeeting) and a teleconference.

Results

Twenty-four research questions and/or topics (Table 1) were initially identified by the 8 HSR-AHC members. Each topic was assigned to one of the following specialty domains with some questions overlapping 2 categories: Education (n = 3); Education/Practice (n = 2); Education/Policy (n = 1); Policy (n = 7); Policy/Practice (n = 4);

Rank	Question/topic	Domain	Score ^a
1	Has patient access to care (surgical, obstetrical, endoscopy, dental services, and pain) improved in states that have opted out of physician supervision?	Policy	12.26
2	Does legislative adoption of the Advanced Practice Registered Nurse (APRN) consensus model result in an increased scope of practice for APRNs?	Policy	12.01
3	What are hospital administrators' (CEOs, CFOs, CMOs, CNOs) perceptions of CRNA anesthesia services in their institutional settings? (variations by type of hospital, location by state, location by rural vs city)	Policy/Practice	11.88
4	How do legislators and other key decision makers perceive the influence of CRNAs (or APRNs)? What can be done in the policy arena to be more effectual/influential?	Policy	11.64
5	What are the outcomes of patients cared for in exclusively CRNA-staffed Veterans Affairs (VA) healthcare facilities compared with VA facilities using other anesthesia staffing models?	Practice	11.63
6	What is the most efficient and cost-effective model of various patient, provider, and payer mixes?	Policy	11.51
7	What are the workforce needs for anesthesia providers in the US healthcare system in the next 10 years?	Policy	11.39
8	Does the recent nonsurgical pain management specialty in nursing anesthesia increase access to underserved populations?	Education/Practice	11.39
9	What are the value-added services hospital administrators and stakeholders value most from an anesthesia practice group?	Practice	11.26
10	How will the VA adoption of full scope of practice potentially affect access and economic burden in the VA healthcare system for primary care services (including anesthesia)?	Policy/Practice	11.26
11	Do outcomes in the military model of independent CRNA practice support the expanded use of this model in the nonmilitary anesthesia care setting?	Practice	10.89
12	What impact would the triple aim framework (access, quality, and affordability) have on CRNA-provided chronic pain management services in rural hospitals?	Policy	10.76
13	Can the application of Geographic Information Systems (GIS) demonstrate both an economic as well as access expansion and savings by allowing all anesthesia providers to practice at full scope of practice?	Policy/Practice	10.63
14	Outcomes in a medical direction model vs a medical supervision model of anesthesia delivery: a quality and cost analysis	Policy/Practice	10.13
15	What dimensions of anesthesia practice are going to be critical in determining a CRNA's readiness for rural anesthesia practice? What are the dimensions of rural anesthesia practice?	Practice	10.13
16	What antecedent knowledge and skills do students of nurse anesthesia require to practice independently in a small rural hospital setting?	Education	10.01
17	Does implementation of a Preanesthesia Evaluation Clinic reduce costs and improve patient satisfaction?	Practice	9.88
18	What are the outcomes of trauma patients cared for in exclusively CRNA-staffed American College of Surgeons Level I trauma centers compared with Level I trauma centers using other anesthesia staffing models?	Practice	9.76
19	What are the most common procedures being performed throughout the United States in various types of facilities, by various types of providers?	Education/Practice	9.76
20	What are the effects of a structured and ongoing CRNA preceptor faculty development program on SRNA attrition in graduate nurse anesthesia programs?	Education	9.63
21	What is the projected vacancy rate of CRNAs in hospitals and surgery centers?	Policy	9.38
22	What is the personal and societal rate of return to educating various healthcare providers (can include multiple types of ARNPs, PAs, AAs, MDs, etc)?	Education/Policy	9.26
23	What are the effects of emotional intelligence testing and education on minority SRNA attrition in graduate nurse anesthesia programs prior to matriculation and during the didactic and clinical phase of the program?	Education	9.25
24	What are the morbidity and mortality rates for the 50 or 100 most common surgical procedures performed in the United States?	Practice	8.76

Table 1. Questions Submitted by Health Services Research Ad Hoc Committee and Round 1 Survey Results

Abbreviations: AA, anesthesiologist assistant; CEO, chief executive officer; CFO, chief financial officer; CMO, chief medical officer; CNO, chief nurse officer; CRNA, Certified Registered Nurse Anesthetist; MD, physician; PA, physician assistant; SRNA, student registered nurse anesthetist.

^aA mean composite score of the 3 statements was calculated using a 5-point Likert scale (1 indicated disagree; 2, somewhat disagree; 3, neutral; 4, somewhat agree; and 5, agree).

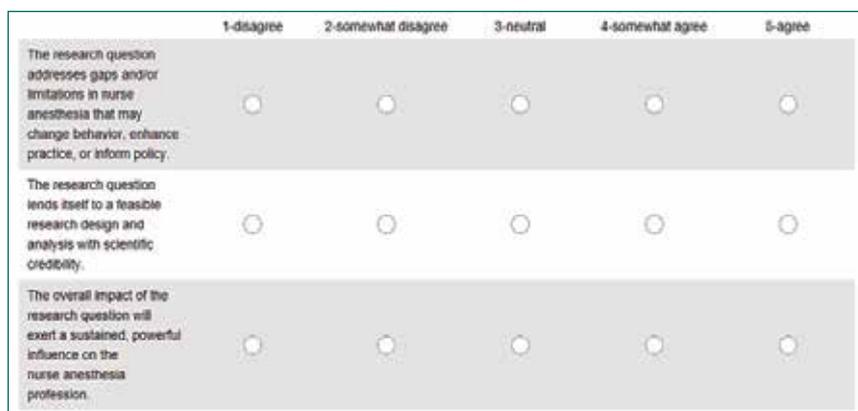


Figure 1. Screen Shot of Anonymous Survey Ranking for All Research Questions/Topics Submitted by Health Services Research Ad Hoc Committee (Source: SurveyMonkey.com.)

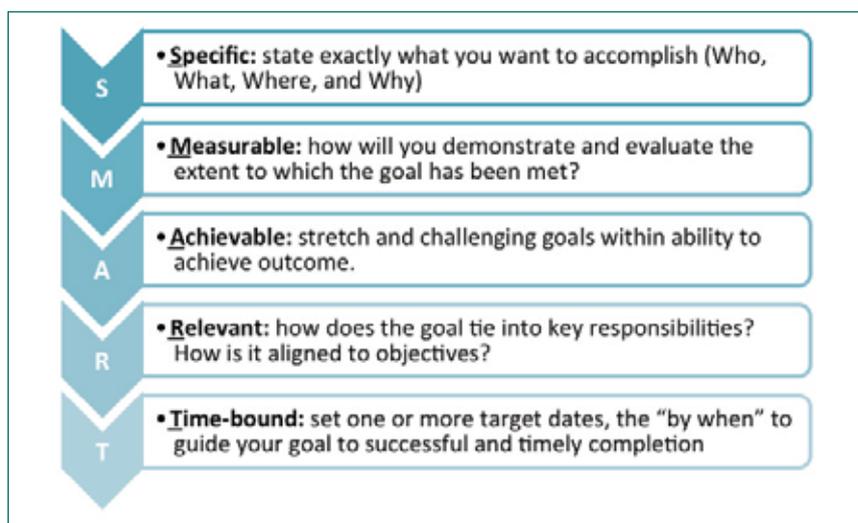


Figure 2. SMART Criteria Used to Defend and Support Top-Priority Health Services Research Questions (Adapted with permission from Doran.¹⁰)

and Practice (n = 7). To reduce individual biases, the project staff did not alter any of the 24 original questions that were submitted by the HSR-AHC, nor was the identity of the submitters revealed to the committee. Using an electronic survey tool, the HSR-AHC members anonymously evaluated each of the 24 research questions using a 5-point Likert scale. After the mean composite scores were compiled, 8 unique research questions with a ranking score above 11.0 underwent further evaluation. The highest ranking research questions revealed that committee members gravitated more toward questions under the

policy domain relative to the other domains.

- **Consensus Meeting 1 Proceedings.** Each HSR-AHC member was asked to choose, justify, and defend 1 of the top 8 ranked questions during the first consensus meeting. All the HSR-AHC committee members were present and represented their respective affiliates (see Acknowledgments section). The meeting was moderated by Lorraine Jordan, PhD, CRNA, CAE, FAAN, chief executive officer of the AANA Foundation and the executive sponsor for this project. Six of the 8 top-ranked questions were defended and discussed; based on the pro-

ceedings, it was decided that 2 of the 6 questions would be eliminated from priority consideration due to issues regarding feasibility (eg, lack of accessibility to the necessary data) and/or because of the impact (eg, pain management).

- **Round 2 Survey Results and Consensus Meeting 2 Proceedings.** A second anonymous survey was conducted to prioritize the top 3 research questions followed by a second consensus meeting to finalize the proposed HSR questions for the 2016 fiscal year. In this second survey, the members were asked to rank the 4 remaining research questions by priority (first, second, third). The final top 3 questions were prioritized as follows (Table 2):

1. How do healthcare administrators (practice and payer) value the cost and care that CRNAs provide in their facilities?

2. Has patient access to care (surgical, obstetrical, endoscopy, dental services, and pain management) improved in states that have opted out of physician supervision?

3. Does legislative adoption of the Advanced Practice Registered Nurse (APRN) consensus model result in an increased scope of practice for APRNs?

Discussion

The HSR Agenda for nurse anesthesia was developed using a systematic method. The modified Delphi process used to establish this agenda is optimal because the opinions of each participant representing different affiliates are weighted equally compared with a consensus in-person process in which a few influential participants may prevail and control the outcomes. In brief, the Delphi method involves a formal group process originally developed by the RAND Corporation in Santa Monica, California, to assess long-term trends in science and technology, and their anticipated effects on society.^{8,9} Over the last decade, researchers have increasingly used the Delphi tech-

Rank	Mean score	Domain	Research question
1	3.38	Policy/ Practice	<i>Root question:</i> What are hospital administrators' (CEOs, CFOs, CMOs, CNOs) perceptions of CRNA anesthesia services in their institutional settings? (variations by type of hospital, location by state, location by rural vs city) <i>Revised question:</i> How do healthcare administrators (practice and payer) value the cost of the care provided by CRNAs in their facility?
2	2.63	Policy	Has patient access to care (surgical, obstetrical, endoscopy, dental services, and pain management) improved in states that have opted out of physician supervision?
3	2.25	Policy	Does legislative adoption of the Advanced Practice Registered Nurse (APRN) consensus model result in an increased scope of practice for APRNs?

Table 2. Round 2 Survey Results and Health Services Research Project Prioritization

nique to identify research priorities in nursing and other specialties.^{2-7,11} Key components to a Delphi process include anonymity, iteration, controlled acquisition of feedback, and analytic aggregation of responses.⁹ In addition, the process is structured and transparent and adds validity to the results.

The 24 research questions submitted and ranked by the HSR-AHC members are presented in this article and encompass various HSR topics under the research domains of policy, education, and practice. Compared with the initial AANA and AANA Foundation Research Agenda published in 2014, which spanned a broad range of topics, the updated HSR Agenda offers investigators questions with greater detail that can be considered and further delineated. For example, the top-rated healthcare policy question “*How do healthcare administrators (practice and payer) value the cost and care that CRNAs provide in their facilities?*” replaced the previous top-rated question from 2014: “What is the impact of nurse anesthesia care?”

This focused HSR agenda systematically highlights important gaps in knowledge about nurse anesthesia as identified. The questions posed in the HSR Agenda were assessed for potential feasibility and are believed to exert a sustained powerful influence in the nurse anesthesia profession. Seasoned CRNA researchers and nurse anesthesia students interested in pursuing high-impact HSR research may choose to concentrate

their efforts by focusing or modifying the questions posed in the HSR agenda. Furthermore, the key stakeholder organizations can continue to strengthen HSR efforts by strategically establishing their research programs in the areas of highest need. Finally, this HSR agenda may help funding organizations in allocating limited grant resources to the areas of most need and interest. Through all of these mechanisms, such a research agenda may advance the field of nurse anesthesia forward by promoting change, enhancing practice, or informing policy.

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DISCLOSURES

The authors have declared they have no financial relationships with any commercial interest related to the content of this activity. The authors did not discuss off-label use within the article.

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