


**Handbook for the Rural Anesthesia Provider:
How to Develop and Manage an
Anesthesia Department**

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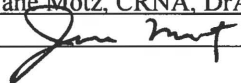
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Abstract

Purpose: Certified Registered Nurse Anesthetists (CRNAs) working in rural facilities may have limited resources to develop and manage anesthesia departments. Literature demonstrates a lack of consolidated information available for anesthesia department managers. Information necessary for a functional and efficient anesthesia department is available; however, it is dispersed over multiple data systems and is often difficult to find. The purpose of this project was to develop a resource handbook to assist the nurse anesthesia provider in developing and managing a functional anesthesia department in rural facilities. This project is intended to benefit the CRNA manager by placing the information in a single handbook for use as a reference.

Methods: The compilation of referential information and recommendations made in this handbook are based on evidence found through a literature search of professional journals and websites, relating to the areas being discussed. This book addresses recommendations regarding department layout and use of personnel, interdepartmental cooperation, policy development, government and independent agency credentialing, equipment requirements, and practice tips. A qualitative survey of rural anesthesia providers was conducted to assess areas of knowledge deficit among this group of anesthesia practitioners.

Results: The majority of anesthesia providers surveyed (77.27%) indicated a desire for a consolidated resource to aid in managing an anesthesia department. They indicated accreditation issues (68.75%) and solo provider issues (62.5%) as the primary areas of knowledge deficit. The majority (93.75%) indicated they were unable to locate a single consolidated source for all the information. These results were combined with the literature search to develop a resource handbook.

Conclusions: A detailed literature search combined with results of a qualitative survey determined a lack of a consolidated resource handbook for nurse anesthesia department managers. A resource handbook was developed with evidence-based recommendations to aid managers in developing and managing anesthesia departments in rural facilities.

Data sources: Mayo Clinic and University of Michigan, Flint libraries. Databases included CINAHL Complete, Embase, PubMed, Scopus, Google Scholar, UpToDate and the Cochrane Library.

Key words: Anesthesia department management, interdepartmental cooperation in healthcare, government healthcare regulations, healthcare regulating agencies, anesthesia credentialing organizations, state nursing boards, anesthesia equipment, rural anesthesia, and EMR.

Introduction

The goal of this project was to develop a consolidated reference resource for an anesthesia provider attempting to implement and manage an independent anesthesia department. This endeavor can be challenging and time-consuming. Rural anesthesia providers may have access to all the necessary information to accomplish this task, however, searching the literature requires time, and possibly outside assistance. CRNA leaders working in large facilities, especially teaching institutions, may have assistance to facilitate access to this information, although a considerable amount of time may be expended. A consolidated resource reduces the substantial amount of time and effort required to attain information, allowing CRNAs more time for the provision of patient care and managerial duties.

This handbook may be particularly useful for the anesthesia provider working in small, rural hospitals with limited information resources. When CRNAs attempt to develop a functional and independent department, they often have to rely on extensive literature reviews or trial and error to find the necessary information. This paper will describe the process used to develop a reference handbook for the anesthesia department manager. Information covering a wide variety of topics the anesthesia provider will need to facilitate the development of an anesthesia department, will be included in the handbook.

This manual discusses problems facing small departments such as efficient use of personnel, interactions with other departments, necessary policies, credentialing by federal and independent agencies, and equipment needs. This resource provides suggestions to protect practitioners with regard to liability insurance and conditions of employment. The information necessary to develop a functional anesthesia department in a healthcare facility can be found

with thorough investigation; however, this handbook compiles this information into one reference manual to expedite the process.

A thorough search of the literature revealed no consolidated source of information for the anesthesia provider to develop an independent anesthesia department. This handbook may assist nurse anesthesia providers develop anesthesia departments in their facilities more efficiently.

Research questions answered through investigation for this project include:

1. Who should make the decisions regarding anesthesia practice in rural facilities?
2. What unique challenges are faced by rural anesthesia practitioners in the development and management of independent anesthesia departments in their facilities?
3. Would a consolidated resource guide in handbook format address practitioner barriers to creating independent anesthesia departments?

Review of Literature

For this project, a literature search was conducted between December 2014 and November 2015. A search of the electronic databases found in the libraries of the Mayo Clinic and University of Michigan, Flint was performed for each section of the book to determine the extent of current information available. No date or language limit was set for this search. The databases included CINAHL Complete, Embase, PubMed, Scopus, Google Scholar, UpToDate and The Cochrane Library.

In researching the literature for this handbook, it was decided that the subheadings in the following literature review will align with each section in the handbook created for this project. The need for information contained in the sections was supported by the results of the qualitative survey of rural anesthesia providers.

Anesthesia Department Operated Under a Nurse Anesthetist

A survey completed in 2004 found 70% of the anesthesia care in the rural areas was performed by CRNAs, and a single anesthesia provider covered many facilities of 50 beds or less.¹ Education and clinical expertise may allow the rural CRNA to develop a more flexible or transformational leadership style.² This provides a benefit to the anesthesia department, as well as related departments under the surgery umbrella. Different approaches to operating room (OR) management between Registered Nurses (RNs), and anesthesia providers, as well as the positive benefits of separate leadership, has been demonstrated in the literature. Anesthesia providers were found to concentrate more on managing the daily surgical schedule while nurse managers focus on long-term planning.³

Efficient Use of Personnel:

Efficient use of personnel is critical due to the current and projected shortage of anesthesia providers in this country.⁴ The increasing severity of the shortage of anesthesia personnel has been associated with factors such as the expansion of anesthetizing locations and growth of surgical procedures.⁵ Staff scheduling is defined as planning the number of anesthesia providers required on a particular day, while ‘staff assignment’ is deciding what specific cases a provider will manage.⁶

Managing the efficiency of OR scheduling improves the efficiency of anesthesia personnel usage.⁶ Monitoring actual surgical case durations for individual surgeons, and the various types of procedures they perform, increases accuracy of the surgical schedule.⁷ Processes need to be developed in each facility to reduce the non-operative time by expediting room turnover and anesthesia induction and emergence. Determining parallel activities or tasks that can be performed by different personnel at the same time, reduces the non-operative time and increases OR efficiency.⁸ Wallston et al.⁹ utilized a Quality and Workload Assessment Tool (QWAT) to determine how efficient scheduling of surgical procedures depends on cooperation between the surgeon, OR nurse managers, and anesthesia staff. The QWAT is a questionnaire designed to measure anticipated surgical workload or difficulty to perceived post-procedure assessment of surgical workload. Each group is able to better estimate the time requirements for their areas of expertise.

An important step in surgical case management is proper preparation by the anesthesia provider. According to the Centers for Medicare and Medicaid Services (CMS), complete history and physicals (H&Ps) are required within 30 days prior to all procedures.¹⁰ Quality improvement methods may be used to increase efficiency in acquiring H&Ps promptly to reduce

surgery delays and cancelations.¹¹ Implementation of a pre-anesthesia questionnaire by the preoperative nurse, days before surgery, may assist anesthesia providers in preoperative patient assessment when used for comparison to the H&P obtained from the patient's physician.¹² Checklists used during the pre-operative interview by the anesthesia provider, have been found to have a positive effect on patient safety and OR efficiency.¹³

A provision in the Affordable Care Act requires hospitals to achieve a specified level of patient satisfaction, or risk losing a percentage of Medicare or Medicaid reimbursement.¹⁴ A national standardized survey of patient perspectives known as Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, was developed to measure patient satisfaction.¹⁵ Improving efficiency and reducing hospital stays have been found to produce an increase in HCAHPS scores.¹⁶

Burnout and Call Time

Stress and burnout are factors which lead to loss of anesthesia personnel.¹⁷ Stress management education is an important method of reducing loss related to burnout.¹⁸ A relationship has been found connecting reduced job satisfaction from over work, and perceived under appreciation, to loss of personnel due to burnout. Increased staff participation in the decision-making process, and increased autonomy have been found to increase job satisfaction.¹⁹

Call time is a factor in burnout and needs to be addressed when considering management of an anesthesia department.¹⁷ The cost of providing on-call services may be excessive for rural facilities. Associations with nearby hospitals and the development of a community call center, may relieve the need for continuous call coverage.²⁰ The need or amount of night and weekend coverage may be determined by calculating the number, times, and revenue from call procedures.

Delayed start time in greater than six percent of call surgeries indicates a need to increase staffing for night and weekend call.²¹

Complication rates and recovery times for patients requiring emergency orthopedic surgery are no different when those operations wait until daytime hours when compared to performing the surgery at night. There is an increased incidence of follow-up surgery needed to remove hardware placed at night possibly due to technical errors.²² Yardeni et al.²³ found performing emergency appendectomies at night provides no improved outcome over waiting until daytime hours. They determined that waiting until daytime hours increased the efficient use of staff and resources.

Disruptive Behavior and Interpersonal Communication

A statistically significant link has been found between workplace incivility and burnout among anesthesia staff.²⁴ Disruptive behavior may include verbal or physical threats, demeaning comments or gestures, or refusal to help or communicate with another staff member.²⁵

Disruptive behavior leads to a breakdown in communication and team collaboration which in turn leads to a reduction in quality of patient care and an increase in adverse events.^{26 27} Policies must be enacted to restrict disruptive behavior and should include clear definitions, reporting methods, and consequences.²⁸

Quality patient care depends on effective interpersonal and interdepartmental communication.²⁹ Preoperative checklists and team briefings have been found to significantly decrease communication errors.³⁰ A reduction in surgical errors and costs have also been linked to the use of preoperative team briefings.³¹ The use of a Situation, Background, Assessment, and Recommendation (SBAR) system, creates clear and concise communications and significantly improves satisfaction and collaboration in clinical areas.³²

Budgeting and Cost Containment

Surgical services account for 50% or more of a hospital's inventory of supplies and equipment.³³ In a comparison of costs of anesthetic techniques, anesthetic medication accounts for 10–13% of a hospital pharmacy's budget. Wasted anesthetic medication ranged from 20–50% daily. Improved planning of the anesthetics needed for each procedure could lower the cost of an anesthetic by 13–30 dollars per case.³⁴ Schuster et al.³⁵ compared the costs of anesthesia for various surgical specialties. It was determined that for specialties such as Ears, Nose, Throat (ENT), with shorter procedure times, as well as procedures which could be performed under regional anesthesia, such as outpatient orthopedics, produced less cost to the facility. The actual cost of one minute of OR time depends on the complexity of the surgical procedure but as of 2004, this averaged \$62 per minute.³⁶

The steps involved in creating a department budget include understanding the revenue expectations, determining labor and supply costs, setting goals for the department, and anticipating potential variables.³⁷ Coordinating the budget planning with other departments is important. The budget, once developed, must be monitored continuously throughout the year to address changes and to prepare the next year's budget.³⁸

Anesthesia services for the majority of the rural communities are provided by Certified Registered Nurse Anesthetists (CRNAs).¹ A ruling by the CMS states, CRNAs must be supervised by a qualified doctor of medicine or osteopathy. State Governors may opt-out of this rule providing better use of anesthesia personnel and improved access to anesthesia services in the rural areas.³⁹ Supervision of CRNAs by an Anesthesiologist has been found to be unnecessary in the majority of cases and an unwarranted expense.⁴⁰ A recent study by Dulisse and Cromell found no difference in morbidity or mortality rates when comparing CRNAs

working unsupervised versus those who are medically directed by Anesthesiologists.⁴¹ The most cost effective model of anesthesia care has been determined to be that of a CRNA practicing alone. The least cost effective model which may cost more than the revenue for the case, is that of an Anesthesiologist supervising only one CRNA.⁴²

Policies

Policies are necessary to protect patient and staff safety, meet regulatory requirements, and influence accepted behavior.⁴³ Policies may be used in court to either defend an action or to indict an action by a healthcare provider.⁴⁴ Every anesthesia department requires policies to be in place, to standardize practice and meet accreditation requirements. A list of anesthesia department policies was attained from the Mayo Clinic Health System Anesthesia Department Policy Manual. These require modifications based on the facility for which these policies will be utilized.⁴⁵ A complete policy manual may be purchased and customized through MCN Healthcare Inc.⁴⁶ See Appendix 1 for a list of patient safety policy recommendations.⁴⁷

Standards and Accreditation

Reimbursement for services may depend on a hospital meeting certain quality measures. Medicare is moving toward reimbursements based on patient outcome measures.⁴⁸ Accreditation is not required by CMS for Medicare or Medicaid reimbursement, however, according to section 1865(a)(1) of the Social Security Act, accreditation by an approved organization exempts a hospital from state survey agencies.⁴⁹ Accreditation can strengthen community confidence, improve risk management, and improve staff recruitment, education, and development.⁵⁰

The American Association of Nurse Anesthetists (AANA) and the American Society of Anesthesiologists (ASA) provide lists of standards of practice and guidelines to incorporate into

policy language.^{51 52} The scope of practice for the CRNA may differ from state to state. The AANA provides a list of state agencies, their requirements, and the contact information for each of the 50 states.⁵³

Equipment – Medical Devices

A medical device is any piece of equipment, other than a drug or biologic, used to prevent, diagnose, or treat any injury or illness. Medical devices are under the control of the US Department of Health and Human Services and specifically the Food and Drug Administration (FDA). The Food, Drug, and Cosmetic Act of 1998 gave the FDA jurisdiction over medical devices of all kinds.⁵⁴ Injuries or deaths related to a malfunctioning device are required to be reported to the FDA and/or the manufacturer through the MedWatch system.⁵⁵

Biomedical Technicians

Anesthesia providers may be held liable if an injury is caused by misuse of a device, but the hospital will be held liable if the injury is caused by faulty maintenance.⁵⁶ Biomedical technicians are responsible for all aspects of medical devices used in a healthcare facility. They test new equipment to ensure the device meets federal and local standards for safety. Biomedical technicians test new devices to ensure they perform as the manufacturer has intended and to calibrate the item to optimal function. Technicians perform routine tests to assess the function of a device and recalibrate, repair or recommend replacement if the device fails any test. They may also serve to educate users in the proper use and care for devices.⁵⁷

Monitoring Standards

The ASA issued a paper describing the basic standards needed for monitoring patients during anesthesia.⁵⁸ These include oxygen analyzers, pulse oximetry, Electrocardiogram (ECG), blood pressure, and body temperature. Capnography, or end-tidal Carbon Dioxide, monitoring

has become a standard of care for sedation and monitored anesthesia care as well as for general anesthesia.⁵⁹

Anesthesia Gas Machine

Understanding the components and functions of an anesthesia gas machine aids in the purchase and maintenance of a machine. M. Doesch produced a tutorial including manufacturers, components, accessories, and safety checklists.⁶⁰ Failure to maintain an anesthesia machine may lead to death or disabilities, resulting in liability actions and awards from \$542 up to \$6,337,000.⁶¹

Electronic Medical Records (EMR) and AIMS

The Health Information Technology for Economic and Clinical Health Act (HITECH Act), as part of the American Recovery and Reinvestment Act of 2009, established a requirement for hospitals to convert from paper record keeping to electronic medical records (EMR), also called Electronic Health Records (EHR).⁶² The HITECH Act created incentive programs through Medicare and Medicaid to reward facilities and physicians for using EMRs based on the concept of “meaningful use”, which are specific objectives showing the hospital has “used” EMR for a particular percentage of its patients. Core objectives being examined include up-to-date lists of current diagnoses, an active medication list, and an active allergy list, etc. The core objectives then have to meet a designated measurement such as 80% or more patients have a structured data entry of the objective to meet the “meaningful use” criteria.⁶³

As of 2009, only 2% of rural hospitals reported meeting the government requirements for implementation of EHR.⁶⁴ Problems confronting small, rural facilities when implementing EHR include limited budgets, few or no IT personnel, and inadequate infrastructure.⁶⁵ A 2007 survey

found a majority of critical access hospitals were more concerned with the ease of use than the cost of these systems.⁶⁶

The benefits and detriments of using an Anesthesia Information Management System (AIMS) include pros such as record legibility, decision support, and ease of use, with cons being device integration and system downtime.^{67 68} A study by Bates et al.⁶⁹ demonstrated improvements in patient safety through decision support, improved monitoring, information access, and rapid response to crises. The use of AIMS has been shown to improve quality improvement tracking and process measures.⁷⁰ Cost containment is another benefit to the utilization of an AIMS. Improved record keeping and tracking of drug use data have been shown to aid in developing processes to contain costs.⁷¹ The use of AIMS improves the accuracy of documentation leading to an increase in billing capture. This improves the reimbursement rate and reduces missed billing opportunities.⁷²

Implementation of an AIMS requires several steps. Identifying specific needs of the anesthesia department and the facility is the first step.⁷³ Considerations involved in product selection include functionality, cost, need, workstation ergonomics, and workflow.⁷⁴ Phases of implementing an AIMS include training, practice and mock implementation, and finally the go-live phase⁷⁵

Professional Protection and Employment Status

One study found the average range of compensation for claims against anesthesia providers to be \$80,000 to \$400,000 with 25% of the cases paying \$200,000 to \$250,000.⁷⁶ Studdert et al. found an average award of \$485,348 with trial verdict awards averaging \$799,365, and additional defense costs averaging \$52,521.⁷⁷ The average cost of a full-time malpractice policy for CRNAs is about \$3,900 annually.⁷⁸ A supplemental malpractice policy used to

augment a policy offered by an employer, assures the anesthesia provider of personal representation.⁷⁹

The advantages of a nurse anesthesia provider working as an independent contractor (IC) include increased autonomy, potential for increased overall income, and the ability to lower annual assessed income taxes. Disadvantages of working as an IC include a lack of job security, employer-provided healthcare benefits, unemployment or worker's compensation insurance, or liability for business debts.⁸⁰ The benefits to a facility to use an IC include reduced overhead costs, reduced accounting requirements, and no responsibility for wage garnishments or retirement contributions. The costs to a facility include lack of control, lack of exclusivity, retention of training and equipment costs, and the possibility of mislabeling the IC with the IRS leading to fines.⁸¹ Items to include within an IC agreement include time and place services will be provided, compensation rates, facility access, and use of equipment.⁸²

Practice Tips

A study by Maranets and Kain describe the correlation between increased preoperative anxiety and increased anesthetic requirements.⁸³ The goals of an anesthetic are to provide analgesia (the elimination of pain), amnesia (the elimination of memory of the procedure), and complete relaxation during surgical intervention (neuromuscular blockade).⁸⁴ A review by G P Joshi describes the recommended method for fluid management in the operating room.⁸⁵ Jeng and Rosenblatt provide an overview of peripheral nerve blocks, including types, indications, contraindications, and techniques.⁸⁶ Kodali and Oberi discuss the management of postoperative pain by regional and intravenous methods.⁸⁷

Many rural anesthesia providers will have elderly patients as a significant percentage of their clients, due to the ever increasing population of elderly in this country.⁸⁸ An article by S.

Barnett and a study by C A Polanczyk et al. provide recommendations for caring for the elderly including physiological effects of aging and potential complications.^{89 90}

The increase in the number of obese patients in today's society may be problematic for an anesthesia provider.⁹¹ Recommendations for managing patients with high Body Mass Indices, (BMI), can be found in an article by R. Schumann describing the physiologic changes with obesity and the anesthetic implications.⁹² There has been no increase in morbidity found between obese and non-obese patients.⁹³ Including an Obstructive Sleep Apnea (OSA) test with the H&P may provide an indication for a difficult airway. Regional anesthesia combined with light sedation is the technique of choice with OSA.⁹⁴

Two reviews by G J Grant offer recommendations for pain control during labor and cesarean deliveries.^{95 96} Included are physiologic changes associated with labor and their effects on anesthesia, and discussions of the choices of anesthesia such as patient controlled analgesia and regional blockades. Norwitz, Park, and Snegovskikh offer suggestions for providing anesthesia for pregnant patients having non-obstetric surgery including physiologic effects related to anesthetic choice.⁹⁷

Avidan and Mashour describe the incidence of surgical recall, contributing factors, and techniques to prevent its occurrence.⁹⁸ Post-procedure complications such as respiratory and cardiovascular problems, urinary retention, and nausea and vomiting, are described in an article by D. B. Glick.⁹⁹ Malignant Hyperthermia is a potentially serious complication with a resource for management being the MHAUS website.^{100 101}

The use of colonoscopy for detection and removal of precancerous polyps has demonstrated a reduction in rates of colo-rectal cancer of 57%.¹⁰² A study by Inadomi et al. describe an increased use of professional anesthesia services for sedation for endoscopic

procedures.¹⁰³ Sedation has demonstrated an increased tolerance and completion rate for endoscopic procedures. J. Cohen provides an overview of requirements for sedation for endoscopy.¹⁰⁴

Review of the literature demonstrated a lack of a concentrated resource for developing and managing an independent anesthesia department in a rural facility. The literature addresses specific areas of concern for a nurse anesthesia department manager as expressed in a survey of rural nurse anesthesia providers. This information was consolidated into a handbook format for use by rural nurse anesthesia professionals.

Theoretical Model

One theoretical model used for this handbook was the Unified Theory of Adult Learning or Andragogy described by Malcolm Knowles. This model describes the assumptions for adult learning including; the need to know, self-concept, experience, readiness to learn, orientation to learning, and motivation (see figure 1).¹⁰⁵ An adult learner such as a CRNA manager may possess the need to know the importance of learning how to implement and manage an anesthesia department. As they advance in their field, they typically develop an increasingly independent self-concept. CRNAs accumulate experiences during their practice that serve as resources for learning. Many are eager to learn new techniques or processes, to improve their practice. As a CRNA matures, their orientation to learning may change from one centered on a specific subject, to one focused on problem-solving. Their motivation often shifts to a more self-directed approach to practical problem solving.



Figure 1. Theoretical model based on Knowles' theory.

This project also uses McClusky's theory of margin which connects adult learning to the pressures of their daily lives¹⁰⁶. McClusky's theory describes the effects of external stressors on adult learning. External stressors such as family and job responsibilities, reduce the amount of time and energy an adult student is able to expend on learning new ideas (see figure 2). This handbook provides easily accessible and convenient information to meet the learning needs of the rural anesthesia provider and address their needs according to McClusky's theory¹⁰⁷.



Figure 2. Theoretical model combining Knowles' and McClusky's theories.

Knowles' theory of adult learning supported by McClusky's theory of margin provide the basis of the theoretical model used for this project. Development of a resource handbook provides anesthesia department managers access to information to enhance learning. Nurse anesthesia managers may realize the importance of acquiring information to improve their ability to manage a department, however they may require enhanced access to this information.

Enhanced access may reduce time required to obtain knowledge and limit effects of external stressors on the anesthesia manager.

This project addresses each of the steps listed in Figure 1 and 2. The rural nurse anesthesia professional in a position requiring them to manage an independent department will have a 'need to know' information necessary to effectively manage that department. Understanding their own 'self-concept' or their strengths and weaknesses, aids in approaching how they learn the material, and apply the information provided in this handbook. The rural anesthetist's past experience will provide a basis from which to expand their knowledge. The necessity to implement an efficient and independent anesthesia department, creates a 'readiness to learn' for the nurse anesthesia department manager.

The combination of text and graphic information contained in the handbook, meets the individual's orientation to learning. The motivation for the rural nurse anesthesia professional to provide an efficient and independent department within their facility, completes the learning process. This project addresses the external stressors affecting the nurse anesthesia manager's readiness to learn, as illustrated in figure 2, by consolidating the information in a single format. This may reduce stressors by decreasing the time and effort expended to obtain information.

This handbook employed an Evidence-based approach by using a systematic and comprehensive review of the literature to formulate recommendations to meet the needs of the anesthesia department manager.¹⁰⁸ The information was consolidated within a reference handbook and will be made available to the anesthesia community by means yet to be determined.

Methodology

The primary method of data collection for this project consisted of a thorough literature review of databases available through the University of Michigan and the Mayo Clinic. This data was assembled into a handbook for dissemination to rural anesthesia providers, for use as a reference to develop a functional anesthesia department within their healthcare facility. The book was divided into chapters concentrating on specific areas of department development, management, professional issues, and practice tips.

A qualitative survey of rural nurse anesthesia providers in relation to the management of the anesthesia departments in their facilities is included in this project. The qualitative design was chosen due to the small size of the study population and nonrandom selection process. A numerical value from the survey was developed and then statistically evaluated.¹⁰⁹ The population surveyed included rural anesthesia providers working in small facilities of four or less operating rooms or procedure rooms. The survey was sent to 37 rural anesthesia providers. The number of providers completing the survey was 22 for a 59% response rate.

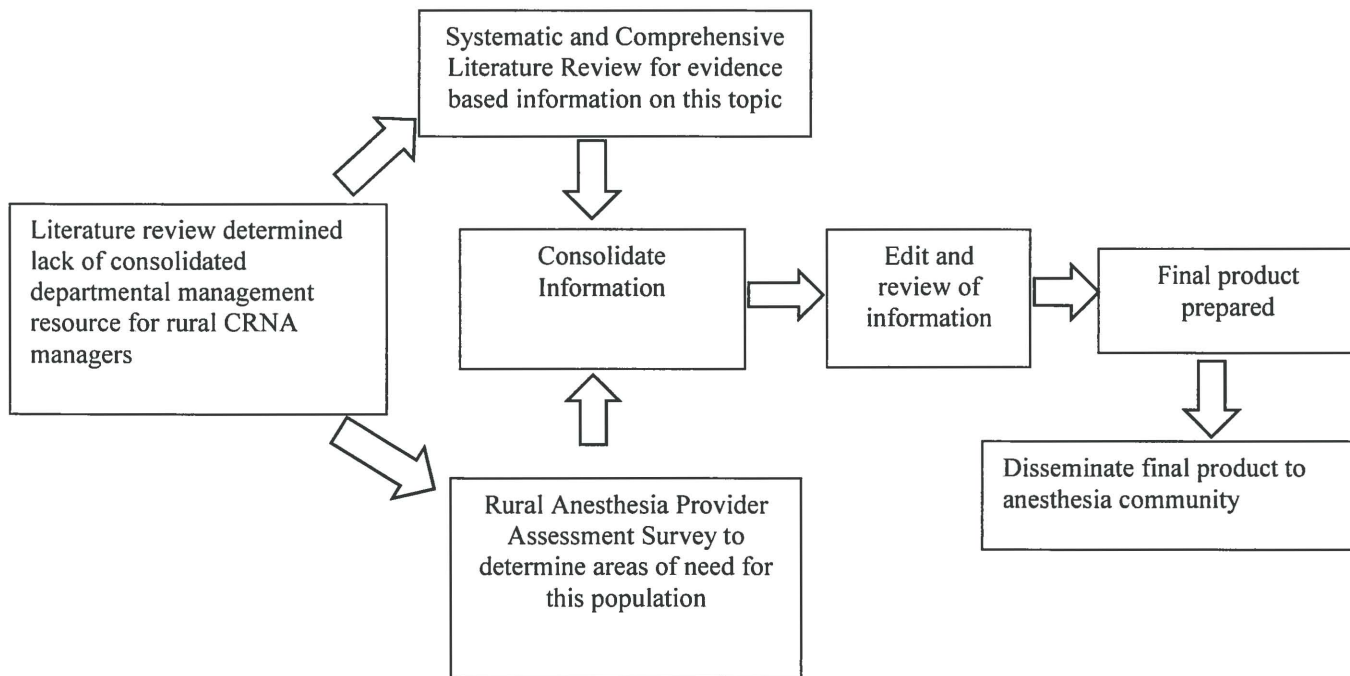
Institutional Review Board permission from the University of Michigan, Flint was obtained for conducting the survey. Risks to participants were minimal. Participation was voluntary and anonymous. Respondents were not compensated for their involvement.

The study was divided into three sections. The first included demographic questions to determine the background of the respondent. These questions were chosen to determine the subject's years of experience, level of education, and conditions of employment. The second section established structure and function of the anesthesia department within the respondent's facility. Questions for this section were chosen to determine services and responsibilities of the respondents at their institutions, and the level of independence of their anesthesia department.

The third portion of the survey elicited the respondent’s opinions regarding a demand for a handbook, as well as issues of importance to them concerning department development. The questions for this section were chosen to assess participants’ opinions regarding the necessity of this project and its various subsections. Comment sections were included for respondents to explain answers if they chose to do so. See Appendix 2 for a sample of the survey.

The project will be disseminated in the form of a handbook. A handbook is defined as “A concise reference book covering a particular subject”.¹¹⁰ This format will provide a concise reference book on developing and managing a rural anesthesia department.

Conceptual Model



Results

Survey Data Analysis

The data was analyzed producing simple percentages to determine trends, and rank the issues listed by respondents.¹¹¹ These findings were then used to stress specific areas of importance when compiling the handbook. See Appendix 3 for survey results.

The demographic questions demonstrated a range of experiences of the participants. Years of practice demonstrated a broad range of experience with those having been in the practice from 6 to 10 years as the largest group, but half of the participants having more than ten years in the profession (Figure 3). The vast majority (81.8%) of respondents, indicated having a Master’s degree, with Associate and Doctoral degrees, at 9.1% each (Figure 4).

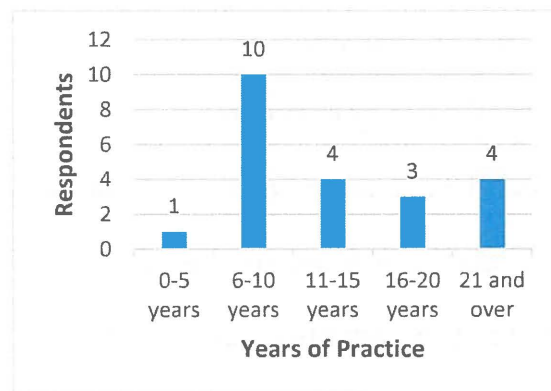


Figure 3. Years of Clinical Practice

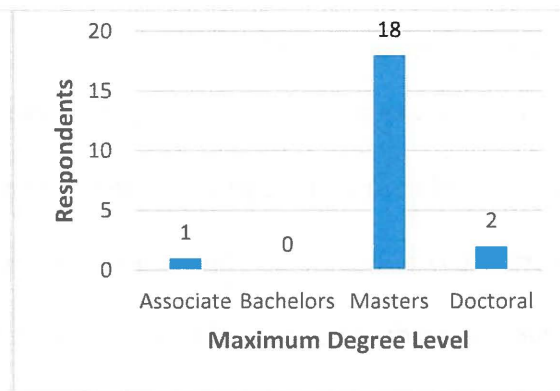


Figure 4. Educational Degree

The majority (90.91%) indicated no desire to pursue a higher degree than they currently held. The majority (63.24%) of participants, were practicing as hospital employees. A substantial minority (31.82%) were independent contractors. One individual was a member of a group which contracted services (Figure 5). The final demographic question indicated a slight majority (59.09%) provided anesthesia to only one facility, and a significant minority (31.82%) offered services to two facilities (Figure 6).

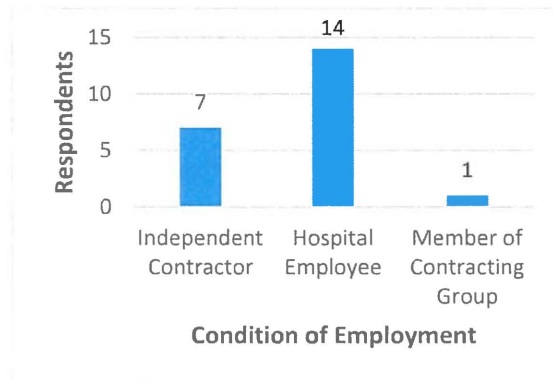


Figure 5. Employment Conditions

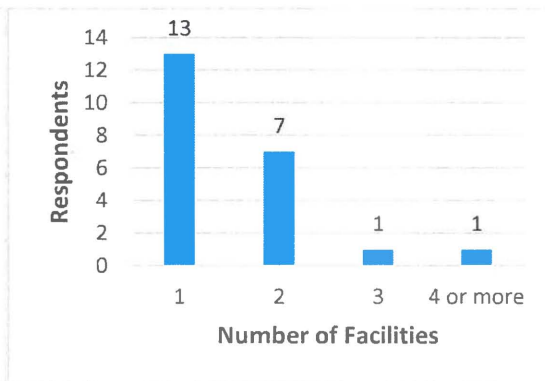


Figure 6. Facilities Covered by Respondent

Questions used to determine practice situations yielded the following results. The range of anesthesia providers in the facility was distributed nearly evenly from one provider, up to greater than five. A nearly unanimous (95.45%) number of respondents work independently, versus one individual who works in a team model with an Anesthesiologist supervising (Figure 7).

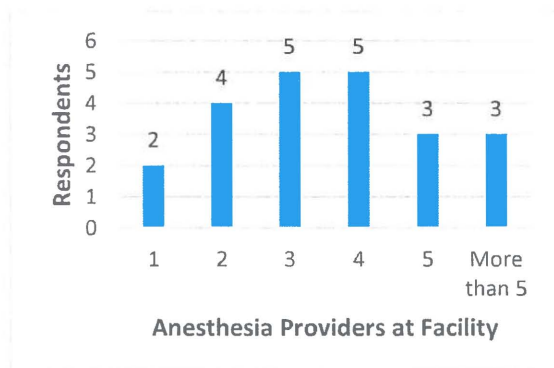


Figure 7. Number of Anesthesia Providers Present at Facility

The majority (63.64%) stated their facility provided OB/Labor and Delivery services, and all of those services are covered by the CRNA without an Anesthesiologist (Figure 8).

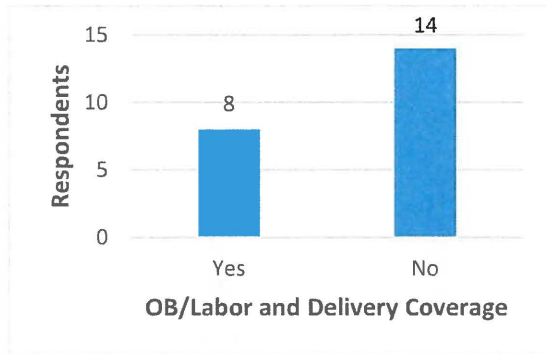


Figure 8. OB/Labor and Delivery Coverage by CRNA at Facility

All the respondents indicated their facility provided 24/7 anesthesia call coverage. One respondent commented that call was covered from home. The number of providers sharing the call coverage varied from one provider to more than five (Figure 9).

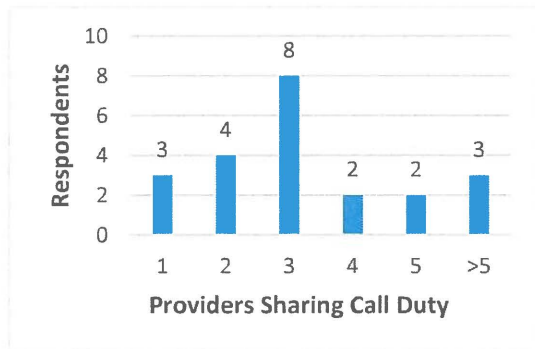


Figure 9. Anesthesia Providers Sharing Call Duty

Additional participant comments were made describing the rotation of call among the providers. The number of days and weeks that a provider would be responsible for covering call was evenly spread (Figures 10 and 11).

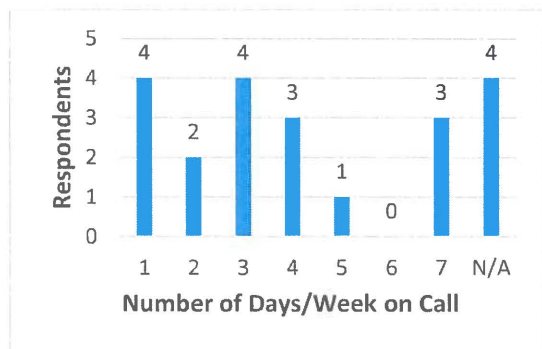


Figure 10. Number of Days per Week on Call

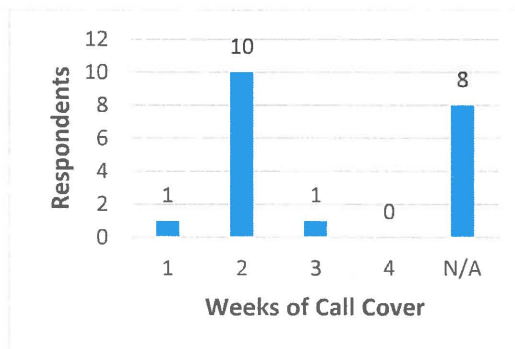


Figure 11. Number of Weeks per Month on Call

The majority (50%) of respondents, indicated their institutions have two operating/procedure rooms with an even distribution of from one, to more than four for the remainder of the subjects (Figure 12).

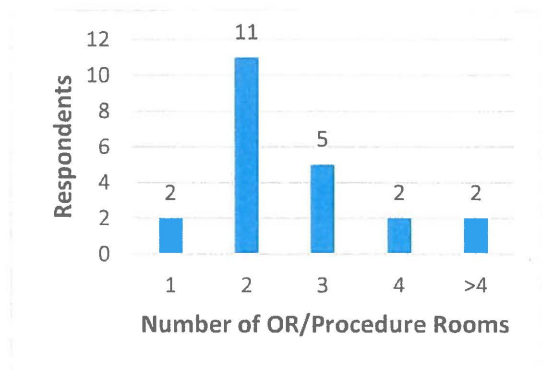


Figure 12. Number of Operating/Procedure Rooms in Facility

The majority of providers participating (68.18%) indicated they were responsible for providing anesthesia for all endoscopic procedures, with an even distribution between providing anesthesia for some endoscopy, or no endoscopy as Registered Nurses were providing conscious sedation for all endoscopy in their institution (Figure 13).

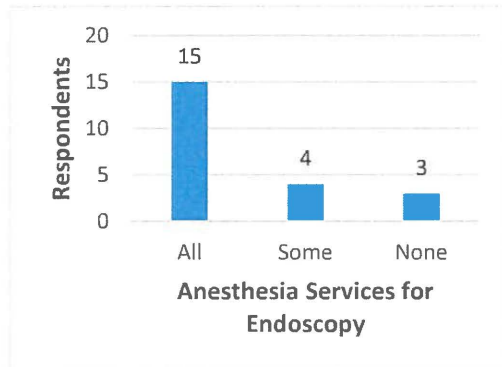


Figure 13. Anesthesia Services Provided for Endoscopy

Other services offered by the respondents included IV starts, PIC/Central line placement, nursing unit code response, Emergency Room (ER) code response, and ER trauma response. A small number (9.09%) indicated providing pain services for their hospital (Figure 14).

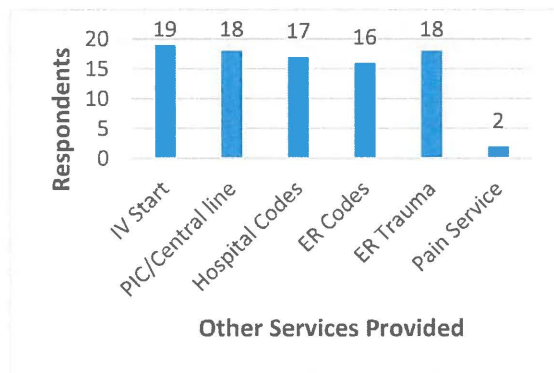


Figure 14. Other Services Provided at Facility

In answer to the question of emergency airway assistance, the majority (54.55%) stated another CRNA in the facility would provide difficult airway assistance, and a significant minority (45.45%), indicated the ER physician provided airway support. A small number listed the surgeon (22.73%) or other (13.64%) as their backup. The comments indicated other to include the circulating nurse (Figure 15).

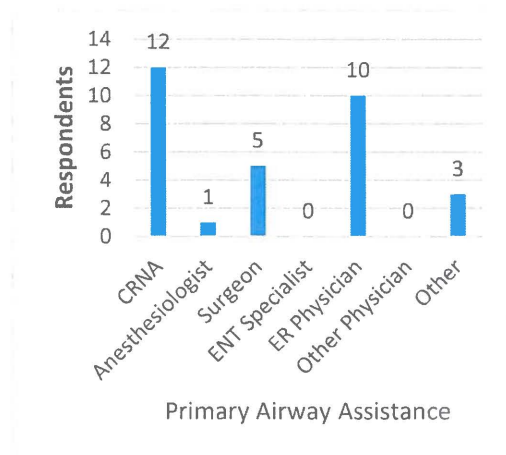


Figure 15. Primary Backup for Airway Assistance

Questions about the Anesthesia Department and its management received the following responses. A slight majority (59.09%) reported having an independent anesthesia department separate from other departments in the facility (Figure 16).

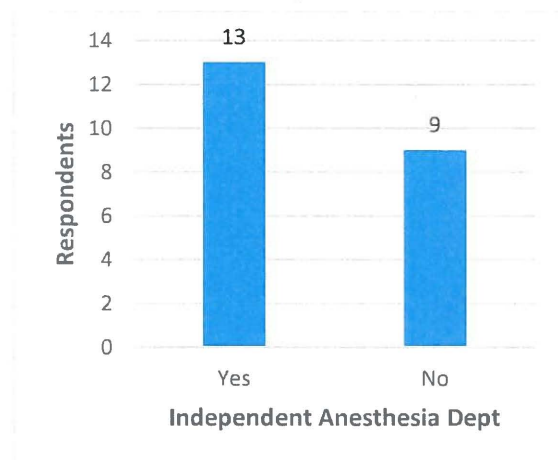


Figure 16. Presence of Independent Anesthesia Department in Facility

Of those that stated their department was part of another entity, it was evenly distributed, 50% for each, that the anesthesia department was part of the surgery department or another separate department. The comments indicated some of the anesthesia departments are independent although connected to a larger, system-wide, anesthesia department. The majority (63.64%) stated the anesthesia provider made the decisions affecting the anesthesia department with the remaining (36.36%) citing the hospital administrator as the primary decision maker. None of the respondents indicated having a nurse manager as the decision maker (Figure 17).

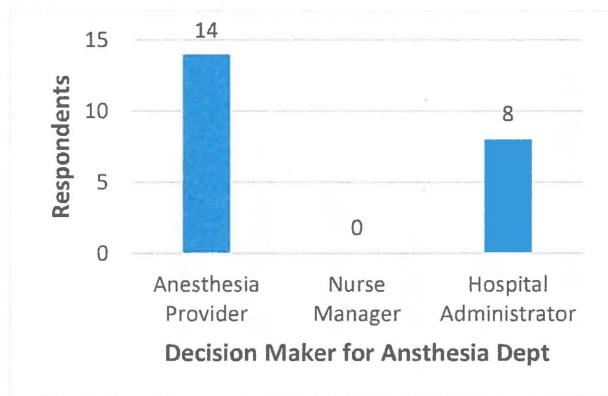


Figure 17. Person Responsible for Decisions Affecting Anesthesia Department

The last set of questions sought the opinion of the respondents about the need for a handbook to aid in developing or managing a rural facility Anesthesia Department. A majority (77.27%) indicated a detailed handbook would be useful (Figure 18).

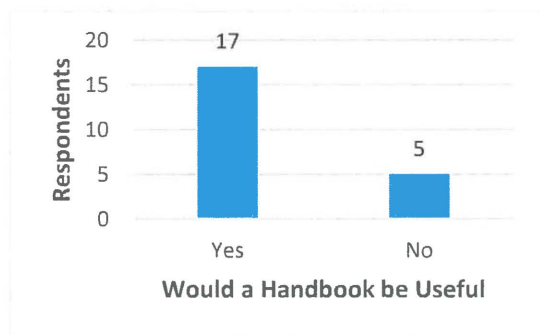


Figure 18. Would an Informational Handbook On Anesthesia Department Management be Useful

Areas which the respondents felt they required more information included Equipment Standards (75%), Policy Development (75%), Standards of Care (75%), Accreditation Issues (68.75%), Solo Provider Issues (62.5%), and Insurance Information (50%). Other areas demonstrating less interest included Budget Information (43.75%), Negotiations with Management (37.5%), Cost Containment (37.5%), EMR/AIMS (25%), Independent Contractor versus Employee (18.75%), Staff Management (18.75%), and Departmental Control (12.5%) (Figure 19).

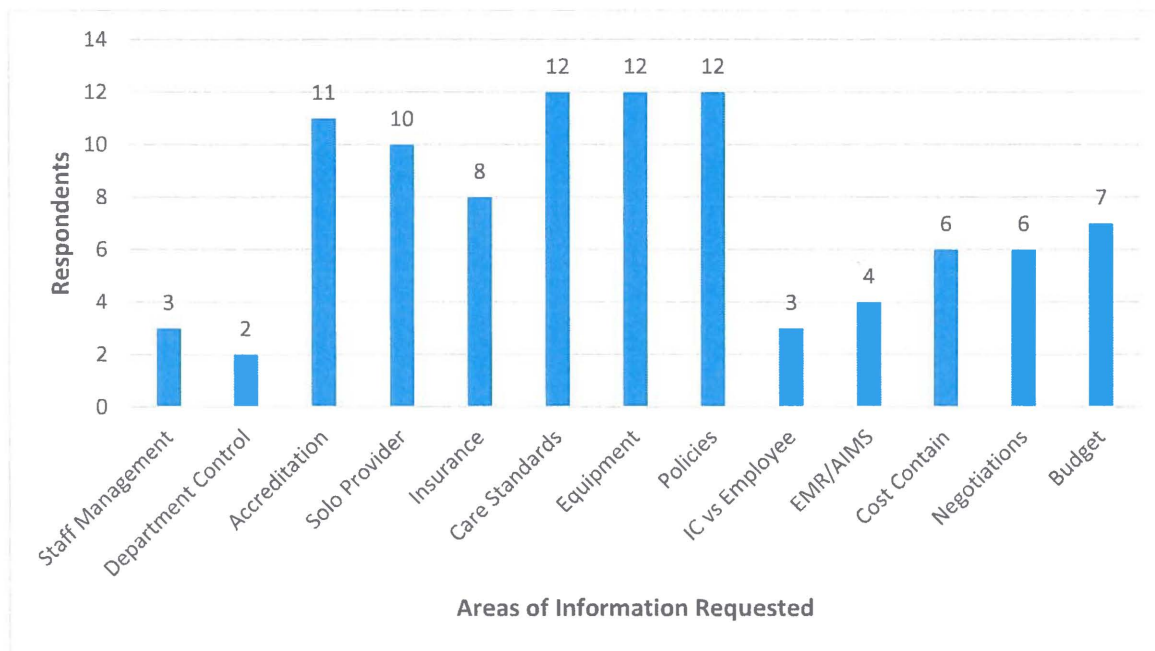


Figure 19. Areas of Information Requested by Survey Respondents

In response to a question regarding where nurse anesthesia managers receive the majority of information they use to operate their departments, a slight majority (53.33%) cited independent research, while an even distribution indicated previous providers, hospital administration, or other as their source of information (Figure 20).

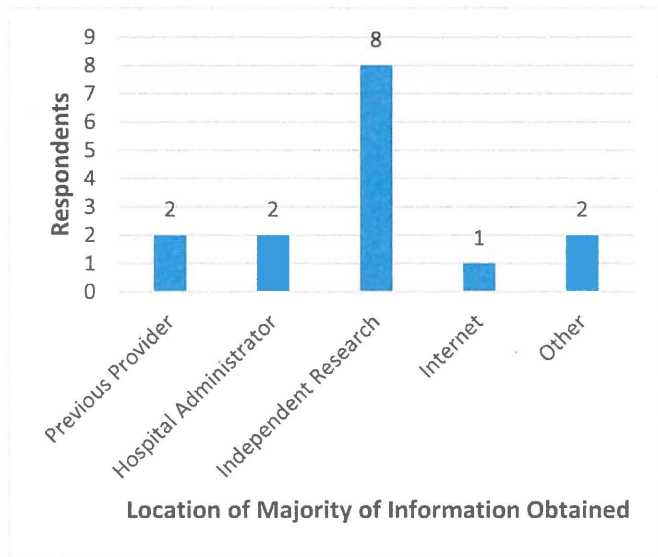


Figure 20. If Anesthesia Provider was Instrumental in Developing Department, Where Was Information Obtained

The final survey question asked providers if they were able to locate all the information for the management of an independent anesthesia department, consolidated in one source. The vast majority (93.75%) indicated they were unable to find all the information in one source (Figure 21).

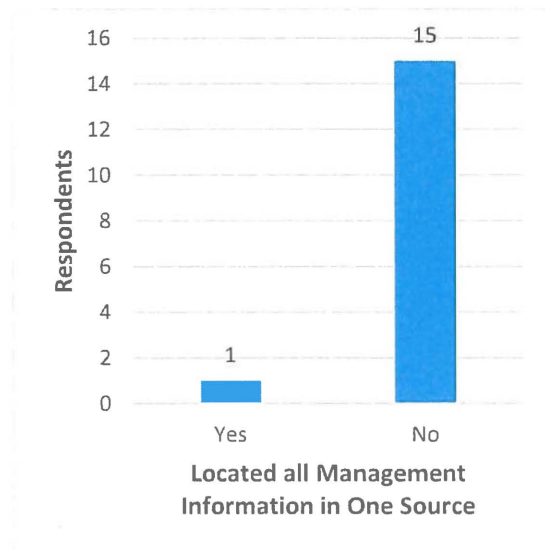


Figure 21. Ability of Anesthesia Manager to Locate Information in Single Source

One respondent claimed they were able to find all the information in one place, and the comment indicated the AANA website as the source. The AANA website does contain much of the information a manager may need. In this author's experience, some of the AANA resources were not comprehensive or up to date.

Quality

The literature review was in depth and thorough. No date range was established nor was a language specified for the search parameters. An attempt was made to use the most recent literature whenever possible. The search engines used from the Mayo Clinic and University of Michigan, Flint libraries were thorough. Less than 3% of articles were irretrievable.

The results of the survey were limited by the small study population of 37 providers. The response rate was moderate at 59%. The majority of respondents reside and work in the upper Midwest area of the United States. The focus of the survey was narrow, concentrating on nurse anesthesia providers in rural settings. This limits the results to represent a small demographic of CRNAs nationwide. A survey of a larger population encompassing all regions of the country would improve generalizability of the results. The questions asked were comprehensive although more questions may reduce ambiguity among the results. Rewording survey questions may have allowed for improved statistical analysis of the results.

Information obtained from the survey was used as a resource for the handbook. Opinions expressed by the respondents were considered when adding content to various sections of the handbook. Dissemination of the final product will depend on approval by the publishing body to be determined. The AANA has been contacted to aid in the distribution to association members. Promotion for the handbook will be by poster presentations at state anesthesia association meetings or through the AANA website.

Conclusion

Developing and managing an anesthesia department requires time and resources. A search of the literature demonstrated a lack of a consolidated source of essential information. The literature supports the benefits of anesthesia professionals making the decisions regarding anesthesia practice in rural facilities.

The challenges faced by rural anesthesia practitioners and anesthesia department managers are complex and multiple. They include; efficient use of personnel, call time and burnout, communication and disruptive behavior, budgeting and cost containment, policies and standards, equipment procurement and maintenance, professional protection, and ultimately providing safe and evidence based patient care. The literature contains research based approaches to managing these challenges.

A survey of rural anesthesia providers indicated a demand for a consolidated information resource. A handbook was developed using evidence-based recommendations acquired through an exhaustive search of the literature. Information was arranged in the handbook by chapters according to areas of concern expressed by nurse anesthesia providers including personnel management, budgeting, equipment concerns, and professional topics. It is hoped that this handbook will meet the goal for which it was intended, to facilitate the process of managing an independent anesthesia department for nurse anesthesia providers.

Appendix 1: Patient safety policy recommendations by Winters et al.⁴⁷

Topic	Safety Recommendations
Education	Set up regular education and training exercises for patient safety concerns.
Identify Hazards	Encourage staff to voice concerns about patient safety and identify potential hazards.
Regular Meetings	Develop a regular schedule of meetings for safety and other organizational issues.
Teamwork	Develop a process for team training. See http://teamstepps.ahrq.gov/ for help with team training.
Informed Consent	Describe the process of acquiring informed consent from patients. Include who will be involved, what is to be done (be precise), and where it will take place.
Preoperative Briefing	Should include entire surgical team and include: team roles, re-ID of patient, patient medical status and relevant lab tests, antibiotic regimen, DVT prevention, positioning and pressure point care, skin prep, implant or equipment needs, monitoring, critical steps and contingency plans, need for blood products, any pathology to be taken, and post-op care needs.
Safety Stop/Hard Stop	Develop process to stop procedure prior to incision to verify correct patient, site, and procedure where every member of surgical team vocally acknowledges this information. Also include for anesthesia antibiotics given and if any special medication has been given.
Infection Control	Develop process for antibiotic standardization: specific drug, dose, and schedule. Also, consider allergies and alternate antibiotic.
Central Line Infection	Develop process for central line placement and care.
Needle Sticks	Develop a process for the care of needle stick injuries including reporting, wound care, and lab tests for patient and staff member.
Anesthesia	Develop requirements for training, accreditation, record keeping, proper equipment usage, patient evaluation pre-, peri-, and post-op.
Positioning	Develop a process for proper patient positioning and training of OR team.
Electrical Injury	Develop a process for protecting the patient from electrical injury, either burns or nerve damage. Provide training exercises.
Thermal Injury	Develop a process for preventing patient burns from fires caused by prep solutions or anesthetic agents combined with surgical cautery.
Radiation Injury	Rare in the rural setting but need a process to protect patient from excess radiation either from radiotherapy or extensive x-ray exposure.
Connection Errors	Develop a process to protect against wrong medication or gas administration and how to manage errors that do occur.
Post-op Briefing	Should be a discussion among the entire surgical team and include what went well, what went wrong and how to prevent this from happening again, and any patient issues needing to be addressed.

Appendix 2: Survey questions sent to rural anesthesia providers.**Consent Form****Introduction**

This study attempts to collect information about rural anesthesia providers and the anesthesia departments in their facilities. The goal is to use this information to aid in developing a resource handbook for anesthesia providers to assist in initiating and managing an independent anesthesia department in their facility.

Principle Investigator: Todd Walter CRNA, MS, Department of Anesthesia, University of Michigan, Flint.

Co-investigator: Dr. Jane Motz CRNA, DrAP, Department of Anesthesia, University of Michigan, Flint.

Procedures

You will be asked to answer 25 questions. The survey will take approximately 15 minutes to complete.

Risks/Discomforts

Risks are minimal for involvement in this study. Although we do not expect any harm to come to any participants due to electronic malfunction of the computer, it is possible though extremely rare.

Benefits

There are no direct benefits for participation. However, it is hoped that through your participation, a more complete reference source will be created to help all anesthesia providers.

Confidentiality

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All responses will be kept confidential, and no one other than the primary investigator and co-investigator listed above will have access to them. There will be no connection between data collected and any individual respondent.

Compensation

There is no compensation provided for this study. Participation is highly appreciated.

Participation

Participation in this research study is completely voluntary. You have the right to withdraw at any time or refuse to participate entirely without consequence.

Questions About the Research

If you have questions regarding this study, you may contact Todd Walter CRNA, MS, at 507-261-3391 or toddwa@umflint.edu.

Questions about your Rights as Research Participants

If you have questions you do not feel comfortable asking the researcher; you may contact UM-Flint Institutional Review Board, 303 E Kearsley, 4204 William S White Bldg., Flint, MI 48502-1950, (810) 762-3384, irb-flint@umflint.edu.

I have read, understand, and printed a copy of the above consent form and desire of my own free will to participate in this study.

Yes

No, if no, please skip to survey end.

Demographic Questions

1) How many years have you practiced rural anesthesia?

0-5

6-10

11-15

16-20

21-greater

2) What is your maximum educational degree?

Associate

Bachelors

Masters

Doctoral

3) Are you currently pursuing or interested in pursuing a higher degree?

Yes

No

4) Select the option that best describes your situation.

Independent Contractor

Hospital employee

Member of a group contracting services

5) How many facilities do you or your group provide services for as the sole anesthesia provider(s)?

1

2

3

4 or more

Institutional Questions

6) How many anesthesia providers are currently at your facility?	
1	
2	
3	
4	
5	
More than 5	

7) Do you practice independently or in a team model with an anesthesiologist supervising?	
Independently	
Team model	

8) Does your facility provide OB/Labor and Delivery?	
Yes	
No	

9) Who provides OB/Labor and Delivery call coverage?	
Yourself alone	
Anesthesiologist alone	
Team coverage	

10) Do you have 24/7 anesthesia call coverage?	
Yes	
No	
Comments	

11) Do you have a weekend call?	
Yes	
No	
Comments	

12) How many anesthesia providers share call coverage?	
Only One	
2	
3	
4	
5	
More than 5	
N/A	
Comments	

13) If you cover call by days, how many days in a week are you on night call?	
1	
2	
3	
4	
5	
6	
7	
N/A	
Comments	

14) If you cover call by weeks, how many weeks in a month are you on night call?	
1	
2	
3	
4	
N/A	
Comments	

15) Number of Operating/Procedure Rooms at your institution?	
1	
2	
3	
4	
More than 4	

16) Do you provide anesthesia services for endoscopy?	
All	
Some	
None (all done with RN conscious sedation)	
Comments	

17) What other services do you provide for your facility? Please check all that apply:	
IV starts	
PIC/Central line placement	
Nursing Unit Code response	
ER Code response	
ER trauma response	
Pain service	
Other (List below)	
If Other, Please list:	

18) Who is your primary backup for airway assistance? Please check all that apply.	
Another CRNA	
Anesthesiologist	
Surgeon	
ENT specialist	
ER physician	
Other physician (Please list below)	
Other (Please list below)	
Other Physician or Other:	

19) Do you have an independent Anesthesia Department?	
Yes	
No	

20) If not an independent department, is your Anesthesia Department considered a part of the Surgical Department or a separate entity?	
Part of Surgery Department	
Separate Entity (Please describe below)	
Comments:	

21) Who makes management decisions for the Anesthesia Department?	
Anesthesia Provider	
Nurse Manager	
Hospital Administrator	
Comments:	

Opinion Questions:

22) Would a Handbook with detailed information on developing and managing an Anesthesia Department be useful for you now?	
Yes	
No	
Comments:	

23) If you are the leader of the anesthesia department: what areas would you like to have more information on? Please check all that apply:	
Staff Management	
Department Control	
Accreditation Issues	
Solo Provider Issues	
Insurance Information	
Standards of Care	
Equipment Standards	
Policy development	
Independent Contractor vs. Employee	
EMR/AIMS	
Cost Containment	
Negotiations with management	
Budget information	
Other (Please list below)	
Comments:	

24) If you were instrumental in developing the anesthesia department in your facility, where did you obtain the majority of information you used for departmental development?	
Previous provider	
Hospital Administration	
Independent research	
Internet	
Other (please describe in comments)	
Comments:	

25) Were you able to locate one source which contained all or most of the information needed to assist in the development of an anesthesia department for rural anesthesia?	
Yes	
No	
If Yes, please describe source here.	

Appendix 3

Survey results.

Demographic Questions

Question	Numbers		Percentages
How many years have you practiced rural anesthesia?	<u>Years</u>	<u>Respondents</u>	
	0-5	1	4.55%
	6-10	10	45.45%
	11-15	4	18.18%
	16-20	3	13.64%
21 and over	4	18.18%	
What is your maximum educational degree?	<u>Degree</u>	<u>Respondents</u>	
	Associate	2	9.1%
	Bachelors	0	0%
	Masters	18	81.8%
Doctoral	2	9.1%	
Are you currently pursuing or interested in pursuing a higher degree?	<u>Answer</u>	<u>Respondents</u>	
	Yes	2	9.09%
No	20	90.91%	
Select the option that best describes your situation?	<u>Option</u>	<u>Respondents</u>	
	Independent contractor	7	31.82%
	Hospital employee	14	63.24%
	Member of contracting group	1	4.55%
How many facilities do you or your group provide services for as the sole anesthesia providers?	<u>Facilities</u>	<u>Respondents</u>	
	1	13	59.09%
	2	7	31.82%
	3	1	4.55%
4 or more	1	4.55%	

Institutional Questions

Question	Numbers		Percentages
How many anesthesia providers are currently at your facility?	<u>Providers</u>	<u>Respondents</u>	
	1	2	9.09%
	2	4	18.18%
	3	5	22.73%
	4	5	22.73%
	5	3	13.64%
	More than 5	3	13.64%
Do you practice independently or in a team model with an anesthesiologist supervising?	<u>Answer</u>	<u>Respondents</u>	
	Independent	21	95.45%
	Team Model	1	4.55%
Does your facility provide OB/Labor and Delivery?	<u>Answer</u>	<u>Respondents</u>	
	Yes	8	36.36%
	No	14	63.64%
Who provides OB/Labor and Delivery?	<u>Answer</u>	<u>Respondents</u>	
	Yourself alone	10	100%
	Anesthesiologist	0	0%
	Team coverage	0	0%
Do you have 24/7 anesthesia call coverage?	<u>Answer</u>	<u>Respondents</u>	
	Yes	22	100%
	No	0	0%
Do you have weekend call?	<u>Answer</u>	<u>Respondents</u>	
	Yes	22	100%
	No	0	0%
How many anesthesia providers share call coverage?	<u>Providers</u>	<u>Respondents</u>	
	Only one	3	13.64%
	2	4	18.18%
	3	8	36.36%
	4	2	9.09%
	5	2	9.09%
	More than 5	3	13.64%
If you cover call by days, how many days in a week are you on call?	<u>Days</u>	<u>Respondents</u>	
	1	4	19.05%
	2	2	9.52%
	3	4	19.05%
	4	3	14.29%
	5	1	4.76%
	6	0	0%
	7	3	14.29%
	N/A	4	19.05%

Institutional Questions continued

Question	Numbers		Percentages
If you cover call by weeks, how many weeks in a month are you on night call?	<u>Weeks</u>	<u>Respondents</u>	
	1	1	5%
	2	10	50%
	3	1	5%
	4	0	0%
	N/A	8	40%
Number of Operating/Procedure rooms at your institution?	<u>OR/PR</u>	<u>Respondents</u>	
	1	2	9.09%
	2	11	50%
	3	5	22.73%
	4	2	9.09%
	More than 4	2	9.09%
Do you provide anesthesia services for endoscopy?	<u>Answer</u>	<u>Respondents</u>	
	All	15	68.18%
	Some	4	18.18%
	None	3	13.64%
	(all done with RN conscious sedation)		
What other services do you provide for your facility?	<u>Service</u>	<u>Respondents</u>	
	IV start	19	86.36%
	PIC/Central place	18	81.82%
	Nursing unit codes	17	77.27%
	ER codes	16	72.73%
	ER trauma	18	81.82%
	Pain service	2	9.09%
Who is your primary backup for airway assistance?	<u>Backup</u>	<u>Respondents</u>	
	Another CRNA	12	54.55%
	Anesthesiologist	1	4.55%
	Surgeon	5	22.73%
	ENT specialist	0	0%
	ER physician	10	45.45%
	Other physician	0	0%
	Other	3	13.64%
Do you have an independent Anesthesia Department?	<u>Answer</u>	<u>Respondents</u>	
	Yes	13	59.09%
	No	9	40.91%
If not an independent department, is the Anesthesia Department considered part of the Surgical Department or a separate entity?	<u>Answer</u>	<u>Respondents</u>	
	Part of Surgery	9	50%
	Separate Entity	9	50%
Who makes management decisions for the Anesthesia Department?	<u>Answer</u>	<u>Respondents</u>	
	Anesthesia Provider	14	63.64%
	Nurse Manager	0	0%
	Hospital Administrator	8	36.36%

Opinion Questions

Question	Numbers		Percentages
Would a Handbook with detailed information on developing and managing an Anesthesia Department be useful to you now?	<u>Answer</u>	<u>Respondents</u>	
	Yes	17	77.27%
	No	5	22.73%
If you are the leader of the Anesthesia Department: What areas would you like to have more information on?	<u>Areas</u>	<u>Respondents</u>	
	Staff Management	3	18.75%
	Department Control	2	12.5%
	Accreditation issues	11	68.75%
	Solo Provider issues	10	62.5%
	Insurance Information	8	50%
	Standards of Care	12	75%
	Equipment Standards	12	75%
	Policy Development	12	75%
	Independent Contractor vs Employee	3	18.75%
	EMR/AIMS	4	25%
	Cost Containment	6	37.5%
	Negotiations	6	37.5%
	Budget Information	7	43.75%
Other	0	0%	
If you were instrumental in developing your Anesthesia Department in a rural facility, where did you obtain the majority of information you used for this task?	<u>Answer</u>	<u>Respondents</u>	
	Previous Provider	2	13.33%
	Hospital Admin.	2	13.33%
	Independent Research	8	53.33%
	Internet	1	6.67%
	Other	2	13.33%
Were you able to locate one source which contained all or most of the information needed to assist in the development of an Anesthesia Department for rural anesthesia?	<u>Answer</u>	<u>Respondents</u>	
	Yes	1	6.25%
	No	15	93.75%

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