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A Qualitative Examination of Opioid Sparing Anesthesia Practices Among CRNAs

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Abstract

The opioid epidemic has had significant consequences across the healthcare system in the United States. While anesthesia providers have historically provided quality intraoperative analgesia utilizing opioids, research to date suggests that these care experiences may have lasting implications on patients' long term health outcomes. In contrast, opioid sparing anesthesia can provide patients superb analgesic coverage without the noxious side effects of opioids or the risk of misuse. As an emerging topic, no known study to date has described anesthesia providers' qualitative experiences with opioid sparing anesthesia. Therefore, the purpose of this qualitative descriptive study was to conduct semi-structured interviews to examine the practices of Certified Registered Nurse Anesthetists who utilize opioid sparing anesthesia (N=16). Two major themes emerged: (1) perioperative benefits of opioid sparing anesthesia and (2) prospective benefits of opioid sparing anesthesia. Perioperative benefits described include: reduction or elimination of postoperative nausea and vomiting, superior pain control, and improved short-term recovery. Prospective benefits described include: higher surgeon satisfaction, superior surgeon-managed pain control, increased patient satisfaction, reduction of opioids in the community, and awareness of positive prospective benefits of opioid sparing anesthesia. This study highlights the significance of opioid sparing anesthesia and its role in comprehensive perioperative pain control, reduction of opioids in the community, and patient recovery beyond the walls of the Post Anesthesia Care Unit.

Keywords: CRNA, opioid sparing anesthesia, multimodal anesthesia, opioid alternative modalities, perioperative

A Qualitative Examination of Opioid Sparing Anesthesia Practices Among CRNAs

The opioid epidemic has devastated American communities. Purdue Pharma pleaded guilty to criminal charges in 2019—agreeing to pay $8.3 billion—for aggressively marketing Oxycontin, but the damage was already done (Dyer, 2020). In the United States, over 210,000 individuals died from prescription opioid overdoses from 1990-2017 (Egilman et al., 2019). Non-prescriptive and prescriptive opioids directly lead to 530 deaths each day, labeling opioid abuse as a public health crisis (Brummett et al., 2017). In 2018, a staggering 10.3 million Americans abused prescribed opioids and nearly 20% of those abused opioids for the first time (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). Given these well-documented concerns, anesthesia providers are challenged to provide quality anesthesia and pain relief for patients while avoiding deleterious side effects of addictive narcotics.

Opioid-naive patients—whether undergoing simple procedures or major surgeries—experience the same risk for persistent opioid consumption at 3 months post-operation (Brummett et al., 2017). While easy to correlate opioid dependence with postoperative prescriptions, perioperative opioid administration also plays a significant role in a patient's opioid demands. Opioid-naive patients who receive short acting opioids in the perioperative period are susceptible to acute opioid tolerance, withdrawal, and opioid-induced hyperalgesia (OIH) (Colvin et al., 2019). Differing from drug tolerance, OIH is opioid-stimulated nociceptive sensitization resulting from neuroplastic peripheral and central nervous system changes, even with limited use of short acting opioids (Colvin et al., 2019; Koepke et al., 2018; "*Opioid receptor agonists*," 2016). OIH and opioid tolerance phenomena begin with the first dose of intraoperative opioid and are responsible for paradoxical and exponential postoperative opioid demands (Koepke et al., 2018).

Certified Registered Nurse Anesthetists (CRNAs) comprise 80% of anesthesia providers in rural areas and provide greater access to care in medically underserved communities (*Certified Registered Nurse Anesthetists Fact Sheet*, 2021). Opioid sparing anesthesia (OSA) is a highly studied modality with evidence of positive patient outcomes, yet polarizing opinions about OSA utilization differ widely across institutions and CRNAs throughout the United States (Hah et al., 2017). Enhanced recovery after surgery (ERAS) protocols, which focus on the sparing of opioids throughout the perioperative period, are gaining popularity in surgical arenas but are only directed at certain surgical populations. Regional and neuraxial anesthesia have demonstrated a significant reduction in the amount of postoperative pain, but not all anesthesia providers are well-versed in these techniques (Hah et al., 2017). These OSA avenues are available for CRNAs to integrate as fully qualified anesthesia providers, and their use can have a significant impact on both patients' long term outcomes and the opioid epidemic.

Current literature remains highly specific, detailing OSA techniques for certain surgical procedures. The rise of ERAS protocols, neuraxial, and regional anesthesia have brought multimodal anesthesia to the forefront of perioperative care. Recent government payor Merit-based Incentive Payment System (MIPS) metrics for utilization of two or more non-opioid pain management drugs or interventions are based upon 2012 American Society of Anesthesiologist and 2016 American Society of Regional Anesthesia and Pain Medicine multimodal pain management guidelines (2020 MIPS Measure #447, 2021). Despite these incentives and advancements in multimodal anesthesia, current literature remains nearly devoid of research specific to anesthesia providers' routine OSA utilization. Just two studies to date focus on anesthesia providers' practical experiences with OSA. Thiruvenkatarajan et al. (2019) published original material surveying anesthesia providers about their use of non-opioid adjuncts, but the

significance was hindered by a low response rate. Velasco et al. (2019) qualitatively examined CRNAs' multimodal analgesia strategies and perspectives—identifying compelling barriers and facilitators to OSA.

No known studies explore the experiences of CRNAs who regularly integrate OSA in their practice, leaving a gap in research reflective of why CRNAs consistently utilize OSA. Much of the praise and support of OSA comes anecdotally. Contextualizing OSA in practice and taking anecdotal experiences to a documented medium is important for conquering the opioid epidemic, reduction of OIH, and future adoption of OSA techniques for more surgical populations. The purpose of this study was to address a looming research gap and examine the expertise of CRNAs who consistently utilize opioid sparing techniques in their personal practice.

Methods

This qualitative descriptive study utilized a one on one semi-structured interview protocol. Purposive snowball sampling was employed to recruit participants befitting inclusion and exclusion criteria: practicing CRNAs who consistently utilize OSA in their anesthesia practice were included. Exclusion criteria were CRNAs with less than two years of experience, who were no longer practicing, who did not utilize OSA on a regular basis, or did not consent to being audio recorded. Study participants were asked to share the recruitment flyer and information sheet with their colleagues.

Interview questions (Table 1) were developed based on gaps in OSA literature to date and focused on examination of a practitioner's personal experience and expertise with OSA. The questions were validated internally by the five research team members, including two doctoral Student Registered Nurse Anesthetist co-principal investigators, two DNP-prepared CRNAs with qualitative research committee experience and OSA practical expertise, and a PhD-prepared

nurse research scientist with robust training and experience with qualitative methodology. These content experts met to discuss drafts of the interview guide. The final draft was approved after exact consensus, thus, verifying the interview questions' reliability. The DePaul University institutional review board (IRB) approved the exempt study protocol.

CRNA participants were recruited via phone and email distribution of IRB-approved informational materials. The co-principal investigators collaborated to complete all interviews. Each interview began with reiteration of previously-distributed informational materials, the study purpose, semi-structured interview process and acquisition of informed consent to proceed with the interview and audio recording. Each participant completed one uninterrupted interview. Demographic information was obtained. The interview questions pertained to the participants' experience implementing OSA in their practice and subsequent expertise. The co-principal investigators debriefed after each interview and met regularly with the full research team to discuss interview findings and research status. After the eighth interview, the research team concluded that initial findings produced redundancy. Eight further interviews were completed due to participant interest and to test for data saturation, following Polit & Beck's (2017) guidelines. As no novel themes materialized, saturation of results was achieved.

Recorded interview audio was downloaded to secure cloud storage, coded with indirect identifiers for confidentiality, then transcribed by Happy Scribe (Happy Scribe Ltd.), a professional transcription service. Transcription files (Microsoft Word, Microsoft Corp) were verified for accuracy against audio files by the co-principal investigators. Verified text files were then uploaded to Dedoose qualitative data analysis software (Version 8.3.41, University of California, Los Angeles). Demographic data were analyzed with statistical analysis software (SPSS 26, IBM Corp). Qualitative data were thematically analyzed following the frameworks of

Giorgi (2012) and (Sundler et al., 2019). The co-principal investigators developed preliminary codes. The research team met regularly to discuss codes and themes and clarify areas of inconsistency. Consensus and synthesis of explicit perioperative and prospective OSA benefit themes evolved from the identified codes.

Results

Sixteen CRNAs completed interviews for the study. Participant characteristics are detailed in Table 2. The majority of participants identified as male (75%), with an average age of 40 (range = 31-62 years), an average of 9.8 years of experience as a CRNA (range = 2-23 years), and an average of 4.75 years of experience with OSA (range = 1-11 years). 56% of CRNAs identified their workplace as CRNA-only, 25% worked in an anesthesia care team model (ACT), 12.5% were physician supervised, and one participant traveled to various states with multiple kinds of anesthesia delivery models. Participants described their introduction to, implementation of, and overall experiences with OSA. Table 3 illustrates two key emergent themes: (1) perioperative benefits of OSA and (2) prospective benefits of OSA.

Theme 1: Perioperative Benefits of Opioid Sparing Anesthesia

The first key theme is defined as benefits from an opioid sparing anesthetic that are observed within the immediate perioperative period—including the preoperative, intraoperative, and postoperative periods—ending at discharge from the Post-Anesthesia Care Unit (PACU). These benefits were witnessed directly by the CRNA or reported to the CRNA via feedback from perioperative stakeholders including patients, PACU nurses, and surgeons. Three perioperative benefits of OSA identified by participants include reduction or elimination of postoperative nausea and vomiting (PONV), superior CRNA-managed pain control, and improved short-term recovery.

Reduction or Elimination of PONV

While a common side effect of opioids is nausea and vomiting, opioids continue to be a mainstay of modern anesthesia. 14 of 16 (87.5%) participants reported the resulting reduction or elimination of patient PONV as a factor in choosing an opioid sparing technique. Some participants chose OSA based on known risk factors for their patient population:

> Most of the patients are female. They're young. They're nonsmokers. [They] have every single red flag for nausea that you could have. [In] trying to combat [their] PONV, I was like, 'Let's try to use some of these opioid sparing techniques.'

Other participants saw opportunities to improve experiences for patients with documented histories of PONV.

> They come in with [this] fear—and also sort of this acceptance— that it's going to happen. And we're able to say to them, . . .'We've got this technique called opioid-free anesthesia. It doesn't mean it's analgesia free. [It] will drastically reduce your chances of postoperative nausea/vomiting. . . .You've got a reasonable chance of being comfortable and [a] much higher chance of being nausea free.' And a good percentage of those patients do wake up nausea free. . . . And those are some of the most grateful patients that [you'll] ever speak to.

Superior CRNA-managed Pain Control

Pain management responsibility for CRNAs is typically limited to the perioperative period, before collaborating with and handing off to the surgical team. Participants overwhelmingly reported that in the perioperative period, OSA was superior to an opioid-based technique. CRNAs utilizing OSA detailed that OSA was not successful due to the reduction or

elimination of opioids, but because of the resulting balanced anesthetic. A number of participants commented on the comprehensive nature of OSA. One CRNA explained:

> The benefit of opiate free anesthesia versus an opiate based [anesthesia] . . . is that opiates are just controlling one aspect of the [pain] cycle. Where with opiate free anesthesia, we're using different [medications], anti-inflammatories, substance P inhibitors, NMDA antagonists, . . . local anesthesia . . . [to block] the pain stimulus. So we're using a whole gamut [of] tools to control the pain pathways rather than just focusing on the mu receptors.

Participants acknowledged that OSA modulates the transmission of pain signals from varied receptors and reduces the prevalence of OIH and tolerance. As a result, while their patients may receive opioids in the PACU for pain control, they "will require significantly less dosage to obtain relief than patients who were receiving opioids the entire time they were back in the surgical arena."

Improved Short-term Recovery

Improved "short-term recovery" reflects the accelerated and superior immediate recovery from anesthesia in the OR and PACU, related to the sparing of opioids. Reduced opioid administration yields reduced risk of a host of untoward side effects including PONV. Participants noted additional opioid side effects to be reduced or absent with OSA including "emergence agitation and delirium," "respiratory depression," rigors, urinary retention, and ileus. With reduction of those side effects and superior perioperative pain control, patients experienced a "safer anesthetic - patients breathe easier, and at the end of surgery, [they] wake up faster with less risk of any sort of obstruction or respiratory compromise." Because patients reported to be "doing better in recovery," they can "discharge faster" from the PACU. OSA also

impacted hospital length of stay. Surgeries like mastectomies, which traditionally required "one to two day post-op admissions for PONV and pain control" may now be done as "ambulatory outpatient procedures" thanks to regional and multimodal anesthesia.

Theme 2: Prospective Benefits of Opioid Sparing Anesthesia

The second key theme is defined as benefits directly related to an opioid sparing anesthetic that occur post-discharge from the PACU. These benefits were reported to CRNAs through feedback from patients and surgeons and pertain to inpatient hospitalization, the patient recovery period at home, and beyond. Five prospective benefits of OSA are higher surgeon satisfaction, superior surgeon-managed pain control, increased patient satisfaction, reduction of opioids in the community, and CRNA awareness of positive prospective benefits of OSA.

Higher Surgeon Satisfaction

Higher "surgeon satisfaction" encompasses surgeons' reports to CRNA participants on how patient prospective benefits were derived from OSA techniques. Surgeons reported high praise to CRNAs about "how happy the patients were" with "less breakthrough pain scores" and "less post op nausea" leading to surgeon requests for OSA in their future patients. A CRNA participant explained, "We actually had the surgeons . . . [ensure their] patients got blocks and received the opioid sparing medications as well." This shift in practice was mentioned by many CRNA participants as "surgeons did not take long to realize [the] benefits [of OSA]." Though participants mentioned regional anesthesia often has a stigma of "taking a considerable amount of time in the surgical window", CRNAs were able to continue collaborative relationships with surgeons and demonstrate improved patient outcomes on "the back end of surgery." Surgeons not only saw improvements in their patients' hospital stays but also in discharge prescribing practices due to OSA:

> [Our] general surgeon [has] been [in practice] almost 30 years. [His discharge prescriptions were] 30 or 45 Vicodin . . . before we were changing the anesthesia approach. And now he says his usual discharge prescription . . . [is] either 5 or 7 Vicodin. And he said most patients don't even end up filling that.

Superior Surgeon-managed Pain Control

This prospective benefit describes patient pain control beyond the PACU, traditionally managed by the surgical team yet directly affected by CRNAs' intraoperative OSA techniques. CRNAs mentioned thinking outside the perioperative period when performing an anesthetic such as how patients' pain will be "managed at home", the risk of "long term opioid" use, and their potential contribution to the "opioid epidemic." One participant reflected on OSA stating, "I think it does a good job because it approaches the 21st century idea of pain, which is that it's complex and that it involves a lot of different mechanisms, which we try to address." CRNAs often cater their focus to the perioperative situation, but our participants shared how they can provide a lasting positive impact in their patients' life at home after surgery. Several participants noted the large impact they can have on surgeon-managed pain control.

> The most critical part of [whether] or not somebody ends up on long term opioids after surgery is how much opiates they use in the first couple of weeks. [If] you do a better job of controlling their pain with [OSA] adjuncts and not causing hyperalgesia intolerance [with] the opioids that we give intra-op - just because it's what we're used to giving - [that] change can really make a difference . . . It's a matter of controlling pain better. It's purely a job of controlling pain— not just during surgery, not just in post-op, [but] at home and beyond. So [that's] why I do it.

CRNAs often spoke of shorter length of stays due to their choice of OSA and decreased need for opiates postoperatively.

> Once we switched to opiate free anesthesia techniques [and performing] nerve blocks, patients were getting discharged postoperative day one, day two. . . . The surgeons say [they] can't even recall a time that they've had to put a patient on a PCA pump.

These examples told from CRNA participants demonstrate how OSA produces superior surgeon-managed pain control after patients leave the PACU and beyond.

Increased Patient Satisfaction

Increased "patient satisfaction" refers to patient feedback given to participants regarding the lasting impact of their OSA surgical experience. Most CRNAs shared meaningful feedback about how their OSA choice made a positive difference in their patients' lives. Patients reached out to participants on social media platforms, ran into them in public, or saw them on additional hospital visits and raved about their quick recovery with minimal postoperative pain. One CRNA shared a story about a former radiologist patient that underwent a sigmoid resection; "[With] his understanding of medicine and physiology and pharmacology, he was just absolutely baffled as to how you can do that big of a surgery and have it not hurt." Other participants shared stories about how patients' prevalent PONV, anxiety, and depression were greatly improved or eliminated after OSA. A CRNA commented, "It's those things that we don't even take into consideration when we're . . . taking care of our patients— the other things in their life that they're bringing to surgery with them. . . . We could do something positive for them."

Reduction of Opioids in the Community

This prospective public health benefit shows how OSA can directly reduce the amount of circulating opioids in the community. Several participants shared how their communities have

"opioid dependence" and "high opioid consumption." The opioid epidemic was and still remains a major public health issue. One participant commented:

> If I was going to encourage surgeons to decrease the amount of opiates that they were going to be prescribing to patients, then, as the person who's known as the drug guy, I needed to show that I could manage pain in surgical patients without the need for opiates. So that was really a driving force for me to . . . start using opiate free techniques.

Another participant referred to a large study that showed lowering the "leftover opioids" in the general public by reducing postoperative prescriptions had a direct correlation to reducing the "rate of opioid addiction." Several participants mentioned recovering addicts as an important population for OSA techniques. One CRNA mentioned:

> I've taken the care of several recovering addicts who are just absolutely terrified of having surgery and being exposed to opioids when they've been fighting so hard for so long to be in recovery. . . . There's one guy that was actually in tears— just happy to hear that he didn't necessarily have to be exposed to them again [and] worry about veering off in that direction.

Many of our participants felt OSA could have a massive impact on the opioid epidemic, and that they could effectively provide analgesia without opioids being the main focus.

CRNA Awareness of Positive Prospective Benefits of OSA

"CRNA awareness" pertains to being cognizant of the long-term effects of OSA and what patient outcomes may look like beyond the operating room. Participants reflected how practicing OSA "is definitely more work" with managing several medications, but patients have better outcomes with "less post-op complications" and "lower risk of chronic opioid use and chronic pain." One CRNA reflected, "I try to treat each one of my patients every day as if they're

family.” Recognizing the lasting impact of anesthetic choices may be a complete change of thinking for some providers. Another participant commented, “Reframing, philosophically, [that] it's not going opioid free for the sake of losing the opioids, it's for . . . these other goals which augment surgery and recovery and rehab." The majority of our participants framed their activism for OSA with examples of how their anesthetic choice affects their patients in the long run. One CRNA explained:

> I'm able to produce a similar type of patient comfort and wake up, . . . without any of those untoward effects that . . . anesthesia providers [are] aware of. . . . I think it's just made me [a more] collaborative provider and a provider [who is] thinking about [what's] going to happen to the patient beyond . . . the drop off, which is [really] the extent of our responsibility. . . . We can have an impact much further than that.

Discussion

This qualitative descriptive study investigated the OSA practices of experienced CRNAs across the United States. Considerable perioperative and prospective benefits of OSA emerged as these CRNAs—practicing in a wide variety of anesthesia models—elaborated on these two major themes with their detailed personal insight. Three perioperative and five prospective themes were identified.

Our extensive literature review yielded few articles pertaining to CRNAs’ use of OSA. As our participants were known to be consistently utilizing OSA, their shared perceptions reflected details on their personal OSA experiences. All participants gave full support of OSA saying that it’s a “safer anesthetic” noting better overall patient outcomes mostly due to the reduction or elimination of untoward effects of opioids. The reported high praise for OSA with decreased opioid adverse effects echoes the qualitative work of Velasco et al. (2019), who found

the adverse side effects of opioids to be a major facilitator for CRNAs to choose opioid-alternative drugs. One CRNA participant stated the use of OSA allowed for "better ambulation, less issues with blood pressure [and] breathing, improved appetite, [and] early return of bowel gas." The positive practical OSA experiences of our participants mirror a major facilitator described by Velasco et al. (2019); "'Positive experiences' describes participants' experiences with effective analgesia using opioid-alternative strategies, as well as the lessened adverse effects of opioids as a result of using opioid alternatives."

Our study resonates strongly with (Velasco et al., 2019) in bringing CRNA OSA perspectives to light in a qualitative manner, yet differs in that our focus was to enlighten the anesthesia community on why CRNAs choose OSA. This qualitative study navigates uncharted territory in focusing on the personal experiences of CRNAs already utilizing OSA, therefore, producing results much different from other studies with an OSA focus. While countless other OSA studies concentrate on a specific patient population or procedure, our results reflect an opportunity to incorporate OSA techniques for any type of patient. Results encompassing every aspect of a patient's OSA experience from the perioperative period to how they are recovering at home exemplifies how a CRNA's anesthetic choice can affect a patient's life, long after they leave the operating room.

This study demonstrates many strengths. It is novel in its approach to examine the lived experiences of CRNAs who successfully integrate OSA in their practice. Furthermore, our research team followed a meticulous review process to ensure consensus and validation. While our snowball recruitment method secured a number of nationwide participants to achieve consistent saturation of results, it does limit generalizability of findings. Incidentally, all participants identified as white and 75% identified as male. Additionally, 10 of 16 participants

(62.5%) worked outside of large hospital systems or academic centers, noting high CRNA autonomy in smaller settings. This sample size lacked insight from large teaching institutions. Most participants attested to being acquaintances through in-person and social media connections, or through an organization dedicated to opioid free anesthesia. Despite this limitation, each participant took individual initiative to employ OSA and has developed their technique to best fit the needs of their patient population.

This research emphasizes numerous important clinical implications. OSA is a critical step toward a paradigm shift of perioperative pain management. Traditional opioid-based techniques treat pain in an archaic fashion, focusing only on the mu receptor and leaving patients susceptible to OIH, opioid tolerance and dependence, and deleterious side effects. Providing patients with the foundation of a comprehensive and balanced opioid sparing technique yields superior pain management via control of numerous pain transmission receptors, attenuation of the sympathetic nervous system response, improved efficacy of opioids when used on virgin mu receptors, and resulting enhanced recovery from anesthesia and surgery. Understanding the benefits of an opioid sparing anesthetic provokes provider introspection— is there any patient who would not benefit from an ERAS protocol or OSA technique? When well aware of detrimental consequences of opioids, why continue to rely on them as the foundation for modern pain management?

Additionally, OSA techniques embody the Advanced Practice Nurse model. Professionally, nurses are trained to provide holistic patient care. Not only does OSA address and combat the public health concern of excess opioids in the community and the risk of addiction, it positively impacts the wellbeing and recuperation of the patient beyond their time in the hospital.

CRNAs are not simply proceduralists, but pain management specialists with a unique opportunity and obligation to improve the long-term health of patients.

Future studies should qualitatively examine the perspectives of more diverse CRNA populations and institutions, including those practitioners independently employing OSA without the influence and advice of networking opportunities. Research focusing on the collaboration for perioperative and postoperative pain management between anesthesia and surgical teams is critical. Both teams play critical roles in a patient's susceptibility for opioid dependence and the efforts of one team can either be helped or hindered by the other. Another area for future research is education for OSA implementation. Our participants took individual initiative to learn and adopt OSA techniques, and SRNAs and CRNAs could greatly benefit their patients with improved awareness and knowledge of this balanced and future-facing anesthetic technique.

Conclusion

This qualitative descriptive study examined the practices of CRNAs utilizing opioid sparing anesthesia. It identified a myriad of perioperative and prospective patient and public health benefits. This research highlights the significance of OSA and its role in comprehensive perioperative pain control, reduction of opioids in the community, and patient recovery beyond the walls of the PACU. CRNAs have a privilege and responsibility to consider the holistic needs of the patient and augment their quality of life. These findings will guide providers in their task to move toward modern methods of pain management.

Table 1

Study Interview Guide

Interview Questions

- What is your age?
- What is your gender?
- What is your race?
- How many years of experience do you have as a CRNA?
- What city or town do you practice in?
- Describe your clinical setting. (Large teaching institution, rural hospital, surgery center)
- Which anesthesia delivery model is used at your primary institution? (CRNA-only, physician supervised, physician anesthesiologist directed)

Shifting gears, please think about when you first heard of opioid sparing anesthesia…

- Tell me about how you were introduced to OSA.
- How long have you been utilizing OSA in your personal practice?
- Tell me about any obstacles you have encountered when implementing OSA in your practice.
- Now, please reflect on your current use of OSA…
- Describe any OSA techniques you use frequently for your patients.
- Describe what factors compel you to choose OSA techniques for your patients.
- When do you incorporate opioids? For what type of cases or patients do you find opioids are necessary?
- Do you feel OSA appropriately controls patients' pain? Why or why not? Have you seen improvements in pain scores?
- Describe how you measure a patient's pain level when using an OSA technique.
- Tell me how your personal anesthesia practice has changed after implementing OSA techniques.
- Tell me about any patient feedback you've received regarding your OSA techniques.

Now, think about the culture of your institution and the network of CRNAs you are connected with

- Describe your current institution's stance on OSA techniques.
- How do you share your OSA expertise with other anesthesia providers? Have they changed their practice as a result?
- What advice can you offer to other anesthesia providers who are considering introducing OSA in their practice?

Probing questions

- Tell us more about...
- You mentioned _____. Can you give us an example?
- You mentioned _____. Are you able to elaborate?
- I didn't fully understand _____. Can you clarify?

Table 2

Participant Characteristics

Participant Characteristic	No (%)
Identified gender	
Male	12 (75%)
Female	4 (25%)
Age, y	
Range	31-62
Mean	40
CRNA experience, y	
Range	2-23
Mean	9.8
OSA experience, y	
Range	1-11
Mean	4.8
Anesthesia setting	
Rural, critical access or community hospital	10 (62.5%)
Surgery Center	
Large Teaching Institution	2 (12.5%)
Various	2 (12.5%)
	2 (12.5%)
Anesthesia model	
CRNA-only	9 (56.3%)
ACT	4 (25%)
Physician supervision	2 (12.5%)
Various	1 (6.3%)

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