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Original Research

## The Impact of Intraoperative Nursing Care on Perioperative Complications During Wide-Awake Local Anesthesia Hand Surgery



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**Purpose:** The wide-awake local anesthesia technique in hand surgery is widely used, but there are currently no guidelines or protocols for the number of operating room personnel required to optimize patient safety intraoperatively. This study aimed to evaluate perioperative complication rates of wide-awake local anesthesia hand surgeries performed at surgery centers that used different numbers of operating room nurses.

**Methods:** We conducted a retrospective review of patients who underwent wide-awake local anesthesia hand surgery at 4 surgical centers over a 30-month consecutive period. Two surgical centers used 3 operating room nurses, and 2 centers used 2 operating room nurses. The complications reported included intraoperative case abortion because of critical change in patient vitals, intraoperative medication delivery, intraoperative intravenous placement for medication delivery, intraoperative conversion to sedation, intraoperative medical complications, and postoperative transfer to the emergency department or a hospital.

**Results:** A total of 1,771 wide-awake local anesthesia surgical procedures were identified, with 925 performed at a facility that used 2 operating room nurses and 846 performed at a facility that used 3 operating room nurses. There were no perioperative complications in either group during the study period.

**Conclusions:** There was no difference in perioperative complications between the surgery centers that used 3 versus 2 intraoperative nurses during wide-awake local anesthesia hand surgery. This study supports that limiting the nursing personnel for wide-awake local anesthesia hand surgeries could be an efficient way to cut procedural costs without compromising patient safety.

**Type of study/level of evidence:** Therapeutic IV.

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With its cost savings and improved efficiency, wide-awake local anesthesia surgery is growing in popularity.<sup>1–3</sup> As more surgeons adopt wide-awake local anesthesia for hand surgeries, the logistics of running these operating rooms are still being refined by surgical facilities. An anesthetic provider is unnecessary without formal anesthesia, and a registered nurse may monitor the patient. However, the number of personnel needed in the operating room during wide-awake surgery is unclear.

Our experience is that some centers provide only a circulating nurse and a scrub technician/nurse in the room for wide-awake procedures (2 nurses), whereas other centers provide an additional patient-monitoring nurse along with the circulating nurse and the scrub technician/nurse (3 nurses). There are no formal guidelines by the Association of periOperative Registered Nurses that we are aware of that provide requirements for a minimal number of nurses to be present during a local procedure. The Association of periOperative Registered Nurses guidelines state that the “patients’ acuity, level of anxiety, and complexity of the procedure” must be considered with determining the number of personnel needed to care for a patient receiving local anesthesia without the presence of an anesthesia care provider.<sup>4</sup>

Although minimizing the number of nurses would save cost per procedure, it is imperative to maintain patient safety during

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**Table 1**  
Responsibilities of the Circulating Nurse Versus the Dedicated Patient-Monitoring Nurse

2-Nurse Operating Room	3-Nurse Operating Room	
Circulating Nurse	Patient-Monitoring Nurse	Circulating Nurse
<ul style="list-style-type: none"> <li>• Verification of H&amp;P/consents</li> <li>• Transporting the patient from the preoperative holding area to the OR</li> <li>• Positioning the patient</li> <li>• Prepping the patient</li> <li>• Time-out procedure</li> <li>• Intraoperative monitoring (blood pressure/pulse oximeter)</li> <li>• Communicating with the patient</li> <li>• Surgical documentation</li> <li>• Circulating (retrieving/opening supplies)</li> <li>• Transferring the patient from the OR to the PACU</li> <li>• Giving report to the PACU</li> <li>• Room turnover between cases</li> </ul>	<ul style="list-style-type: none"> <li>• Intraoperative monitoring (blood pressure/pulse oximeter)</li> <li>• Communicating with the patient</li> </ul>	<ul style="list-style-type: none"> <li>• Verification of H&amp;P/consents</li> <li>• Transporting the patient from the preoperative holding area to the OR</li> <li>• Positioning the patient</li> <li>• Prepping the patient</li> <li>• Time-out procedure</li> <li>• Surgical documentation</li> <li>• Circulating (retrieving/opening supplies)</li> <li>• Transferring the patient from the OR to the PACU</li> <li>• Giving report to the PACU</li> <li>• Room turnover between cases</li> </ul>

H&P, history and physical exam; OR, operating room; PACU, post-anesthesia care unit.

surgery. This study aimed to evaluate the perioperative complications of wide-awake local anesthesia hand surgeries performed with and without an additional patient-monitoring nurse in the operating room and to determine how many patients required higher-level care during surgery. We hypothesized that there would be no difference in patient complications.

## Materials and Methods

An approval from the institutional review board was obtained, with a waiver of informed consent per institutional protocol. A retrospective chart review was conducted for patients operated on between January 1, 2018 and June 5, 2020, at 4 separate surgical centers associated with a single academic practice. Two board-certified, hand surgery fellowship-trained hand surgeons performed all surgeries using the wide-awake local anesthesia technique. Two surgical centers used 3 nurses for local anesthetic cases, whereas 2 surgical centers used 2 nurses. The duties of the various nurses discussed are depicted in [Table 1](#). All wide-awake local anesthesia cases were reviewed for complications during the procedure and in the immediate postoperative recovery room by performing a chart review. Queries were run to identify any complications or instances in which the patient required additional treatment or a higher level of care. All the surgical centers reported complications via Quantros data reporting. The specific outcomes included intraoperative case abortion because of vital sign instability, intraoperative medication delivery, intraoperative intravenous placement for medication delivery, intraoperative conversion to sedation, intraoperative medical complications, and postoperative transfer to the emergency department or hospital. Demographic data were collected, including age, sex, body mass index, smoking history, and past medical history. The patients were divided into 2 groups based on who underwent surgery at a facility that used 3 nurses and who underwent surgery at a facility that used 2 nurses.

The demographic information, medical history, and complications for each group were summarized using means and standard deviation for continuous data and counts and percentages for categorical data. Continuous data were analyzed using independent *t* tests, and categorical data were analyzed using chi-square tests. Statistical significance was set at *P* value of  $<.05$ . A power calculation determined that we needed a total of 1,428 procedures in this study, 714 per group, to achieve a power of 0.8 and an  $\alpha$  of 0.05.

## Results

A total of 1,771 patients who underwent wide-awake local anesthesia hand surgery were identified at the 4 separate surgery centers. A total of 925 patients had surgery at a facility that used 2 nurses in the operating room, whereas 846 patients had surgery at a facility that used 3 nurses. The patient demographics and medical history for both groups are summarized in [Table 2](#). On demographic analysis, the patients in the 3-nurse group had a significantly higher average body mass index ( $P < .001$ ), significantly more former/current smokers ( $P = .008$ ), and significantly more patients with hypertension ( $P = .004$ ) and diabetes ( $P = .015$ ) than those in the 2-nurse group. There were no other statistical differences in the other demographics between the 2 groups. The types of surgeries performed in both study groups were similar, with the majority being soft tissue surgeries. ([Table 3](#))

No perioperative complications were recorded in either group ([Table 4](#)). There was no difference between using 2 versus 3 intraoperative nurses during wide-awake local anesthesia hand surgeries. Statistical analysis of our perioperative complication rate was not possible, given that there were zero complications in both groups.

## Discussion

After reviewing 1,771 consecutive wide-awake local anesthesia upper-extremity surgeries, we found no difference in perioperative complications when using 2 versus 3 operating room nurses. Although having a nurse solely to monitor the patient may seem judicious, it does not seem to impact patient safety objectively.

The wide-awake local anesthesia technique in hand surgery has many benefits, including increased cost savings and improved operational efficiency.<sup>1,3,5–7</sup> As wide-awake local anesthesia surgery has become increasingly adopted, protocols for the implementation of this technique into a surgeon's practice have been well published.<sup>8,9</sup> In contrast, minimal information exists in the literature to help guide facilities in incorporating this technique. When using general anesthesia, an anesthesia provider always monitors the patient because of the critical importance of guarding and maintaining the patient's airway. However, with wide-awake local anesthesia, the anesthesia provider is no longer necessary to either anesthetize the patient or supervise the airway. This has left the decision on how to best monitor the patient up to the individual facilities.

**Table 2**  
Patient Demographics and Medical History

Variable	2-Nurse Group (n = 925)	3-Nurse Group (n = 846)	P Value
Age (SD)	60 (15)	61 (15)	.380
BMI (SD)	28.9 (6.1)	30.1 (6.0)	<.001*
Sex			.263
Male (%)	451 (48.8)	390 (46.1)	
Female (%)	474 (51.2)	456 (53.9)	
Hypertension (%)	339 (36.6)	356 (42.1)	.004*
CKD (%)	17 (1.8)	25 (3.0)	.131
Diabetes (%)	129 (13.9)	154 (18.2)	.015*
Vascular disease (%)	19 (2.1)	19 (2.2)	.732
Bleeding disease (%)	26 (2.8)	24 (2.8)	.901
Tobacco use			.008*
Former smoker (%)	184 (19.9)	168 (19.9)	
Current smoker (%)	86 (9.3)	105 (12.4)	

BMI, body mass index; CKD, chronic kidney disease; SD, standard deviation.

\* Indicates statistical significance.

When performing the wide-awake local anesthesia surgery in our region, we have at the minimum an attending surgeon, a scrub technician/nurse, and a circulating nurse. Moreover, at 2 of our facilities, there is an additional nurse who solely monitors the patient. The additional personnel used at some facilities may be because of a lack of universal guidelines for the wide-awake local anesthesia surgery. The current study demonstrates that having 1 nurse to monitor the patient and circulate the room, rather than having a separate nurse for each task, is sufficient for patient safety. The 3-nurse group was significantly more unhealthy in terms of body mass index, hypertension, type 2 diabetes, and smoking status; yet, there were no complications using the wide-awake local anesthesia technique, and the extra nurse in the room was not required from a patient safety standpoint. If a patient were to have an intraoperative complication with 2 nurses in the room, we suggest that the circulating nurse may cease circulating duties and solely monitor the patient. Between the surgeon and the circulating nurse now monitoring the patient, we believe that the patient would receive adequate medical care. This is supported by other fields, including dentistry, hand surgery, and dermatology, which perform wide-awake local anesthesia surgery in the office setting without dedicated patient-monitoring during the procedure.

Minimizing operating room personnel has several advantages. First, it is cost effective. Similar to the cost savings of bypassing general anesthesia, optimizing nurse utilization has clear cost savings by requiring fewer staff per procedure. Second, it helps with operating room staffing. Given that many surgery centers and hospitals are short-staffed, this allows the redistribution of the additional nurse to other operating rooms that may require more coverage. Third, it limits the flow in and out of the sterile operating room environment, which potentially could decrease infection risk.

Creating intraoperative guidelines for facilities to use during wide-awake local anesthesia surgery has the potential to facilitate the provision of better patient care. Clearly, there are situations in which local anesthesia is safer for the patient (multiple medical comorbidities), aids in the success of the surgical procedure (flexor tendon repair), or is more convenient for the patient (no fasting requirement, no preoperative testing, and patient can drive to and from the procedure). Nevertheless, because of the relative novelty of this technique in the United States, hospitals and surgical centers may inadvertently discourage these procedures due to various factors, including the perceived necessity of a nurse to monitor the patient, which is often difficult to provide because of staffing shortages. As indications continue to expand for the use of wide-awake local anesthesia in hand surgery, the benefits of the

**Table 3**  
Procedure Types in Each Group

2-Nurse Group	N	3-Nurse Group	N
Open CTR	251	Endoscopic CTR	393
TFR	174	TFR	135
Endoscopic CTR	119	Mass excision	70
Mass excision	75	Endoscopic CTR, TFR	27
Flexor tenosynovectomy	48	Cyst excision	23
Extensor tenosynovectomy	35	DeQuervain release	22
IPJ arthrodesis	31	Tendon repair	20
Tendon repair	25	Dupuytren fasciectomy	19
Local flap	18	Ulnar neuroplasty	19
I&D	17	CRPP	18
Ulnar neuroplasty	12	Ganglion excision	16
Foreign body removal	11	Tendon transfer	11
Mass excision	11	Nailbed repair	10
Nerve repair	10	I&D	9
External fixation	10	Open CTR	9
Dupuytren fasciectomy	8	Phalanx ORIF	8
Wound exploration	8	IPJ arthrodesis	8
Nailbed repair	8	Removal of hardware	7
Cyst excision	7	Foreign body removal	6
CRPP	7	Digit amputation	5
Endoscopic CTR, TFR	6	External fixation	3
Tendon transfer	5	Flexor	2
		tenosynovectomy	
DeQuervain release	5	Metacarpal ORIF	1
Polydactyly excision	4	Endoscopic CTR, mallet	1
		finger repair	
Extensor tenosynovectomy	3	Central slip repair	1
Ganglion excision	3	Contracture release	1
Excision olecranon bursa	2	Open CTR, TFR	1
Wound debridement	2	Hook of hamate	1
		excision	
IPJ capsulectomy	2	Total	846
Phalanx ORIF	2		
Bursa aspiration	1		
Removal of hardware	1		
Osteophyte excision	1		
Endoscopic CTR, mass excision	1		
Digit amputation	1		
Pisiform excision	1		
Total	925		

CRPP, closed reduction and percutaneous pinning; CTR, carpal tunnel release; I&D, incision and drainage; IPJ, interphalangeal joint; ORIF, open reduction internal fixation; TFR, trigger finger release.

technique in terms of cost savings, time efficiency, patient safety, and patient satisfaction will become increasingly apparent.<sup>10,11</sup> Therefore, it is important for facilities to use the best available evidence when adopting protocols for the use of this technique. This will allow them to realize these same benefits.

Our study has several strengths. First, this is a relatively high number of surgeries performed under the wide-awake local anesthesia comparing intraoperative personnel. Second, we evaluated a topic that has been understudied and that has safety and economic implications. Third, it provides empiric data to facilities that may help them develop appropriate safety protocols for the wide-awake surgery.

Our study also has several limitations. First, although we concluded that the additional patient-monitoring nurse is unnecessary from a perioperative patient safety standpoint, we did not investigate the potential benefits of the additional nurse. It is possible that the additional operating room personnel could have a positive effect on patient satisfaction, operating room efficiency, or other measures. Second, this study did not evaluate the overall outcomes of these surgeries as they relate to the use of 2 or 3 nurses in the operating room. Third, given that we had zero perioperative complications, it is possible that the study may be underpowered. Nevertheless, with the number of patients in each group, we believe that any potential difference would have minimal clinical

**Table 4**  
Intraoperative and Postoperative Complications

Complication	2-Nurse Group (n = 925)	3-Nurse Group (n = 846)
Intraoperative		
Cases aborted due to vital signs	0	0
Medication delivery	0	0
Intravenous placement for medication delivery	0	0
Conversion to sedation	0	0
Medical complications (ie, MI)	0	0
Postoperative		
Transfer to ED or hospital	0	0

ED, emergency department; MI, myocardial infarction.

implications. Fourth, the operative time was not recorded for procedures in either group, so we cannot conclude whether the length of operative time in wide-awake hand surgery procedures contributes to perioperative complications. Finally, as with any retrospective study, it is possible that a complication was missed or not recorded in the medical chart.

With the benefits of wide-awake local anesthesia surgery now well-known and published in the literature, more centers are incorporating this style into their practices. Guidelines and protocols for implementing wide-awake local anesthesia surgery are becoming available. However, the number of nursing staff required for safe patient care has not been defined. The current study found no difference in perioperative complications between operating rooms functioning with 2 versus 3 nurses in wide-awake local anesthesia hand surgery. In an effort to decrease unnecessary personnel in the operating room and to reduce cost, we

recommend having a single nurse to monitor the patient and to act as a circulator.

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