

THE ROLE OF THE NURSE ANESTHETIST IN THE PLANNING OF POSTOPERATIVE PAIN MANAGEMENT

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Adequate pain relief after surgery is essential for avoiding pain-associated stress and patient comfort in the postoperative period. The Swedish nurse anesthetist has an important role in the intraoperative management of the surgical patient by assessing and moderating individual physiological responses evoked by surgical stimuli during general anesthesia. The extent to which knowledge of specific individual response patterns are used to plan postoperative pain management is unknown. The aim of the present study was to assess the role of the nurse anesthetist in planning early postoperative pain management for surgical patients.

Nurse anesthetists (N = 101) at 4 academic hospitals in Sweden responded to a questionnaire focusing, in

addition to demographic data, on intraoperative routines for postoperative pain management, perceived clinical relevance of used routines, personal involvement (in addition to existing routines) in postoperative pain management, factors influencing pain alleviation requirements, and the potential role of the nurse anesthetist for improved postoperative pain management.

We found that type of anesthesia and type of surgical procedure were both factors considered important for postoperative pain management. A majority of the participants believed that pain management approaches were not appropriately individualized to the patient.

Key words: Anesthesia, nurse anesthetist, physiological responses, postoperative pain management.

Adequate pain relief after surgery, in accordance with the recommendations by the American Pain Society¹ and the Agency for Health Care Policy and Research,² is essential for the avoidance of pain-associated stress and for patient comfort during the postoperative period. Inadequately treated pain may affect recovery time, complication rate, hospital stay, and costs.³⁻⁵ Despite different recommended quality assurance standards, however, insufficient alleviation of pain remains a common phenomenon, as indicated by reports of moderate or even severe pain experienced by surgical patients during the postoperative period.^{4,6-8}

In clinical practice, it is well known that there are considerable differences in dose requirements and response patterns of individual patients to anesthetic and analgesic drugs. Pharmacodynamic and pharmacokinetic mechanisms related to age, sex, body compartment sizes, and genotype may all influence the response of the individual patient and explain major differences in the minimum effective concentration of drugs.^{9,10} High preoperative trait anxiety seems associated with increased intraoperative anesthetic requirements,¹¹ and changes in pain score following the loading dose of an analgesic drug may predict the individual consumption of analgesics for achieving

acceptable pain alleviation during the postoperative period.¹²

The nurse anesthetist has an important role in the intraoperative management of surgical patients by assessing and pharmacologically moderating physiological responses evoked by surgical stimuli, insufficient depth of anesthesia, or both.¹³ During the assessment and treatment of the responses, the nurse anesthetist gains important information about the response pattern and anesthetic requirements of each individual patient. It seems reasonable to assume that the knowledge gained from observing the specific intraoperative response pattern of the individual patient could be of value in planning early postoperative pain management for the patient. It is not known to what extent the nurse anesthetist actually contributes to and participates in planning early postoperative pain management for surgical patients. Therefore, the aim of the present study was, on the basis of a multicenter study including several university hospitals in Sweden, to assess the role of the nurse anesthetist in the planning of early postoperative pain management for surgical patients.

Study design

A questionnaire assessing the role of the nurse anesthetist in planning postoperative pain management

was developed. Before the main study, a formal test version of the questionnaire was pilot tested using 10 nurse anesthetists. The responses indicated that some open questions resulted in rather unstructured information. Such critical viewpoints on the design were discussed, and new, more structured questions were formulated and included in the final version of the questionnaire. The questionnaire included open questions and given alternative answers focusing on the following specific areas:

- Sex, professional experience, specific training in pain management
- Intraoperative routines for postoperative pain management (The perceived efficacy of present routines was measured by using a visual analogue scale in which 0 denoted no effect and 10 denoted optimal effect.)
- Perceived clinical relevance of used routines
- Personal involvement, in addition to existing routines, in postoperative pain management
- Factors influencing pain alleviation requirements
- The role of the nurse anesthetist for improved postoperative pain management

Adult anesthesia departments at university hospitals in Sweden were invited to participate in the study, which was approved by the Ethics Committee of the Medical Faculty, Göteborg University, Göteborg, Sweden. Questionnaires were distributed to coordinators at the anesthesia departments of the 4 university hospitals that agreed to participate in the study. The invitation to nurse anesthetists to participate was based on a convenience sample of nurse anesthetists who were on duty during a specific week and included verbal and written information. One of us (M.W.S.) informed participants about the aims of the study at 2 of the hospitals, while well-informed contact persons were responsible for providing the information about the study and for distributing questionnaires at the 2 remaining university hospitals. The questionnaires were handled anonymously and returned in unmarked envelopes by the responder directly to the researchers. Completed questionnaires were obtained from 101 nurse anesthetists.

- *Data analysis.* The answers to the questionnaires were transcribed into the Statistical Package for the Social Sciences (SPSS, Stockholm, Sweden AB), program version 7.5.1 for Windows. The program was used to find similarities and differences within and between the various responses. After an initial identification process of responses, the different response patterns were codified and classified to enable generation of data for appropriate descriptive statistics. The statistical calculations included descriptive statistics and use of the Pitman test for comparisons.

Table 1. Demographic data for the studied sample of nurse anesthetists (N = 101)*

Variable	Results
F/M	83 (82.2)/18 (17.8)
Mean \pm SD working experience, y, all nurse anesthetists	12.0 \pm 8.5
F/M	13.3 \pm 8.6/6.0 \pm 4.4
Specific pain management training	15 (14.9)
F/M	15 (18)/0 (0)

*Data are given as number (percentage) unless otherwise indicated.

Results

- *Sex, professional experience, specific training in pain management.* Demographic data for nurse anesthetists (N = 101) participating in the study are summarized in Table 1. As indicated in the Table, the mean working experience was considerable, and only 18 nurse anesthetists reported working experience of 3 years or less, while 62 reported 10 years or more. It is not known to what extent this distribution of experience among participants is representative of all nurse anesthetists in Sweden. The nurse anesthetists worked mainly at operating theaters providing anesthesia for adults undergoing general surgical, orthopedic, gynecological, or neurosurgical procedures.

- *Intraoperative routines for postoperative pain management and perceived clinical relevance.* Existing preoperative and intraoperative routines for postoperative pain management were reported by 70 of the 101 participants. The dominating routine was preoperative or intraoperative administration of anti-inflammatory drugs (usually paracetamol (acetaminophen); sometimes diclofenac, ketorolac, or COX-2-inhibitors). Administration of opioids (morphine, ketobemidone, or tramadol) was reported by 60 participants to be part of the routine, as was the use of central or regional nerve blocks (referred to by 28 participants). Of the 31 nurse anesthetists reporting absence of intraoperative routines for early postoperative pain management, 15 (48%) claimed to ask the anesthesiologist for an individual pain management strategy before the end of the surgical procedure, while the strategies used by the remaining participants (16 [52%]) were not detailed.

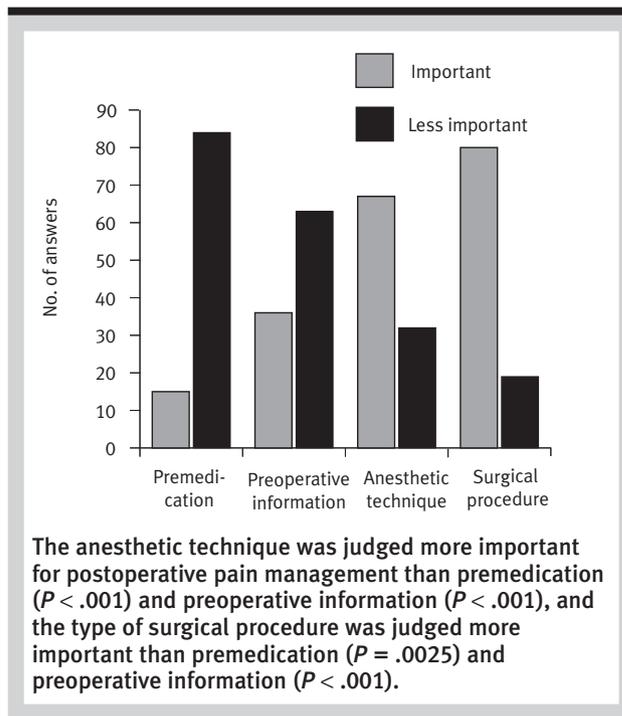
The mean \pm SD perceived efficacy of present routines was 7.1 \pm 2.1 on a 10-cm visual analog scale (from no effect to optimal effect). The mean \pm SD values for the perceived efficacy were not significantly different for nurse anesthetists with working experience of 3 years or less (6.8 \pm 1.6) compared with

nurse anesthetists with working experience of 10 years or more (7.2 ± 1.9). A combination of different strategies and drugs for postoperative pain alleviation was considered to provide better postoperative analgesia ($P < .001$) than the use of only one routine approach. Nurse anesthetists having specific training in pain management were less convinced of the clinical relevance and efficacy of existing routines than nurse anesthetists without such training ($P = .042$).

- *Personal involvement, in addition to routines, in postoperative pain management.* In addition to existing routines, 71.8% of the nurse anesthetists claimed to take specific intraoperative measures for the prevention of early postoperative pain. Most often (47.8%) a dose of opioid given toward the end of surgery was mentioned. In this context, the importance of individualization of the given dose of analgesic and initiation of the pain management early enough during the intraoperative course were stressed. Furthermore, discussions with the responsible anesthesiologist about the possible benefit of a nerve block for postoperative pain management in individual cases was considered by 11 respondents.

- *Factors influencing pain alleviation requirements.* In Figure 1, the weighted importance (ranking 1-4; 1, most important; 4, least important) of premedication, preoperative information about pain and pain management, anesthetic technique used, and type of surgical procedure for postoperative pain management is summarized. Type of anesthesia and surgical procedure were both judged as more important for postoperative pain management by the nurse anesthetists than premedication and preoperative information about postoperative pain management to the patient. The significance levels were $P < .001$ for type of anesthesia compared with premedication and preoperative information, $P < .0025$ for type of surgery vs premedication, and $P < .001$ for type of surgery vs preoperative information. Major abdominal and orthopedic surgery, as well as hysterectomy, were identified by 31.6%, 24.4%, and 18.3%, respectively, of the nurse anesthetists as procedures associated with considerable postoperative pain. Use of inhalation anesthesia or a very short-acting opioid (remifentanyl) also was indicated by 68.3% of the nurse anesthetists as an anesthetic technique necessitating specific intraoperative measures for postoperative pain alleviation. Of all participants, 74.2% claimed that intraoperative measures for postoperative pain alleviation are always necessary. A rapid turnover rate of patients in the operating room was, however, thought to make it more difficult always to establish optimal pain alleviation before the patient leaves the operation room. A few (n

Figure. The weighed importance* of premedication, preoperative information about pain and pain management, anesthetic technique used, and type of surgical procedure for postoperative pain management



* Ranking 1-4, 1 = most important; 4 = less important

= 11) nurse anesthetists stated that short procedures and neurosurgery did not necessitate specific intraoperative measures for postoperative pain management.

- *The role of the nurse anesthetist for improved postoperative pain management.* In response to the question of why insufficient postoperative pain management seems to remain a clinical problem, the comments summarized in Table 2 were obtained. It was obvious that a majority of the nurse anesthetists questioned the efficacy of routines since they thought that the routines usually were too general and not adapted to the individual patient and that analgesia often was initiated too late, when pain breakthrough had already occurred. Limited knowledge, lack of proper evaluation of the efficacy of used routines, and lack of time for involvement in postoperative pain management were other aspects of potential importance for suboptimal relief of pain in the early postoperative phase. There were no differences in the response patterns among less experienced (3 years or less of working experience) nurse anesthetists, very experienced (10 years or more of working experience) nurse anesthetists, or nurse anesthetists with special pain management training.

Adequate preoperative information to the patient

Table 2. Reasons for suboptimal postoperative pain alleviation*

Reason	Result
Routines too general, not individualized according to patient factors and type of surgery	62 (61.4)
Limited knowledge among nurse anesthetists of postoperative pain problems and management	24 (23.8)
Used routines not properly evaluated and continuously updated	21 (20.8)
Not aware of specific reasons	16 (15.8)
Insufficient time due to workload/shortage of staff	14 (13.9)
Suboptimal premedication	7 (6.9)

* Data are given as number (percentage).

in order to induce a feeling of security was considered an important measure for postoperative pain alleviation by 54 nurse anesthetists (53.5%). Most of the nurse anesthetists (82.0%) claimed that they thought that it would be of value for the anesthetic management of a patient if a routine preoperative visit were included in their clinical responsibility. At such a visit, important information about the specific characteristics of each individual patient would be obtained and a contact would be established that would give the patient a feeling of security and later also save time during preanesthetic management in the operating room. However, from the response to the questionnaires, it was obvious that at none of the anesthesia departments was a routine visit by nurse anesthetist to patients in the preoperative period included as part of the clinical anesthetic management.

In response to the question of whether a routine visit was made to patients in the postanesthetic period, 58.4% of the respondents claimed absence of such a routine in their anesthesia department. Shortage of time was given as a major reason for not having established such a routine. The remaining 41.6% of the nurse anesthetists occasionally visited their patients. This visit was made when the nurse anesthetists thought it would be important to obtain feedback after a complicated procedure or when specific intraoperative events had occurred. Some nurses reported that they would like to get more experience and knowledge of the recovery of patients in the immediate postanesthetic period. Work rotation into the postoperative unit was suggested as a means to learn more about postanesthetic adverse effects (for example, nausea, vomiting, hypothermia, pain) and to attempt to prevent such adverse effects by modified anesthetic management.

It was emphasized by 95.0% of the nurse anesthetists that the occurrence of side effects will influence the experience of pain and, therefore, pain alleviation

requirements. Measures for prevention of nausea, the most common side effect of general anesthesia, were emphasized as important for moderation of the postoperative pain experiences (n = 86). Keeping the patient warm and relaxed by prevention of intraoperative hypothermia also was mentioned (n = 19). Nurse anesthetists having more working experience (10 years or more) seemed more aware of the negative influences of side effects of anesthesia during the postoperative phase than those with less working experience (3 years or less; $P = .043$). Acupuncture and transcutaneous electrical nerve stimulation (n = 10) and music and visualization therapy (n = 3) were mentioned as possible supplemental pain-alleviating measures.

Discussion

A multidisciplinary and multiprofessional approach is considered a fundamental element of successful postoperative care strategies.¹⁴ The nurse anesthetist is intimately involved in the preoperative and intraoperative care of the surgical patient. Our previous studies have clearly documented a considerable knowledge among nurse anesthetists intraoperatively during general anesthesia to assess the response pattern of the individual patient from observations of direct and indirect physiological responses.^{13,15} Therefore, it was assumed that such information on the response pattern and anesthetic drug requirements of the individual patient also would be of potential value in the actual planning of postoperative pain management for the patient. It is not known to what extent this knowledge is used in the clinical management of surgical patients.

The results of the present study show that such specific intraoperative information achieved by the nurse anesthetist, independent of specific training in pain management, is usually not taken into consideration in planning postoperative pain management for surgical patients. This indicates, as pointed out by Field,⁶ that too little consideration seems to be given for specific

knowledge of individual patient variation in pain responses. Considering that unacceptable levels of postoperative pain still occur despite availability of efficient drugs, modern analgesic technologies, and guidelines for management,^{1,2,16} it seems reasonable to assume that consideration of the knowledge of the nurse anesthetist of the interindividual patient variation in response pattern in the intraoperative phase could contribute to more optimal postoperative pain management.

Four university hospitals in Sweden participated in the study. We distributed 160 questionnaires to the hospitals, and 101 (63.1%) were completed and returned. The response frequency may have been influenced somewhat by the fact that the questionnaires were distributed close to the summer of 2000 when fewer nurse anesthetists were on duty and a busy work situation was usually prevailing. Respondents generally had long experience, which also may have influenced the results. The questionnaire seemed to have excellent face validity based on the previously noted pilot study.

The present data indicate that intraoperative routines for postoperative pain management were commonly used, since about 70% of the nurse anesthetists at the 4 academic teaching hospitals included in the study reported such practical clinical management of surgical patients. Such a strategy is in accordance with the present, generally accepted, pain management policy advocating the use of institution-wide perioperative analgesia programs.¹⁷⁻²⁰ Some personal initiatives in addition to existing routines were reported by 71.8% of the nurse anesthetists. Such initiatives were restricted to an extra dose of opioids toward the end of the surgical procedure or suggesting that the anesthesiologist induce a nerve block or infiltrate the wound with local anesthetics to reduce postoperative pain. According to this, in earlier studies,^{5,21} preemptive administration of morphine decreased postoperative pain and analgesic requirement.

It is obvious from the respondents, however, that the nurse anesthetists were somewhat critical of the use of general routines for postoperative pain management and questioned the effectiveness of the routines. Insufficient individualization of pain management according to patient factors and type of surgery could, according to the nurse anesthetists, be the main reason for suboptimal postoperative pain alleviation. Such a viewpoint is in agreement with the viewpoints of Wulf et al,¹⁴ stressing the importance of accurately assessing patient management strategies for each type of surgery and taking into account each individual working environment. However, limited knowledge of postoperative pain management and

lack of proper evaluation and updating of the routines also were mentioned by 23.8% and 20.8%, respectively, of the nurse anesthetists. This type of response, as well as the fact that no respondents referred to American Pain Society or Agency for Health Care Policy and Research recommendations,^{1,16} indicates that nurse anesthetists may not be involved in ongoing quality assurance programs for postoperative pain management at their hospitals. Considering that only university hospitals were included in the present study, it seems highly probable that such programs existed or were in progress.

The nurse anesthetist is, no doubt, an important care provider in the perioperative management of surgical patients. The important issue is to what extent the knowledge of the nurse anesthetist is used optimally today or if it could be used even better in the future. It repeatedly has been claimed that preoperative visits by anesthesiologists, as well as by nurse anesthetists, are of value for providing proper preoperative information and thereby reducing anxiety and stress for the surgical patient. More than 50.0% of the nurse anesthetists who participated in the present study thought that adequate preoperative information to the patient would induce a feeling of security. Most of the nurse anesthetists (82.0%) claimed that they thought that it would be of value for the anesthetic management of a patient if a routine preoperative visit by the nurse was included as part of the clinical responsibility. Such a viewpoint is in agreement with the findings of Martin²² showing a significant decrease in patient anxiety level 24 to 72 hours postoperatively after a preoperative visit also from an operating room nurse. A positive relationship between preoperative anxiety and levels of pain, nausea, and experience of dependence also was found in that study. Therefore, it seems reasonable to stress that to prevent fragmentation of patient care and further develop knowledge about pain during the perioperative period, the nurse anesthetist should have the possibility of meeting the patient while the patient is awake and free of drug sedation.²³

The present study also showed that 41.6% of the participants, despite the absence of such a routine, occasionally visit their patients in the postanesthesia care unit to obtain some feedback about specific intraoperative events. The initiative occasionally to visit a patient postoperatively may indicate that there is a generalized need for such a feedback mechanism. A more extensive involvement of the nurse anesthetist also would favor the development of a multiprofessional perspective of pain alleviation. Klopfenstein et al⁷ emphasized the importance of better training in

systematic assessment of pain intensity and alternative approaches to pain alleviation. An individualized regimen would increase the quality of pain alleviation. The importance of basing such a regimen on a proper dialog between nurses and physicians about postoperative pain management in surgical wards, including evaluation of patient outcome, has been stressed.²⁴

In further research it would be of interest to compare opinions such as “routines are too general, not adapted for the individual patient,” and “there is a lack of proper evaluation of the efficacy of used analgesia” in greater detail and between nurse anesthetists with different experience.

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ACKNOWLEDGMENT

This study was supported by grants from Vårdalstiftelsen, Stockholm, Västra Götalandsregionen, Högskolan, Skövde and Skaraborgsinstitutet, Skövde, Sweden. We are grateful to statistician Anders Odén, PhD, for help with the statistical calculations.