

## Registered Nurses' and Midwives' Knowledge of Epidural Analgesia

Annette Bird RN BN MN

Clinical Nurse Consultant, Acute Pain Service, Gold Coast Hospital, Queensland, Australia

Professor Marianne Wallis RN PhD

Chair, Clinical Nursing Research, Griffith University and Gold Coast Health Service District,

Queensland, Australia

Professor Wendy Chaboyer RN PhD

Director, Research Centre for Clinical and Community Practice Innovation

(RCCCPI), Griffith University, Queensland, Australia

Correspondence:

Annette Bird  
CNC Acute Pain Service,  
Anaesthetic Department,  
Gold Coast Hospital,  
108 Nerang Street,  
Southport, 4215,  
Queensland, Australia  
E-mail: [Annette\\_Bird@health.qld.gov.au](mailto:Annette_Bird@health.qld.gov.au)

## **ABSTRACT**

Background: Very little research-based, generalizable information is available about what registered nurses (RNs) and midwives know about epidural analgesia.

Objective: To explore the current epidural knowledge levels of RNs and midwives in a multi-site setting.

Method: In total, 408 RNs and midwives at four, regional teaching facilities completed an epidural knowledge test instrument developed by the research team. The instrument included demographic data and comprised five knowledge subscales relating to epidural analgesia: spinal cord anatomy and physiology, epidural pharmacology, complications of epidural analgesia, assessment of sensory and motor blockade and the general management of a patient with epidural analgesia.

Results: The overall knowledge of RNs and midwives about epidural analgesia was good, with some subscales problematic for the sample. Results showed fair knowledge relating to the spinal cord anatomy and physiology subscale. Respondents demonstrated poor knowledge of the epidural pharmacology and complications of epidural analgesia subscales. Good knowledge of sensory and motor blockade assessment and the general management of epidural analgesia subscales was demonstrated.

## **Key Words**

Epidural analgesia, Nurses Knowledge, Assessment, Complications

## Statements

### What is already known about this topic?

- There is a plethora of evidence-based information about nurses' knowledge of general pain management, but very little exists regarding knowledge of epidural analgesia.

### What this paper adds?

- This paper provides beginning, generalizable data about what RNs and midwives know about epidural analgesia.
- The research demonstrated that the knowledge subscales relating to epidural pharmacology and the complications of epidural analgesia were problematic to the sample of RNs and midwives.
- The research instrument developed specifically for this study was highly valid and reliable and could be used to guide comparative studies.

## Registered Nurses' and Midwives' Knowledge of Epidural Analgesia

### Introduction

Epidural analgesia is a recognized technique for efficacious post-operative anaesthesia and analgesia and is also widely used to assist with the management of pain in the obstetric setting. Epidural infusions offer optimum analgesia (and anaesthesia) because of their ability to completely block the transmission of nerve impulses to the spinal cord and brain (Miller, 2005). In the United States approximately 60% of women (over 2.4 million) each year choose either epidural or combined spinal-epidural analgesia to manage their pain during labour (Eltzschig, Lieberman & Camann, 2003). Comparative figures for Australia indicate that 40% of women each year opt for epidural intervention to facilitate the delivery process (Personal communication, APS, Gold Coast Hospital). Epidurals are also widely used for surgical analgesia. Zimmermann and Stewart (1993) report that 87% of Canadian hospitals use epidural analgesia for the management of postoperative pain.

Changes in healthcare dynamics have seen the movement of patients with epidural infusions from step down or high dependency settings into the general ward environment. This trend, coupled with the increasing frequency of epidural techniques to facilitate the delivery process, means that more RNs and midwives must now possess the necessary knowledge and skills to safely manage these patients. There is, however, little research evidence to indicate knowledge levels of nurses and midwives about epidural analgesia. This study aimed to provide important understanding about nurses and midwives knowledge of epidural analgesia.

Empirical evidence in relation to the nursing knowledge of pain management in general is well reported in the literature. There is a plethora of information about nursing assessment, with a common finding that nurses' pain assessment is limited and often inaccurate (McMillan, Tittle, Hagan, Laughlin & Tabler, 2000; Clarke, French, Bilodeau, Capasso, Edwards & Empoliti, 1996;

Hollinworth, 1995). There is also strong evidence to suggest that some nurses lack basic knowledge relating to pharmacology (Heath, 1998; McCaffery & Ferrell, 1995; Ferrell, Eberts, McCaffery & Grant, 1991). Deficit areas concern drug identification (McCaffery, Ferrell, O'Neil-Page & Lester, 1990), doses (McCaffery & Ferrell, 1995), action (Glajchen & Bookbinder, 2001; Brown, Bowman & Eason, 1999), and optimum analgesic regimes (Brown, Bowman & Eason, 1999; Hamilton & Edgar, 1992).

A search of Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline databases revealed only two research-based studies in the nursing literature reporting nurses knowledge about epidural analgesia (Bird & Wallis, 2002; Sandie & Heindel, 1999). Critical analysis of these studies reveals that generalizability to the larger population of RNs and midwives may be limited due to methodological issues such as the single-site nature of the settings and the existence of extraneous variables including access to educational programs. In these studies the data collection instruments were also identified as potentially problematic, with the Bird and Wallis (2002) study (n = 158) containing two types of multiple-choice questions (MCQs), some with one correct answer and others with multiple correct answers, reportably proving difficult to collate. The Sandie and Heindel (1999) tool was not pilot tested and contained MCQs, as well as true/ false questions. With true/ false questions, respondents had a 50/50 chance of guessing the correct answer regardless of their actual knowledge. In addition, the response rate for the Sandie and Heindel (1999) study was poor, at only 43%, whilst the response rate for the Bird and Wallis (2002) study was 88%.

The purpose of this study was to describe RNs and midwives knowledge of epidural analgesia and was part of a larger study which sought to identify predictors of epidural knowledge.

## **METHOD**

### **Design**

A self-administered, descriptive survey was used in this study.

### **Setting and Sample**

RNs and midwives at four regional, teaching hospitals in two Australian states (Queensland and New South Wales) participated in this study. The sites are referred to as sites 1, 2, 3 and 4. All sites had surgical, medical, obstetric areas and Intensive Care Unit (ICU) or High Dependency Unit (HDU), except site 2, which did not have an obstetric facility. In total, approximately 195 surgical epidurals and 1360 obstetric epidurals were inserted at the 4 sites each year, indicating a large potential for exposure of nurses and midwives to epidural patients. All sites had a multi-disciplinary Acute Pain Service (APS) supporting the clinicians in the management of all aspects of acute pain (surgical and obstetric). The total potential population for this research (all sites inclusive) was 633 RNs and midwives.

### **Inclusion Criteria**

To be included in this study the RNs and midwives must have:

- worked in areas where patients with epidurals were accepted: Surgical, obstetric, medical, ICU, HDU, anaesthetics, Post Anaesthetic Care Unit (PACU) and APS
- current registration as a RN or midwife
- a clinical role, ie. involved in 'hands on' patient care; and
- worked at least 3 days per week

Note: All midwives participating in this study were also RNs, as the two participating states have yet to have direct-entry midwife graduates. In addition, the midwives in this study work exclusively in the obstetric setting.

## Research Instrument

The research instrument, developed by the research team, comprised a demographic profile and an epidural knowledge test. The demographic profile explored personal and professional aspects and identified sources of knowledge related to epidural analgesia. The knowledge test comprised a total of 21 items from five key components of epidural analgesia; spinal cord anatomy and physiology (4 items), epidural pharmacology (4 items), complications of epidural analgesia (3 items), assessment of sensory and motor blockade (6 items) and the general management of epidural analgesia (4 items). Multiple-choice questions (MCQs), with 4 response options were used for all knowledge test items.

The knowledge test instrument was tested for validity and reliability. Content validity was evaluated by the use of a panel of 10 experts, from the fields of anaesthesiology, acute pain management, education, nursing and midwifery. Based on the experts' advice, the instrument was modified and then pilot tested on 22 RNs and midwives to assess face validity. Test-retest reliability was undertaken using the pilot sample one week later. Data from both the initial pilot sample and the research sample were assessed statistically for item difficulty and discrimination, and distractor performance. These statistical analyses were undertaken with the assistance of a computer program designed to evaluate cognitive tests; the Laboratory of Educational Research Test Analysis Package (LERTAP), Version 5 (Curtin University: Western Australia).

Statistical analyses were performed on the pilot sample and repeated on the research sample.

The instrument returned a test-retest reliability of 0.98 following the pilot test. LERTAP 5 suggested changes to only two items following data analysis of the research sample (compared to 9 following the pilot test) indicating a reliable and valid instrument. The Cronbach's Alpha figure for the research sample was 0.76.

## Data Collection

Data were collected over a 10 month period. A supervised group setting technique was utilized at each site to ensure consistency of data collection and to prevent respondents from looking up answers or asking colleagues, thus ensuring a more accurate reflection of knowledge. This also provided opportunity for further clarification and discussion of the research aims and any other aspects of the research. After an explanation of the research aims and process, all potential participants were given equal opportunity to participate, or decline participation.

## **Ethics**

Ethical approval for this project was granted by the Research Ethics Committees representing each of the four sites and the university.

## **Data Analysis**

Data gathered from the epidural knowledge test instrument were entered into a database and analysed using the Statistical Package for Social Sciences (SPSS) (1997), Version 14.0 (SPSS Incorporated: Chicago). Demographic data were analyzed using numerical and visual summaries and measures of central tendency and distribution. Mean and standard deviations were presented for continuous demographic data. A frequency histogram was used to display the total test scores for the sample. Frequencies and percentages were used to summarize the response options for the 21 knowledge test items.

## **Results**

A total of 633 RNs or midwives were working in the participating areas, with 409 RNs and midwives from the four hospital sites invited to participate. Organizational issues, such as time constraints, prevented all potential respondents from having opportunity to participate. The number of RNs and midwives completing the knowledge test instrument was 408, giving a response rate of 99.7%. Thus, the research sample comprised 64.4% of the total potential population.

The sample was predominately young, with 30.4% in the 20 – 30 year age group and 27.7% in the 31 – 40 year age group. Over half (54.4%) of the sample indicated that their initial qualification into nursing or midwifery was a bachelor’s degree. A bachelor’s degree was also the most frequently reported highest educational qualification, with 65.7% of the sample reporting this qualification. Nearly one-half of the sample (41.7%) identified their current clinical specialty as the surgical field.

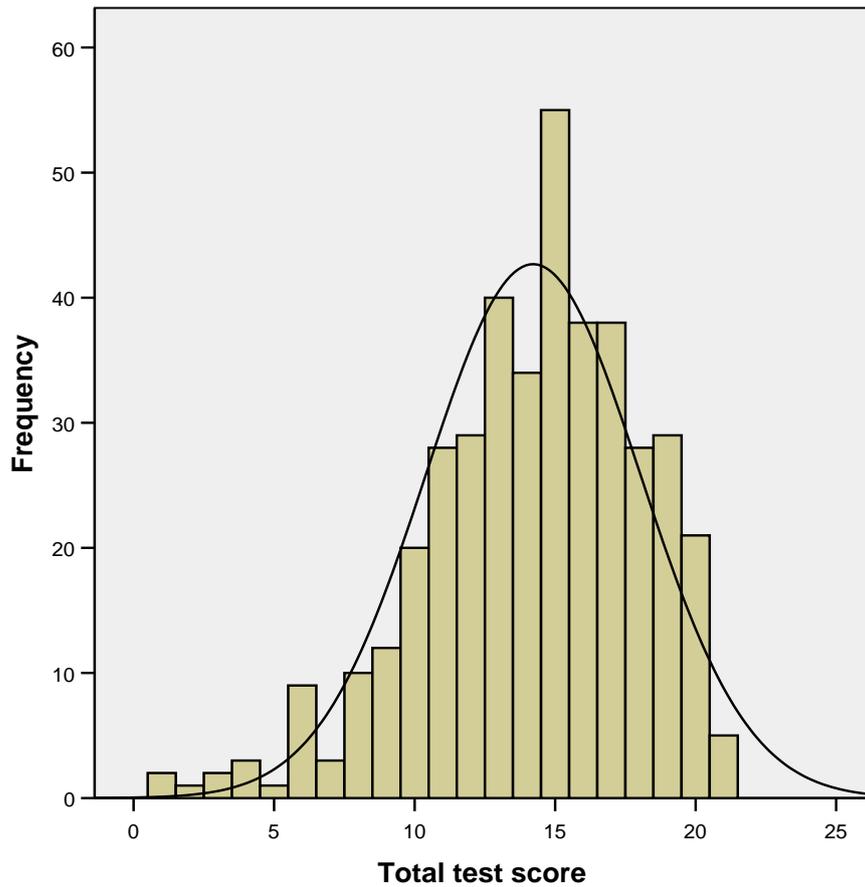
Table 1 provides a demographic summary of the education and institutional support relating to epidural analgesia for nurses pertaining to each site. Nearly one half (47.8%) of the sample reported that they had completed a dedicated epidural educational module and 43.9% reported having had inservice about epidural analgesia by an APS. A large proportion (81.4%) indicated that they had clinical experience with epidural patients. Other sources of epidural knowledge included: reading in books or nursing/ medical journals, information from colleagues, epidural education as part of university curriculum and self-interest.

**Table 1 Demographic summary of epidural education and institutional support of the sample (by site)**

<b>Characteristic</b>	<b>Total n (%)</b>	<b>Site 1 n (%)</b>	<b>Site 2 n (%)</b>	<b>Site 3 n (%)</b>	<b>Site 4 n (%)</b>
<b>Epidural Educational Module</b>	195 (47.8)	132 (49.4)	24 (77.4)	9 (15.8)	30 (56.6)
<b>Clinical Facilitation</b>	61 (15%)	38 (14.2)	3 (9.7)	5 (8.8)	15 (28.3)
<b>APS Inservice</b>	179 (43.9)	115 (43.1)	20 (64.5)	19 (33.3)	25 (47.2)

<b>Post- Grad Certificate in Pain Management</b>	2 (0.5)	0 (0)	0 (0)	0 (0)	2 (3.8)
<b>Ward Experience</b>	332 (81.4)	195 (73)	31 (100)	53 (93)	53 (100)
<b>Other</b>	34 (8.3)	27 (10.1)	1 (3.2)	3 (5.3)	3 (5.7)

Figure 1 presents a histogram of the total test scores, showing the distribution of data reflecting the total knowledge scores of the research sample. The mean total test score (n = 408) was 14.2 (SD 3.8). The actual knowledge score range for the sample was from 1 – 21 (possible range 0 – 21). Thirty-nine percent of the sample scored in the 15 to 18 score range on this knowledge test, that is, one SD above the mean. Five participants scored a perfect knowledge score of 21.



**Figure 1.** Absolute frequency of total test scores

Table 2 presents a summary of the epidural knowledge test subscale scores and indicates that knowledge in some areas was problematic for the sample. Only 57% correctly responded to the questions relating to epidural pharmacology, suggesting that almost half of respondents did not know the answers to the questions in this subscale. A similar result was found in the epidural complications subscale, with respondents correctly responding to only 56% of the questions relating to this subscale. Fair knowledge was demonstrated relating to spinal cord anatomy and physiology, with respondents correctly responding to 69% of these questions. Knowledge was good relating to the remaining two subscales, with respondents correctly responding to 75% of questions about assessment of sensory and motor blockade and 77% correctly responding to questions about the general nursing management of epidurals.

**Table 2 Knowledge test subscale summary**

<b>Subscale (possible range)</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Average % Score</b>
Spinal Cord Anatomy and Physiology (0 – 4)	2.75	0.97	69%
Epidural Pharmacology (0 - 4)	2.30	0.94	57%
Assessment of Sensory and Motor Blockade (0 – 6)	4.50	1.55	75%
Complications (0 – 3)	1.67	1.00	56%
General Nursing Management (0 – 4)	3.08	1.06	77%

Table 3 shows the percentages of correct and incorrect responses to all items on the knowledge test. There were two questions that less than 40% of respondents answered correctly; questions 14 (37.5%) and 15 (24.5%) in the epidural pharmacology subscale. Only 47.8% correctly answered question 25 in the complications of epidural analgesia subscale. Question 23 was also problematic for the sample with only 50% able to correctly recognize the classic signs of epidural haematoma. The range of correct responses for the remaining items was from 59.8% to 89.5%.

**Table 3 Correct and incorrect response option percentages: Research data**

Question and Description	Subscale	Correct n (%)	Incorrect n (%)
9 - Location of epidural space	Spinal Cord Anatomy & Physiology	262 (64.2)	145 (35.6)
10 – Implications of insertion level	Spinal Cord Anatomy & Physiology	211 (51.7)	196 (48)
11 – Definition of a dermatome segment	Spinal Cord Anatomy & Physiology	336 (82.4)	71 (17.4)
12 - Identification of dermatome segment	Spinal Cord Anatomy & Physiology	308 (75.5)	97 (23.8)
13 – Commonly used epidural drugs	Epidural Pharmacology	320 (78.4)	88 (21.5)
14 – Action of local anaesthetic agents	Epidural Pharmacology	153 (37.5)	254 (62.2)
15 – Action of epidural opioids	Epidural Pharmacology	100 (24.5)	308 (75.5)
16 – Recognition of pharmacological complication	Epidural Pharmacology	365 (89.5)	43 (10.5)
17 – Theory for control area	Assessment of Sensory & Motor Blockade	344 (84.3)	64 (15.7)
18 – Procedure for sensory assessment	Assessment of Sensory & Motor Blockade	302 (74)	105 (25.8)
19 – Documentation of findings	Assessment of Sensory & Motor Blockade	310 (76)	97 (23.7)
20 – Identification of motor blockade assessment tool	Assessment of Sensory & Motor Blockade	268 (65.7)	133 (32.8)
21 – Recognition of clinical motor block	Assessment of Sensory & Motor Blockade	308 (75.5)	93 (22.8)
22 – Recognition of progression of motor block	Assessment of Sensory & Motor Blockade	283 (69.4)	118 (28.9)
23 – Recognition of classic signs of epidural haematoma	Complications of epidural analgesia	204 (50)	204 (50)
24 – Recognition of local anaesthetic toxicity	Complications of epidural analgesia	277 (67.9)	130 (31.8)
25 – Recognition of complication of local anaesthetic agent	Complications of epidural analgesia	195 (47.8)	206 (50.5)

26 – Management of inappropriate motor blockade assessment	General management	326 (79.9)	80 (19.6)
27 - Management of inappropriate sensory blockade assessment	General management	52 (86.3)	56 (13.8)
28 – Management of high sensory block	General management	333 (81.6)	75 (18.3)
29 – Procedure for epidural catheter removal	General management	244 (59.8)	164 (40.2)

## Discussion

The overall finding in this study was that, in general, the level of knowledge of RNs and midwives about epidural analgesia was consistent with the two existing studies on this topic (Bird & Wallis, 2002; Sandie & Heindel, 1999). The high response rate (99.7%) and the multi-site nature of this study means that the results may be more generalizable to acute care settings than the previous studies. This study also provided a more comprehensive overview of knowledge about the individual components of epidural analgesia and care of the epidural patient than existing research.

The sample of 408 RNs and midwives comprised predominately younger nurses compared to the overall Queensland nursing population. This is probably because the Queensland figures (QNC, 2007) are for all specialties, including mental health and aged care, where there is a higher mean age compared to surgical nurses. The largest group of respondents were RNs from the surgical specialty (41.7%), not a surprising finding considering that the surgical areas are diverse, encompassing RNs from the fields of orthopaedics, urology, gynaecology, neurology, vascular and general surgery. Medical nurses only accounted for 15.9% of the sample, another expected finding, due to very few medical areas using epidural analgesia.

Some of the epidural knowledge subscale scores were low in this sample. Questions relating to the subscale anatomy and physiology explored general spinal cord knowledge, with the results indicating some knowledge deficit. There is evidence in the literature suggesting that bioscience is a source of anxiety for nurses, with students often perceiving the pathophysiology component to be difficult compared to other topics (Kumar, 2005; Gretszy & Cotton, 2003). The research results are consistent with these previous studies.

Authors have found evidence to suggest that good biological knowledge will lead to more optimal patient care (Jordan & Potter, 1999; Jordan & Reid, 1997). The implications of knowledge deficits about physiology are that, if nurses and midwives do not understand how the body systems function, they may not fully understand the pharmacological effects of the drugs they are administering to their patients, potentially resulting in sub-optimal outcomes (Jordan & Reid, 1997; Jowett, Walton & Payne, 1994). That is, they may not then recognize the complications resulting from pharmacological causes. For example, if they have poor understanding of the difference between the epidural space and the spinal space in relation to opioid dosing, they may fail to recognize the early warning signs of respiratory depression following opioid administration.

Questions in the pharmacology subsection explored specific knowledge relating to the drug groups commonly used for epidural analgesia: opioids and local anaesthetic agents. Whilst most participants could identify the drug groups used in epidural analgesia, they could not distinguish between the effects and side effects of these drugs. Further evidence of poor pharmacological knowledge was established in the complications of epidural analgesia subscale, with poor overall knowledge demonstrated by the sample. It is important to acknowledge that many of the complications of epidural analgesia are pharmacologically related and thus, incorrect responses to questions in this subscale provide further evidence that nursing and midwifery pharmacological knowledge was lacking. These findings support the opinion that of all the topics studied in the

biological sciences, pharmacology is the hardest of the sciences for nurses to learn (Manias, Aitken & Dunning, 2004; Manias & Bullock, 2002; Jordan & Reid, 1997).

The results of the pharmacology subscale are consistent with other studies examining nurses' and midwives' general knowledge of the pharmacologic agents used for pain control. Inadequate knowledge of opioid analgesics by nurses and midwives has been a primary issue to researchers for many years (Jastrzab et al, 2003; Mackrodt & White, 2001; McMillan et al, 2000; Heath, 1998; McCaffery & Ferrell, 1997; McCaffery & Ferrell, 1992; Hamilton & Edgar, 1992; Cohen, 1980). These studies have consistently identified lack of knowledge about the use of analgesic drugs, including inaccurate knowledge about commonly used analgesics, routes of administration, titration of doses, equianalgesic dosing and concerns about the possibility of opioid addiction or respiratory depression.

The role of the nurse and midwife in medication management has been well documented and encompasses tasks such as; administering the drugs safely and efficiently, assessing the patient for drug effects and side-effects, the re-evaluation of drug regimes and documentation (Manias & Bullock, 2002; Latter, Rycroft-Malone, Yerrell & Shaw, 2000; McCaffery & Pasero, 1999; Spencer, 1996). Authors have expressed concern that if a student's preparation in pharmacology is poor then there may be a failure to identify the interconnections between pharmacology theory and clinical practice (Manias & Bullock, 2002; Courtenay, 1991). The implications of poor pharmacological knowledge are that if nurses and midwives do not understand the actions of the administered drugs, it is logical that they may fail to recognize potential side effects, leading to unnecessary patient discomfort or even harm. The current research supports this concern.

There are very few studies specifically examining nurses' and midwives' knowledge of epidurally administered drugs. The multiple-choice section of the Sandie and Heindel (1999) study relating to epidural pharmacology showed that only 30% of the sample produced an overall correct

response rate. One of the major findings in the Sandie and Heindel (1999) study, consistent with the present study, was that only 11% of respondents correctly distinguished between the adverse effects of opioids and local anaesthetic agents. The present study findings that 43% of responses to the questions in this subscale were incorrect, suggests that this continues to be an issue.

The subscale assessment of sensory and motor blockade explored respondents' knowledge on given examples of epidural patient scenarios. Accurate patient assessment is a pivotal component guiding the decision-making process and ongoing patient care, with the goal of producing optimum patient satisfaction and outcomes. The scenarios explored application of knowledge to the clinical setting, with good overall knowledge demonstrated. Results indicated that knowledge of sensory blockade assessment was slightly better than knowledge of motor blockade assessment (Table 3).

There is little empirical research in the area of nurses' and midwives' knowledge of sensory and motor blockade assessment. The level of knowledge relating to this subscale demonstrated by respondents is reassuring, considering that the literature does not provide very much information for nurses or midwives about how to perform sensory and motor blockade assessment. The current research findings relating to the assessment and general management subscales suggest that nurses and midwives may acquire this knowledge from other sources such as on ward experience or specific epidural on-site education by APS.

Only one other study was identified that specifically related to RNs' and midwives' knowledge and assessment of sensory and motor blockade (Bird & Wallis, 2002). Interestingly, participants in the 2002 study also performed better on the sensory blockade assessment than the motor blockade assessment, consistent with the current research findings.

The sample scored highest on the general nursing management subscale (using clinical scenarios), producing an overall average percent correct score of 77%. The first three questions explored what the nurses and midwives would do in given situations where there were not ideal assessment findings, with from 80% to 86.3% of respondents identifying the correct course of action in all scenarios (Table 3). The final question was the most problematic in this subscale and explored the actions of the respondent prior to removing the epidural catheter, with only 59.8% identifying the correct procedure. This was a concerning finding because failure to check if the patient has recently received anticoagulant therapy prior to epidural catheter removal may result in arguably the most catastrophic epidural patient outcome: an epidural haematoma.

One of the primary concerns of this study (directly related to the above finding) was that half of the RNs and midwives had difficulty recognizing the classic signs of epidural haematoma (Table 3, Question 23). This low result may indicate inadequacy in educational preparation of the RNs and midwives despite information about this complication easily located in the literature (Naber, Jones and Halm, 2004; Mahlmeister, 2003; Kou, Fischgrund, Biddinger & Herkowitz, 2002; Faccenda & Finucane, 2001; Cox, 2001). The Bird and Wallis (2002) study found that in theory, 7% and in practice, over 17% of nurses and midwives did not recognize the classic signs of epidural haematoma. The implications are that if undiagnosed within 6 – 8 hours, this complication will have catastrophic consequences for the patient, such as permanent paralysis.

The current study findings support the two previous studies in regard to the level of knowledge relating to epidural analgesia. The results of the general nursing management subscale in the current study are encouraging because this subscale explored what the nurses and midwives would do in a clinical setting. Thus, even though knowledge relating to some subscales was poor, the majority of respondents were still able to demonstrate correct management interventions in the given clinical situations.

## Limitations of the Research

The benefit of this study lies in the resulting description of the current epidural knowledge level of a large and broad sample of RNs and midwives. The findings provide a foundation to develop future, evidence-based educational programs, however there are several limitations to this research. One limitation relates to the generalizability of the study because of the setting. Four hospitals participated in the research and while more generalizable than single-site studies, all sites were public facilities. Thus, caution must be exercised when generalizing the results to the private sector as nurses and midwives working in the private sector may comprise different characteristics to those working in the public sector.

A further limitation relates to the services provided at the hospital sites. All participating sites had an institutional APS. Thus, it would be unwise to generalize the study results to those institutions that do not have an APS because they may comprise different characteristics and knowledge levels than those that do.

There is also evidence to suggest that pen and paper tests may reflect knowledge levels but not what is actually done in clinical practice, ie. actual behaviour (Bird & Wallis, 2002). Twycross (2002) concurs, stating that "nurses may have theoretical knowledge about pain management but this does not necessarily mean that they are able to use this knowledge in practice" (p. 706). The Bird and Wallis (2002) study for example, found that the nurses' theoretical knowledge of epidural analgesia outweighed their clinical performance in assessing epidural patients and decision-making. Future research could examine the relationship between knowledge and actual behaviour.

## **Recommendations**

Three main recommendations arise from this research. First, RNs and midwives should complete an epidural educational program prior to caring for patients with epidural analgesic techniques. This may result in better patient outcomes related to more knowledgeable RNs and midwives. Second, comparative studies should be undertaken to expand the knowledge base about the knowledge levels of epidural analgesia of RNs and midwives. The extent to which the findings are unique to Australia is unknown. The third recommendation arising from this research relates to future research suggestions; including studies that explore the clinical assessment skills of RNs and midwives who care for epidural patients in the clinical setting and the quality of individual epidural educational programs for RNs and midwives.

## **Conclusion and Implications for Practice**

The results of this study further the knowledge base about what RNs and midwives know about epidural analgesia and provide more generalizable data compared to the existing literature. Nursing education prepares nurses with basic knowledge and skills, but it is in the practice environment that nurses build on this knowledge and learn the analytical and clinical skills important for correct decision-making in any situation. If nurses perform their care without adequate understanding of the underlying theory about anatomy and physiology and pharmacology then they may dismiss or misinterpret signs and symptoms predisposing the patient to potentially catastrophic complications. The implications of poor nursing knowledge relating to epidural analgesia is that patients will not have their pain appropriately and adequately managed leading not only to complications, but also to decreased patient satisfaction, longer hospital stays and greater economic burdens on the healthcare system.

The foundation for competence in clinical practice begins with the educational preparation of nurses and midwives at the under-graduate level and is thus, of paramount importance. Results of this study indicate that further work in the preparation of new-graduate RNs and midwives

about epidural analgesia is needed. Attention then, to both undergraduate curriculum and on-going on-site educational opportunities about epidural analgesia will likely mean greater RN and midwife epidural knowledge, resulting in optimum patient outcomes.

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