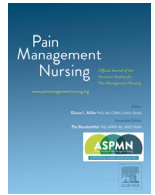




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Original Research

Do No Harm: Nursing Students' Knowledge and Attitudes Toward Pain Management

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ABSTRACT

Background: Nurses play an important role in effectively assessing and managing patients' pain. There is limited evidence in relation to Australian undergraduate nursing students' knowledge, attitudes, and management of pain and this study attempts to address this gap.

Objective: To explore the current knowledge and attitudes to pain management among undergraduate nursing students.

Methods: This is a cross-sectional study of a convenience sample of 150 undergraduate nursing students from three Australian regional universities measuring student knowledge and attitudes toward pain management and assessment using the Knowledge and Attitudes Survey Regarding Pain (KASRP) tool between May and September 2023.

Results: The average scores for each year level in relation to the total KASRP were Year 1 ($M = 22.98$; $SD = 4.74$), Year 2 ($M = 25.09$; $SD = 4.46$), and Year 3 ($M = 27.27$; $SD = 4.22$). There were statistically significant differences in KASRP scores between students across the three years of the program. The results also indicated that very few students were able to achieve the overall pass rate (80%). Additionally, medication knowledge was an identified aspect of pain management poorly answered.

Conclusions: Nursing students' pain knowledge and attitudes appear to improve throughout their undergraduate program, however there are significant knowledge deficits that may impede the ability to assess and manage pain in clinical practice. This knowledge may be helpful for nursing educators and curriculum developers to develop strategies to address this gap.

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Pain does not discriminate. Across all socio-economic, cultural, or geographic contexts, most people will experience pain (acute, chronic, short, or long term) at some point in their lives. Poorly managed pain, whether acute or chronic, can contribute to reduced mobility, reduced social interaction, restricted employability, hospital admissions, and extended length of hospital stays.

Acute pain is also a significant health issue because postsurgical pain affects up to 80% of inpatients, and after hospital discharge, moderate-to-severe postoperative pain is a common occurrence (Park et al., 2023). Chronic pain affects approximately one-third of people worldwide and is identified as the primary reason people seek healthcare (Cohen et al., 2021).

Health professionals' inadequate or inaccurate pain assessment can be a barrier to patients receiving prompt and effective pain relief (Hroch et al., 2019; Shdaifat et al., 2020; Ying Ge et al., 2013). Pain management consists of the actions taken to relieve pain, and pain assessment is inextricably linked to pain intervention. Recog-

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tion is the first step in pain assessment, followed by implementing assessment protocols, acting to address pain (intervention), operationalizing existing pain management plans, and evaluating the efficacy of the intervention.

Acute (primary) pain plays a healing role in encouraging rest following tissue trauma and does not usually cause distress to the person experiencing it (Cohen et al., 2021; Glare et al., 2019). Poorly managed acute pain may lead to unrelieved chronic pain (Hussien & Hay, 2022). Between 10% and 12% of adult surgeries result in substantial functional impairment due to chronic pain (Glare et al., 2019; Lavand'homme, 2017), and pediatric post-surgical pain develops in 11%–54% of children and adolescents (Rosenbloom et al., 2022). Chronic pain is defined as pain persisting beyond the normal healing time of around three months (Cohen et al., 2021; Glare et al., 2019). Unrelieved chronic pain causes changes in function, loss of mobility, poor sleep, depression, anxiety, decreases in quality of life, and suicidal ideation in extreme cases (Cohen et al., 2021; Cáceda et al., 2022). These consequences signify that health professionals must acknowledge, assess, and manage acute and chronic pain appropriately.

Background

As the largest health workforce, nurses are at the frontline of care provision and have frequent contact with people in hospitals, residential care, at home and in the community. They are ideally placed to identify the person in pain, perform an assessment, initiate, and advocate for appropriate pain management, and evaluate the subsequent effectiveness of any all interventions (Dequeker et al., 2018; International Association for the Study of Pain [IASP], 2018). Due to the subjective nature of pain, nurses must recognize and respect the patient's account as a valid and accurate interpretation of the level of pain beyond the perceptions and attitudes of others (Cousins et al., 2022; Dequeker et al., 2018).

Understanding nurses' knowledge of pain is not a new area of research, with recent reviews indicating that nurses' pain knowledge and attitudes toward pain management worldwide have remained relatively unchanged for 20 years (Alshehri et al., 2024; Cousins et al., 2022). Recommendations to re-evaluate the quality of pain education were identified more than 20 years ago for undergraduate nurses, to ensure they can effectively manage pain (Twycross, 2000; 2002). No definitive action has resulted, as shown by reviews of undergraduate nurse education in the United Kingdom (Mackintosh-Franklin, 2017) and the USA (Campbell, 2020). While pain education is embedded in all nursing undergraduate curricula, focus on chronic pain is less visible, and clinical placements are relied upon to close the gap between practice and theory (Grey, 2023). There needs to be a clear process to identify the knowledge development of undergraduate nursing students' pain knowledge. A 2022 study of undergraduate nursing, midwifery, and allied health professional students from 12 universities across five countries (including Australia) found that although the number of hours differed across institutions, nursing students received approximately five hours of pain education compared to up to 40 hours in physiotherapy courses (Mankelow et al., 2022).

Evaluating learning is essential in teaching student nurses how to assess and manage pain effectively. Understanding how these students learn and apply this knowledge is crucial for improving the curriculum. There are limited validated assessment options to determine if nursing students are learning appropriate content to provide adequate and effective care for the person experiencing pain (Grey, 2023). A study of undergraduate health students discovered that nursing students often expressed a need for more pain management content and used both pharmacological

and nonpharmacological methods to moderate pain (Kodama et al., 2021).

Registered nurses' attitudes and knowledge about pain have been assessed in many countries, including Hong Kong (Lui et al., 2008), Australia (Van Niekerk & Martin, 2001), the USA (Duke et al., 2013), Italy (Latina et al., 2015), and Turkey (Ocak, Yildizeli & Topcu, 2023) and in each instance, the results indicated a lack of knowledge to assess and manage pain adequately and recommendations reflected those made by Twycross in 2000 who called for further pain education for nurses. Additionally, studies have been conducted on undergraduate nursing students in Canada (Hroch et al., 2019), Saudi Arabia (Shdaifat et al., 2020), and Spain (Zuazua-Rico et al., 2022), again finding that pain knowledge is inadequate. In many instances, the literature has called for further similar research using larger populations.

Following the recommendations to survey larger cohorts and to determine if the Australian experience reflects the current literature, nursing students from three universities were surveyed. This paper presents the findings of that exploratory study to understand the level of undergraduate nursing students' knowledge, attitudes toward pain, and pain management.

Methods

This study sought to answer the research questions: (1) What are undergraduate nursing students' knowledge and attitudes toward pain management and assessment during Year 1, Year 2, and Year 3 of their Australian nursing program? and (2) Are there differences between knowledge, attitudes, and pain assessments between year levels?

Study Design

This study employed a quantitative cross-sectional study to examine the differences in knowledge, pain assessment, and management of pain by undergraduate nursing students.

Participants

This study was conducted between May and September 2023 (Term 2) at three regional universities located in Australia. As of the census date (the final day a student can withdraw from a university course or unit of study without financial or academic penalty), the Bachelor of Nursing (BN) program had a combined enrolment of 6,698 students across the three institutions. All students enrolled in the BN program were invited to participate, irrespective of their year of study.

Measurement Tool

The Knowledge and Attitudes Survey Regarding Pain (KASRP) tool is frequently used in assessing registered nurses' knowledge of pain management (Alshehri et al., 2024; Ortiz et al., 2022). The KASRP tool was developed by Ferrell and McCaffery in 1987, with periodic revisions to reflect changes in pain management practice (Ferrell & McCaffery, 2014). It was originally developed based on cancer pain guidelines across six areas (medication, assessment, intervention, addiction, spiritual/cultural, and pathophysiology) (Ortiz et al., 2022). Although it is known to have limitations (Alshehri et al., 2024; Cousins et al., 2022), it is a validated, widely used tool to assess registered nurses' knowledge and attitudes toward pain management (Ferrell et al., 1993; Shdaifat et al., 2020).

While considered the only proven, reliable, and valid survey measuring knowledge and attitudes toward pain in nurses (Gök, & Yildizeli Topcu, 2023), it has also been stated that there is no "Gold

Table 1

Original Question and Australian Changes

Original question	Australian changes
Q16. Vicodin (hydrocodone 5 mg + acetaminophen 300 mg) PO is approximately equal to 5-10 mg of morphine PO.	Q16. Tramadol 50mg PO is approximately equal to 10 mg of morphine PO
Q25. Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?	Q25. Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?
a. Codeine	a. Codeine
b. Morphine	b. Morphine
c. Meperidine	c. Tramadol
d. Tramadol	d. Oxycodone
Q30. Which of the following is useful for treatment of cancer pain?	Q30. Which of the following is useful for treatment of cancer pain?
a. Ibuprofen (Motrin)	a. Ibuprofen (Brufen)
b. Hydromorphone (Dilaudid)	b. Hydromorphone (Jurnista)
c. Gabapentin (Neurontin)	c. Gabapentin (Neurontin)
d. All of the above	d. All of the above
Q32. Which of the following describes the best approach for cultural considerations in caring for patients in pain:	Q32. Which of the following describes the best approach for cultural considerations in caring for patients in pain:
a. There are no longer cultural influences in the U.S. due to the diversity of the population.	a. There are no longer cultural influences in Australia due to the diversity of the population.
b. Cultural influences can be determined by an individual's ethnicity (e.g., Asians are stoic, Italians are expressive, etc.).	b. Cultural influences can be determined by an individual's ethnicity (e.g., Asians are stoic, Italians are expressive, etc.).
c. Patients should be individually assessed to determine cultural influences.	c. Patients should be individually assessed to determine cultural influences.
d. Cultural influences can be determined by an individual's socioeconomic status (e.g., blue collar workers report more pain than white collar workers).	d. Cultural influences can be determined by an individual's socioeconomic status (e.g., blue collar workers report more pain than white collar workers).

Note. Q16. True/False; Q25,30 & 32 are multiple choice. Wording in bold reflects changes.

Standard" tool available for measuring nurses' knowledge and/or attitudes toward pain management (Alshehri et al., 2024). To date, there is evidence of studies using the KASRP within undergraduate populations (Hroch et al., 2019; Ortiz et al., 2022; Zuazua-Rico et al., 2022); the authors of this paper have not found evidence that has specifically validated the tool within this student cohort. There has not been a tool developed specifically for undergraduate nursing students that the authors of this study are aware of.

The reliability of the KASRP tool was explored with a focus on the internal consistency of the items. A reliability coefficient score above 0.70 indicates the scale is reliable (Sürücü & Maslakçi, 2020). This tool has a test-retest reliability of ($r = 0.80$) and a Cronbach alpha of 0.70 (Ortiz et al., 2022). The Cronbach's alpha for this study was $\alpha = 0.69$.

The survey applied in this study consisted of two parts. Part 1 contained demographic questions, including participants' year level of the BN program, age, and ethnicity. Gender was not included among the demographic variables collected in this study. While ethnicity was included in the survey, it was optional and was poorly answered; therefore, it was not reported in the results. Part 2 included 41 scale items of the self-administered Knowledge and Attitudes Survey Regarding Pain scale (KASRP). The 41-item scale contains three sections, including 22 true/false questions, 15 multiple-choice questions, and 4 case study questions. Within the scale section, questions were modified to align with current prescribing in Australia, and the change from US language to Australian English, as shown by bold text in Table 1.

The total KASRP score is based on the total correct answers provided by participants and percentages based on the number of correct responses as a percentage of the total scale (X/41). An acceptable pass for the scale of $>80\%$ has been cited by several authors (Duke et al., 2013; Hroch et al., 2019; Latina et al., 2015; Zuazua-Rico et al., 2022). The authors of the scale recommend avoiding distinguishing items as measuring either knowledge or attitudes, as some items may measure both. However, it is suggested to analyze both the percentage of total scores and isolate items with

the highest and lowest correct responses to guide educational approaches (Ferrell & McCaffery, 2014).

Data Collection

Participants were recruited via student email and electronic messages via students' online learning platforms. Students voluntarily decided to participate in the online survey at their convenience. During the data collection period, course coordinators were asked to send reminders to potential participants via the online learning platforms on two occasions.

Data Analysis

Data were analyzed using the Statistical Package for Sciences (SPSS version 29.0.0). Descriptive statistical analysis was performed based on the year of study, given that the research question examined differences across year levels. For the KASRP tool, correct responses were scored with 1, and incorrect responses with zero (total score ranged from 0 to 41). The data were analyzed in terms of each item and groupings of questions (e.g., true/false, multiple-choice, and case study). Assumptions of normality and homogeneity of variances found no violations.

A one-way ANOVA was performed using Tukey's post hoc test, and significance of $p < .05$ was considered to examine differences in the KASRP score across year levels. Effect sizes were calculated using eta squared η^2 , which represents the proportion of variance in the dependent variable explained by group membership. Eta squared values were interpreted using Cohen (1988) guidelines: small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$) and large ($\eta^2 = 0.14$). Cohen's d was calculated to estimate the effect size of the mean differences between groups and was interpreted using Cohen's (1988) guidelines: small ($d = 0.2$), medium ($d = 0.5$) and large ($d = 0.8$).

An a priori power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2007) to determine the minimum sample size required. Results indicated the required sample size to achieve 80% power for detecting a medium effect, at a significance criterion

Table 2
Demographic Characteristics of Nursing Student Participants

Age (years)	Year 1	Year 2	Year 3	Total
18-24	23	18	13	54
25-34	9	9	7	25
35-44	14	16	12	42
45-54	3	11	8	22
55 and over	2	1	4	7
	51	55	44	150

of $\alpha = 0.05$, was $N = 159$ for a one-way ANOVA. As the sample in this study was below this, these results need to be considered with caution.

Ethical Considerations

Anonymity, confidentiality, and participants' right to voluntary participation were ensured during data collection by using the Qualtrics platform. All participants were informed that consent to participate in the study and publish their data would be assumed on completion and submission of the study survey. The researchers acknowledge an unequal relationship between them and the students, as many of the researchers are university lecturers. Ethical approval was obtained from CQUniversity Human Research Ethics Committee (number 23621, February 7, 2023), and subsequent administrative ethics permission was obtained at the collaborating universities.

Results

Participants in this study were Australian undergraduate students undertaking a three-year Bachelor of Nursing at one of three regional Australian universities. Demographic variables included age (i.e., year categories), and year level of academic program. In total, there were 150 students in the sample, including 51 (year 1 students), 55 (year 2 students), and 44 (year 3 students). An overview of age categories and year levels is represented in Table 2.

Table 2 demonstrates that across year levels, more than half of the students (64%) were either between 18 and 24 years or 35 and 44 years of age. Of all first-year students, 45.1% were between 18 and 24 years, compared with second year (32.73%) and third year (29.55%).

Table 3 below shows the Total KARSP score for each year level, and the average scores for each part of the scale.

Table 4 summarizes the results based on year level for the various parts of the survey and a total KARSP score for each year level. In Year 1, the Total KARSP mean was $M = 22.98$ ($SD = 4.74$), compared with Year 2, with a mean score of $M = 25.09$ ($SD = 4.46$), and finally Year 3, with a mean of $M = 27.27$ ($SD = 4.22$). The mean Total KARSP score for all participants was $M = 25.01$ ($SD = 4.78$).

To test whether there was a statistically significant difference between the Total KARSP means across each year level, a one-way ANOVA was performed. The ANOVA was significant, showing that there were statistically significant differences in the Total KARSP score between at least two of the year levels, $F(2, 147) = 10.80$; p

Table 3
KASRP Results Across Student Year Levels

Year level	M	SD
1st year		
Q1-Q22	13.73	3.00
Q23-Q37	7.94	2.33
Q38-Q41	1.31	1.12
Total KARSP	22.98	4.74
2nd year		
Q1-Q22	15.04	2.72
Q23-Q37	8.29	1.92
Q38-Q41	1.76	1.23
Total KARSP	25.09	4.46
3rd year		
Q1-Q22	15.84	2.69
Q23-Q37	9.32	2.10
Q38-Q41	2.11	1.32
Total KARSP	27.27	4.22

Note: 1st year $n = 51$, 2nd year $n = 55$, 3rd year $n = 44$. Q1-22 = True/False, Q23-37 = Multiple-choice, Q38-41 = Case study questions.

$\leq .001$, and an overall effect size of $\eta^2 = 0.128$ (CI 0.039 to 0.224), which is considered a medium-large effect size Using Cohen's d , there was a large effect between Year 3 and Year 1 ($d = 0.95$), medium effects between Year 3 and Year 2 ($d = 0.50$), and Year 2 and Year 1 (0.46).

Table 4 showed that the third-year students ($M = 27.27$, $SD = 4.22$) had significantly higher scores than both second ($M = 25.09$, $SD = 4.46$) and first year students ($M = 22.98$, $SD = 4.74$), ($p \leq .05$), and between third year and first year students ($p \leq .001$). A box plot is also provided (Figure 1) to illustrate the distribution of KARSP scores across year levels, showing a progressive increase from first year to third year. Third year students had the highest median score ($Mdn = 28$) with an interquartile range of $IQR = 5$, followed by second year ($Mdn = 25$) and $IQR = 6$, and first-year students having the lowest median score ($Mdn = 22$) and $IQR = 5$. Four outliers were observed in first year, and one in third year, yet the IQR ranges indicate low variability and consistency in the data, which is not affected by the outlier values.

The pass level assigned by the tool's creators required the achievement of 80% (Ferrell et al., 1993). In this study, for simplicity, those who had achieved 33 out of 41 or above were considered to have met the pass mark. A total of 11 students (7.33% of the total sample of 150) achieved a passing mark, and the highest mark was 36/41 obtained by 2 students. Table 5 summarizes the results.

Responses were also analyzed to determine the most correct and incorrect responses (Table 6), and these have been presented according to questions (e.g., true/false, multiple choice, and case studies) and question types (i.e., addiction/substance abuse/physical dependence, medication/pharmacology, spiritual/cultural, pain assessment, cancer-related pain, intervention) (Al-Sayaghi et al., 2022; Thapa et al., 2022).

The highest number of correct answers was related to the use of opioids, patients' cultural and spiritual beliefs, and belief in patient reports of pain. Medication and pharmaceutical knowledge questions were the most incorrectly answered. In both case studies, the patient rated his pain as 8 out of 10, yet the smiling pa-

Table 4
Differences in KARSP Between Year Levels

		Mean difference (1-2)	Std. Error	Sig	95% CI for the mean difference		Cohen's <i>d</i> [CI]
					Lower bound	Upper bound	
3rd year	1st year	4.29	0.924	<0.001	2.10	6.48	0.95 [0.52, 1.38]
3rd year	2nd year	2.18	0.908	0.046	0.03	4.33	0.50 [0.10, 0.90]
2nd year	1st year	2.11	0.873	0.044	0.04	4.18	0.46 [0.07, 0.84]

Table 5

Number of Passing Students and Year Levels

Year level 1	Year level 2	Year level 3
Student A Total KASRP = 33	Student E Total KASRP = 33	Student H Total KASRP = 33
Student B Total KASRP = 33	Student F Total KASRP = 33	Student I Total KASRP = 33
Student C Total KASRP = 33	Student G Total KASRP = 34	Student J Total KASRP = 35
Student D Total KASRP = 36		Student K Total KASRP = 36
Total = 4	Total = 3	Total = 4

tient was assessed by the nurses with a pain level lower than the grimacing patient and was therefore given less pain relief.

Discussion

Nursing students need to acquire the necessary knowledge and skills to be able to provide effective pain management during an undergraduate degree to prepare them for professional practice. This study presents the findings of an exploratory study that examined undergraduate nursing students' knowledge and attitudes toward pain management and assessment across year levels. The new knowledge contribution of this study focuses on the student perspective to facilitate an enhanced future nursing workforce.

Overall Knowledge, Skills, and Attitudes of Nursing Students

This study found that the majority of students did not have an adequate level of knowledge, or positive attitudes toward pain. This was reflected in the fact that only 7.33% of the sample met the pass mark. The authors of the original KASRP tool set a pass mark of 80% (Ferrell et al., 1993). This research found that few students were able to meet this requirement, which may indicate that at the time of completing their program of study, their knowledge of pain may be problematic.

While it can be considered encouraging that participants answered questions about opiates correctly and indicated that patients are the most accurate judges of the intensity of their pain in the true/false and multiple-choice questions, there was an apparent disconnect in the survey answers. The case study results indicate that while students state they believe the patient is the

best person to judge their pain in theory, they might not display this in practice. In both scenarios, the patient rates his pain as 8 out of 10, yet the participants did not achieve 100% in these questions, and the smiling patient was rated lower than the grimacing patient. In both case studies, the patient would not be administered appropriate as-needed (PRN) medication, and the smiling patient would be given less pain relief than the grimacing patient. While participants in this study achieved better results in this section than nursing students from five Spanish universities (Zuazua-Rico et al., 2022), the pattern remains similar. Unlike other studies (Al-Sayaghi et al., 2022, for example), participants in this study correctly answered that children less than 11 years old can reliably report pain, but then incorrectly answered that children under two years of age have decreased pain sensitivity and limited memory of painful experiences. Such findings are concerning because false beliefs can lead to undertreatment of pain and false judgmental and stereotypical attitudes toward pain relief requests, causing potential harm to the patient.

All undergraduate nursing students are expected to understand pain perception among individuals and the subjective nature of pain. While the case study scenario uses an acute pain example only, the lack of correct answers alludes to the nonacceptance and stigmatization of those with chronic pain. Patients often perceive health professionals as not believing their accounts of the extent of their chronic pain. Further, the link between the severity of the reported pain and the likelihood of it being discounted by clinicians raises concerns (Chibnall et al., 2018).

The results in this study reflect those of nursing students shown in the literature, such as Hroch et al. (2019), Shdaifat et al. (2020), and Zuazua-Rico et al. (2022), with little difference in answers to the questions in all sections, and all concluded that their study demonstrates poor nursing students' knowledge regarding pain and pain management. As these studies were conducted in Canada, Saudi Arabia, and Spain, there appears to be a lack of cultural influence apparent in the results, as the correct and incorrect answer patterns are similar. Nursing students have less clinical experience and less pharmaceutical knowledge than registered nurses, which suggests that some questions are out of the scope of a student, especially considering KASRP was originally developed based on cancer pain guidelines across six areas (medication, assessment, intervention, addiction, spiritual/cultural, and pathophysiology) (Ortiz et al., 2022).

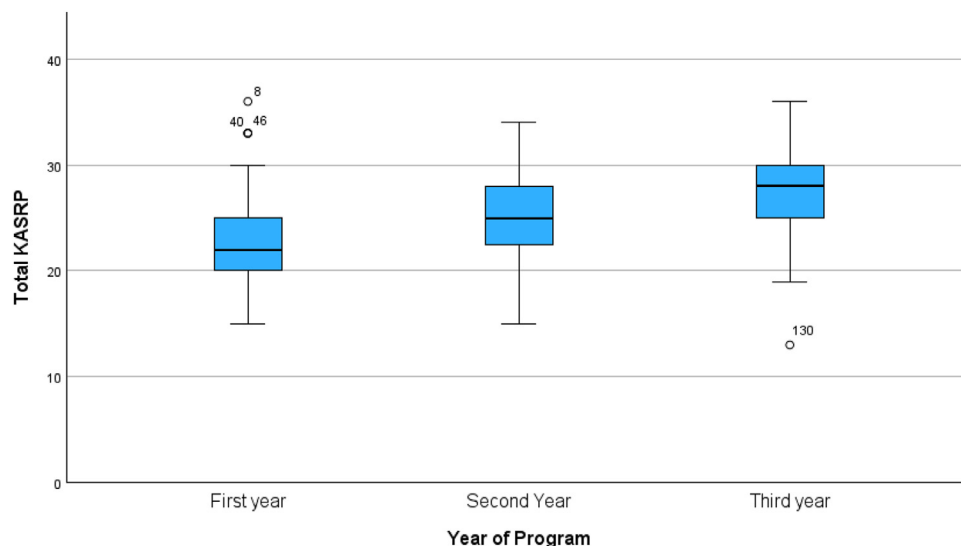


Figure 1. Distribution of KASRP scores across year groups.

Table 6

Most Common Correct and Incorrect Responses by All Participants

Top 5 correct answers (true/false)	Number (% of total)	Question type
Q20. Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving (True)	147 (98.0%)	Addiction
Q13. Patient's spiritual beliefs may lead them to think pain and suffering are necessary (True)	145 (96.7%)	Spiritual/cultural
Q22. Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression (True)	140 (93.3%)	Addiction
Q14. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response (True)	138 (92.0%)	Medication
Q12. Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent's assessment of the child's pain intensity (False)	134 (89.3%)	Assessment
Top 5 incorrect answers (true/false)		
Q8. The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours (False)	36 (24.0%)	Medication
Q17. If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain (False)	40 (26.7%)	Medication
Q9. Opioids should not be used in patients with a history of substance abuse (False)	60 (40.0%)	Addiction
Q5. Aspirin and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases (False)	71 (47.3%)	Medication/pharmacology
Q2. Because their nervous system is underdeveloped, children under two years of age have decreased pain sensitivity and limited memory of painful experiences (False)	73 (48.7%)	Pain Assessment
Top 5 correct answers (multiple choice)		
Q31. The most accurate judge of the intensity of the patient's pain is....	136 (90.7%)	Pain assessment
Q29. The most likely reason a patient with pain would request increased doses of pain medication is....	135 (90.0%)	Medication/pharmacology
Q32. Which of the following describes the best approach for cultural considerations in caring for patients in pain?	124 (82.7%)	Spiritual/cultural
Q30. Which of the following is useful for treatment of cancer pain?	114 (76.0%)	Medication/pharmacology
Q34. The time to peak effect for IV morphine is?	109 (72.7%)	Medication/pharmacology
Top 5 incorrect answers (multiple choice)		
Q28. A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months	16 (10.7%)	Cancer-related pain
Q36. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following....	42 (28.0%)	Addiction
Q37. Which statement is true regarding opioid induced respiratory depression?	52 (34.7%)	Medication/pharmacology
Q33. How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?	54 (36.0%)	Addiction
Q23. The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is.....	85 (56.7%)	Medication/pharmacology
Most correct answers (case studies)		
Q40. ...he is lying quietly in bed and grimaces as he turns in bed ... On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert's pain....	103 (68.7%)	Assessment
Q38. ... he smiles at you and continues talking and joking with his visitor... On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert's pain.....	94 (62.7%)	Assessment
Most incorrect answers (case studies)		
Q39. He has identified 2/10 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time.....	20 (13.3%)	Intervention
Q41. He has identified 2/10 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time:	40 (26.7%)	Intervention

Note: Answer is provided in bold in True/False section.

Differences Across Year Levels

This study found that there were statistically significant differences between year levels in relation to the total KARSP score. Students in the third year performed better than first- and second-year students, and second-year students performed better than first-year students.

Undergraduate nursing students receive progressively complex pain assessment and management knowledge during their three-year program. As information is scaffolded across the 3-year course (Coffman et al., 2023), pain management and assessment concepts are taught with increasing complexity.

Implications for Nursing Education/Curricula

Nursing students require education strategies and content that promote understanding of the subjective nature of pain, pain assessment, intervention, and management strategies, to provide the foundation upon which to build a good practice that nurtures genuine empathy and knowledge-informed actions to relieve or mitigate pain (Cousins et al., 2022). Universities' nursing curricula greatly emphasize caring for people living with conditions iden-

tified as national health priority areas, such as diabetes and kidney disease. Chronic pain may be associated with the priority areas, such as chronic conditions, and addressed in that context. However, chronic pain spans multiple diseases and pathophysiology and is considered a disease.

To improve pain education worldwide, the International Association for the Study of Pain (IASP) developed a Curriculum on Pain for Schools of Nursing in 1999, and nine health professional pain curricula, which have been freely available online since 2010 (IASP, 2018; Van Niekerk & Martin, 2001). Although the use of this curriculum has been recommended in the literature many times, for example, in 2001 by Van Niekerk and Martin, and Shdaifat et al. in 2020, the IASP nursing pain curricula are not embedded in the curriculum at the universities that student participants in this study attend. It is reasonable, then, to propose that pain education must commence at the undergraduate level, and the current hours and pain topics be increased (Ortiz et al., 2022).

Limitations of Using the KASRP

As indicated, the KASRP scale has been widely used to assess registered nurses' knowledge and attitudes toward pain manage-

ment, yet it has also been used in studies with undergraduate nursing students (Hroch et al., 2019; Ortiz et al., 2022; Zuazua-Rico et al., 2022). Although there are identified strengths of this tool (i.e., validity and reliability and ease of administration), given that it was developed in the United States, the KASRP may not capture nuanced ethical, ethical, cultural, or emotional dimensions that are relevant to nursing students within an Australian health care context. For example, it does not fully reflect Australian healthcare contexts, including Indigenous perspectives of pain (Mittinty et al., 2022). Additionally, Alshehri et al. (2024) identified that scales such as the KASRP have limitations, such as using self-reported knowledge and attitudes, which may not capture subtle cultural nuances or reflect actual knowledge, by using only true/false or multiple-choice questions. As the KASRP scale was not developed for undergraduate students, and the studies have found that their knowledge, skills and attitudes are poor, developing a scaffolded pain knowledge and attitudes scale that evolves alongside their education, clinical exposure and identify formation aligned with progressive complexity of pain management knowledge and attitudes across a program may be of greater benefit.

Limitations

There was poor participation of student nurses undertaking the survey, and future studies should include strategies to improve response rates to be able to validate the findings. Conducting the survey online has been considered a limitation in terms of participant numbers (Glare et al., 2019) when compared to studies conducting the survey during face-to-face class time, which achieved better response rates (Hroch et al., 2019). Perhaps an incentive system for survey completion might increase participation for online students. The KASRP focuses on pharmacological interventions for pain management, which is outside the scope of the 1st year nursing student and may also explain why completion rates were poor. The time involved in completing the survey and the complexity of the questions may have been factors influencing completion rates, yet some questions, such as the true/false questions, may be easier for students to answer.

Finally, the results must be considered with caution due to the low response rate. Ideally, a larger sample size could afford to undertake an exploratory factor analysis. The authors are not aware of any empirical studies that have been conducted to validate in-depth validation within this cohort.

Recommendations for Education Curricula

The introduction of Australian Standards for Health Practitioner Pain Management Education is imminent and will enhance capacity building in health workforce pain education (Slater et al., 2022). The standards will meet goal one of the *National Strategy for Health Practitioner Pain Management Education* (Faculty of Pain Medicine, 2023). In anticipation of the introduction of the pain standards, and to ensure Australian nursing graduates are work-ready to play their significant role in pain management, we recommend the following:

- Pain education should be recognized as a national priority within nursing curricula.
- The addition of pain management questions in stimulation and oral examinations.
- Mapping to assess what and how pain is taught in nursing programs across Australia, commencing with the mapping of learning outcomes.
- Ensure that content is aligned across theoretical and clinical components (including simulation).

- Incorporate case-based learning that focuses on the multidimensional nature of pain, pain assessment and management, management strategies, and clinical conditions across the lifespan.
- Include interprofessional education to reflect collaborative pain management approaches.
- Include the role of nurses in pain management and factors that influence pain intensity and outcomes.
- Understand cultural, gender, and socioeconomic disparities in pain perception and treatment
- Include reflective activities that challenge negative attitudes and misconceptions about pain and those who experience pain.

Recommendations for Future Research

Further, we also recommend the following:

- Stringent item analysis, revision, and validation of the KASRP tool to create a version tailored to the undergraduate nursing scope of practice within Australia
- Revision of the KASRP tool tailored to the scope of practice in generalist nursing settings (i.e., as opposed to the oncology focus in the original KASRP).
- Longitudinal studies measuring nursing students' knowledge and attitudes toward pain across their program
- Intervention studies designed to increase students' knowledge and attitudes of pain and applied pain management within an undergraduate degree program.

Conclusion

Preparing undergraduate nursing students to have well-developed knowledge and skills to implement appropriate interventions to address patients' pain is vitally important. While Australian nursing students learn about pain management during their three-year undergraduate program, there is concern that their knowledge levels may be insufficient to assess and manage pain in clinical practice. Based on the findings from this study, further research into the knowledge levels of students is warranted. How pain is embedded through a nursing curriculum has implications for nurse educators and those responsible for curriculum design.

Declaration of competing interest

None

CRediT authorship contribution statement

Colleen Johnston-Devin: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Lisa Beccaria:** Writing – review & editing, Writing – original draft, Validation, Investigation, Formal analysis, Data curation. **Marina Cousins:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Data curation, Conceptualization. **Adele Baldwin:** Writing – original draft, Methodology, Funding acquisition, Data curation. **Patrick H. Du Preez:** Writing – original draft, Project administration, Investigation, Formal analysis. **Katrina Lane-Krebs:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Ethics Statement

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