INTRODUCTION

There is an increasing global acknowledgement of the importance of pain assessment that is increasingly recognized as a serious worldwide public health concern. Pain is an undesirable feeling related to tissue impairment and a cause for requiring medical services. Feeling pain has an undesirable effect on the quality of life and satisfaction level of patients, with increasing knowledge and perceptions of pain management and ways to alleviate symptoms and effects worldwide (Glowacki, 2015; Johnson, 2019). In recent years, there has been increasing interest in pain management as a vital part of medical treatment and nurses have a significant role in the evaluation and handling of pain events as they spend the most time liaising with patients in bedside care provision (de Araujo & Romero, 2015; Tompkins, Hobelmann, & Compton, 2017). Nurses can have a substantial impact on controlling pain if they have sufficient knowledge and positive perceptions towards pain management, but nurses consistently under-estimate pain and deliver sub-optimal pain control and treatment worldwide (Yava et al., 2013).

This is implicitly due to inadequate knowledge about pain management. Nursing students enter nursing programmes with a misunderstanding of pain and consequently continue to hold these erroneous concepts regardless of subsequent training and
experience (Goldberg & McGee, 2011). Thus, a lack of training and misconceptions about pain management prevent nurses from providing appropriate treatment (Chen, Tsoy, Upadhye, & Chan, 2018; Germossa, Sjetne, & Hellesø, 2018). Some studies have focused specifically on pain management skills and knowledge among nurses (Gatchel, McGeary, McGeary, & Lippe, 2014; Umuhoza, Chironda, Katende, & Mukeshimana, 2019).

Research has consistently shown that pain profoundly influences patients' physical and psychological status and thus has broader impacts on patients' families and communities. Consequently, the theory-practice gap (i.e. the poor knowledge and attitudes towards pain management among nurses) results in inadequate pain assessment and treatment in health systems (Department of Health & Human Services, 2019). The absence of international guidelines on pain management in medical and nursing programmes reduces the ability of healthcare professionals to evaluate and respond to patient pain (Department of Health & Human Services, 2019; Tabije-Ebuen, 2018).

Nurses are at the front-line of dealing with patients' pain, through assessing and managing patients' conditions and preferences on a frequent basis. However, despite many recommendations provided by the International Association for Pain Management and other bodies, it has been widely reported that undergraduate nursing curricula do not have adequate consideration of pain management (Burke, 2019; Latchman, 2014). Much uncertainty still exists about the pain as an unpleasant feeling for patients and it is a complicated experience in healthcare settings, which is not well detected or managed (Sherrill, 2013). Despite many empirical studies, advanced technological aides and pain management training workshops, pain treatment remains a challenge for health workers (Lewthwaite et al., 2011).

To find out the efficiency of current pain education on the knowledge, attitudes and perceptions of nursing students, valid measurement tools are required to assess and quantify these domains. This study thus undertakes to determine the level and predictors of knowledge and attitudes of nursing students towards pain management. The significance of this study is that its results can contribute to the literature about the level of student awareness and attitudes regarding pain management, which can help planners in the future to improve the quality of services provided for patients through better evaluation and treatment, thus improving patient health outcomes and satisfaction, providing optimum quality of care via evidence-based practice (EBP).

2 | METHODS

2.1 | Setting

A cross-sectional study was conducted at a college of nursing in a university in the Eastern Region of Saudi Arabia from March to May 2017. The college delivers a bachelor's degree in nursing and offers a bridging programme as well.

2.2 | Sampling and sampling criteria

The population sample comprised all undergraduate and bridging students at the nursing college during the study period. Convenience sampling was used to collect data from the students during the study period. Using the online software Sampsize (http://sampsize.sourceforge.net/iface/s3.html), the calculated sample size was 163, through the following parameters (precision 5%, prevalence 50%, CL 95% and population 282). Nursing students who were studying in our school through March to May 2017 were eligible to take part in the study. We excluded students who did not attend pharmacological courses or who joined pain management workshops.

2.3 | Survey instrument

The Knowledge and Attitudes Survey Regarding Pain (KASRP) was used to evaluate the knowledge and attitudes of nursing students towards pain management. The scale, originally developed by Ferrell and McCaffery in 1987, enables students to self-report their responses to items designed to assess their knowledge and attitudes concerning pain and pain management (Ung, Salamonson, Hu, & Gallego, 2016). The English version of the scale was used, as English is the medium of instruction in the University and in the Saudi healthcare sector.

The KASRP is a self-administered scale which includes 39 questions. The first 22 items are true or false questions. Questions 23–37 are multiple-choice ones, and finally, questions 38–39 are case study questions. The tool has Cronbach's alpha of 0.70 and test–retest reliability of 0.80. The scoring for the correct answers was reported as percentages (Duke, Haas, Yarbrough, & Northam, 2013; Ung et al., 2016). The total scores ranged from 0–41, with higher scores indicating a higher degree of knowledge and attitudes regarding pain management. The scores are categorized into three categories: poor (<50%), fair (50–75) and good (>75). It should be noted that a very advanced level of prose is used in KASRP, which may be difficult even for native speaking nursing professionals to immediately comprehend, as may be judged from the examples quoted in the Results section below, which has methodological implications.

2.4 | Ethical consideration

Research Ethics Committee approval was obtained from the Institutional Review Board (IRB) at the university where the research was carried out. The study protocol and questionnaire were approved prior to conducting any participant recruitment. At the outset, students were given a comprehensive Participant Information Sheet which, in addition to verbal communication, explained in full the voluntary nature of participation and the right to withdraw from the study at any time without giving a reason, without this affecting students’ education or statutory rights. It also explained the research purpose, significance and benefits.
2.5 | Data collection

Data were collected during the teaching hours at the university. Thirty minutes were allocated to students to answer all the questions.

2.6 | Data analysis

The analysis of data was done using SPSS version 20. Descriptive statistics and frequency distributions were performed to describe the baseline characteristics of study participants and to determine their level of knowledge and attitudes. Continuous data were assessed for normality, and chi-square test was used to evaluate the association between demographic variables and level of pain management knowledge and attitudes. Binary logistic regression analysis was carried out to explore the independent predictor variables. A p-value of <.05 was considered statistically significant.

3 | RESULTS

3.1 | Demographic characteristics

The response rate was 68.4%, and students’ mean age was 24.3 years (SD 4.6). 52.3% were male, 58.5% were single, and 72.8% were undergraduate students (thus, 27.2% were bridging students) (Table 1).

3.2 | Pain management knowledge and attitudes

The mean knowledge on pain management was 42.6 (SD 9.1). According to scoring criteria, 81% of nurses got poor scores and 19% got fair scores. Table 2 shows the relationship between proportion of demographic characteristics according to knowledge and attitude level. Chi-square for gender shows that there is a significant difference between the knowledge and attitude of students and gender (p = .002). No significant association was found between knowledge and attitude score and marital status, educational level and age.

Table 3 shows that the statements with the most correct responses were the following:

- “Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression” (over 75%).
- “After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient’s response” (73.7%).
- “Narcotic/opioid addiction is defined as a chronic neurobiological disease, characterized by behaviours that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm and craving” (70.6%).

The number of correct answers for other statements among the top ten correctly answered items ranged from 68.0%–54.8%.

Table 4 shows that the statements with the fewest correct responses were the following:

- “Received morphine 2 mg IV. Half-hourly pain ratings following the injection ranged from 6–8, and he had no clinically significant respiratory depression, sedation or other untoward side effects. 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” (8.3%).
- “The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is (oral)” (8.3%).

The number of correct answers for other statements among the top ten incorrectly answered items ranged from 10.1%–31.1%.

Binary logistic regression was used for four variables (age, gender, education level and marital status) as predictors of knowledge and attitudes among students. The Omnibus Test of Model coefficient
The model or equation is significant ($X^2 = 13.3, df = 4, N = 193, p = .01$). Nagelkerke's $R^2 = .10$ indicates a weak relationship between prediction and gender (82.9%). The Wild criterion demonstrates that only gender made a significant contribution to prediction ($p = .002$) (Table 5).
This study investigated Saudi nursing students’ knowledge and attitudes towards pain management and found them to be generally inadequate. Approximately three-quarters of the nursing students correctly answered a question regarding sedation assessment (“Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression”), but all other items were answered correctly by fewer than 75% of participants.

The findings of the current study showed that there is insufficient knowledge among nursing students with regard to pain medications and assessment, as low percentages of correct answers were reported. This finding is congruent with previous studies (Al-Khawaldeh, Al-Hussami, & Darawad, 2013; Goodrich, 2006; Lewthwaite et al., 2011; Rahimi-Madiseh, Tavakol, & Dennick, 2010). One notable finding is that only 54.8% of the participants knew that morphine is considered the drug of choice for the treatment of prolonged moderate-to-severe pain for cancer patients. Our results agree with the results obtained in a study carried out in Jordan, where almost half of the respondents correctly responded to the same item (54.5%) (Al Omari, 2016). Thus, it is critically important to enrich undergraduate nursing students’ pharmacological knowledge regarding pain management (Al Omari, 2016; Al-Khawaldeh et al., 2013; Gadallah, Hassan, & Shargawy, 2017).

The level of education might be intuitively expected to be significantly associated with the knowledge and attitudes of the students in terms of pain management, and this is affirmed by some empirical investigations (Duke et al., 2013; Ekim & Ocakci, 2013; Lewthwaite et al., 2011). This reflects that seniors are expected to have more theoretical and clinical courses than juniors, as well as more clinical experience. However, the results of the current study support previous investigations which reached the opposite conclusion: that educational level is not significantly associated with students’ knowledge and attitudes (Craig, 2014; Shakya & Shakya, 2016). At any rate, it is crucial for the nursing education curriculum to be updated and revised to ensure that it contributes to enrich the students’ knowledge as they move from one level of education to the next.

4 | DISCUSSION

The items answered correctly most frequently focus on pain medication and administration, while the most commonly incorrect items were mainly related to assessment and pharmacological intervention. This result is consistent with studies declaring that current nursing education does not adequately emphasize students’ abilities to assess their patients’ needs and intervene properly in response (Alnajar, Darawad, Alshahwan, & Samarkandi, 2019; Manwere, Chifweu, Mukwamba, & Chirolona, 2015).

Gender is significantly associated with students’ knowledge of pain management, with female students having better knowledge than males. Moreover, gender was found to be a predictor of knowledge and attitudes among students. This result is concurrent with previous research findings (Greenberger, Reches, & Riba, 2006), specifically relating to the behavioural dimension of pain assessment. However, in other studies, gender was not found to exert any significant effect on undergraduate nursing students’ knowledge of pain management (Gadallah et al., 2017). As female student nurses are generally more empathetic than their male counterparts (Ouzouni & Nakakis, 2012), it can be inferred that they may pay more attention to pain management information.

5 | CONCLUSION

The present study was designed to determine the level and predictors of knowledge and attitudes of the nursing students towards pain management. The most obvious finding to emerge from this study is that the students’ mean knowledge of pain management was 42.6%. The items answered correctly most frequently concerned pain medication and administration. Furthermore, the most commonly incorrect items were mainly related to assessment and pharmacological interventions. Regression analysis found that gender was significantly associated with the level of knowledge and attitudes about pain management.

The most obvious implication of this study is the low percentages of Saudi nursing students’ knowledge regarding pain management treatment. Consequently, we recommend strengthening the current pharmacology curriculum for nursing students, which is clearly inadequate in terms of imparting knowledge of pain management treatments.

The results of this study contribute to the literature about the level of student awareness and attitudes regarding pain management, which can help planners in the future to improve the quality of services for patients through better evaluation and treatment.

Several important limitations need to be considered, such as its small sample size, non-probability sampling technique (a convenient sample) and use of self-reporting. Also, using the English version of the tool may have impeded the students’ ability to understand some items. Though the findings of the current study might not be generalized for all Saudi universities (e.g. private universities), the findings provide a piece of beneficial evidence for academics and decision-makers to integrate pain management education in different courses taught in nursing faculties.
Accordingly, we recommend further research studies to include a larger and more representative sample randomly selected from all Saudi universities (public and private) from different districts of the country. In addition, developing and applying an Arabic version of the KASRP questionnaire is highly recommended.

ACKNOWLEDGEMENTS
We are grateful to all the students who participated in the present study. We would also like to express our gratitude to Dr Arwa Oweis for her valuable support and help. We are thankful to Prof. Suleiman Bah for carefully reviewing the manuscript. We would like to express our great appreciation to Dr Shadia Aboulazm and Dr Fatimah Mokabel for their valuable and constructive suggestions during the planning and development of the study. We also would like to acknowledge the support of field research teams for their efforts in data collection, Mrs. Ebtsam Mahmoud.

ORCID
Emad Shdaifat https://orcid.org/0000-0003-2723-6710

REFERENCES
Al Omari, O. (2016). Knowledge and attitudes of Jordanian nursing students toward children’s pain assessment and management: A cross-sectional study. Journal of Nursing Education and Practice, 6(3), 51–58.
Al-Khawaldeh, O. A., Al-Hussami, M., & Darawad, M. (2013). Knowledge and attitudes regarding pain management among Jordanian nursing students. Nurse Education Today, 33(4), 339–345. https://doi.org/10.1016/j.nedt.2013.01.006
Alnajar, M., Darawad, M., Alshahwan, S., & Samarkandi, O. (2019). Knowledge and attitudes toward cancer pain management among nurses at oncology units. Journal of Cancer Education, 34(3), 186–193. https://doi.org/10.1007/s13187-017-1285-5
Burke, A. (2019). Review of nursing education [independent report]. Educating the Nurse of the Future, Submission to Department of Health. Retrieved from https://consultations.health.gov.au/office-of-the-chief-nursing-and-midwifery-officer/educating-the-nurse-of-the-future-e-independent-rev1/supporting-documents/Manusell_Tk20Burke_A%20Wallace_D_Australian%20Pain%20Society%20Limited.PDF
Chen, E., Tsyo, D., Upadhye, S., & Chan, T. M. (2018). The acute care of chronic pain study: Perceptions of acute care providers on chronic pain, a social media-based investigation. Cureus, 10(3), e2399. https://doi.org/10.7759/cureus.2399
Craig, J. A. (2014). Nursing knowledge and attitudes toward pain management, Theses and Capstone Projects. Nursing Theses and Capstone Projects, 8. Retrieved from https://digitalcommons.gardner-webb.edu/nursing_etd/8
de Araujo, L. C., & Romero, B. (2015). Pain: Evaluation of the fifth vital sign - A theoretical reflection. Revista Dor, 16(4), 291–296. https://doi.org/10.5935/1806-0013.20150060
Department of Health and Human Services (2019). Pain management best practices Inter-Agency Task force report: Updates, gaps, inconsistencies and recommendations. Retrieved from https://www.hhs.gov/ash/advisory-committees/pain/reports/index.html
Duke, G., Haas, B. K., Yarbrough, S., & Northam, S. (2013). Pain management knowledge and attitudes of baccalaureate nursing students and faculty. Pain Management Nursing, 14(1), 11–19. https://doi.org/10.1016/j.pmn.2010.03.006
Ekim, A., & Ocakci, A. (2013). Knowledge and attitudes regarding pain management of pediatric nurses in Turkey. Pain Management Nursing, 14(14), e262–e267. https://doi.org/10.1016/j.pmn.2012.02.004
Gadallah, M., Hassan, A. M., & Shargawy, S. (2017). Undergraduate nursing students’ knowledge and attitude regarding pain management of children in Upper Egypt. Journal of Nursing Education and Practice, 7(6), 101–108. https://doi.org/10.5430/jnep.v7n6p100
Gatchel, R. J., McGeeary, D. D., McGeeary, C. A., & Lippe, B. (2014). Interdisciplinary chronic pain management: Past, present and future. American Psychologist, 69(2), 119–130. https://doi.org/10.1037/a0035514
Germossa, G. N., Sjetne, I. S., & Hellesen, R. (2018). The impact of an in-service educational program on nurses’ knowledge and attitudes regarding pain management in an Ethiopian university hospital. Frontiers in Public Health, 6, 229. https://doi.org/10.3389/fpubh.2018.00229
Glowacki, D. (2015). Effective pain management and improvements in patients’ outcomes and satisfaction. Critical Care Nurse, 35(3), 33–41. https://doi.org/10.4037/ccn2015440
Goldberg, D. S., & McGee, S. J. (2011). Pain as a global public health priority. BMC Public Health, 11(1), 770. https://doi.org/10.1186/1471-2458-11-770
Goodrich, C. (2006). Students’ faculty members’ knowledge and attitudes regarding pain management: A descriptive survey. Journal of Nursing Education, 45(3), 140–144. https://doi.org/10.3928/01484854-20060630-09
Greenberger, C., Reches, H., & Riba, S. (2006). Levels and predictors of knowledge and attitudes regarding pain among Israeli baccalaureate nursing students and nurses pursuing specialty certification. International Journal of Nursing Education Scholarship, 1(1), 8. https://doi.org/10.2202/1548-923X.1221
Johnson, M. I. (2019). The landscape of chronic pain: Broader perspectives. Medicina (Kaunas, Lithuania), 55(5). 182. https://doi.org/10.3390/medicina55050182
Latchman, J. (2014). Improving pain management at the nursing education level: Evaluating knowledge and attitudes. Journal of the Advanced Practitioner in Oncology, 5(1), 10–16.
Lewthwaite, B. J., Jabusch, K. M., Wheeler, B. J., Schnell-Hoehn, K. N., Mills, J., Estrella-Holder, E., & Fedorowicz, A. (2011). Nurses’ knowledge and attitudes regarding pain management in hospitalized adults. Journal of Continuing Education in Nursing, 42(6), 251–257. https://doi.org/10.3928/00220124-20110103-03
Manwere, A., Chipfuwa, T., Mukwamba, M., & Chironda, G. (2015). Knowledge and attitudes of registered nurses towards pain management of adult medical patients: A case of Bindura hospital. Health Science Journal, 9(4), 3.
Ouzouni, C., & Nakakis, K. (2012). An exploratory study of student nurses’ empathy. Health Science Journal, 6(3), 534–552.
Rahimi-Madiseh, M., Tavakol, M., & Dennick, R. (2010). A quantitative study of Iranian nursing students’ knowledge and attitudes towards pain: Implications for education. International Journal of Nursing Practice, 16(5), 478–483.
Shakya, S., & Shakya, B. (2016). Knowledge and attitude of nurses on pain management in a tertiary hospital of Nepal. International Journal of Nursing Research and Practice, 3(1), 3–8.
Sherrell, R. J. (2013). Assessment of nurses’ knowledge and attitudes toward pain management: Novice to expert, [BSN thesis]. Nursing Theses and Capstone Projects, 85. Retrieved from https://digitalcommons.gardner-webb.edu/nursing_etd/85
Tabije-Ebuen, M. (2018). Evaluation of knowledge and attitudes by healthcare providers regarding pain in the ED and ICU. International Journal of Anesthesia and Relaxation, 2(3), 19–32.
Tomkins, D. A., Hobelmann, J. G., & Compton, P. (2017). Providing chronic pain management in the “fifth vital sign” era: Historical and treatment perspectives on a modern-day medical dilemma. Drug and Alcohol Dependence, 173(S1), S11–S21. https://doi.org/10.1016/j.drugalcdep.2016.12.002
Umuhoza, O., Chironda, G., Katende, G., & Mukeshimana, M. (2019). Perceived knowledge and practices of nurses regarding immediate post-operative pain management in surgical wards in Rwanda: A descriptive cross-sectional study. *International Journal of Africa Nursing Sciences, 10*, 145–151.

Ung, A., Salamonson, Y., Hu, W., & Gallego, G. (2016). Assessing knowledge, perceptions and attitudes to pain management among medical and nursing students: A review of the literature. *British Journal of Pain, 10*(1), 8–21. https://doi.org/10.1177/2049463715583142

Yava, A., Çicek, H., Tosun, N., Özcan, C., Yildiz, D., & Dizer, B. (2013). Knowledge and attitudes of nurses about pain management in Turkey. *International Journal of Caring Sciences, 6*(3), 494–505.

How to cite this article: Shdaifat E, Al-Shdayfat N, Sudqi A. Saudi nursing students’ pain management knowledge and attitudes. *Nursing Open*. 2020;7:1833–1839. https://doi.org/10.1002/nop2.570