

Report

Optimizing Post-Surgical Pain Management in Adult Surgical Patients: Effects of Training Interventions on Surgical Nurses' Knowledge

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Abstract: *Context:* There is a surplus of contemporary scientific evidence-based indicated numerous precarious positions with inadequate post-surgical pain management in adult surgical patients. The most important barrier in this context was suboptimal postsurgical pain interventions. *Aim:* This nursing improvement initiative aimed to optimize post-surgical pain nursing interventions in adult surgical patients by training surgical nurses the strategies to enhance their pain management competencies in one teaching hospital in Saudi Arabia. *Materials and methods:* A descriptive, cross-sectional pain prevalence survey was conducted quarterly in all eight adult surgical inpatients wards to determine and assess if their pain was controlled to a satisfactory level of less than moderate pain. Secondly, pre-and post-test surgical nurses' knowledge assessment surveys were conducted. Descriptive statistics were used to analyze and interpret and present the data. *Results:* The outcomes demonstrated that through the improvement nursing initiative strategies implemented, the pain prevalence survey in February 2020 improved by more than 9% with an average of 93.4% (n=142; N=152) of patients with pain intensity less than moderate pain, while in September after omitting quarter three due to Covid-19 surge, all eight surgical wards achieved an average of 88% (n=152; N=173), thus improved by 3,6% compared to the results of November 2019. The average pretest pain knowledge assessment survey taken in January 2020 by 103 surgical nurses in all eight surgical wards was 71%. In October 2020, 114 surgical nurses participated in the post-test and achieved 83%, demonstrated an increase of more than 12% from all 20 questions. *Conclusion:* The eight surgical wards substantially achieved more than 80% of patients with controlled postsurgical pain levels of less than moderate pain during the last two prevalence cycles, and the posttest revealed pain management knowledge acquisition from the baseline of the pretest conducted. It is therefore postulated that it is essential to monitor the pain management quality of delivered patient nursing care interventions based on the type of pain and consider the provision of refresher training sessions to influence practical skills of pain management competencies.

Keywords: Prevalence Surveys, Pain Management Training, Post-surgical Pain, Surgical Nurses

1. Introduction

The complicated clinical problem of post-surgical pain management per se and the possibility to improve recovery and reduce disease continues to represent a major challenge in

post-surgical pain (PSP) nursing interventions of adult patients [1, 2]. Inadequate postoperative pain interventions of adult patients who have undergone major or minor elective or non-elective surgical procedures result in suffering moderate-to-severe PSP in the first 72 hours following

different surgeries that may be a devastating experience to the patients [3, 4]. PSP is a condition of tissue injury together with muscle spasms after surgery [5]. This type of pain is multifactorial and imperative to achieve a successful surgical outcome result if it remains inadequately managed, the patient may develop pain amplification and emotional distress that may transit to persistent post-surgical pain (PPSP) [1, 7, 8]. This phenomenon of PPSP is defined as pain that develops after surgical intervention, excluding other causes, that lasts longer than 2 months and is unrelated to a condition preceding surgery, and is one of the pain catastrophizers [9]. It has been shown from a plethora of overwhelming amounts of data that most surgical procedures may be followed by a risk of persistent pain syndromes [10, 11].

The impact of uncontrolled post-surgical pain may lead to a negative influence on the patient reduced quality of life and impaired physical function outcomes resultant of multifactorial deleterious effects such as psychological state of the patient and family members, and complications such as pneumonia, deep vein thrombosis, infection, delayed recovery, prolonged hospitalizations and rehabilitation, prolonged use of opioid causing toxicity or opioid-induced hyperalgesia, financial health economic burden, readmissions as well as advance to chronic PPSP that may result in increased morbidity and mortality [1, 2-15].

It is therefore indispensable to optimize postoperative pain interventions with a target goal aiming to reduce pain and enhance recovery, considering the multifactorial causes, involving multidisciplinary or interdisciplinary pain intervention approaches, using multimodal analgesia including nonpharmacological interventions, and adopting the biopsychosocial approach of allowing the patients to take a leading role in their pain interventions in treating the adverse effects of post-surgical pain [2, 16-19].

PSP is a significant problem in surgical wards that may amplify to transit to persistent pain if not adequately managed [7]. Hence the role of surgical nurses in the wards plays a pivotal part in optimizing PSP management. Providing optimal care for post-surgical patients in managing their pain is an essential role and responsibility of surgical nurses. The ward surgical nurses' role is to assess the pain of the patients, educate patients and families; ensure patient safety at all times; take care of patients with similar types of illness or surgical problems undergoing surgical and postsurgical procedures working with, multidisciplinary surgical teams to ensure patient health needs are met such as pain management, being competent in managing PSP and monitoring quality improvement initiative to optimize PSP management [20-24]. Current evidence shows that nurses also play a role in the follow-up discharge of postoperative patients for their full recovery as part of enhanced recovery after surgery by effectively managing pain [25].

In a subsequent review of improving and searching actions and strategies to optimize post-surgical pain in surgical wards of Hospital A, Riyadh in the Kingdom Of Saudi Arabia, a plethora of studies have shown that nursing training interventions could influence the interventions to relieve

post-surgical pain [26]. In November 2019, seven out of nine inpatient surgical wards achieved above 80% in the hospital-wide prevalence survey used as a key performance indicator for nursing quality improvement initiatives. However, the two wards did not achieve the target goal of 80% of patients with pain not more than moderate intensity, hence training interventional strategies to optimize the pain management in these two wards were initiated.

The factors contributing to inadequate PSP interventions in this context were identified after brainstorming by all surgical wards representatives and were related to barriers of optimal pain management such as the need for patient education on pain management, the need to improve nurses knowledge on PSP assessment and management, inadequate pain management prescription as per the type of pain, to use nonpharmacological with pharmacological interventions, and to have clinical pathways for postoperative pain management. The study of Meissner *et al* stated that barriers to achieving patient-satisfactory analgesia include deficient knowledge regarding postoperative pain management (POPM) among staff, lack of instructions, insufficient pain assessments, and suboptimal treatment, and recommended effective monitoring of POPM was essential to enable policymakers and healthcare providers to improve the quality of care [39].

It was also noted in other studies that the nurses' role of caring and understanding of pain and a determination to ameliorate pain management are primary responsibilities of nurses towards patients in pain and adopting a biopsychosocial approach is the best option to empower the patient and family in managing pain [27-29]. The implication of the nursing training interventions for optimizing PSP management was in line with recommended paradigm shift for nurses to adopt the biopsychosocial approach and promote complementary and alternative methods of nonpharmacological interventions, patient participation, patient and family education considering the harm from the prescribed opioid crisis and opioid-induced ventilatory impairment (OIVI) aiming to maintain a balance between analgesia and side effects as proposed in Good's 1998 middle-range theory of acute pain management concepts [28, 30, 31, 49].

Pain is a global public health priority, therefore factors that contribute to suboptimal pain management of PSP that may affect the quality of life and limit functioning has been identified worldwide due to lack of physicians and nurses training leading to insufficient or inappropriate pain management insufficient knowledge, attitudes and education, and poor communications at various levels, the lack of awareness of the availability and importance of clear policies and guidelines specific for postoperative pain management, the use of specific analgesics and the proper approach to patient education have led to the consistent under-treatment of pain management in the region [32-34].

The consensus was reached by all surgical nurse managers in collaboration with the hospital nursing pain team to conduct specific goal-oriented pain management workshops for all surgical nurse managers and nurses over nine months. Clinical

resource nurses (Clinical facilitators) were assigned to conduct unit-based in-services with specific content training during nine months based on concepts identified with knowledge deficit identified from surgical nurses' pain knowledge pre-test survey conducted. The survey results were used for both patient care improvement and staff education.

To our knowledge, no study in nursing exists in the Kingdom of Saudi Arabian hospitals to ameliorate PSP nursing interventions by training surgical nurses. This study aimed to optimize PSP nursing interventions in adult surgical patients by training surgical nurses the strategies to enhance their pain management competencies.

2. Materials and Methods

This reflective article for key performance indicators of nursing initiatives was used as the educational interventional strategies to improve the management of PSP. A descriptive, cross-sectional pain prevalence survey was conducted quarterly in all eight adult surgical inpatients wards of Hospital A, Riyadh city, Saudi Arabia to determine and assess if patients' pain was controlled to a satisfactory level of less than moderate pain. Secondly, surgical nurses' pain knowledge assessment survey related to pain assessment and management of post-surgical pain was conducted before and after attending pain management training sessions.

Initially, in December 2019 a pilot survey with 20-items questionnaire was conducted to evaluate surgical nurses' pain knowledge from the two excluded surgical units. This pilot enhanced internal consistency of the questionnaire by examining test-retest reliability in two weeks intervals to the same nurses. The 20-items of the questionnaire were dichotomous with closed-ended questions, either "Yes" or "No". The Cronbach's alpha was 0.7 for both the pretest and test-retest, significantly an acceptable internal consistency [35, 36]. Despite that, these were approved key performance nursing initiatives by nursing leadership, the ethical principles were maintained in all activities by protecting the rights of the participants and the institution as part of daily nursing practice.

The main surgical nurses' pain knowledge assessment survey questionnaires were conveniently distributed to all eight surgical wards on the same day at 07h30 in January 2020, and was completed voluntarily by a total of 103 nurses as a pretest before attending pain management training, whereas post-test in October 2020 was completed by a total of 114 nurses who attended the pain management workshop.

An Excel data sheet was used to enter the data collected. This reflective study was a nursing initiative action plan to improve patient post-surgical pain management and nurses' knowledge as there was no ethical approval was pursued.

Data was entered and analyzed statistically for both pain prevalence and surgical nurses' pain knowledge assessment surveys using a Microsoft Excel Spreadsheet Software 365 and shared with all eight surgical wards [37, 48]. Descriptive data analysis was performed for data presentation and interpretations.

3. Results

The effects of pain management training of surgical nurses in optimizing PSP nursing interventions in adult surgical patients were evidence of these results. The results highlights how pain management training strategies to the surgical nurses improved the outcomes of the pain prevalence that were conducted quarterly, a process to monitor if the pain was controlled to those patients with post-surgical pain. The baseline results that triggered the nursing initiative action plan to improve are as presented in Figure 1.

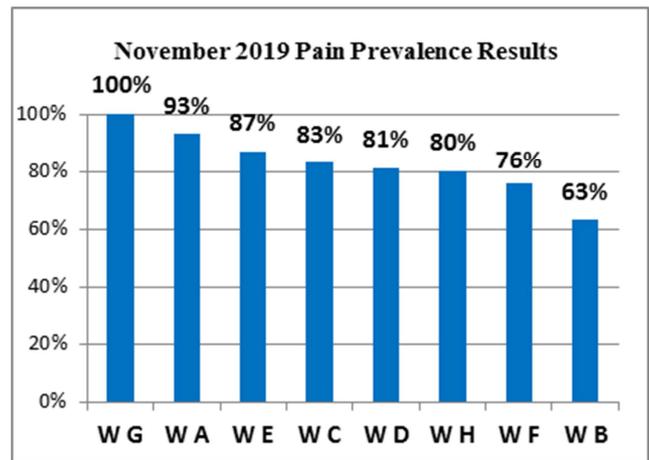


Figure 1. November 2019 Surgical Wards' Pain Prevalence.

Figure 1 illustrates the prevalence results of November 2019 whereby all eight surgical wards achieved an average of 84.4% (n=141; N=167) of patients with pain below 4/10 (no pain and mild pain). Only two wards attained less than the target of 80% of patients who experienced pain intensity of less than 4/10 namely, ward F was 76% (F=22; n=29), whereas ward B was 63% (F=5; n=8) of patients with no pain and mild pain. These results motivated the surgical wards to initiate the assessment of the nurses' knowledge as part of their improvement plan by testing their knowledge on pain management of the patient with post-surgical pain.

Following the pilot test, the main pretest survey of all eight surgical wards was conducted in January 2020, with an average of 71% of accurate answers from the 20 questions taken by 103 surgical nurses (see Figure 3). This assisted the clinical resource nurses and the pain team nurses to identify the content to be specifically educated throughout nine months utilized for training of all nurses. The target goal was to achieve an average of 80% for each question out of 20 questions. The highest average achieved by all eight surgical wards was between 85% to 95%, while the lowest was between 28% to 79%. This indicated the areas needed for improvement based on the questions scored less than average of 80%. Therefore, the educational content was designed according to those questions scored less than 80% during the ward based in-service training and pain management workshop in center of education.

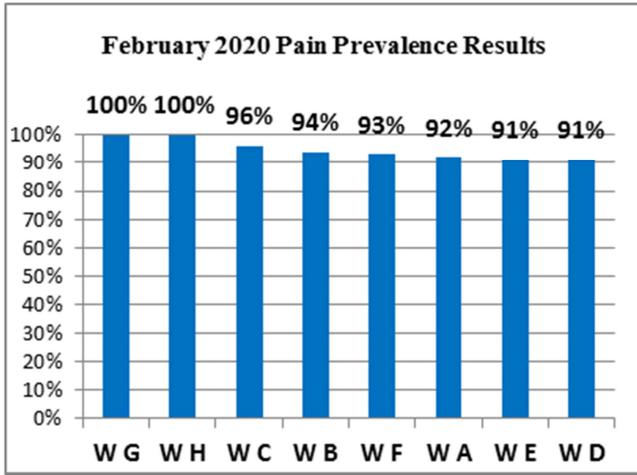


Figure 2. February 2020 Surgical Wards' Pain Prevalence.

The prevalence results of February 2020 as portrayed in Figure 2, indicated that after the eight surgical wards delivered their first-month in-service training in parallel with the pain management workshops conducted, they achieved an average of 93,4% (n=142; N=152) of patients with pain below 4/10 (no pain and mild pain). All eight surgical wards achieved an outcome of more than 80% of patients who experienced pain intensity of less than 4/10 pain (0-3/10).

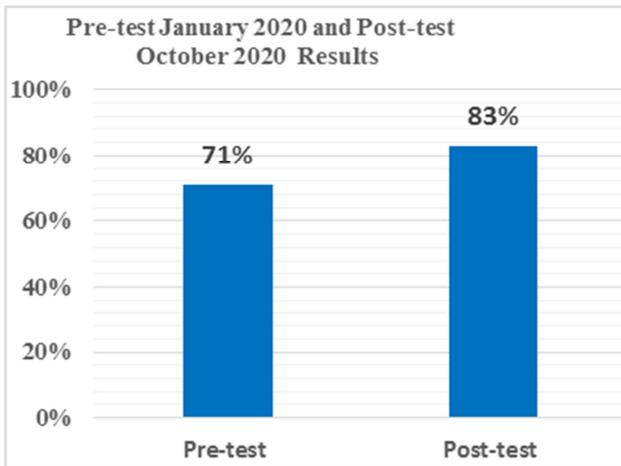


Figure 3. Surgical Nurses' Pain Knowledge pre-and-posttests.

In October 2020 the average posttest results of all eight surgical wards were 83% of the 20 questions written by 114 surgical nurses (see Figure 3). There was a significant improvement in those questions that were identified with less than 80% achievements. The highest average scores achieved were between 84% and 100%, while the least average scores were between 55% to 79% of those 20 questions. Hence, this motivated the education to continue beyond nine months as was projected initially.

The COVID-19 pandemic surges influenced the omission of the pain prevalence survey during the third quarter as a preventive measure for the spread of infection. Hence the results displayed the prevalence surveys conducted in September 2020 as portrayed in Figure 4. The outcomes as illustrated in figure 4 indicated that the average was 88%

(n=152; N=173) of patients with pain below moderate pain intensity.

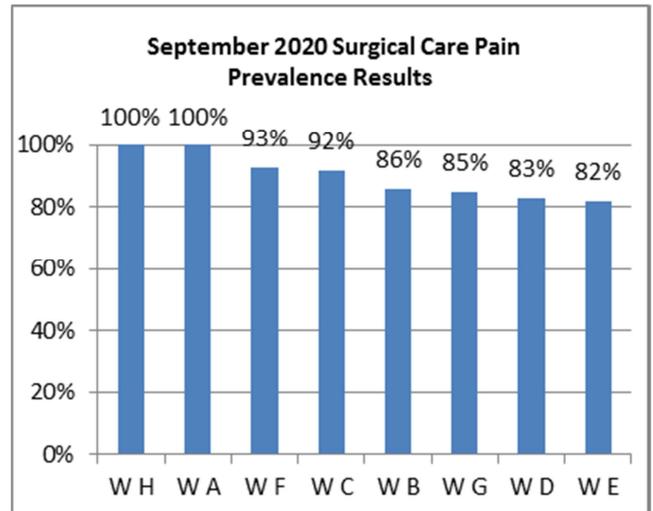


Figure 4. September 2020 Surgical Wards' Pain Prevalence.

4. Discussion

This nursing initiative improvement aimed to optimize PSP nursing interventions of adult patients in surgical settings, with pain management training of surgical nurses to enhance their pain management competencies.

As indicated through contemporary scientific evidence-based that post-surgical pain remains suboptimal leading to poor patient satisfaction for pain management, and the progression to persistent pain [38, 39]. The November 2019 results significantly showed that pain in two wards was inadequately controlled as more than 20% of patients suffered moderate-to-severe PSP, which motivated the process of the nursing initiative to optimize the pain interventions and improve nurses' knowledge. Studies have shown that improving nurses' knowledge, attitude, and skills in managing PSP optimize pain relief as it enhanced their knowledge transfer [40].

The prevalence results of the two quarters demonstrated improvements after the implementation of PSP interventions and educational strategies. This significant improvement was seen during February 2020 prevalence survey results with the achievement of an average of 93,4% (n=142; N=152) of patients with pain of less than moderate, thus 9% rise compared to November 2019, however, there was a slight decline in September 2020 within the target goal of 80%, that was an average of 88% (n=152; N=173) of patients with no pain and mild pain, and that was lesser by 5.4% from the previous prevalence. This was still higher than the initial pain prevalence of November 2019. This occurred due to an interruption of continuity of scheduled activities during the third quarter related to the surge of COVID-19 as mentioned earlier.

The average pretest results of all eight surgical wards in January 2020 was 71% of the 20 questions in the pretest taken by 103 surgical nurses, while in October 2020 the average

posttest results of all eight surgical wards were 83% of the 20 questions written by 114 surgical nurses. This significantly indicated the improvement of knowledge acquisition with an average of 12% by all eight wards that improved their pain management competencies. There was a significant increase in those questions that were identified with less than 80% achievements, with the highest average scores achieved were between 84% and 100%, while the least average was between 55% to 79% of those 20 questions. Therefore, after reviewing the outcomes of the posttest, all the eight surgical wards decided to continue with the focused education to further improve nurses on those least achieved questions.

The outcome of this nursing improvement initiative process was substantially effective. This was indicated during these nine months of the continued interventional educational pain management that signified optimization of PSP management and improved surgical nurses' pain management knowledge. This facilitated the noticeable development of the initial identified factors and barriers of PSP management that inspired the eight surgical wards to pursue these pain management improvement initiative strategies. For sustainability and further nursing initiative interventional strategies, these wards intended to introduce phase two of this pain management creativities and strategies that needed to address the approvals to have clinical pathways for PSP management and utilizing additional resources through a collaborative interprofessional patient pain management approach [41-44].

The limitation in this study is that the 20 questions used for pretest and posttest were not included in this knowledge contribution only the average was presented to highlight the results of these initiatives. The use of pretest and post-test of surgical nurses' knowledge surveys to evaluate the effects of training interventions for pain management knowledge acquisition did not reflect their practical and emancipatory abilities to perform their role [45]. The third quarter was omitted to indicate the actual trend of improvement due to the rationale stated. Only the surgical nursing division was part of this initiative to give a broader picture of nurses' knowledge regarding this type of pain.

5. Conclusion

This pain nursing initiative was important, and the findings showed the positive effect of monitoring the quality of pain management by optimizing the pain nursing interventions and empowering the nurses' knowledge to provide effective care. It is therefore concluded to commend that various nursing care divisions need to monitor the pain management quality of delivered patient nursing care interventions based on the specialty of patients, and consider empowering nurses by adopting a collaborative interprofessional pain education model as endorsed in the plethora of studies that might advance their postsurgical pain management competencies [42, 46, 47]. It is therefore further essential to continue monitoring the outcome of pain nursing interventions in adult surgical patients and improving the competencies of the

surgical nurses through the provision of pain management refresher sessions as indicated in this study [45].

Conflicts of Interest

The authors declare they have no competing interests.

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References

- [1] Gan, T. J. J. J. o. p. r. (2017). Poorly controlled postoperative pain: prevalence, consequences, and prevention. 10, 2287. doi: 10.2147/JPR.S144066.
- [2] Kehlet, H. J. P. (2018). Postoperative pain, analgesia, and recovery—bedfellows that cannot be ignored. 159, S11-S16. doi: 10.1097/j.pain.0000000000001243.
- [3] John, E. B., Kaufmann, M. W., Barnhart, R. A., Baratta, J. L., & Schwenk, E. S. (2019). Acute pain. In *Academic Pain Medicine* (pp. 167-175): Springer. doi: 10.1007/978-3-030-18005-8_27.
- [4] Ojo, A. (2019). *The Use of Aromatherapy to Improve Post-Operative Perception of Pain*. Grand Canyon University.
- [5] Cifu, D. X. (2020). *Braddom's Physical Medicine and Rehabilitation E-Book*: Elsevier Health Sciences.
- [6] Watson, R. R., & Zibadi, S. (2017). *Nutritional Modulators of Pain in the Aging Population*: Elsevier Science.
- [7] Lavand'homme, P. J. P. (2017). Transition from acute to chronic pain after surgery. 158, S50-S54. doi: 10.1097/j.pain.0000000000000809.
- [8] Pozek, J.-P. J., De Ruyter, M., & Khan, T. W. J. A. c. (2018). Comprehensive acute pain management in the perioperative surgical home. 36 (2), 295-307. doi: 10.1016/j.anclin.2018.01.007.
- [9] Gulur, P., & Nelli, A. J. C. O. i. A. (2019). Persistent postoperative pain: mechanisms and modulators. 32 (5), 668-673. doi: 10.1097/ACO.0000000000000770.
- [10] Check, J. J. C., obstetrics, e., & gynecology. (2021). Chronic pelvic pain syndromes—traditional and novel therapies: part I surgical therapy. 38 (1), 10-13.
- [11] Glare, P., Aubrey, K. R., & Myles, P. S. J. T. L. (2019). Transition from acute to chronic pain after surgery. 393 (10180), 1537-1546. doi: 10.1016/S0140-6736(19)30352-6.
- [12] Jones, M. R., Kramer, M. E., Beutler, S. S., Kaye, A. D., Rao, N., & Brovman, E. Y. et al. (2020). The association between potential opioid-related adverse drug events and outcomes in total knee arthroplasty: a retrospective study. 37 (1), 200-212. doi: 10.1007/s12325-019-01122-1.

- [13] Hansen, T. B. J. E. o. r. (2017). Fast track in hip arthroplasty. *2* (5), 179-188. doi: 10.1302/2058-5241.2.160060.
- [14] Jones, J., Southerland, W., & Catalani, B. J. O. C. (2017). The importance of optimizing acute pain in the orthopedic trauma patient. *48* (4), 445-465. doi: 10.1016/j.ocl.2017.06.003.
- [15] Pędziwiatr, M., Mavrikis, J., Witowski, J., Adamos, A., Major, P., & Nowakowski, M. et al. (2018). Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. *35* (6), 1-8. doi: 10.1007/s12032-018-1153-0.
- [16] Benson, S., Hagen, S., Hoffmann, O., Pasler, A., Bingel, U., & Schedlowski, M. et al. (2019). Can a brief psychological expectancy intervention improve postoperative pain? A randomized, controlled trial in patients with breast cancer. *160* (7), 1562-1571. doi: 10.1097/j.pain.0000000000001546.
- [17] Hadlandsmyth, K., Conrad, M., Steffensmeier, K. S., Van Tiem, J., Obrecht, A., & Cullen, J. J. et al. (2020). Enhancing the Biopsychosocial Approach to Perioperative Care: A Pilot Randomized Trial of the Perioperative Pain Self-Management (PePS) Intervention. *Annals of Surgery*. *275* (1), p e8-e14. doi: 10.1097/SLA.0000000000004671.
- [18] Makhlof, M. M., Garibay, E. R., Jenkins, B. N., Kain, Z. N., & Fortier, M. A. J. P. m. (2019). Postoperative pain: factors and tools to improve pain management in children. *9* (4), 389-397. doi: 10.2217/pmt-2018-0079.
- [19] Zaouter, C., Oses, P., Assatourian, S., Labrousse, L., Rémy, A., & Ouattara, A. J. J. o. c. et al. (2019). Reduced length of hospital stay for cardiac surgery—implementing an optimized perioperative pathway: prospective evaluation of an enhanced recovery after surgery program designed for mini-invasive aortic valve replacement. *33* (11), 3010-3019. doi: 10.1053/j.jvca.2019.05.006.
- [20] Cui, C., Wang, L. X., Li, Q., Zaslansky, R., & Li, L. J. J. o. c. n. (2018). Implementing a pain management nursing protocol for orthopaedic surgical patients: Results from a PAIN OUT project. *27* (7-8), 1684-1691. doi: 10.1111/jocn.14224.
- [21] Dequeker, S., Van Lancker, A., & Van Hecke, A. J. J. o. a. n. (2018). Hospitalized patients' vs. nurses' assessments of pain intensity and barriers to pain management. *74* (1), 160-171. doi.org/10.1111/jan.13395.
- [22] Samarkandi, O. A. J. S. j. o. a. (2018). Knowledge and attitudes of nurses toward pain management. *12* (2), 220-226. doi: 10.4103/sja.SJA_587_17.
- [23] Smeland, A. H., Rustøen, T., Næss, T., Nybro, L., Lundeberg, S., & Reinertsen, H. et al. (2019). Children's views on postsurgical pain in recovery units in Norway: A qualitative study. *28* (11-12), 2157-2170. doi: 10.1111/jocn.14788.
- [24] Yajnik, M., Hill, J. N., Hunter, O. O., Howard, S. K., Kim, T. E., & Harrison, T. K. et al. (2019). Patient education and engagement in postoperative pain management decreases opioid use following knee replacement surgery. *102* (2), 383-387. doi: 10.1016/j.pec.2018.09.001.
- [25] Ljungqvist, O., Francis, N. K., & Urman, R. D. (2020). *Enhanced Recovery After Surgery: A Complete Guide to Optimizing Outcomes*: Springer International Publishing.
- [26] Reaza-Alarcón, A., & Rodríguez-Martín, B. J. I. y. e. e. e. (2019). Effectiveness of nursing educational interventions in managing post-surgical pain. Systematic review. *37* (2).
- [27] Rabbitts, J. A., Palermo, T. M., & Lang, E. A. J. J. o. P. R. (2020). A conceptual model of biopsychosocial mechanisms of transition from acute to chronic postsurgical pain in children and adolescents. *13*, 3071. doi: 10.2147/JPR.S239320.
- [28] Riswold, K., Brech, A., Petersen, R., Schepper, S., Wegehaupt, A., & Larsen-Engelkes, T. J. et al. (2018). A Biopsychosocial Approach to Pain Management. *71* (11).
- [29] Taylor, I., & Wilson, S. A. (2020). Managing pain. In *Clinical Challenges* (pp. 3-23): Routledge.
- [30] Ghotra, J. K. (2020). Nitrous Oxide for Pain Management in the Emergency Department.
- [31] Osypiuk, K., Ligibel, J., Giobbie-Hurder, A., Vergara-Diaz, G., Bonato, P., & Quinn, R. et al. (2020). Qigong mind-body exercise as a biopsychosocial therapy for persistent post-surgical pain in breast cancer: a pilot study. *19*, 1534735419893766. doi: 10.1177/1534735419893766.
- [32] Garcia, J. B. S., Bonilla, P., Krachete, D. C., Flores, F. C., Valtolina, E. D. P. d., & Guerrero, C. J. R. b. d. a. (2017). Optimizing post-operative pain management in Latin America. *67*, 395-403. doi: 10.1016/j.bjane.2017.10.004.
- [33] Kusi Amponsah, A., Oduro, E., Bam, V., Kyei-Dompim, J., Ahoto, C. K., & Axelin, A. J. B. P. (2020). Dynamics on the field: a focused study on the culture and context of pediatric pain management at four Ghanaian hospitals. *20* (1), 1-14. doi: 10.1186/s12887-020-02399-w.
- [34] Wylde, V., Beswick, A., Bruce, J., Blom, A., Howells, N., & Goberman-Hill, R. J. E. o. r. (2018). Chronic pain after total knee arthroplasty. *3* (8), 461-470. doi: 10.1302/2058-5241.3.180004.
- [35] Mahmood, T., Choudhury, M. R., Islam, M. N., Haq, S. A., Shahin, M. A., & Ali, S. M. M. et al. (2020). Translation, cross-cultural adaptation and validation of the English Lequesne Algofunctional index in Bengali. *18* (1), 1-9. doi: 10.1186/s12955-020-01583-x.
- [36] Manlapaz, D., Escuadra, C. J., Averia, J. K. C., Blancaflor, A., Ann, R. J. T., & fallers, v. o. t. P. A. S. f. t. E. i. F. c.-d. o. a. et al. (2019). Test-retest reliability, internal consistency, and discriminant validity of the Filipino version of Knee injury and Osteoarthritis Outcome Score among community-dwellers with knee osteoarthritis. *53*. doi: 10.36413/pjahs.0301.002.
- [37] Held, B., Moriarty, B., & Richardson, T. (2019). *Microsoft Excel Functions and Formulas with Excel 2019/Office 365*: Stylus Publishing, LLC.
- [38] Clarke, J. L., Skoufalos, A., & Scranton, R. J. P. h. m. (2016). The American opioid epidemic: population health implications and potential solutions. Report from the National Stakeholder Panel. *19* (S1), S-1-S-10. doi: 10.1089/pop.2015.0144.
- [39] Meissner, W., Huygen, F., Neugebauer, E. A., Osterbrink, J., Benhamou, D., & Betteridge, N. et al. (2018). Management of acute pain in the postoperative setting: the importance of quality indicators. *34* (1), 187-196. doi: 10.1080/03007995.2017.1391081.
- [40] Menlah, A., Garti, I., Amoo, S. A., Atakro, C. A., Amponsah, C., & Agyare, D. F. J. S. O. N. (2018). Knowledge, attitudes, and practices of postoperative pain management by nurses in selected district hospitals in Ghana. *4*, 2377960818790383. doi: 10.1177/2377960818790383.

- [41] Durham, M. L., Egan, A., Jankiewicz, A., Murphy, M. P., Nedved, P., & Luvich, R. et al. (2017). Addressing safe opioid monitoring practices using an interprofessional approach. 47 (11), 537-544. doi: 10.1097/NNA.0000000000000540.
- [42] Gordon, D. B., Watt-Watson, J., & Hogans, B. B. J. P. r. (2018). Interprofessional pain education—with, from, and about competent, collaborative practice teams to transform pain care. 3 (3). doi: 10.1097/PR9.0000000000000663.
- [43] Watt-Watson, J., Lax, L., Davies, R., Langlois, S., Oskarsson, J., & Raman-Wilms, L. J. P. M. (2017). The pain interprofessional curriculum design model. 18 (6), 1040-1048. doi: 10.1093/pm/pnw337.
- [44] Watt-Watson, J., Siddall, P. J., & Carr, E. J. P. m. (2012). Interprofessional pain education: The road to successful pain management outcomes. 2 (5), 417-420. doi: 10.2217/pmt.12.46.
- [45] O'Donovan, J., O'Donovan, C., Kuhn, I., Sachs, S. E., & Winters, N. (2018). Ongoing training of community health workers in low-income and middle-income countries: a systematic scoping review of the literature. 8 (4), e021467. doi: 10.1136/bmjopen-2017-021467%JBMJOpen.
- [46] Guraya, S. Y., & Barr, H. J. T. K. j. o. m. s. (2018). The effectiveness of interprofessional education in healthcare: A systematic review and meta-analysis. 34 (3), 160-165. doi: 10.1016/j.kjms.2017.12.009.
- [47] Simko, L. C., Rhodes, D. C., McGinnis, K. A., & Fiedor, J. J. A. j. o. p. e. (2017). Students' perspectives on interprofessional teamwork before and after an interprofessional pain education course. 81 (6). doi: 10.5688/ajpe816104.
- [48] Vieira, A. L., Nespeca, M. G., Pavini, W. D., Ferreira, E. C., Neto, J. A. G. J. C., & Systems, I. L. (2019). A user-friendly excel spreadsheet for dealing with spectroscopic and chromatographic data. 194, 103816. doi: 10.1016/j.chemolab.2019.103816.
- [49] Levy, N., Mills, P., & Rockett, M. J. B. j. o. a. (2019). Post-surgical pain management: time for a paradigm shift. 123 (2), e182-e186. doi: 10.1016/j.bja.2019.05.031.