



Factors influencing the perception of pain after surgery

Czynniki wpływające na odczuwanie bólu po zabiegu operacyjnym

Maria Belcarz- Ciuraj^{1,A-F}, Iga Piukuła^{1,A-F}

¹ Faculty of Health Sciences, Vincent Pol University, Lublin, Poland

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Belcarz-Ciuraj M, Piukuła I. Factors influencing the perception of pain after surgery. Med Og Nauk Zdr. 2014; 30(3): 218–222. doi: 10.26444/monz/192701

Abstract

Introduction and Objective. Pain is the natural response of the body to surgical intervention. However, its intensity and duration can depend on the type of surgery, location of the procedure, and the individual characteristics of the patient. Effective management of post-operative pain is crucial for shortening the recovery period and improving the overall well-being of the patient. The aim of this study was to identify factors that exacerbate pain in adult patients following surgical treatment.

Materials and Method. A retrospective analysis of medical records was conducted for patients who underwent surgery for colorectal cancer over a period of 6 months. The study included 117 patients. Statistical analysis of the study results was performed using IBM SPSS Statistics.

Results. Nearly 95% of patients experienced pain after surgery. It was identified that the following factors contributed to increased pain perception: pre-operative systemic treatment ($p=0.017$), high risk of post-operative wound infection ($p=0.022$), surgical method – laparotomy ($p=0.018$), and body mass index (BMI) value ($p=0.012$).

Conclusions. Post-operative pain is one of the most significant problems after surgery. Factors influencing increased pain sensations have been identified, such as: BMI value, surgical method, risk assessment of infection, and systemic treatment used before surgery. The primary aim of post-operative management is to eliminate unnecessary suffering, provide comfort, and facilitate recovery

Key words

surgery, pain, pain control

Streszczenie

Wprowadzenie. Ból jest naturalną reakcją organizmu na ingerencję chirurgiczną. Jednakże jego intensywność i czas trwania może zależeć od rodzaju operacji, miejsca zabiegu, jak i cech osobniczych pacjenta. Efektywne zarządzanie bólem pooperacyjnym jest kluczowe dla skrócenia okresu rekonwalescencji oraz poprawy ogólnej sprawności pacjenta. **Cel pracy.** Celem pracy było zidentyfikowanie czynników nasilających dolegliwości bólowe u dorosłych pacjentów po zabiegu chirurgicznym.

Materiał i metody. Przeprowadzono retrospektywną analizę dokumentacji medycznej pacjentów operowanych z powodu nowotworu jelita grubego w przeciągu 6 miesięcy. W badaniu uwzględniono 117 pacjentów. Analiza statystyczna wyników badania została wykonana w programie IBM SPSS Statistics.

Wyniki. Prawie 95% pacjentów po zabiegu operacyjnym odczuwało dolegliwości bólowe. Zaobserwowano, że na zwiększone odczuwanie bólu wpływają następujące czynniki: przedoperacyjne leczenie systemowe ($p=0,017$), wysoka ocena ryzyka zakażenia rany pooperacyjnej ($p=0,022$), metoda operacji – laparotomia ($p=0,018$) oraz wartość wskaźnika BMI ($p=0,012$).

Wnioski. Ból pooperacyjny jest jednym z najbardziej istotnych problemów po zabiegu operacyjnym. Zidentyfikowano czynniki wpływające na wzmożone odczucia bólu, takie jak: wartość BMI, metoda operacji, ocena ryzyka zakażenia oraz zastosowane przed operacją leczenie systemowe. Podstawowym celem postępowania po operacji jest wyeliminowanie niepotrzebnego cierpienia pacjenta, zapewnienie mu komfortu i ułatwienie zdrowienia.

Słowa kluczowe

ból, operacja, kontrola bólu

INTRODUCTION

Nowadays, surgical procedures are widely used in the treatment of cancers. Pain often remains an inseparable element of surgical treatment, impacting the healing process and the overall condition of the patient. According to the Polish Association for the Study of Pain (PASP), ‘pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such

damage’. Post-operative pain is most often characterized as acute, of high intensity, and occurs immediately after surgery. The discomfort gradually decreases over the following days, depending on the type of surgery, surgical technique, and individual patient characteristics [1, 2].

Due to the complex nature and often extensive scope of interventions, oncological surgeries can be particularly painful for patients. Effective management of post-operative pain is crucial for improving patients’ quality of life and preventing negative health outcomes [3].

Key to effective pain management is the clinical assessment of pain, which should include: its location, radiation, character, intensity, factors affecting pain perception, effectiveness

✉ Address for correspondence: Maria Belcarz-Ciuraj, Faculty of Health Sciences, Vincent Pol University, Lublin, Poland
E-mail: maria.belcarz@gmail.com

Received: 24.06.2024; accepted: 28.08.2024; first published: 13.09.2024

of previous treatments, and the occurrence of breakthrough pain. The patient’s mental state should also be considered. Appropriate pain management should be applied after a thorough interview using adequate assessment tools. Recommendations include the NRS (Numerical Rating Scale), VRS (Verbal Rating Scale), PHHPS (Prince Henry Hospital Pain Score), which are particularly useful after surgical procedures due to their assessment of pain intensity at rest and during movement. More complex tools that can be used, including the Brief Pain Inventory – Short Form, Pain Assessment Sheet, McGill Pain Questionnaire, and the Doloplus Scale [3, 4].

The range of pain treatment is broad and includes both pharmacological and non-pharmacological methods. Treatment should be individually tailored to the patient’s needs and clinical condition, taking into account contraindications to the use of analgesic substances. Pharmacotherapy includes the use of painkillers, such as paracetamol, metamizole, and non-steroidal anti-inflammatory drugs (NSAIDs), which are currently the first-choice substances for most patients. Opioids, adjuvants, and analgesic techniques also find wide application in post-operative pain management. Polish recommendations for the proper organization of pain management include, among others, regular pain assessment in all operated patients, documentation of pain assessment and applied treatment, and monitoring of possible adverse effects of treatment [5, 6].

Post-operative pain management is not only about improving patient comfort, but also about preventing chronic pain which can develop if acute pain is not adequately controlled. In oncological surgery, effective pain control can also impact wound healing, reduce the risk of infection, and improve overall patient prognosis [7, 8, 9].

The aim of the study was to assess the degree of perceived pain and the factors exacerbating pain symptoms among adults who had undergone surgical treatment for cancer.

MATERIALS AND METHOD

The study was conducted in the General Surgery Department of a an Oncology Hospital, where surgeries are performed using both classical and laparoscopic methods. An analysis was conducted of the medical records of patients who underwent surgery for colorectal cancer (diagnosis according to ICD-10 classification from C18 to C20) over a 6-month period (1 January 1–30 June 2020). Statistical analysis of the results was performed using IBM SPSS Statistics. The analysis included 117 patients. The following were analyzed: patient medical history, per-operative control chart, surgical protocol, nursing history, and anaesthesia record. Exclusion criteria for the study were identified as gaps in the documentation or surgeries performed for reasons other than cancer (according to ICD-10 classification, C18 – C20).

RESULTS

A review was conducted of 117 patient medical histories for individuals operated on for colorectal cancer (according to ICD-10 classification, C18 – C20) from 1 January – 30 June 2020. The study analyzed the occurrence of post-operative pain in 117 patients using the NRS scale (1–10), and identified factors that could influence the presence of severe pain symptoms.

During the analyzed period, 109 patients were admitted to the hospital electively, and 8 urgently. In the study, 69 individuals (58.9%) were men, while 41.1% (48 individuals) were women.

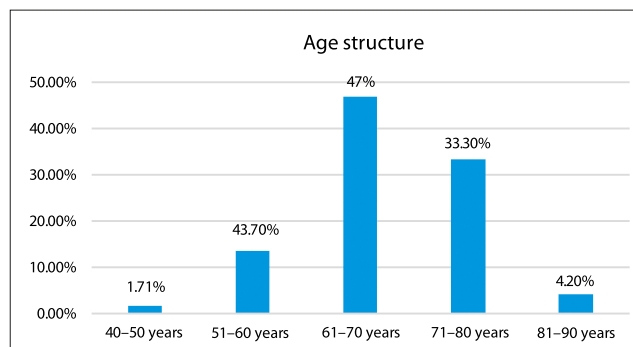


Figure 1. Patient age structure. Source: Based on own research

The majority of patients undergoing colorectal surgery were in the age range of 61 years and older – 105 people. The youngest patient who underwent surgery was 42-years-old, the oldest – 87-years-old; average age – 68 years, median age – 69.5 years.

During the analyzed period, surgery was performed on 69 men and 48 women (n=117). Post-operative pain was assessed using the NRS scale. 111 patients (94.9%) experienced pain. The highest pain level according to the NRS scale was 6, the lowest – 2. The occurrence and intensity of post-operative pain were compared by gender.

Table 1. Comparison of women and men in terms of the level of pain in the operated site on a scale of 0–10

Gender	N	Min	Maks	M	Me	SD
Women	48	2	6	2.98	3.00	0.98
Men	69	0	6	2.54	3.00	1.04

Man-Whitney U test: Z = -1.855; p = 0.064

Source: Based on own research. Mann-Whitney U Test was used; n – number of patients in a given category; Min – minimum value of pain experienced; Max – maximum value of pain experienced; M – arithmetic mean; Me – median; SD – standard deviation; Z=-1.855; p – p-value

Based on the obtained data, no statistically significant difference was found between women and men in terms of the level of pain at the surgical site.

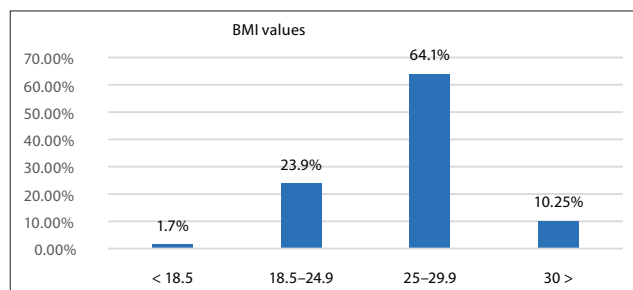


Figure 2. Assessment of BMI values. Source: Based on own research

In the study, the BMI values of patients were analyzed. The normal BMI range is 18.5–24.9. Only 23.9% of patients had

BMI values within the normal range; 10.25% of individuals were obese, and 64.1% were overweight.

Another factor analyzed was the surgical method used. In the study location, surgeries are performed using 2 methods – the classical laparotomy and laparoscopy. Among the patients, 26 individuals (20.5%) were operated on using laparotomy, while 91 individuals (79.5%) were operated on using the laparoscopic method.

Table 2. Comparison of patients operated on laparoscopically and with laparotomy in terms of pain level at the operated site on a scale of 0–10

Method	n	Min	Max	M	Me	SD
Laparoscopy	91	0	6	2,59	3,00	0,99
Laparotomy	26	2	6	3,19	3,00	1,06

Mann-Whitney U test: $Z = -2.375$; $p = 0.018^*$

Source. Based on own research

Mann-Whitney U Test was used; n – number of patients in a given category; Min – minimum value of pain experienced; Max – maximum value of pain experienced; M – arithmetic mean; Me – median; SD – standard deviation; $Z = -2.375$; p – p-value; * p value <0.05.

Pain is an unpleasant sensation experienced by patients, especially after surgery. The analysis showed that patients undergoing laparotomy surgery experienced significantly greater pain in the operated area than patients after laparoscopy.

In the treatment of colorectal cancer, not only surgical procedures are used. Before surgery, systemic treatment is possible, known as neoadjuvant therapy. In the study, 46 patients (39.3%) received preoperative radiotherapy or chemotherapy.

Table 3. Comparison of patients who underwent and those who did not undergo radiotherapy or chemotherapy in terms of pain level at the operated site on a scale of 0–10

Radio /chemotherapy	N	Min	Max	M	Me	SD
No	70	0	4	2,50	3,00	0,86
Yes	46	0	6	3,07	3,00	1,18

Mann-Whitney U test: $Z = -2.390$; $p = 0.017^*$

Source. Based on own research.

Mann-Whitney U Test was used; n – number of patients in a given category; Min – minimum value of pain experienced; Max – maximum value of pain experienced; M – arithmetic mean; Me – median; SD – standard deviation; $Z = -2.390$; p – p-value; * p value <0.05.

The Mann-Whitney U test showed that patients who received pre-operative treatment of radio or chemotherapy felt significantly stronger pain at the surgical site than patients who did not undergo radio or chemotherapy.

The patients had comorbidities which affected 88 patients, this constituted 72.2% of all patients operated on. The respondents had hypertension (19.3%), hypertension, and another chronic disease (59.1%), and 21.6% had another chronic disease.

The study analyzed patients with comorbidities (n=88) and their pain sensations compared to people without comorbidities (n=29).

The study found no statistically significant differences in the level of pain at the surgical site between patients without comorbidities, those with only hypertension, those with other comorbidities, or those with both hypertension and other comorbidities.

The majority of patients (64.9%) were classified in the ASA III group, with only 7.7% assigned to group IV.

Next, it was checked whether there were statistically significant correlations between factors such as age, BMI, ASA

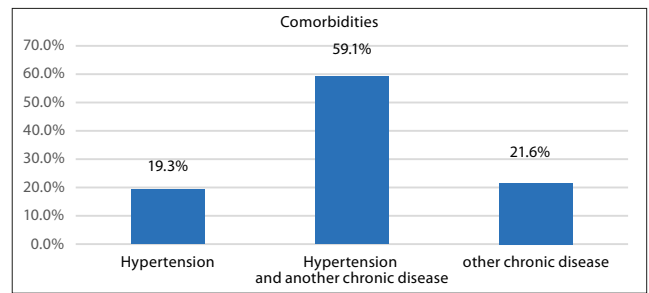


Figure 3. Occurrence of comorbidities.

Source. Based on own research

Table 4. Comparison of people with and without comorbidities in terms of the level of pain in the surgical site on a scale of 0–10

Comorbidities	N	Min	Maks	M	Me	SD
n/o	29	0	6	2.59	2.00	1.02
Hypertension	17	2	4	2.65	2.00	0.79
Other chronic disease	23	2	5	2.91	3.00	1.00
Hypertension, other chronic disease	46	0	6	2.74	3.00	1.16

Kruskal-Wallis test: $H = 0.835$; $p = 0.659$

Source. Based on own research

Kruskal-Wallis test was used; n – number of patients in a given category; Min – minimum value of pain experienced; Max – maximum value of pain experienced; M – arithmetic mean; Me – median; SD – standard deviation; $H = 0.835$; p – p-value.

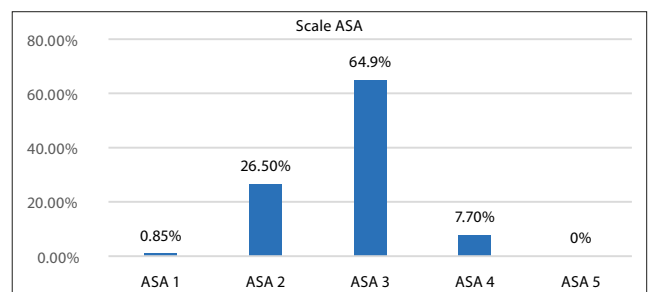


Figure 4. Anaesthesia risk assessment according to ASA scale.

Source. Based on own research

anaesthesia risk, wound infection risk assessment, and the occurrence of pain at the surgical site.

Table 5. Correlation between pain at the surgical site and age, BMI, anaesthesia risk (ASA), infection risk score

Factors	Pain at surgical site on a scale of 0–10		
	<i>rho</i>	<i>p</i>	<i>N</i>
Age in years	-0.056	0.546	117
BMI	0.233	0.012*	117
Anaesthesia risk (ASA)	0.138	0.137	117
Infection risk assessment	0.215	0.022*	117

Source. Based on own research.

Spearman's rho correlation was used; n – number of patients in a given category; p – p-value; * p value <0.05

There were statistically significant linear correlations between the level of pain at the surgical site and both BMI and wound infection risk assessment. It was found that the higher the BMI and the higher the wound infection risk assessment, the stronger the pain at the surgical site. On the other hand, age and ASA anaesthesia risk were not correlated with the level of pain.

DISCUSSION

Pain is a major issue among patients after surgical procedures. In conducted studies, 95% of patients reported pain complaints. These findings are confirmed by the literature, which indicates that pain is associated with the disease, hospitalization, and post-operative treatment. Similar results were obtained by other researchers, including Gawęda A. et al. in a study conducted on a group of 189 individuals, where pain was the main problem after surgery [9]. Effective pain management is a crucial element of patient care and should not be limited to the post-operative period. It is recommended to start pain treatment even before the surgery. It is necessary to conduct a pre-operative assessment of patients, identify potential factors that may exacerbate pain, and plan techniques to alleviate unpleasant sensory experiences [10]. The current study analyzed some factors that could influence increased pain perception after surgery. The first factor analyzed was the gender of the patients. The conducted study did not show any difference between women and men in terms of the perceived level of pain at the surgical site ($p=0.064$). However, in studies by Gawęda A. et al., and Budzyńska K., gender differences in pain intensity were confirmed. Women experienced higher pain intensity compared to men [11].

Another factor was the age of the operated patients. Statistics indicate that colorectal cancer primarily affects older individuals, and in Poland ranks third in terms of incidence of malignant tumors, and the number of cases is still increasing [12]. In the current study, over 80% of the patients were over the age of 61. The study did not find a correlation between age and the level of perceived pain after surgery ($p=0.546$). However, age can influence pain perception after surgery. Older individuals may experience increased pain due to various factors, such as physiological changes related to aging and the presence of comorbidities [13].

In the current study, the BMI indices of patients who underwent surgery were analyzed. It is concerning that nearly 75% of them had abnormal BMI values, indicating overweight or obesity. Excessive body weight is a serious health issue, leading to numerous physical, mental, and social health consequences [14]. In this study, patients with a higher BMI experienced more intense pain at the surgical site ($p=0.012$). Similar results were obtained by González-Callejas et al., who studied 96 patients who underwent abdominal surgery – patients with a higher BMI experienced more severe pain [15]. This problem is not limited to general surgery. Increased pain is also observed in obese patients after orthopaedic procedures [16]. Excessive body weight significantly increases the risk of post-operative complications, which can result in prolonged hospital stays and higher treatment costs. Overweight patients are also more susceptible to complications related to post-operative wound infections [17]. In the presented study, a wound infection risk assessment form, completed during patient admission to the hospital, was analyzed. It was found that the higher the wound infection risk score, the more intense the pain experienced by patients at the surgical site ($p=0.022$). Therefore, the pre-operative preparation of patients is a crucial step in ensuring the safety and effectiveness of the surgical procedure. This process includes both physical and psychological aspects. Attention to all these aspects contributes to a safe procedure and faster recovery [18].

In the course of the current study, coexisting diseases in patients underwent surgery were analyzed. In addition to cancer, 88 individuals also suffered from another chronic disease. The study did not show statistically significant differences in the perceived pain at the surgical site between patients with comorbidities and those without such conditions. The analysis mainly focused on hypertension. Further research in this area is necessary because the literature indicates that patients with chronic conditions may experience more intense and prolonged post-operative pain. Chronic diseases, such as diabetes, hypertension, or respiratory diseases, can affect the wound healing process and increase the risk of post-operative complications. These conditions can also lower the pain threshold, leading to stronger pain perception after surgery [19, 20, 21].

Pre-operative systemic treatment, also known as neoadjuvant therapy, is increasingly used in the treatment of various types of cancer. Conducted studies showed that 40% of patients received this treatment before surgery. Patients who underwent radiotherapy or chemotherapy experienced significantly more intense pain at the surgical site compared to patients who did not undergo such therapies ($p=0.017$), according to the Mann-Whitney U Test. Scientific research suggests that both radiotherapy and chemotherapy can lead to pain for different reasons; radiotherapy can cause pain due to damage to healthy tissues, while chemotherapy often leads to peripheral neuropathy, manifesting as pain, tingling, and numbness in the limbs [22].

The next analyzed factor was the method of operation. The analysis showed that patients operated on using laparotomy experienced significantly stronger pain at the operation site compared to patients who underwent laparoscopic surgery ($p=0.018$). Laparoscopy benefits patients by significantly reducing the number of peri-operative complications and hospitalizations, improving the quality of life, and accelerating the return to normal activities [23]. Studies conducted by Gao et al. indicate that the laparoscopic method is associated with reduced pain and faster recovery after surgery [24]. Laparoscopy is considered a safer and more effective method in many surgical cases, offering shorter recovery times, less bleeding, and a lower risk of post-operative complications [25].

CONCLUSIONS

1. Post-operative pain is one of the most common post-operative problems in patients after surgery.
2. After surgery, patients experienced increased pain caused by the following factors: BMI value, method of operation, higher infection risk assessment, and pre-operative systemic treatment.
3. Post-operative pain management is a key element of comprehensive patient care. Appropriate pain management contributes to faster and more effective recovery, prevents complications, and improves the patient's overall hospital experience.

REFERENCES

1. Chojnacka-Kowalewska G, Sopolnińska M, Chojnacka B. Ocena skuteczności leczenia dolegliwości bólowych u pacjentów w pierwszej dobie

- po przednich resekcjach odbytnicy z powodu nowotworu złośliwego. *Innowacje w Pielęgniarstwie i Naukach o Zdrowiu*. 2022;7(3):7–28. <https://doi.org/10.21784/IwP.2022.013>
2. Pysz-Waberski D, Bulska-Będkowska W, Wachuła E. Leczenie bólu przewlekłego w onkologii – współpraca onkologa z psychoonkologiem. *Onkologia w Praktyce Klinicznej – Edukacja*. 2019;5(4):257–265.
 3. Cata JP, Corrales G, Speer B, Owusu-Agyemang P. Postoperative acute pain challenges in patients with cancer. *Best Pract Res Clin Anaesthesiol*. 2019;33(3):361–371. <https://doi.org/10.1016/j.bpa.2019.07.018>
 4. Amaechi O, McCann Huffman M, Featherstone K, et al. Pharmacologic therapy for acute pain. *Am Fam Physician*. 2021;104(1):63–72.
 5. Krawczyk M, Wródlczyk J, Czupryna A, et al. Rekomendacje w uśmierzaniu bólu okołoperacyjnego w chirurgii ogólnej. *Chirurgia po Dyplomie*. 2013;8(1):47–56.
 6. Mears L, Mears J. The pathophysiology, assessment, and management of acute pain. *Br J Nurs*. 2023;32(2):58–65. <https://doi.org/10.12968/bjon.2023.32.2.58>
 7. Lopes A, Seligman Menezes M, Antonio Moreira de Barros G. Chronic postoperative pain: ubiquitous and scarcely appraised: narrative review. *Braz J Anesthesiol*. 2021;71(6):649–655. <https://doi.org/10.1016/j.bjane.2020.10.014>
 8. Gawęda A, Kamińska J, Wawoczna G, et al. Ból pooperacyjny w opinii pacjenta. *Pielęgniarstwo Pol*. 2020;4(78):209–216. <https://doi.org/10.20883/pielpol.2020.23>
 9. Small C, Laycock H. Acute postoperative pain management. *Br J Surg*. 2020;107(2):e70–e80. <https://doi.org/10.1002/bjs.11477>
 10. Budzyńska K. Ból jako jeden z głównych problemów osób leczonych operacyjnie. *Innowacje w Pielęgniarstwie i Naukach o Zdrowiu*. 2021;6(2):33–45. <https://doi.org/10.21784/IwP.2021.009>
 11. Wojciechowska U, Barańska K, Michałek I, et al. Nowotwory złośliwe w Polsce w 2020 roku. *Zwrotnik raka*. <https://www.zwrotnikraka.pl/nowotwory-zlosliwe-w-polsce-krajowy-rejestr-nowotworow/> (access: 2024.06.13).
 12. Grochans E, Hyrcza V, Kuczyńska M, et al. Subjective, postoperative judgment of patients pain after certain surgery. *Surg Vascular Nurs*. 2011;5(2):82–87.
 13. Golden A. Obesity's Impact. *Nurs Clin North Am*. 2021;56(4):xiii–xiv. <https://doi.org/10.1016/j.cnur.2021.08.004>
 14. Sun X, Yan AF, Shi Z, et al. Health consequences of obesity and projected future obesity health burden in China. *Obesity (Silver Spring)*. 2022;30(9):1724–1751. <https://doi.org/10.1002/oby.23472>
 15. González-Callejas C, Aparicio VA, De Teresa C, Nestares T. Association of Body Mass Index and Serum Markers of Tissue Damage with Postoperative Pain. The Role of Lactate Dehydrogenase for Postoperative Pain Prediction. *Pain Med*. 2020;21(8):1636–1643. <https://doi.org/10.1093/pm/pnz325>
 16. Giesinger K, Giesinger JM, Hamilton DF, Rechsteiner J, Ladurner A. Higher body mass index is associated with larger postoperative improvement in patient-reported outcomes following total knee arthroplasty. *BMC Musculoskelet Disord*. 2021;22(1):635.
 17. Safaei M, Sundarajan EA, Driss M, Boulila W, Shapiro A. A systematic literature review on obesity: Understanding the causes & consequences of obesity and reviewing various machine learning approaches used to predict obesity. *Comput Biol Med*. 2021;136:104754.
 18. Iqbal U, Green JB, Patel S, et al. Preoperative patient preparation in enhanced recovery pathways. *J Anaesthesiol Clin Pharmacol*. 2019;35(Suppl1):S14–S23. https://doi.org/10.4103/joacp.JOACP_54_18
 19. Naranjo C, Ortega-Jiménez P, Del Reguero L, et al. Relationship between diabetic neuropathic pain and comorbidity. Their impact on pain intensity, diabetes complications and quality of life in patients with type-2 diabetes mellitus. *Diabetes Res Clin Pract*. 2020;165:108236. <https://doi.org/10.1016/j.diabres.2020.108236>
 20. Chiang HL, Huang YC, Lin HS, et al. Hypertension and Postoperative Pain: A Prospective Observational Study. *Pain Res Manag*. 2019;2019:8946195. <https://doi.org/10.1155/2019/8946195>
 21. Sevick MA, Trauth JM, Ling BS, et al. Patients with Complex Chronic Diseases: perspectives on supporting self-management. *J Gen Intern Med*. 2007;22 Suppl 3(Suppl 3):438–444. <https://doi.org/10.1007/s11606-007-0316-z>
 22. Marmiroli P, Scuteri A, Cornblath DR, et al. Pain in chemotherapy-induced peripheral neurotoxicity. *J Peripher Nerv Syst*. 2017;22(3):156–161. <https://doi.org/10.1111/jns.12226>
 23. Wang J, Cheng L, Liu J, et al. Laparoscopy vs. Laparotomy for the Management of Abdominal Trauma: A Systematic Review and Meta-Analysis. *Front Surg*. 2022;9:817134. <https://doi.org/10.3389/fsurg.2022.817134>
 24. Gao Y, Li S, Xi H, et al. Laparoscopy versus conventional laparotomy in the management of abdominal trauma: a multi-institutional matched-pair study. *Surg Endosc*. 2020;34(5):2237–2242. <https://doi.org/10.1007/s00464-019-07013-4>
 25. Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: A qualified systematic review. *World J Methodol*. 2015;5(4):238–254. <https://doi.org/10.5662/wjmv5.i4.238>