Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Analgesic Medications for Pain Treatment in a ICU

Tahir Belice (drtahirelf@hotmail.com)
SBU İzmir Bozyaka Training and Research Hospital Internal Diseases Department
https://orcid.org/0000-0001-7957-3423

Berivan Akdoğan
SBU İzmir Bozyaka Training and Research Hospital Internal Diseases Department
https://orcid.org/0000-0002-9650-4283

İsmail Demir
SBU İzmir Bozyaka Training and Research Hospital Internal Diseases Department
https://orcid.org/0000-0001-7787-1443

Research Article

Keywords: Analgesics, Intensive Care Units, Pain Management

Posted Date: April 26th, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1586458/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Abstract

Aim

Pain management requires a broad and multidisciplinary approach that includes physical, psychological and spiritual domains. In this study, we provide the rates and types of painkillers that have been used in a ICU with demographics and mortality rates.

Methods

Patients charged in the ICU were found over the Probel registry system, and the number and types of painkillers, mortality rates, age and gender of the patients were recorded in excel and analyzed with SPSS. Independent T test and one way ANOVA were used to correlate variables

Results

A total of 283 subjects was included in this study with 143 (50.5%) women and 140 (49.5%) men. The numbers of ICU patients that were under 65 years old and aged 65 and over were 88 (31.1%) and 195 (68.9%), respectively. The number of patients that was not administered analgesics was 172 (%60.8) while the number of participants that was administered was 111 (39.2%). The number of single analgesic usage was 83 (29.3%), whereas the number of two analgesics or three were 3 (1.4%) and 23 (8.1%), respectively.

Conclusions

Pain management is a complex and difficult process and it is possible to obtain more effective results when it is planned as comprehensive and multidisciplinary.

Introduction

Pain is defined by the International Association for the Study of Pain as an "unpleasant sensory and emotional experience arising from actual or potential tissue damage, or described in terms of such damage" (1). One of the most important concern of the patients in ICU to feel of losing their life or experiencing severe pain, so the pain management is required to be at a high quality level. It would be a top priority for healthcare workers to provide sufficient pain relief, especially for the patients in ICU since as ill critically patients they receive aggressive interventions that are highly possible to cause them excessive pain other than fear (2,3). For about two billion people lack access to essential medicines leading to immense suffering from pain, fear, loss of dignity and life which are basic human rights that need to be improved (2,3).In ICU patients who are on a mechanical ventilation, sedatisized or injured on brain may not express the pain which can be the only wish of a patient that can be alleviated by a range

of medications (4,5). The acute pain is a leading stressor from moderate to severe pain intensity in nearly 50% of ICU patients (6). There are many serious consequences of the pain after surgery including tachycardia, systemic vascular resistance and increased *norepinephrine and* epinephrine which as a result lead to a another life-threatining condition such as stroke, bleeding, myocard infarction etc (7,8,9).

In pain management, the combining a non-opioid with an opioid or a regional analgesia technique with a systemic analgesic would be effective to decrease the need to opioid-based therapy (10). Becasuse of opioid-sparing management of pain control earlier mobilisation and earlier feeding could be achieved and beside that approach would help the physician to reduce adverse effects, overdiagnosis, over-treatment etc (11). Furthermore, at the end, the patient would be charged out earlier from hospital which is also another concern in this time of century since as we know that we need now more ICU units due to the increased elderly population worlwide(12). Another important point in pain management, acute neuropathic pain is always not determined clearly and overlooked, so its treatment is also tried to solve with only analgesics instead of tramadol, tapentadol, gabapentin, pregabalin etc(13). An effective and appropriate treatment in time can also reduce the development of chronic pain. So the pain should be managed by a pain specialist and especially in case of the persistent pains it should be referred to(14).

We need to reduce the gap between evidence and practice in the field of pain management as to improve the safety and effectiveness of the treatment to reduce patients' pain and suffering(15). With this study we criticize the types of painkillers and the percentages of their usage in a ICU comparing demographics, mortality and length of the stay.

Methods

Patients charged in the ICU unit between January 2019 and December 2019 were scanned through the Probel registry system, and the duration of hospitalization, the number and types of painkillers, mortality rates, age and gender of the patients were recorded in excel and analyzed with SPSS. Independent T test and one way ANOVA were used to correlate variables. Inclusion criterias were being aged 18 and over, patients charged in ICU of the hospital over 2019. Exclusion criterias were being participants under 18 years old and unclear records or histories of patients in Probel were excluded.

Results

There were 307 patients charged in ICU over 2019 in Probel. We excluded 24 patients due to not clear info backround registered in electronic data system of the hospital. A total of 283 subjects was included in this study with 143 (50.5%) women and 140 (49.5%) men. The numbers of ICU patients that were under 65 years old and aged 65 and over were 88 (31.1%) and 195 (68.9%), respectively. The number of patients that was not administered analgesics was 172 (%60.8) while the number of participants that was administered was 111 (39.2%). In patients that the analgesics were administered, there were 70 (63.1%) women and 41 (36.9%) men and there was a statistical significance between genders ($p<0.05$) women The number of patients that the analgesics were used in geriatric group was 75 (67.6%) whereas the

number of participants under 65 years old was 36 (32.4%). The number of fatal outcomes was 98 (34.6%). The numbers of analgesics that used as single or with combination therapy were as follows: Single analgesic: 83 (29.3%), a combination of two analgesics : 23 (8.1%), a combination of three analgesics: 3 (1.4%). The types of analgesics had used in ICU were opioids (tramadol, 15.2%, pethidine 13.2%, morphine 2.2%, fentanyl 11.3%), spasmolytics (scopolamine, 4.9%; metamizole, 1.1%)), non-steroidal anti-inflammatory (diclofenac sodium, 0.4%), anticonvulsants (gapapentin, 0.4%) and paracetamol (25.4%) (Table I).

Table I. The Analgesics that were administered in the ICU

Opioids :	**Percentages(%)**
Tramadol	15.2%,
Pethidine	13.2%
Morphine	2.2%
Fentanyl	11.3%
Spasmolytics:	
Scopolamine	4.9%
Metamizole	1.1%
Non-steroidal anti-inflammatory drugs	
Diclofenac sodium	0.4%
Anticonvulsants	
Gapapentin	0.4%)
Others:	
Paracetamol	25.4%

Discussion

Despite the fact that various pharmacologic factors may alter protein binding, volume status and function of end-organ, specifically in elderly people, the pain management is somehow underestimated and could not be paid a reasonable attention by healthcare providers(16,17). Trauma, sepsis, hipoxemia and some drugs can decrease the hepatic blood flow and drug which make the situation complex in turn for a physician when the pain exist. Pain in critically ill patients remains undertreated even though the decades of studies, guidelines and educational efforts have been introduced into the literature. Because of the inappropriate pain management in ICU, a range of complications including the prolonged mechanical ventilation, increased length of the stay, hypoxemia, thromboembolic events, pain-related immune supression, delirium and chronic pain etc. increases in number and severity(17,18,19). It is

recommended that a therapeutic trial of an analgesic should be considered in patients when the unpredicted and abnormal changes happen in clinic such as increased blood pressure, tachycardia, agitation or delirium etc(17,20). Because the pain causes sympathetic stimulation it is often detectable by the symptoms such as tachycardia and increased blood pressure. But it should be bear in mind that excessive or prolonged sedation can also cause compression ulcers, nerve compression or delirium etc (21).

Despite the high prevalance of the pain, it is often underreported in older people and perceived as something inevitable to feel and should be tolerated during aging process, but the evidence shows that it is higly possible to be a result of pathology involving a physical or psychological process (22,23). Furthermore, it was shown in several studies that the most of the patients that were under mechanical ventilation received sedatives and analgesics without further evaluation in detail(24,25). With the present study, we revealed that even though the most of patients in ICU was elderly (68.8%) and the percentage of patients that analgesics were administered was low at 39.2%. The most commonly used analgesics for all patients admitted to the ICU were pethidine (26.1%) in another study whereas it was the tradamol (15.2%) in our study (26). When we compare the usage of analgesics between genders, the women were administered analgesics with a higher proportion than men ($p<0.05$). In many studies, the effect of gender on pain was shown that women need more analgesics than men as the same in presented study(27,28,29). We found that in ICU the percentage of analgesics that used as single was 29.3%, which is not an effective way to alleviate the pain, especially in geriatric patients. So not only pharmacotherapy with single or combined type, but also music therapy or hand massage therapy were proven to be effective to some extent on pain relief alone or with analgesics (30,31,32,33). In sum, the pain management needs a multidisciplinary approach and educational studies that can improve the attitudes and behaviours of the healthcare workers.

Limitations: Pain is a symptom due to many reasons that is hard to associated with all of them in a study. It is difficult to state a relationship between the observed predictors and psychological side of pain in this study. Another limitation of this study was that the variables related to the patients were not asked. Furthermore, the diagnostic evaluation of the psychiatric conditions of the individuals (such as previous psychotropic medications, etc.) was not performed. These dimensions should be considered in future studies.

Conclusions

Despite the many educational efforts and studies, lack of the pain management has been a growing concern in clinic that need to be valued again as to control it in effective way. For an optimal pain management we need to create a multidisciplinary, evidence-based and patient-centered solution to the patients that are undertreated in hospital ICUs.

Declarations

Acknowledgments:

Conflict of Interest: The author has no conflicts of interest to report.

Author Contributions: The author contributed to the writing, reviewing and editing of the review.

Financial Disclosure: The author declared that this study received no financial support

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (Turkish SBU Izmir Bozyaka Education and Training Hospital) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. Treede RD. The International Association for the Study of Pain definition of pain: as valid in 2018 as in 1979, but in need of regularly updated footnotes. Pain Rep. 2018 Mar 5;3(2):e643. doi: 10.1097/PR9.0000000000000643.
2. Montreal Statement on the Human Right to Essential Medicines, 2005. Available at (18.04.2020): http://www.ccghr.ca/default.cfm?lang e&contentaccessmeds_news&subnavnews.
3. Ahmedzai SH, Costa A, Blengini C, Bosch A, Sanz-Ortiz J, Ventafridda V, et al., A new international framework for palliative care. Eur J Cancer 2004;40:2192–2200. https://doi.org/10.1016/j.ejca.2004.06.009
4. Stanik-Hutt JA, Soeken KL, Belcher AE, Fontaine DK, Gift AG, Pain experiences of traumatically injured patients in a critical care setting. Am J Crit Care. 2001 Jul; 10(4):252–9. PMID: 11432213
5. Puntillo, K., Pasero, C., Li, D., Mularski, R. A., Grap, M. J., Erstad, B. L et al. Sessler, C. N. (2009). Evaluation of Pain in ICU Patients. Chest, 135(4), 1069–1074. doi:10.1378/chest.08-2369.
6. Follin SL, Charland SL. Acute pain management: operative or medical procedures and trauma. Ann Pharmacother. 1997 Sep;31(9):1068–76. https://doi.org/10.1177/106002809703100917
7. MacIntyre P, on behalf of the Working Party of the Australian and New Zealand College of Anaesthetists. Acute Pain Management: Scientific Evidence, 2nd ed. Melbourne, Australia: Australian and New Zealand College of Anaesthetists, 2005. Available at (18.04.2020): http://www.nhmrc.gov.au/publications/synopses/ cp104syn.htm.
8. Scascighini L, Toma V, Dober-Spielmann S, Sprott H. Multidisciplinary treatment for chronic pain: a systematic review of interventions and outcomes. Rheumatology (Oxford). 2008 May;47(5):670–8. doi:10.1093/rheumatology/ken021.
9. Dayoub EJ, Jena AB. Does Pain Lead to Tachycardia? Revisiting the Association Between Self-reported Pain and Heart Rate in a National Sample of Urgent Emergency Department Visits. Mayo Clin Proc. 2015 Aug;90(8):1165-6. doi: 10.1016/j.mayocp.2015.06.007.

10. Macintyre PE, Power I, Schug SA, Acute pain management: scientific evidence. 2nd ed. Melbourne: Australian and New Zealand College of Anaesthetists and Faculty of Pain Management, 2005. Available at (18.04.2020): http://fpm.anzca.edu.au/documents/apmse4_2015_final
11. Fayaz MK, Abel RJ, Pugh SC, Hall JE, Djaiani G, Mecklenburgh JS. Opioid-sparing effects of diclofenac and paracetamol lead to improved outcomes after cardiac surgery. J Cardiothorac Vasc Anesth. 2004 Dec;18(6):742–7, https://doi.org/10.1053/j.jvca.2004.08.012
12. Nguyen YL, Angus DC, Boumendil A, Guidet B. The challenge of admitting the very elderly to intensive care. Ann Intensive Care. 2011 Aug 1;1(1):29. doi: 10.1186/2110-5820-1-29.
13. Arslan M, Albaş S, Küçükerdem H, Pamuk G, Can H. The evaluation of the effectiveness of palliative pain management in cancer patients with visual analogue scale. Family Practice and Palliative Care. 2016; 1(1): 8–5. https://doi.org/10.22391/920.182939
14. CAN H, PAMUK G, BİLYAY H, KOÇ E, KAPLAN Y, KÜÇÜKZEYBEK Y, ALACACIOĞLU A. Narcotic analgesic use of hospitalized patients with lung cancer in palliative care service. Family Practice and Palliative Care. 2017; 1(3): 64–61. https://doi.org/10.22391/920.287410
15. Kehlet H,Wilkinson RC, FischerHB, CamuF. PROSPECT: evidence based, procedure-specific postoperative pain management. Best Pract Res Clin Anaesthesiol 2007; 21: 149–159. https://doi.org/10.1016/j.bpa.2006.12.001
16. Devlin JW. The pharmacology of oversedation in mechanically ventilated adults.Curr Opin Crit Care. 2008 Aug;14(4):403–7. doi: 10.1097/MCC.0b013e32830280b3.
17. Practice guidelines for acute pain management in the perioperative setting: an updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. Anesthesiology. 2012;116(2):248–73. Doi: 10.1097/ALN.0b013e31823c1030.
18. Kumar AB, Brennan TJ. Pain assessment, sedation, and analgesic administration in the intensive care unit. Anesthesiology. 2009;111(6):1187–8. doi: 10.1097/ALN.0b013e3181c0d1b5.
19. Chanques G, Jaber S, Barbotte E, Violet S, Sebbane M, Perrigault PF, et al. Impact of systematic evaluation of pain and agitation in an intensive care unit. Crit Care Med. 2006;34(6):1691–9. doi: 10.1097/01.ccm.0000218416.62457.56.
20. Stern TA, Celano CM, Gross AF, Huffman JC, Freudenreich O, Kontos N, et al. The assessment and management of agitation and delirium in the general hospital. Prim Care Companion J Clin Psychiatry. 2010;12(1):PCC.
09r00938
. doi: 10.4088/PCC.09r00938yel.
21. Sessler CN, Pedram S - Protocolized and target-based sedation and analgesia in the ICU. Crit Care Clin, 2009;25:489–513. https://doi.org/10.1016/j.ccc.2009.03.001
22. Özkök S. Chronic Pain and Related Factors in Patients Aged ≥ 80 Years. Eur J Geriatric Gerontol 2019;1:101–106, 10.4274/ejgg.galenos.2019.226.
23. Gignac MA, Davis AM, Hawker G, Wright JG, Mahomed N, Fortin PR, et al. “What do you expect? You’re just getting older”: A comparison of perceived osteoarthritis-related and aging-related health

experiences in middle- and older-age adults. Arthritis & Rheumatism 2006;55:905–912

24. Payen JF, Chanques G, Mantz J, Hercule C, Auriant I, Leguillou JL, et al. Current practices in sedation and analgesia for mechanically ventilated critically ill patients: a prospective multicenter patient-based study. Anesthesiology. 2007;106(4):687–95. quiz 891-2, https://doi.org/10.1002/art.22338
25. Payen JF, Bosson JL, Chanques G, Mantz J, Labarere J. Pain assessment is associated with decreased duration of mechanical ventilation in the intensive care unit: a post Hoc analysis of the DOLOREA study. Anesthesiology. 2009;111(6):1308–16. doi: 10.1097/ALN.0b013e3181c0d4f0.
26. Kim HH, Choi SC, Ahn JH, Chae MK, Heo J, Min YG. Analysis of trends in usage of analgesics and sedatives in intensive care units of South Korea: A retrospective nationwide population-based study. Medicine (Baltimore). 2018 Aug;97(35):e12126. doi: 10.1097/MD.0000000000012126
27. Hussain AM, Khan FA, Ahmed A, Chawla T, Azam SI. Effect of gender on pain perception and analgesic consumption in laparoscopic cholecystectomy: An observational study. J Anaesthesiol Clin Pharmacol. 2013 Jul;29(3):337–41. doi: 10.4103/0970-9185.117095.
28. Bowsher D, Rigge M, Sopp L. Prevalence of chronic pain in the British population: a telephone survey of 1037 households. Pain Clinic 1991;4:223–230, https://dx.doi.org/10.1136%2Fbmjopen-2015-010364
29. Crook J, Rideout E, Browne G. The prevalence of pain complaints in a general population. Pain 1984;18:299–314, doi:10.1016/j.pain.2004.04.017
30. Mirbagher Ajorpaz N, Mohammadi A, Najaran H, Khazaei S. Effect of music on postoperative pain in patients under open heart surgery. Nurs Midwifery Stud. 2014 Sep;3(3):e20213. doi: 10.17795/nmsjournal20213.
31. Yaman Aktaş Y, Karabulut N. The effects of music therapy in endotracheal suctioning of mechanically ventilated patients. Nurs Crit Care 2015. doi: 10.1111/nicc.12159.
32. Tracy MF, Chlan L, Staugaitis A. Perceptions of patients and families who received a music intervention during mechanical ventilation. Music Med 2015; 7(3): 54 – 8. PMC4543301.
33. Gelinas C, Arbour C, Michaud C, Rober L, Cote J. Patients and ICU nurses' perspectives of non-pharmacological interventions for pain management. Nursing in Critical Care 2012; 18(6): 307–18. doi: 10.1111/j.1478-5153.2012.00531.x.
34. Martorella G, Boitor M, Michaud C, Gelinas C. Feasibility and acceptability of hand massage therapy for pain management of postoperative cardiac surgery patients in the intensive care unit. Heart Lung 2014; 43(5): 437–44. doi: 10.1016/j.hrtlng.2014.06.047.