Jurnal
Berita Ilmu Keperawatan

Jurnal Berita Ilmu Keperawatan
Vol. 19 (1), 2026
p-ISSN: 1979-2697
e-ISSN: 2721-1797
https://doi.org/10.23917/bik.v19i1.10826

Evaluating Pain Assessment in Emergency Care: A Systematic Review

Arief Wahyudi Jadmiko[1*], Debby Syahru Romadlon[2]

[1]*Nursing Department,Faculty of Health Science, Universitas Pembangunan Nasional Veteran Jakarta, Indonesia.*
[2]*Faculty of Nursing, Chulalongkorn University, Bangkok, Thailand*

*Correspondence: *ariefwjadmiko@gmail.com*; *awjadmiko@upnvj.ac.id*

Abstract

Effective pain assessment in emergency departments (EDs) is essential to optimizing patient care and improving outcomes such as satisfaction, reduced hospitalization, and lower re-admission rates. This evidence-based critical review aims to explore the relationship between pain assessment practices in EDs and resulting patient outcomes. A systematic search was conducted across three electronic databases—PubMed, Google Scholar, and Web of Science—using the keywords "Emergency department AND Pain assessment AND Patient outcomes" using a structured PICO approach: Population (P) – ED patients, Intervention (I) – pain assessment, Control (C) – none, Outcome (O) – positive clinical and satisfaction-related outcomes. Inclusion criteria comprised original research articles published in English between 2005 and 2025 that focused on pain assessment in emergency settings and reported outcomes such as patient satisfaction, readmission rates, or clinical improvements. Exclusion criteria included non-English publications, studies outside the ED context, and non-original research. Article selection involved initial identification, duplicate removal, title/abstract screening, and full-text eligibility assessment. Out of 21,317 retrieved articles, 6,957 unique records remained after duplicate removal. The studies involving a total of 54,511 patients. Findings demonstrated that structured pain assessment and timely analgesic intervention led to significantly improved patient satisfaction, reduced emotional distress, better adherence to medical instructions, decreased rates of hospitalization, a higher likelihood of administration potent pain medication, ED Length of Stay, ED charges, and ED revisits. This review reinforces the vital role of effective pain assessment in emergency care settings. Evidence indicates that structured and timely pain management not only enhances patient comfort but also contributes to better clinical outcomes, higher satisfaction, and reduced healthcare utilization.

Keywords: emergency service; pain measurement; treatment outcome

Submitted: 05 June 2025, reviewed: 24 June 2025, revised: 03 November 2025, accepted: 06 November 2025, published: 31 January 2026

INTRODUCTION

Pain management in the Emergency Department (ED) is a vital aspect of healthcare services. Prior to initiating treatment, conducting a pain assessment is essential, as it is closely linked to the outcomes of care delivery (Lidauer et al., 2025). Some of the researches were highlighting the Inadequate assessment and treatment of pain in the ED (Lidauer et al., 2025; Uzun et al., 2025). Study by Scholten et al. (2015), stated that the implementation of pain management for trauma patients within the emergency care continuum varies significantly across healthcare organizations and often does not align with national guideline recommendations. This thing happens, maybe because there is some difference perception of pain between the patient and health physician like nurses or doctors, like highly stated in some recent several studies (Alotaibi et al., 2022; Shih-Chieh et al., 2023). A meta-analysis by Ruben et al. (2018) also stated those same results. Cultural factors significantly influence

how individuals perceive, express, and manage pain, affecting their interactions with healthcare systems and responses to treatment. These differences, shaped by cultural norms, behaviors, and biological mechanisms, highlight the need for culturally competent care and the integration of cultural considerations into pain assessment and management protocols (Chioma Anthonia Okolo, Tolulope Olorunsogo, & Oloruntoba Babawarun, 2024).

In addition, an effective management was the best way to deliver the best outcome of health in patients experiencing pain in ED. As the Brennan et al. (2019) stated in their research that access to pain management as a human right. Therefore, giving the best management of pain at ED is necessary and urgently needed as evidence based showed there is still many an ineffective in pain management at ED.

Previous reviews on pain management have largely focused on pharmacological and non-pharmacological interventions, with comparatively limited attention to the foundational step of pain assessment. Yet, without effective assessment, subsequent pain management strategies may be compromised, perpetuating disparities in care. Furthermore, gaps remain regarding the effectiveness, feasibility, and clinical impact of different assessment approaches in the ED, particularly in vulnerable populations such as older adults, children, and patients with communication barriers.

Furthermore, a systematic review synthesizing current evidence on pain assessment in emergency care is needed. Such a review will clarify which tools and approaches have been studied, their effectiveness in improving patient outcomes, and the contextual challenges influencing their use. By consolidating existing knowledge, this review aims to provide an evidence base to inform best practices, support guideline implementation, and identify priority areas for future research in optimizing pain assessment in the emergency setting. Therefore, this study aims to explore the relationship between pain assessment practices in EDs and the resulting patient outcomes.

METHODS

Study Design

This evidence-based systematic review explores the topic of pain assessment in emergency care and its impact on patient outcomes. Prior to conducting the literature search, a PICO framework was developed to guide the review, Population (P): Patients in the emergency department; Intervention (I): Pain assessment; Control (C): –; Outcome (O): Positive patient outcomes, such as increased satisfaction and reduced rates of readmission or hospitalization. We follow PRISMA guidelines for systematic review.

Search Strategy

The systematic review process was carried out through several stages. The initial stage involved identifying relevant articles by conducting searches in selected electronic databases, including PubMed, Google Scholar, and ScienceDirect. During this phase, these keywords were used "Emergency department AND Pain assessment AND Patient outcomes".

The subsequent stage involved screening and selecting articles that met the inclusion criteria. Only studies published in English over the past 20 years (2005–2025) were considered. The selected literature was then summarized in a table format and further discussed narratively in the analysis section.

Selection Process

To determine study eligibility, a two-stage screening process was employed. In the first stage, all titles and abstracts retrieved from the database search were independently screened by two reviewers against the predefined inclusion and exclusion criteria. Studies deemed potentially relevant were carried forward to the second stage, in which the full-text articles were assessed in detail. Each report was evaluated independently by the same two reviewers to ensure consistency and minimize bias.

Any disagreements between reviewers at either stage were resolved through discussion and consensus; if consensus could not be reached, a third reviewer was consulted to make a final decision. Throughout the process, a standardized screening form was used to guide decisions and ensure that inclusion criteria were applied consistently across all studies. All records were imported into a

reference management software to remove duplicates prior to screening

Inclusion Criteria

In selecting articles for this systematic review, the researcher applied a set of inclusion and exclusion criteria to ensure that the studies were relevant and of high quality. The inclusion criteria consisted of research published within the last twenty years (2005–2025), written in English and categorized as original research articles. The studies had to specifically focus on pain assessment conducted in emergency care settings, and report on patient outcomes such as satisfaction, readmission rates, or clinical improvement.

Exclusion Criteria

Conversely, the exclusion criteria ruled out studies published before 2005 or after 2025, articles written in languages other than English and those categorized as reviews or theoretical papers. Studies that did not focus on pain assessment or were conducted outside the context of emergency departments were also excluded. These criteria helped the researcher select literature that directly aligned with the purpose of the review evaluating the effectiveness and outcomes of pain assessment in emergency care.

Data Analysis

The data analysis involves rigorous data collection, synthesis, and analysis to draw evidence-based conclusions. The research in this study followed the PRISMA flowchart to collect articles which depicts the flow of information through the different phases of a systematic review (Haddaway et al., 2022). It maps out the number of records identified, included and excluded, and the reasons for exclusions. Furthermore, the quality of the research was evaluated utilizing the Cohort Study Checklist released by the Critical Appraisal Skills Program (CASP) in 2018.

Appraisal of the Selected Articles

Table 1. Critical Appraisal Checklist using CASP

Author (year)	Criteria											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
Berardinis (2013)	2	2	2	2	2	2	2	2	2	2	2	22
Brown et al. (2018)	2	2	2	2	2	2	2	2	2	2	2	22
Bhakta & Marco (2014)	2	2	2	2	2	2	2	2	2	2	2	22
Downey & Zun (2010)	2	2	2	2	2	2	2	2	2	2	2	22
Ku et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	22
Kone et al. (2016)	2	2	2	2	2	2	2	2	2	2	2	22
Lidauer et al. (2025)	2	2	2	2	2	2	2	2	2	2	2	22
Prasad et al. (2025)	2	2	2	2	2	2	2	2	2	2	2	22
Wu et al. (2022)	2	2	2	2	2	2	2	2	2	2	2	22
van Zanden et al. (2018)	2	2	2	2	2	2	2	2	2	2	2	22

Description of the question criteria:

1 = Does the study address the clinical problem clearly?
2 = Were the respondents selected in the right way?
3 = Are social isolation and loneliness accurately measured to minimize bias?
4 = Were the outcomes accurately measured to minimize bias?
5 = Did the researcher identify all important confounding factors? Does the researcher account for confounding factors in the design and/or analysis?
6 = Does the research subject complete the research time in full? Were the research subjects followed up for a sufficiently long time?
7 = Are the results precise?
8 = Can the results be trusted?
9 = Are the results applicable to the local (local) population?
10 = Are the results of this study compatible with the available evidence?
11 = Does the implications of this research suitable for practice?

Answer score description:

0 = No
1 = Can't tell
2 = Yes

RESULTS

Characteristics of the Study

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review protocol is currently under review at PROSPERO (No ID: 1144568). All review stages, including literature search, study screening, eligibility assessment, and data extraction, adhered to the PRISMA 2020 framework. The study selection process is illustrated in Figure 1 using the PRISMA 2020 flow diagram, detailing the number of records identified, screened, excluded, and included in the final synthesis.

A total of 11,317 articles were retrieved through electronic databases using the search terms *pain assessment*, *emergency unit*, *emergency department*, and *outcome*, comprising 2,143 articles from PubMed, 37 from Google Scholar, and 9,137 from Web of Science. After removing duplicates, 4,360 unique records remained. Title and abstract screening narrowed the selection to 278 articles. Subsequently, 141 articles were assessed for full-text eligibility; the rest were excluded due to unmatched settings of study (outside ED). Of these, we found 10 studies met the predefined inclusion criteria (See Figure 1).

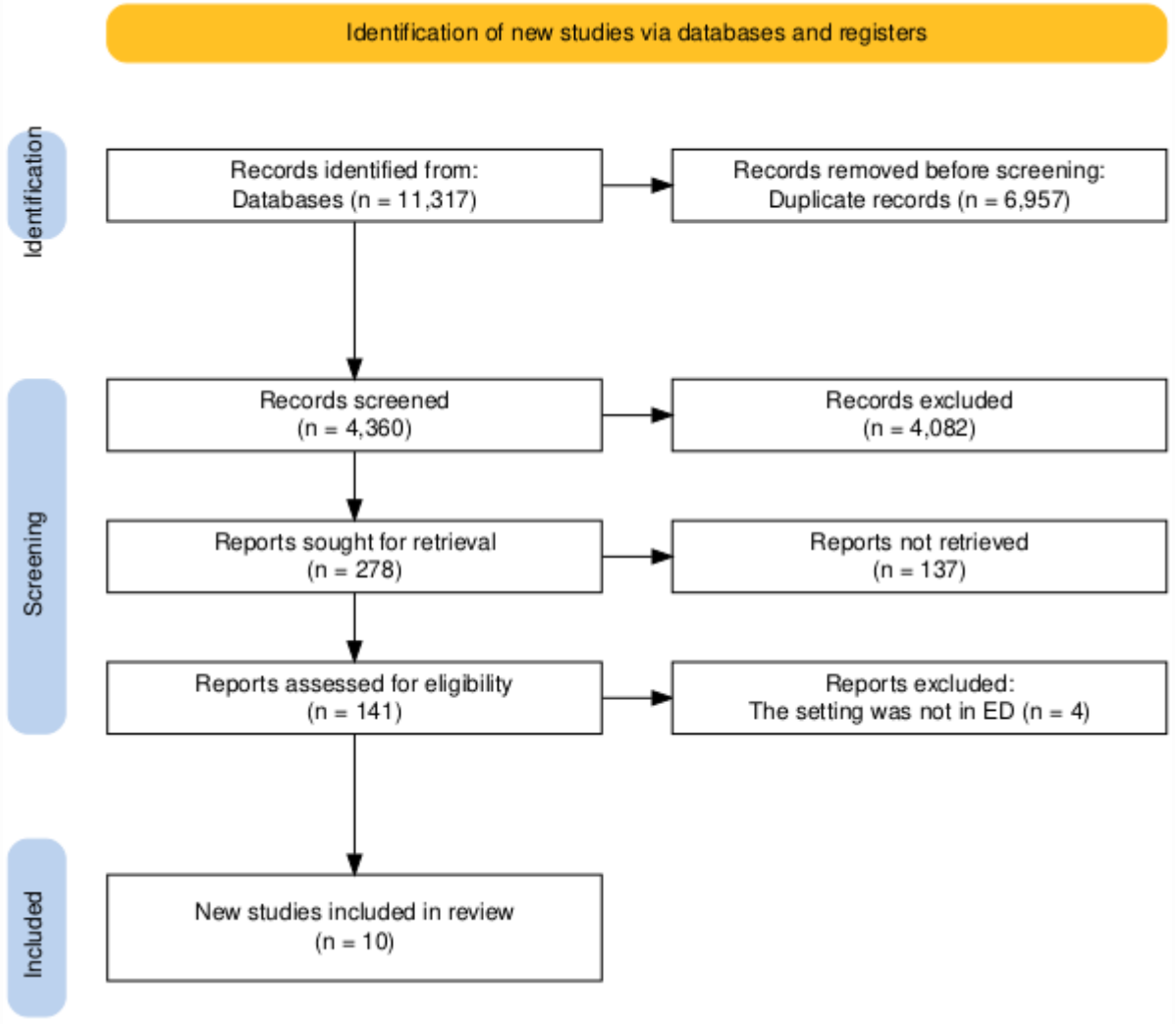

Figure 1. PRISMA 2020 Flow Diagram of Study Selection

Geographically, the included studies originated from Italy (n = 1), the Netherlands (n = 1), Finland (n=1), France (n = 3), the United States (n = 2), Australia (n = 2), and Taiwan (n = 2). The study designs consisted of three cohort study, one prospective observational qualitative, one multicenter prospective observational clinical study, and five cross-sectional studies. Across the seven studies, a total of 54,511 participants were included, with sample sizes ranging from 115 to 28,105. Various pain assessment tools have been employed to evaluate patient pain experiences, particularly in emergency and hospital settings. In Berardinis (2013), both the Visual Analogue Scale (VAS) and the verbal Numerical Rating Scale (NRS) were used to assess pain. Bhakta and Marco (2014), Brown et al., (2018), and Ku et al. (2023), relied solely on the NRS to assess pain levels in emergency department patients. Downey and Zun (2010) utilized a combination of pain assessment instruments: the VAS, the Brief Pain Inventory (BPI), and the Medical Interview Satisfaction Scale (MISS). In Kone et al. (2016), pain was measured using both the NRS and the VAS. Prasad et al. (2025) did not use a traditional pain scale like NRS or VAS. Instead, they analyzed data from the Adult Admitted Patient Survey (AAPS), which gathered self-reported information on the presence, severity, and adequacy of pain management during hospitalization. Wu et al. (2022), employed the NRS to measure patients' initial pain levels and their response to treatment over time. Finally, van Zanden et al. (2018) used the NRS to assess pain in patients receiving analgesics.

Results of Review

Berardinis (2013) examining the impact of dedicated pain management teams in the ED. The study reported significant improvements in early pain assessment, timely analgesic administration, and systematic pain reassessment, resulting in increased pain relief and patient satisfaction ($p < 0.001$).

Bhakta and Marco (2014) demonstrated that a pain reduction of ≥40% was significantly associated with higher patient satisfaction, reduced emotional distress, and better rapport with physicians. Downey and Zun (2010) found that timely and adequate analgesia in the ED positively influenced patient satisfaction and compliance with discharge instructions.

Brown et al., (2018) reported that male sex was inversely associated with satisfaction, whereas compassion, and significant change in pain score were associated with improved patient satisfaction. Staff compassion demonstrated the strongest correlation with satisfaction.

Ku et al. (2023) showed that physician-rated pain demonstrated a positive correlation with extended ED Length of stay and increased ED charges. Moreover, it strengthened the predictive ability of triage for hospitalization.

Kone et al. (2016) carried out a prospective multicenter study in France with a sample size of 785. The implementation of a structured pain protocol led to increased frequency of pain assessments and timely interventions, which were associated with significant improvements in both pain relief and satisfaction ($p < 0.001$).

Study by Lidauer et al. (2025) reported that assessment with a high NRS level was associated with a higher likelihood of administering potent pain medication.

Prasad et al. (2025) revealed that adequate pain management was associated with a significantly lower risk of ED re-admission (aOR 0.69; 95% CI, 0.51–0.94) and fewer return visits (aOR 0.62; 95% CI, 0.44–0.87).

Wu et al. (2022) emphasized the importance of response speed to analgesics, reporting that fast responders had better outcomes and a lower risk of hospitalization (aOR 0.75; 95% CI, 0.70–0.81), whereas slow responders were at higher risk of revisiting the ED (aOR 2.65; 95% CI, 1.85–3.69).

Van Zanden et al. (2018) showed that structured pain management protocols were effective in reducing pain levels, leading to increased satisfaction with emergency care upon discharge. Overall, the reviewed evidence underscores that adequate and timely pain management in emergency settings is critical not only for enhancing patient comfort but also for improving clinical outcomes, satisfaction, and healthcare utilization metrics such as re-admission and return visits.

Table 2. Review of Primary Studies Included

Author	**Study Location**	**Study Design**	**Sample Size**	**Pain Assessment Instrument**	**Variable**	**Outcome**
Berardinis (2013)	Italy	Multicenter prospective observational clinical study	582	The Visual Analogue Scale (VAS) and the verbal Numerical Rating Scale (NRS)	X = Pain judgement, quality of life; Y = Pain assessment	There was a statistically significant difference between nurse and Emergency Physicians pain judgement ($p<0.001$). Adequate pain management in the ED plays a critical role in ensuring patients' quality of life.
Bhakta & Marco (2014)	United States	Cross-sectional	289	NRS	X = Patient satisfaction; Y = Pain assessment	Effective pain management has also been linked to improved patient satisfaction among individuals who come to the ED with painful conditions.
Brown et al., (2018)	Australia	Prospective observational qualitative	115	NRS	X = Patient satisfaction; Y = Pain assessment	Patient satisfaction was inversely associated with male sex, and positively correlated ($p < 0.05$) with increasing age, significant change in pain score and compassion scores
Downey & Zun (2010)	United States	Cross-sectional	159	VAS, Brief Pain Inventory (BPI), and the Medical Interview Satisfaction Scale (MISS)	X = Patient satisfaction; Y = Pain assessment	A reduction of 40% or more in pain levels while in the ED has been found to significantly enhance patient satisfaction.
Ku et al. (2023)	Taiwan	Cohort	656	NRS	X = ED Length of stay, ED charges;	Physician-rated pain demonstrated a positive correlation with

					Y = Pain assessment	extended ED Length of stay and increased ED charges.
Kone et al. (2016)	France	Cross-sectional	785	NRS and the verbal rating scale (VAS)	X = Patient satisfaction and relief; Y = Pain assessment	The implementation of a pain management team in the ED led to patient outcomes, including increased pain relief ($p < 0.001$) and higher satisfaction levels ($p < 0.001$).
Lidauer et al. (2025)	Finland	Cohort	2586	NRS	X = Administration potent pain medication Y = Pain assessment	Assessment with a high NRS level was associated with a higher likelihood of administering potent pain medication
Prasad et al. (2025)	Australia	Retrospective cross-sectional	21,900	Adult Admitted Patient Survey (AAPS). This survey collected self-reported information on the presence, severity, and management adequacy of pain experienced by patients.	X = Re-admission Y = Pain assessment	Adequate pain management is associated with a lower likelihood of re-admission (adjusted odds ratio [aOR] 0.69; 95% confidence interval [CI], 0.51–0.94).
Wu et al. (2022)	Taiwan	Retrospective cohort	28,105	NRS	X = Patient satisfaction and relief; Y = Pain assessment	Patient response speed to pain treatment impacts clinical outcomes. Fast responders showed better treatment outcomes and were independently associated with a lower risk of hospitalization (aOR 0.75; 95%

						CI, 0.70–0.81), whereas slow responders—those with lingering pain—had a higher risk of revisiting the ED (aOR 2.65; 95% CI, 1.85–3.69)
van Zanden et al. (2018)	Netherland	Prospective observational	334	NRS	X = Patient satisfaction; Y = Pain assessment	For patients receiving analgesics, the pain management protocol has proven effective in controlling pain, resulting in increased satisfaction with emergency care upon discharge.

DISCUSSION

The findings of this review reinforce the foundational concept that pain assessment is not merely a clinical formality, but a central component in achieving optimal patient outcomes in emergency care. This supports the initial hypothesis that structured, timely, and contextually relevant pain assessment practices are directly associated with improvements in patient satisfaction, reduction in unnecessary readmissions, and overall quality of care.

Rather than focusing solely on the clinical implementation, these results invite deeper reflection on the systemic and theoretical underpinnings of pain assessment. For instance, the variation in patient outcomes across studies suggests that institutional readiness, healthcare provider attitudes, and the presence of standardized protocols may serve as critical mediating factors. This aligns with the theory of patient-centered care, which posits that outcomes improve when interventions are tailored to individual needs, including how pain is perceived and reported (Batko & Ślęzak, 2022; Bhati et al., 2023).

The interplay between cultural, psychological, and physiological elements further underscores the multidimensional nature of pain. While this review did not explicitly include cultural analysis, the relevance of culturally competent care becomes evident. Pain perception and reporting behaviors differ significantly across populations, and failure to account for these nuances may lead to misinterpretation of pain severity and, ultimately, suboptimal treatment. This highlights the need to embed cultural sensitivity within pain assessment tools—an implication that has both theoretical and practical resonance, especially in increasingly diverse emergency settings.

The review also identifies potential gaps and points of contention in the current literature. While the positive impact of structured pain protocols is well supported, few studies examine long-term outcomes, such as functional recovery and increasing of quality of life (Berardinis (2013). Furthermore, although some studies suggest that rapid response to analgesia correlates with reduced hospitalizations (Wu et al. (2022), it remains unclear whether this is a marker of physiological responsiveness or of the effectiveness of clinical workflow. This opens room for further investigation and a call to refine existing protocols through longitudinal and interventional studies.

From an application perspective, these findings advocate for stronger institutional policies supporting early and repeated pain assessments in the ED. It also suggests a broader role for interprofessional teams—including nurses, emergency physicians, and pain specialists—in the

development and implementation of pain management strategies. Integrating these insights into medical education and clinical guidelines would not only address variability in practice but also close the gap between theory and real-world application.

CONCLUSION

This evidence-based review highlights that structured and timely pain assessment in ED significantly improves patient outcomes. The included studies consistently show that effective pain management is associated with increased patient satisfaction, reduced emotional distress, lower risks of hospitalization and re-admission, and improved adherence to medical instructions. The findings underscore the importance of integrating systematic pain assessment protocols into standard emergency care practices to enhance both clinical effectiveness and patient-centered outcomes.

Healthcare institutions and emergency care providers should prioritize the development and implementation of standardized pain assessment protocols in ED settings. This includes early pain evaluation, prompt analgesic administration, and continuous pain reassessment. Establishing dedicated pain management teams or assigning trained personnel can further enhance the consistency and quality of pain-related care, leading to improved patient satisfaction and reduced strain on emergency services through decreased revisits and admissions.

Hospital administrators and health policymakers are encouraged to adopt evidence-based pain management policies in emergency settings, supported by ongoing staff training and performance monitoring. Institutional commitment to pain assessment as a core clinical indicator can facilitate a more responsive and efficient ED system.

Further research is needed to explore the long-term impact of various pain management models on broader health system outcomes, such as cost-efficiency, length of stay, and cross-cultural applicability. Additionally, studies comparing different pain assessment tools and interventions across diverse emergency contexts would provide deeper insights into optimizing pain care strategies.

ACKNOWLEDGMENT

The authors would like to thank Universitas Pembangunan Nasional Veteran Jakarta for their support and all contributors who assisted in completing this study.

CONFLICT OF INTEREST

None.

ETHICAL CONSIDERATION

This review used secondary data and did not require ethical clearance.

FUNDING

The author utilized personal funds for this study.

PROTOCOL REGISTRATION

The review protocol is currently under review at PROSPERO (No ID: 1144568)

AUTHOR CONTRIBUTION

AWJ: conceptualized the study, designed the methodology, conducted the literature analysis, and drafted the manuscript.
DSR: data screening and interpretation, critically reviewed and edited the manuscript, and supervised the overall research process.

REFERENCES

Alotaibi, M., Aljahany, M., Alhamdan, Z., Alsaffar, M., Almojally, A., & Alassaf, W. (2022). Differences in acute pain perception between patients and physicians in the emergency department. *Heliyon*, *8*(11), e11462. https://doi.org/10.1016/j.heliyon.2022.e11462

Batko, K., & Ślęzak, A. (2022). The use of Big Data Analytics in healthcare. *Journal of Big Data*, *9*(1), 3. https://doi.org/10.1186/s40537-021-00553-4

Berardinis, B. De. (2013). Emergency Department Pain Management and Its Impact On Patients' Short Term Outcome. *The Open Emergency Medicine Journal*, *5*(1), 1–7. https://doi.org/10.2174/1876542420130729001

Bhakta, H. C., & Marco, C. A. (2014). Pain Management: Association with Patient Satisfaction among Emergency Department Patients. *The Journal of Emergency Medicine*, *46*(4), 456–464. https://doi.org/10.1016/j.jemermed.2013.04.018

Bhati, D., Deogade, M. S., & Kanyal, D. (2023). Improving Patient Outcomes Through Effective Hospital Administration: A Comprehensive Review. *Cureus*. https://doi.org/10.7759/cureus.47731

Brennan, F., Lohman, D., & Gwyther, L. (2019). Access to Pain Management as a Human Right. *American Journal of Public Health*, *109*(1), 61–65. https://doi.org/10.2105/AJPH.2018.304743

Brown, T., Shetty, A., Zhao, D. F., Harvey, N., Yu, T., & Murphy, M. (2018). Association between pain control and patient satisfaction outcomes in the emergency department setting. *Emergency Medicine Australasia*, *30*(4), 523–529. https://doi.org/10.1111/1742-6723.12945

Chioma Anthonia Okolo, Tolulope Olorunsogo, & Oloruntoba Babawarun. (2024). Cultural variability in pain perception: A review of cross-cultural studies. *International Journal of Science and Research Archive*, *11*(1), 2550–2556. https://doi.org/10.30574/ijsra.2024.11.1.0339

Dale, J., & Bjørnsen, L. P. (2015). Assessment of pain in a Norwegian Emergency Department. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *23*(1), 86. https://doi.org/10.1186/s13049-015-0166-3

Dijkstra, B. M., Berben, S. A. A., van Dongen, R. T. M., & Schoonhoven, L. (2014). Review on pharmacological pain management in trauma patients in (pre-hospital) emergency medicine in the <scp>N</scp> etherlands. *European Journal of Pain*, *18*(1), 3–19. https://doi.org/10.1002/j.1532-2149.2013.00337.x

Downey, L. V., & Zun, L. (2010). Pain management in the emergency department and its relationship to patient satisfaction. *Journal of Emergencies, Trauma, and Shock*, *3*(4), 326. https://doi.org/10.4103/0974-2700.70749

Gleichgerrcht, E., & Decety, J. (2014). The relationship between different facets of empathy, pain perception and compassion fatigue among physicians. *Frontiers in Behavioral Neuroscience*, *8*. https://doi.org/10.3389/fnbeh.2014.00243

Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). *PRISMA2020* : An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, *18*(2). https://doi.org/10.1002/cl2.1230

Kone, V., Lecomte, F., Randriamanana, D., Pourriat, J.-L., Claessens, Y.-E., & Vidal-Trecan, G. (2016). Impact of a pilot team on patients' pain reduction and satisfaction in an emergency department: A before-and-after observational study. *Revue d'Épidémiologie et de Santé Publique*, *64*(2), 59–66. https://doi.org/10.1016/j.respe.2015.11.010

Ku, N.-W., Cheng, M.-T., Liew, C. Q., Chen, Y. C., Sung, C.-W., Ko, C.-H., Lu, T.-C., Huang, C.-H., & Tsai, C.-L. (2023). Prospective study of pain and patient outcomes in the emergency department: a tale of two pain assessment methods. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *31*(1), 56. https://doi.org/10.1186/s13049-023-01130-9

Lidauer, S. M., Hoppu, S., Kaartinen, K., Lidauer, M. H., & Kalliomäki, M. (2025a). Pain Assessment and Its Effect on Pain Management During Emergency Medical Services—A Descriptive Study

in the Tampere University Hospital Area of Finland. *Acta Anaesthesiologica Scandinavica*, *69*(6). https://doi.org/10.1111/aas.70047

Lidauer, S. M., Hoppu, S., Kaartinen, K., Lidauer, M. H., & Kalliomäki, M.-L. (2025b). Pain Assessment and Its Effect on Pain Management During Emergency Medical Services-A Descriptive Study in the Tampere University Hospital Area of Finland. *Acta Anaesthesiologica Scandinavica*, *69*(6), e70047. https://doi.org/10.1111/aas.70047

Prasad, N., Penm, J., Watson, D. E., Tran, B. N. H., Dai, Z., & Tan, E. C. K. (2025). Association between self-reported pain experiences in hospital and ratings of care, readmission and emergency department visits: a population-based study from New South Wales, Australia. *Anaesthesia*, *80*(3), 269–277. https://doi.org/10.1111/anae.16474

Ruben, M. A., Blanch-Hartigan, D., & Shipherd, J. C. (2018). To Know Another's Pain: A Meta-analysis of Caregivers' and Healthcare Providers' Pain Assessment Accuracy. *Annals of Behavioral Medicine*, *52*(8), 662–685. https://doi.org/10.1093/abm/kax036

Scholten, A. C., Berben, S. A. A., Westmaas, A. H., van Grunsven, P. M., de Vaal, E. T., Rood, P. P. M., Hoogerwerf, N., Doggen, C. J. M., & Schoonhoven, L. (2015). Pain management in trauma patients in (pre)hospital based emergency care: Current practice versus new guideline. *Injury*, *46*(5), 798–806. https://doi.org/10.1016/j.injury.2014.10.045

Shih-Chieh, Y., Hui-Mei, H., Te-Feng, Y., Ching-Hui, S., Chieh-Liang, W., Yun-Jui, H., Chih-Cheng, W., & Chih-Jen, H. (2023). Differences in Pain Assessments Between Inpatients and Nurses Leads to Considerable Misestimated Pain. *Pain Physician*, *26*, 61–68.

Uzun, D. D., Stock, J.-P., Steffen, R., Knapp, J., Lefering, R., Schmitt, F. C. F., Weigand, M. A., Münzberg, M., Woelfl, C. G., & Häske, D. (2025). Trends in analgesia in prehospital trauma care: an analysis of 105.908 patients from the multicenter database TraumaRegister DGU®. *BMC Emergency Medicine*, *25*(1), 36. https://doi.org/10.1186/s12873-025-01186-z

van Zanden, J. E., Wagenaar, S., ter Maaten, J. M., ter Maaten, J. C., & Ligtenberg, J. J. M. (2018). Pain score, desire for pain treatment and effect on pain satisfaction in the emergency department: a prospective, observational study. *BMC Emergency Medicine*, *18*(1), 40. https://doi.org/10.1186/s12873-018-0189-y

Wu, M.-C., Lu, T.-C., Cheng, M.-T., Chen, Y.-C., Liao, E. C.-W., Sung, C.-W., Tay, J., Ko, C.-H., Fang, C.-C., Huang, C.-H., & Tsai, C.-L. (2022). Pain trajectories in the emergency department: Patient characteristics and clinical outcomes. *The American Journal of Emergency Medicine*, *55*, 111–116. https://doi.org/10.1016/j.ajem.2021.09.087