

Ketamine Infusions for Intractable Pain

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Background

In the hospital setting pain management is an important part of nursing care. When a patient experiences pain that is not managed through standard pain management regimes, they are considered to have intractable pain. Recently in the hospital setting ketamine infusions have been introduced for used to treat intractable pain. Ketamine is a N-methyl-D-aspartate (NMDA) receptor antagonist (Griffiths, 2023). Since the 1970's ketamine has been used as an anesthetic but recently has been shown to be effective with pain management (Griffiths, 2023). Ketamine is indicated for patients with intractable pain who are not responding to NSAID's, opioids, PCA pumps or other standard pain management interventions. Ketamine drips are also indicated for surgical patients who experience severe post op pain, patients who are dependent or tolerant to opioids, and patients at high risk of respiratory depression from opioids. (Griffiths, 2023) Pain management is an essential to not only give the patient some relief and peace but also to decrease secondary complications. Unresolved pain can manifest as other complications in patents such as increased blood pressure, increased pulse, and increase in cortisol levels (Orhurhu, 2022). Similarly pain that is not being appropriately managed can lead to patient agitation and irritability and noncompliance with measure in place to promote patient healing. For example, if a post op patients' pain is not being managed it is unlikely that they will get out of bed and walk around the unit to decrease the risk of clots or use an incentive spirometer to prevent pneumonia. Stamford hospital recently implemented the use of ketamine infusions on the 10th floor surgery and orthopedics unit. Previously ketamine drips were only allowed to be administered in the ICU at Stamford hospital. Ketamine drips on the surgery floor allows for patients to receive better pain management without having to be in the intensive care setting. While nurses are allowed to administer ketamine on the unit they are not permitted to titrate or bolus the infusion, if this

needs to be done the patient must be transferred to the ICU. (Stamford Hospital, 2023) Safety precautions for patients who are on ketamine drips include helping patients with ambulation and making sure precautions are taken to prevent falls as patients may be sedated. Nurses should also monitor for adverse reactions that can occur with ketamine infusions. These reactions include hallucinations, vivid dreams, disassociation, visual disturbances, and hepatobiliary disfunctions (Orhurhu, 2022). A study done on ketamine infusions for pain management concluded “SDKIs offer a promising alternative for refractory chronic pain patients who are resistant to conventional treatments. Modest reductions in pain scores have been observed across a wide range of types of chronic pain” (Griffiths, 2023) Ketamine infusions are an effective way to help patients get relief from their intractable pain.

Role and Responsibility of the Professional Nurse

Nurses play an important role in managing pain for patients. Nurses are frequently assessing patients pain levels throughout the shift and monitoring for any changes in the severity of patient’s pain. Frequent pain assessments have been found to lead to the outcomes of “improved pain perception, decreased pain intensity and frequency, analgesic use, and mortality, and result in fewer complications.” (Ahmad, 2023) Nurse’s act as patient advocates if current pain regimes are not providing adequate pain control for patients. Nurses’ role in pain management also includes collaborating with the whole healthcare team to ensure the best outcomes for their patients, “collaborative discussions and regular communication within the team can help ensure a comprehensive and holistic approach to pain treatment” (Ahmad, 2023). If a patient with intractable pain is placed on a ketamine part of the nurse’s role is to be aware of parameters that need to be monitored to ensure the infusion is completed safely and correctly. When patients are

transferred from the PACU to the surgery unit the patients' vitals including blood pressure, respiratory rate and oxygen saturation are to be monitored every four hours while the patient remains on the infusion (Eskrett, 2023). The patient's level of sedation and agitation level should also be monitored to ensure there are no complications. Parameters in place at Stamford hospital that constitute a nurse stopping the ketamine infusion include a respiratory rate less than 8, excessive sedation, systolic blood pressure less than or equal to 90, or a 20% decrease from the patients baseline systolic pressure, a blood pressure reading greater than 180/95, and a heart rate faster than 110 beats per minute (Eskrett, 2023).

When describing intractable pain, it can be noted that "Pain is not merely a physical sensation but also includes emotional and cognitive components" (Saleh, 2023) Pain is multidimension and ketamine infusions are a promising intervention to treat severe intractable pain. Nurses must be aware of parameters that need to be monitored when they are assigned a patient on a ketamine drip. This includes the ethical considerations such as understanding and informing patients that they may feel dissociated from real life. Adverse reactions to ketamine infusions include hallucinations, vivid dreams, and disassociation. Visual disturbances, hepatobiliary dysfunction, hypotension and decreased cardiac output are other possible reactions (Orhurhu, 2023). Due to the possibility of adverse reactions for the patient's safety the patient should be placed in a room close to the nurse's station with the door left open. Ketamine is anesthetic drug which all places' patients at risk for falls. Patients should wear a fall risk bracelet and assisted with ambulation when receiving ketamine infusions. Nurses should also be reassessing the patients pain level at frequent intervals (Eskrett, 2023).

Stamford hospital has implemented policies to ensure the ketamine infusions are used safely on the surgery floor. One policy in place is requiring two nurses to verify the ketamine infusion.

Another protocol in place for ketamine infusions at Stamford hospital is that nurses are not allowed to initiate, titrate or bolus the ketamine infusions if this is needed it must be done on in IMCU or ICU. Nurses on the surgery floor, however, are allowed to discontinue a ketamine infusion if ordered by the patient's physician. Ketamine drips for pain management can be costly. The cost is generally between \$700 to \$2,000 per infusion and can add up to over \$12,000 for some patients at the end of treatment. (Ketamine Clinics, 2024) This is a costly medication so nurses can refer patients to social work and other support services to help with aid in covering the cost of treatment if needed. The dosages for ketamine infusions are 0.05-0.3 mg/kg/hr with 0.3mg/kg.hr being the maximum infusion rate (Eskrett, 2023). Nurses should frequently assess how their patient is responding to their dose of medication and notify the physician with any concerns.

Developmental, Age Appropriate, and Culturally Sensitive and Diversity Considerations

Patients who are possible candidates for ketamine infusions include those who do not respond to standard pain management control measures such as NSAID's, opioids, PCA pumps or local anesthetic. Other indications for ketamine drips are patients in the post- operative period with severe pain, patients who dependent or developed tolerance to opioids, patients with acute exacerbation of chronic pain and patients who are at risk for respiratory depression and are experiencing uncontrolled pain. (Eskrett, 2023) Contraindications for ketamine infusions include uncontrolled hypertension, increased intracranial pressure, severe cardiovascular disease, and severe hepatic dysfunction. (Orhurhu, 2023)

As a nurse it is important to remember that all patients have a unique pain perception which can be influenced by religion and cultural practices. Factors that can influence how a patient

responds to pain includes, “cognitive factors such as attention, expectation, and interpretation of pain signals. Emotional factors like fear, anxiety, and depression can amplify pain perception and impact pain tolerance. Additionally, psychological factors such as coping mechanisms, beliefs, and attitudes towards pain can shape the individual's experience and response to pain.” (Ahmad, 2023) It is also important for nurses to recognize pain cues and any cultural stigmas surrounding pain for a patient. A more holistic view of the patient is “important in understanding and managing pain comprehensively, taking into account the individual's unique experiences, beliefs, and social context.” (Ahmad, 2023). When caring for a patient who is having intractable pain or on a ketamine infusion the nurse should perform an assessment to get a better understanding of what is important to the patient and the patients’ unique circumstances.

Ketamine infusions can be administered for patients of all ages but are generally more commonly prescribed in adult patients. Older adults may have more concerns with the side effects of ketamine and on the strength of the medication. Nurses should ensure patients understand the benefits and risks of ketamine infusions and how to report any side effects. Another difficulty with treating older adults is that often it is harder to get an accurate pain score on elderly individuals. This can be due to causes such a decrease or alteration in cognitive ability. This underreporting of pain in older individuals can lead to unmanaged and worsening pain that is left unresolved or improperly managed.

It is important to recognize that there is a diverse population in the Stamford area. One way in which Stamford hospital demonstrates diversity, equity and inclusion is through the utilization of an online translator system for patients who do not speak English. This technology can be utilized for nurse’s and physicians to communicate with patients who are on ketamine infusions. Not being able to understand a healthcare professional can add unnecessary stress and confusion

for patients. Having a translator available at all times can avoid misunderstanding's and allow for a greater inclusion in care.

Patient-Centered Care Principles

Patient centered care empowers patients to make evidenced based decisions for their care. It allows patients to have a more active role in their treatment. Similarly patient centered care allows for more personalized care that is, “tailored to a patient’s unique set of physical, emotional, and social needs” (Aramtch, 2023) Patient centered care builds trusting relationships between patients and the healthcare staff and is associated with improved patient outcomes. The overall goal of the implementation of ketamine infusions is to help patients get relief from their intractable pain and maintain pain level at a tolerable level. Implementing the use of ketamine infusions on the surgery floor instead of having patients remain in the ICU fosters patient-centered care by allowing the patients pain to be managed in a calmer environment. It also allows more stable patients to receive ketamine who no longer need the intensive care being given in the ICU. Part of the patient center model describes the importance of patients being supported by family and close friends however, while on ketamine Stamford hospital suggests limiting visitors to decrease stimulation and provide a less overwhelming environment for the patient (Eskrett, 2023).

In some community’s ketamine may be thought of with negative connotation due to its potential for abuse. Ketamine has a history of being used as a hallucinogenic “clubbing” drug, especially in adolescents and young adults. (Addiction center, 2024) Ketamine has been used in the past to achieve an “out of body feeling” (Addiction center, 2024). It is the nurse’s role to help educate the patient and the community that like many other drugs ketamine has the potential for

addiction. However, when administered in the hospital for pain the patient is receiving controlled dosages and being monitored for side effects and other complications.

When assessing the impact of ketamine infusions on a patient it is important to not only look at the patient but also their support systems and social and financial situation. The goal of ketamine infusions is to improve a patient's overall pain levels and for patients to increase their ability to perform ADL's and quality of life. After a patient's intractable pain is better controlled with the ketamine infusions other forms of pain management can be reintroduced into the patient's care. At Stamford Hospital patients who are on ketamine infusions are usually transitioned onto an oral narcotic pain regimen (Eskrett, 2023)

Professional Nursing Competencies

The Quality and Safety Education for nurse or QSEN competencies strives to make improvements in the healthcare field through continued research and evidence-based practice. QSEN is composed of six categories that strive to better the nursing profession. These six categories include patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics (QSEN, 2022). Since low dose ketamine infusions are a new form of pain management being used on the surgery and orthopedics floor at Stamford it is important for nurses to be educated on the topic and research ways to implement the QSEN objectives. This includes using teamwork and collaboration to ensure the patient is responding well to the ketamine and not experiencing any adverse reactions. Teamwork and collaboration require working together within the nursing staff and with interprofessional healthcare teams. Characteristics of good teamwork and collaboration include "communication, mutual respect, and shared decision making to achieve quality care" (QSEN, 2022). Nurses who assume care of

patients on ketamine infusions must communicate with prescribing physicians and notify them if their patient starts to experience any side effects such as hallucinations and visual changes. If a patient does experience any adverse reactions the nurse should stop the infusion and notify the provider right away (Eskrett, 2023). Nurses must also communicate with the physicians if the patient needs their infusion titrated, which must be done in the ICU or discontinued which can be performed by the nurse on the surgical floor (Eskrett, 2023). Nurses monitor patients for a change in baseline in blood pressure, pulse, respiratory rate, sedation level and agitation level (Eskrett, 2023). When a nurse is assigned a patient on a ketamine infusion there is also interprofessional collaboration needed with the ICU or IMCU. Patient will be started on ketamine infusions on these units, therefore the nurses on the surgical unit will need to receive report from the ICU/ IMCU nurses (Eskrett, 2023).

Quality improvement includes identifying problems and using data and research to create and implement solutions for the identified problem (QSEN, 2022). The implementation of ketamine infusions on the surgical unit can be used a solution for unmanageable intractable pain. Pain is a problem for many patients, “In the United States alone, as many as 34.7% of females and 26.7% of males experience chronic pain.” (Israel, 2022) Ketamine infusions offer a promising solution for patients with pain who are not responding to traditional pain management regimens. With a growing opioid crisis Ketamine infusion can create a solution for patients who are seeking pain control but cannot take opioids due to addiction or due to risk of respiratory depression. Research shows that “Ketamine may also confer advantages of preserved spontaneous respiration and bronchodilation, as opposed to opioid-induced respiratory depression” (Martinez, 2022). Ketamine drips are also beneficial as they are less work for nurses than heparin drips or PCA pumps. This saves time for nurses to perform other interventions and focus on other aspects of

their nursing care (Eskrett, 2023). Ketamine drips are also “widely available, inexpensive, and generic” (Israel, 2022) which can decrease hospital bills and allow more patients the opportunity to manage their pain.

Discussion and teaching on ketamine infusions for intractable pain is important for safety principles and informatics. According to the QSEN competencies safety includes changing individual actions and system wide policies to decrease the risk of harm or injury to patients (QSEN, 2022). Safety measures nurses must implement when caring for a patient on a ketamine infusion include cardiovascular, neurological, and respiratory assessments (Eskrett, 2023). These safety interventions can help catch any adverse reactions early in treatments and allow for early intervention. Other safety measures in place for ketamine infusions include having the medication in a lock box in the patient’s room to prevent any overdose or misuse of the medication (Eskrett, 2023). The informatics correlation to ketamine infusions includes prevention of errors and promoting patient centered care.

Part of the QSEN competencies is ensuring nurses have the knowledge, skills, and attitudes necessary to excel in the workforce (QSEN, 2022). Knowledge refers to nurses knowing their scope of practice, clinical practice guidelines and researching evidence-based practice for why ketamine infusions would be indicated or beneficial for a patient. Skills refers to being able to communicate with coworkers, initiate change and helping in creating change when need. This includes knowing if a patient’s dose is too high or low and knowing parameters to monitor for patients on ketamine infusions. Skills needed when caring for a patient on a ketamine infusion include the primary nurse being certified in advanced cardiovascular life support in case of emergency (Eskrett, 2023). Attitude refers to respecting and collaborating with all members of the healthcare team, as well as respecting patients and their healthcare decisions. Nurses’

attitudes are important when assigned a patient on a ketamine infusion as they must understand that pain is whatever the patient says it is.

The target audience for the implementation of ketamine infusions is nurses. It is important for nurses and the other members of the healthcare team to ensure that patients on ketamine infusions are monitored for pain levels and for the patient's safety. Ensuring nurses receive proper teaching and education on ketamine infusions promotes patient safety which is one of the most important nursing goals. Since ketamine infusion are newly implemented on the surgical unit holding informational sessions as well as teaching stations for the nurses to attend would help improve nursing care and patient outcomes. This would ensure nurses are aware of the purpose, desired outcomes, interactions, contraindications, and adverse reactions of the infusion. Evidence based research has shown that ketamine infusions have had quality outcomes. A study completed on a patient with intractable pain related to sickle cell disease found that, "the patient not only achieved complete pain resolution with low-dose ketamine but also was able to wean from a high dose of morphine equivalents during a 5-day taper, facilitating discharge." (Martinez, 2022) This exemplifies how ketamine at low dose provided pain relief for patients who were not finding proper management with any other pain regimes. Ketamine infusions would also provide quality improvement outcomes by lowering hospital cost and requiring less resources for pain management, "Hospitals with well-defined protocols that allow for administration of subanesthetic doses in general ward settings are able to optimize cost and resources." (Martinez, 2022) An evidence-based study done on ketamine has also found that the infusions lead to lower pain scale ratings when compared to patients on pain medications such as NSAID's, hydromorphone, gabapentin, "A significant correlation was found between the administration of ketamine and a lower pain score of -1.05" (Odotola, 2023) This study

comparing ketamine infusions to other pain regimes did not find any statistically significant data that patients on ketamine infusions were experiencing more hallucinations, visual disturbances, and adverse reactions. The side effects of patients on tradition pain regimes were similar to those of the patients on ketamine. This demonstrates how at low doses Ketamine can be safely administered with less of a concern for side effects (Odutola, 2023).

Some claim that there are safety concerns regarding ketamine infusions because they have more recently started to be used for pain management and because of its possibly for adverse reactions. Ketamine, like nearly every other medication has the potential for side effects and abuse. Research has shown however, that at low doses ketamine infusions are safe for treatment of intractable pain, “Lack of familiarity with ketamine, along with its reputation as an anesthetic, has limited broader use by some clinicians as a low-dose infusion; however, its safety profile at subanesthetic doses (<0.5 mg/kg/h) in the general ward setting is well documented in the literature” (Martinez, 2022). Ketamine infusions also promote patient safety by simply decreasing pain, “Case reports have demonstrated efficacy using low-dose ketamine for pain management and opioid weaning in chronic noncancer pain” (Martinez, 2022).

Informatics is the “Use of information and technology to communicate, manage knowledge, mitigate error, and support decision-making” (QSEN, 2022) Nurses can mitigate errors when providing care for patients on ketamine infusions by placing the patient in a room by the nurses’ station and by minimizing visitors for the patient to avoid agitation and to allow the patient time to rest. Having two nurses assess and check the dosage of the ketamine infusions running on the floor also mitigates error. Communication with the healthcare team and decision making on who would be a good candidate for ketamine infusions are also part of informatics.

While ketamine was once only used as an analgesic agent its properties that block pain receptors make it a hopeful new pain management medication. Intractable pain is a serious concern for many patients in the US and throughout the world. On top of the already significant number of individuals suffering from pain there is also an aging population in the United States which is associated with even higher rates of pain, “A well-established factor is increased age. With aging, individuals are more likely to acquire other comorbidities that can lead to or exacerbate chronic pain” (Israel, 2021) This mean that in the future there will be even more of a need for alternate methods of pain control. Although more research needs to be done on effectiveness, ketamine infusions are promising for the management of intractable pain. Research on the dosage level that provides the greatest pain relief as well as how long a patient should stay on the ketamine infusions for maximum pain relief should be studied more closely. Research should also be done on whether or not ketamine should be continued to be used or just a one-time pain intervention (Odutola, 2023). This can help create more clear protocols for the infusions and foster a safer environment for the healthcare staff and patients. Research already compiled has shown the benefits of ketamine infusions, “Ketamine has been explored in randomized controlled trials (RCTs) as an alternative treatment option, and it has been demonstrated to improve pain symptoms, patient satisfaction, and quality of life” (Israel, 2022). Ketamine infusions implementation on the surgical unit provides an array of benefits for patients including receiving pain management in a less intensive setting, decreasing the risk of respiratory depression, and potentially reducing or reversing opioid tolerance as well as lowering costs and decreasing pain levels.

References

- Ahmad Mahmoud Saleh. (2023). Nurses' assessment and management practices of pain among intensive care patients in King Khalid Hospital, Kharj, Riyadh. *Heliyon*, 9(9), e19986–e19986. <https://doi.org/10.1016/j.heliyon.2023.e19986>
- Aramtch. (2023, August 28). *Patient-Centered Care Explained with 5 Examples*. ChartSpan. <https://www.chartspan.com/blog/patient-centered-care-explained-with-examples/#:~:text=Compassionate%2C%20active%20listening%20is%20a>
- Cost of Ketamine Infusions? | Find Ketamine Infusion Clinics | Ketamine Clinics Directory*. (2024). <https://ketamineclinicsdirectory.com/ketamine-infusion-cost/>
- Eskrett. (2023). *Ketamine Drip Stamford Hospital*.
- Griffiths, H. J. (2023). Low-dose ketamine infusions for chronic pain management: Does this qualify as evidence-based practice? *British Journal of Pain*. <https://doi.org/10.1177/20494637231182804>
- Intractable Pain: Symptoms, Causes, and Treatments*. (2017, May 18). Healthline. <https://www.healthline.com/health/intractable-pain>
- Israel, J. E., St Pierre, S., Ellis, E., Hanukaai, J. S., Noor, N., Varrassi, G., Wells, M., & Kaye, A. D. (2022). Ketamine for the Treatment of Chronic Pain: A Comprehensive Review. *Health Psychology Research*, 9(1), 25535. <https://doi.org/10.52965/001c.25535>
- Ketamine Addiction and Abuse - Hallucinogenic Addiction*. (2023). AddictionCenter. <https://www.addictioncenter.com/drugs/hallucinogens/ketamine/>
- Martinez, M. R., Garmon, E. H., Starling, G. D., & Sheth, M. A. (2022). Ketamine as an Analgesic Adjunct for Opioid-Induced Hyperalgesia in a Patient With a Sickle Cell Pain Episode. *Ochsner Journal*, 22(3), 281–284. <https://doi.org/10.31486/toj.22.0011>

Orhurhu, V. J., Roberts, J. S., Ly, N., & Cohen, S. P. (2022). *Ketamine In Acute and Chronic Pain Management*. PubMed; StatPearls Publishing.

<https://www.ncbi.nlm.nih.gov/books/NBK539824/>

Peter Olujimi Odutola, & Gupta, R. (2023). IV ketamine infusion therapy for chronic pain: A systematic review and meta-analysis. *Medicine Advances*, *1*(4), 394–407.

<https://doi.org/10.1002/med4.45>

QSEN Institute. (2022). *QSEN competencies*. QSEN. <https://www.qsen.org/competencies-pre-licensure-ksas>