

Ketamine: An Experiential Review

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Ketamine is a fascinatingly useful drug for the Special Operations Force (SOF) community. The greater military medical system also utilizes this drug. In SOF, we use it at point of injury (POI) as an analgesic. From our perspective, it's fantastic because it a) treats pain, b) reduces negative physiological responses to pain, c) can improve the patient's psychological outcome as a result of reduced pain, d) cannot kill the patient via overdose, and e) has side effects that are not necessarily debilitating to a trauma patient (e.g. increased heart rate and blood pressure, no depression of respiratory drive, etc.). Some SOF medics have heard stories of medics overseas giving children 200mg of ketamine; while the experience of the child may be intense, the dose doesn't kill the patient and they don't have lingering health deficits.

I received ketamine after I stepped on an IED in Afghanistan on 5 March 2019. I was given 100mg intramuscular (IM) followed by 50mg intravenous (IV). Typically, in SOF, it's customary to add a benzodiazepine with ketamine. Versed is preferable because it's fat soluble and has a quicker onset compared to Valium. A standard dose would be a 2mg Versed adjunct to any ketamine dose. To give hospital providers perspective, 50mg ketamine is likely my starting dose for a trauma patient, especially with my SOF teammates. That dose could easily increase to 100mg depending on the size of the patient and the injury. I have given 50mg to a patient who was hit by an RPG blast with various shrapnel wounds, yet I was primarily concerned about the small hole through his trachea. I chose not to give him Versed in fear of the benzodiazepine depressing his respiratory drive, yet I later learned at the Joint Special Operations Medical Training Center (JSOMTC – where the Army's SOF personnel attend medical training) a 2mg Versed dose wouldn't have caused any respiratory depression. I bring this up because Versed wasn't used on me, and it's possible it could mitigate a patient's psychological outcome.

I continued to receive ketamine after the POI until 7 May 2019. In other words, I was on ketamine for two months, and in the first few weeks of the injury I was on 100mg/hr every hour, every day. I had an exceptional exposure to ketamine, and the nature of the injuries –bilateral below the knee amputations and complete amputation of both testicles – demanded significant analgesia.

As a Special Forces soldier, a medical provider, and a member of the Army, it's inherent in my job to conduct an After-Action Review (AAR) in order to evaluate relevant "sustains" and "improves". My experience with ketamine – as a provider and a patient – has given me insight on how to improve best practices.

In May 2020, one year after the cessation of ketamine analgesia, I received ketamine in a clinical setting. Ketamine and other related drugs have a robust and interesting amount of research in treating or reducing symptoms in depression, post-traumatic stress disorder (PTSD), and chronic pain. Receiving ketamine again gave me perspective on my time as a casualty and my suggestions for improvement. But first, a brief review of my emotional and physical trauma provides context.

Personal Emotional and Physical Trauma

I experienced depression after my first deployment throughout 2018. A combination of extremely high operation tempo – before, during, and after the deployment – potential prior emotional health concerns, and a divorce provided challenges in addition to a challenging job. When I deployed in February 2019, I was in the midst of learning how to manage and improve my emotions. And then I stepped on a bomb.

I didn't experience syncope after the blast and remember everything, including explaining to my teammates how to treat me and cutting my sleeve off to allow IV access. My memory re-packaged the events; the beginning of the ketamine experience occurs before the blast in my memory.

I recall sounds and images as my consciousness drifted in and out of dissociation. There was a significant fire fight with close air support bombs dropping and machine gun fire. My teammates had to move me down multiple terraces of 10 to 15 meters on the way to the MEDEVAC landing zone. *En route*, I received warmed whole blood. I'm convinced I would not have survived without it. Despite receiving blood, my condition seemed bleak to my teammates and me.

In the moments before being put on the MEDEVAC helicopter, I was convinced I was going to die. The shame associated with the divorce and prior emotional challenges resulted in me feeling like I deserved to die. This poignant point was and is a significant aspect of my psyche. The worst emotional trauma of my life bonded with the worst physical trauma in my life. And all of it was established within the context of a mindset on ketamine.

Ketamine Appointment Methodology

I've spent the last year unpackaging and understanding these emotions daily. It's vital to my total well-being and I'm afforded the luxury of time to do so. I have official diagnoses of PTSD and Major Depressive Disorder. I also have chronic nerve pain. Through the forward-thinking efforts of LTC Jamie Riesberg, the 10th Special Forces Group Surgeon, I was referred to a local ketamine clinic.

The provider is retired Army doctor named Jeffrey Gainok – a Doctor of Nursing Practice and Certified Registered Nurse Anesthetist. He also has experience giving hundreds of ketamine infusions. More importantly, he's incredibly kind and compassionate. Dr. Gainok also caters to the idea of "set and setting" – where mindset and environment play a significant role in quality of experience on mind-influencing drugs.

Given the medical indications and my experience with ketamine, I qualified for a total infusion dose of 200mg at a tentative rate of 100mg/hr. I denied prophylactic Zofran (an anti-vomiting drug with little side effects) and we started with a 30mg ketamine slow IV push (SIVP). Note a SIVP initiation was an idea I fully supported; it's not inherent in Dr. Gainok's protocol because every patient is different. He is exceptional in his approach to patient care and drug administration. The SIVP dose was slightly disorienting and I had mild irritability, so Dr. Gainok decreased the rate of infusion to allow me to get accustomed. Later he returned to rate of 100mg/hr until complete. After, I had low level and persistent nausea and disorientation. When at home I consumed 4mg orally disintegrating Zofran and ate dinner, and then I felt completely normal.

Subjective Experience During the Medical Ketamine Appointment

Ketamine inherently dissociates the mind from a conscious state. Anyone who has ever given the drug observes the patient still functioning as if conscious, albeit similar to drunken behavior. For example, I ripped out my saline lock during the POI events. Logically I know this isn't good, yet my ketamine-induced state did it anyway.

The effects of ketamine during the appointment were extremely familiar to me. I think it's valuable to describe the sensation and implications thereof. Given that all of my life experience with ketamine is in extreme emotional and physical pain, I have a negative association with the drug. It isn't inherently damaging, yet the familiar perceptions and state of mind allow me to understand more about my previous hospital experience.

Ketamine blunts sensory input and thought processes. It's akin to laying in a vat of liquid rubber or trying to listen to a conversation while underwater. Ketamine has an ability to slowly, lethargically pull the mind away from clear perception and reality. Everything is dulled to include thoughts, speed of thinking, and understanding. Listening to music with headphones and wearing an eye mask were uncomfortable. The music was muted and "far away". And closing my eyes was like swimming underwater in darkness; there's no up or down and it's disorienting. Overall, ketamine limits perception and reality functions in the "background". And, given my association with the drug, it sometimes seems tortuous because everything, including time, is drawn out.

Ketamine is inherently ineffable. Visual images are almost "stamped" into place. If you stare at a bright light with a silhouette in front of it, then look away, your vision has the imprint of the shapes. This same concept applies to thoughts and feelings on ketamine. When combined with pain and trauma, this is a recipe for imprinting agony. Especially if it's self-induced via fear, shame, and vulnerability (the mindset portion of "set and setting").

This confusion, perception, and distress are what I felt in the hospital. There are additional sensations, such as strange perceptions in size of body parts (especially tongue, teeth, and hands), and short-term memory issues interfering with coherent conversation.

Without detailing too much of my personal life, my ex-wife visited me during my first weekend at Walter Reed Medical Center. The ketamine made this encounter surreal and strange. The weekend visitation ended negatively and abruptly, and I was extremely confused and distraught. While journaling about this memory after the recent ketamine appointment, I burst into tears because I understood both the emotional pain as well as ketamine's unique influence on the experience. This event played a significant role in my psyche going forward, and it was heavily influenced by the ketamine.

Generally, I don't think perceptions while on ketamine are pleasant. I believe it's mostly due to my past's negatively framed experience with ketamine. After experiencing the ketamine again, I understand not only why it was hard during the hospital stay, but the effect it had on me over time. Emotions on ketamine can be seared into the background of the sub-conscious based on how things happen. The "So what?" from re-experiencing ketamine is "understanding". As negative as this account seems, learning, processing, and understanding all of this information is incredibly valuable to me. And telling this story and the implications of it can provide understanding to providers.

Lessons in Understanding My Ketamine Experience

Ketamine is an extremely useful drug, and it is a “sustain” to use at POI and hospital settings. However, we must admit we don’t know much about the drug – and that’s okay! The unknowable, arbitrary effects on a psyche are worth the utility. My experience results in several take home points.

First, when a patient receives ketamine at POI, SOF medics should strongly consider a benzodiazepine adjunct (e.g. Versed 2mg). In my team’s AAR, they clarified this as an “improve” (in addition to their many “sustains”). I’m not sure if Versed would have reduced the cognitive exposure to the “setting” and my subsequent memories. If Versed can reduce memories of trauma, it would be worth using with ketamine.

Secondly, when a trauma patient receives ketamine in a hospital setting, special care should be given to how providers and family interact with the patient. The patient’s psyche – dating back to the pre-injury state – can be framed from the confusing and disorienting nature of ketamine. It doesn’t mean ketamine should stop unless it’s particularly distressing to the patient. I’ve heard stories of disturbing open eye visuals resulting in the cessation of ketamine treatment. These effects could be related to genetic predisposition (i.e. gene expression changing neurotransmitter receptor action and therefore the perceived effects) or “set and setting” (to be discussed later). The attitude of any person interacting with a patient on ketamine should be exceptionally understanding and compassionate. Acting tough, mean, or insensitive are unacceptable because a mind on ketamine is incredibly sensitive. In actuality, anybody in a post-trauma state is sensitive and ketamine will only synergistically add to the state of mind. Providers occasionally interacted inappropriately towards me. They, not the drug, added to my distress. Also note when on ketamine, it isn’t always possible to logically consider situation and circumstance because the drug inherently precludes this. In other words, if someone is unkind while I’m on a high dose of ketamine, I likely won’t be able to reason through it and not let it affect my emotions.

Third, the patient, family, and friends should be briefed on the effects of all drugs on mental and physical state (with the implication all providers are taught and reminded of the same). Ketamine has a way of stretching out feelings and emotions to seemingly infinite lengths. Seemingly irrelevant interactions can be dwelled on longer than a sober mind. Blatantly disruptive experiences can linger for hours or days. If everyone understands the strange perception and confusion, it can prevent causing more distress to the patient, whether from providers or visitors. Compassion and warmth are the only ways to handle a patient. It isn’t coincidence this concept fits within the context of the Hippocratic Oath, which all providers are inherently subject to.

Fourth, attention should focus on “set and setting”. Providers may not be able to reduce the stress of trauma on mindset, but setting can definitely be controlled. The most important physical senses are vision and hearing. Softening the harshness of a hospital room visually and audibly will pay dividends on the patient’s acute and chronic psyche. Nurses or techs can cover or dim fluorescent lights to reduce painful bright lights. The facility can provide sound machines with pleasant ambient noise to drown out hospital machines and exterior noise (e.g. people talking outside the room, slamming doors, etc.). It’s extremely distressing to hear random loud noises in a hospital ward. Noise cancelling head phones may work, yet headphones can provide their own disturbing quality of muffled noise that can only be appreciated when under the influence of ketamine.

Additionally, multi-system trauma in-patients are constantly bombarded by visitors, whether actual providers or otherwise. Reducing the total interactions to a minimum is key as each interaction is emotionally fatiguing. Time is stretched beyond normal intervals and a five-minute conversation seems much longer to me on ketamine. When visitors do come into the room, they should speak one at a time and quietly. I routinely had to ask people to stop talking or to talk quieter because both are disorienting and painful. Remember, any harshness adds to distress, and distress is ominously stretched in time resulting in discomfort.

Fifth, consider the synergistic effect of drugs, good and bad. This may sound obvious, yet I haven't observed this attention to detail in practice. Severe pain calls for severe drug regimens. The patient and family should be active participants in choices of drugs, which requires careful explanation relative to the education level of the audience (i.e. medical naïve patients and families will need simple explanations). Had I and my family been explained the unique and severe challenge of getting off of Methadone (a drug intimately similar to heroin), we would have denied it. I understand why the "pain team" chose this drug, yet I showed a history of being my own advocate, and I and my family didn't receive any explanation about how horrible a drug methadone is. I explained the implications of this drug to other SOF casualties resulting in their denial of the drug, and they always thanked me in retrospect.

Doctors can and should do a better job considering the synergy of drugs, severity of injury, and patient response. I realize this is inherently "doing medicine", but my experience is reflective of a medical field in stunted development. For example, I had severe and traumatic severing of major nerves in my legs. Narcotic drugs are supposed to blunt or stop pain signals from passing through the spinal cord to my brain. Yet, if the pain signal is so large due to such a large trauma, and the narcotics are relatively ineffective, does it make sense to prescribe them in high doses? If my narcotic patient-controlled analgesia (PCA) – whether IV or epidural – is ineffective, should I continue to be slammed with narcotics? My opinion is a capitalized No, but the reason is because narcotic side effects are infinitely more harmful than any negative side effect of ketamine.

Narcotics turn off the pre-frontal cortex's ability to perform REM sleep, a necessary and vital component to recovery and hormonal milieu. I wouldn't drink hard liquor when recovering from trauma for the same analogous reason. Narcotics also effectively stop blood flow to the bowels therefore "turning them off". These side effects are so commonly effective, I was prescribed Nortriptyline (a drug written off by sleep doctors as irrelevant at best and harmful at worst) and a stool softening regimen. This standard of care is extremely common, and the provider doesn't have to deal with the consequences. Yet I am the one who spent an entire week trying to dislodge stool in my rectum with my own gloved finger – which is more painful than it sounds. I don't want drugs that cause awful side effects when they aren't achieving their primary job of analgesia. Better bowel movements and digestive function is nice, but better sleep is one of most important components of recovery.

The skeptic may point out how a patient in severe pain can't effectively sleep. True, but I'm suggesting to not administer drugs exacerbating the issue. Instead, give ketamine and THC. Neither drug inherently turns the pre-frontal cortex off. Both drugs have a "dissociation of pain" quality. If you give me too many narcotics, I won't sleep, the lack of sleep will destroy my emotions and cognitive processes, and I'll have exquisite bowel and anus pain. All of these things make the experience of being an in-patient significantly worse.

In contrast, if you give me too much THC, I'll merely sleep for a long time. This sleep quality is better than with narcotics, and I would also get more total sleep improving mood, cognition, and emotions. THC is given in the military medical system in the form of Marinol (Dronabinol). While cannabis is a Schedule I drug (implied to have no medical benefit), the psychoactive component of THC is synthetically created and prescribed in the form of Marinol. Note it's been shown the other active compounds in cannabis (endocannabinoids) enhance the medicative properties of THC, and none of these compounds are present in Marinol. There are few contraindications to THC (primarily a history with psychosis or similar psychological issues) and nearly a negligent median lethal dose (LD50). In other words, if you give me 200mg of THC in any form right this second, it's wildly unlikely anything bad will happen. In contrast, narcotics can and do kill every day. And they do so quickly and slowly.

I found it interesting the hospital system intensely fears "delirium", a common side effect in the ICU. Providers don't want the patient to have a drug induced experience causing them distress. I routinely asked why doses of ketamine and Marinol weren't higher, and this was the only consistent response I found. Interestingly, both of these drugs (ketamine and Marinol) don't have a reasonable limit that can kill a patient. Significantly high doses can give a patient a "wild ride" in "the K hole" or otherwise, but it won't be physically harmful to the patient. Note there are some mild implications of increased heart rate and blood pressure with both drugs, but the obvious answer is to take vitals and adjust accordingly.

If delirium is the fear, then return to the concept of "set and setting" to reduce the external stressors that would be uncomfortable to the patient. Most of my PTSD isn't related to the blast, but experiences in the hospital. Some leave the scope of this essay (such as nurses being aware of my overt consciousness while intubated and subsequent inability to breathe, gag reflexes, and vomiting). Others are associated with improved settings for the patient. For example, to this day I have an interesting distaste and distress at hearing alarms because of the near constant presence of them from medical machines. These sharp noises are harrowing while on ketamine.

I do give credit to the military medical system for using both ketamine and Marinol. I also criticize them for the significant and ineffective use of narcotics and for the fear in prescribing ketamine and Marinol. When I became an out-patient one week after the cessation of ketamine, my primary goal was to wean off of every drug other than THC because of their harmful effects. In this example, I am a medical provider and understand the side-effects and implications of these drugs. Normal patients are not medically educated and are forced to trust their providers. With my emotional diagnoses and challenges, I am convinced continuing to use Methadone, Lyrica, and Nortriptyline would have resulted in worsened sleep and emotional conditions. Weaning off of Methadone was one of the hardest experiences of my out-patient care. Routine rebound pain (analogous to rebound congestion with Afrin use) and pain crises were normal. One day, I was in 10/10 pain for 9 hours. And I didn't even consider going to the ER because the solution is not more of the same harmful drugs. However, I am convinced I could have alleviated the pain had I gone off-label from my prescription and consumed higher doses of THC with Marinol. Additionally, no doctor of any prestige will ever convince me high and regular dosing of Marinol is remotely similar to the obvious horrors of opioid use, addiction, and death.

Conclusion

There may be logistical challenges with prescribing drugs such as the association with “big pharma” and economic benefit with using this system. Additionally, paradigms in medicine can be slow to change. For example, the American Medical Association blatantly ignores data regarding sleep deprivation and resident medical errors (resulting in greater instances of patient harm). Yet, residents still work wildly long hours and the patients suffer from sleep deprived providers. Narcotics are still frontline drugs for analgesia, yet these drugs were *en vogue* over 100 years ago. I find it difficult to accept this as an ideal medicine when it was “standard of care” before cars existed. There is and should be a better way. Drugs like ketamine and Marinol are already accepted for use. If there’s generally fewer negative side effects, and we can control for “hospital fear of delirium” by addressing “set and setting”, then we have a testable framework.

My hope is my story will give context to these drugs. I clearly aim to challenge archaic paradigms regarding drug prescription because they could have modified my physical and emotional recovery. The “sustains” include authorizing and utilizing the special and fascinating drugs, ketamine and Marinol. The “improves” are as follows:

- Providers should treat patients with compassion and kindness, as pointed out in the Hippocratic Oath of “doing no harm”. This especially applies to trauma patients.
- All providers (doctors, nurses, medical techs, etc.) should be re-briefed on the implications of mind-altering drugs. Note most providers can’t understand this unless they have received the drugs, so accounts like mine are valuable to the community.
- Consider creating a research study with a questionnaire for ketamine patients during and after their hospital stay. Follow-up questionnaires could occur at set intervals (e.g. every six months for two years). This would provide a regular acquisition of experiential knowledge.
- Explain to family and friends the effects of all drugs on mental and emotional state. This not only can improve how everyone treats the patient and understands their behavior, but also educates everyone on the implications of certain drugs. For example, “Methadone is an extremely potent narcotic that creates a physiological dependence. When you wean off of the drug – which you should because narcotic use is very bad – it will be just as excruciating or more so than what you are experiencing right now.”
- Improve the “setting” of hospital rooms when a patient receives ketamine. Reduce all severe sensory inputs like bright lights, loud and abusive sounds, and bombarding the patient with visitors.
- Consider the negative synergy of a drug regime. If a drug requires other drugs to deal with the side effects, it likely should be reconsidered. Not to mention, additional drugs have their own harmful side effects.
- Consider the state of the patient and adjust the regime. For example, if pain is not treated with narcotics, is the answer more narcotics? In my opinion, no.
- Use drugs like ketamine and Marinol to reduce pain through dissociation and the endocannabinoid system. If delirium is a fear, gradually increase doses and control for “set and setting”. As mentioned above, if the patient and family are aware of potential side effects, and are included in the effort of improving “set and setting”, patient disposition will benefit.

The examples I provide here are glimpses into my challenging experience as a trauma patient. The negative experiences are easily forgotten by a provider, yet they are sums of the whole for a patient. What started as a “best practices guide to ketamine” is a challenge to the medical paradigm of drugs and patient care. It’s foolish to think we have everything figured out about ketamine, but it’s equally foolish to think we have figured out how to treat a patient medically – both with drugs and as a human. If we are doing our duty as medical providers and military personnel, we should improve “best practices” through the AAR model. I hope understanding my experience and recommendations spurs a development for drug administration and patient care.