



**Therapeutic Thursdays: Lidocaine for  
Pain Management in the Emergency Department**  
*Episode Transcription*

Speaker 1: Welcome to the ASHP Official Podcast, your guide to issues related to medication use, public health, and the profession of pharmacy.

Vicki Basalyga: Thank you for joining us for Therapeutic Thursdays Podcast. This podcast provides an opportunity to listen in as members sit down to discuss what's new and ongoing in the world of therapeutics. My name is Vicki Basalyga and I will be your host today for the ASHP Therapeutic Thursdays Podcast. With me today, is Dr. David Zimmerman, who is an Associate Professor of Pharmacy at Duquesne University School of Pharmacy and Emergency Medicine Pharmacist at UPMC Mercy Hospital. He has a scholarship focus on medication dosing in obese patients and pain management in the ED. My second guest today is Aimee Mishler. She is an Emergency Medicine Pharmacist and PGY2 Emergency Medicine Pharmacy Residency Program Director at Maricopa Integrated Health Systems in Phoenix, Arizona. Thanks for joining us today Dave and Aimee. Let's get started today by talking about the topic Intravenous lidocaine for Pain Management. Aimee let's talk about why we use lidocaine for pain in the ED and why it is an underutilized agent in certain patient populations.

Aimee Mishler: That's a really good question Vicki. There's a lot of different reasons that you might want to use a lidocaine in the emergency department, especially right now with our opioid epidemic. Lidocaine is really useful for a lot of different reasons. It can treat Non Neuropathic pain and Neuropathic pain, both of those. It can be opioid sparing, it's multimodal, it can be a monotherapy, or it can be used as an adjunct. It's fast acting and there's only a few monitoring parameters that you need to take into consideration. And it's good for both acute pain and acute exacerbations of your chronic pain Vicki Basalyga: So Dave, most pharmacists are familiar with lidocaine as an anesthetic or anti-arrhythmic agent. Can you tell us more about how lidocaine works to relieve pain?

David Zimmerman: Yeah, absolutely. So we know lidocaine is an Amino Amide Anesthetic that alters neuron signal conduction by modulation of sodium channels in both peripheral and the central nervous system. So this is where the thought that the analgesic activity comes from. This sodium channel blockade and CNS hyper excitability resulting in less painful stimulus response. It's not quite clear but it's also thought that lidocaine has some anti-inflammatory effects leading to the reduction of circulating inflammatory cytokines. We know this is how it works as anti-arrhythmic but does lead to the same analgesic mechanism. Does it have a, you know, vast clinical threshold. It's kind of unclear, but it is thought that the analgesic mechanism is a result of these two actions.



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Vicki Basalyga: When we're thinking about patients who present to the ED for pain, what sort of patients would be good candidates to use lidocaine to manage their pain?

Aimee Mishler: Lidocaine should be really added as an ALTO therapy. So, ALTO being the alternatives to opioids, and it can be used by itself or in conjunction with other non-opioid analgesics like NSAIDs, Acetaminophen, sub-dissociative Ketamine and a lot of other options. As we know there are various types of pain that exist, and lidocaine can be utilized for several of those. Neuropathic pain conditions like postherpetic neuralgia and acute pain conditions like renal colic have also demonstrated some of that analgesic benefit. And then also lidocaine has demonstrated an opioid sparing effect in the post-op setting as well. So, there's a lot of different options that we should start looking at lidocaine for and there's a lot of different organizations and institutions that are coming up with their own ALTO programs and really promoting the use of lidocaine specifically for that Opioid sparing or as an opioid alternative.

Vicki Basalyga: Aimee, I'm so glad that you mentioned ALTO. Dave, can you talk to us about lidocaine? Is it better than medications we're using now including opioids versus non-opioids and then what is its role when it comes to pain management? Do you use it as a single agent? Do you use it in combination with other agents? Can you just tell us a little bit about how you use lidocaine in your ED?

David Zimmerman: And it kind of just depends on which pain condition you're looking at. With some of our literature with Renal Colic we know lidocaine has an equal efficacy and pain reduction compared to opioids and that's why Aimee mentioned it's a great ALTO agent. When it was compared to ketorolac, ketorolac was shown to be better than lidocaine. So, from my standpoint, you know, a patient presents with Renal Colic, I'll still go with an NSAID first and then I can use lidocaine as a second line or as an add on option. And certainly, there are patients out there that you may want to avoid systemic NSAIDs. So, then IV lidocaine would be an option. So, for Renal Colic we know it's as good as an opioid. Those we can use it as an ALTO agent or avoid opioids all together.

David Zimmerman: When you look at a pain condition like acute radiating low back pain, IV lidocaine was shown to be similar to ketorolac. So, if a patient presents with low back pain you can consider lidocaine as a first line option or use it in conjunction with ketorolac or as a second line option. And then there was an interesting study that looked at, and this was in the ICU, it looked at opioid requirements for patients prior to and after a lidocaine infusion and they noted that there was a decrease in opioid requirements after the addition of lidocaine. So, I don't think we fully know for every acute pain condition. We still certainly need evidence, but I think



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this is an agent that we can certainly add to our arsenal. It may not be First Line everywhere, but I think it's a good second agent or an add on the agent to something else first line.

Vicki Basalyga: So Aimee patients present to the emergency department for all sorts of pain. You briefly mentioned earlier talking about Neuropathic pain and as Dave just mentioned is lower back pain. We also see patients present to the ED for pain such as Cancer pain and those patients tend to have already a lot of pain medication onboard and might not be opioid naive. Can you talk to us a little bit more about these different kinds of pains, particularly Neuropathic pain and pain for Cancer patients and the role that lidocaine plays for this unique patient population?

Aimee Mishler: Yeah, definitely. I think this one's a little bit more difficult to talk about from an ED perspective because a lot of these studies with these case reports were more on the chronic pain versus the acute pain, but lidocaine has been studied for postherpetic pain, trigeminal neuralgia and some cancer pain like you mentioned, and it looked like in these studies that the pain score measured at different intervals decreased by about 50% from the pre-infusion values and about 75% of those cases for those different indications. But again, this may be more of an area that we need to look at for future studies specifically in the emergency department because a lot of these were more chronic pain. I don't know, Dave, if you have anything to add to that.

David Zimmerman: I think you summarized it well. There's a really good systematic review that was published in Pharmacotherapy by Dalila Masic and Megan Rech and colleagues that kind of goes through some of the conditions to summarize them.

Vicki Basalyga: The next question that pharmacists receive is, okay, I want to give this medication. How do I give it? In what dose? What do you recommend starting at and how should it be administered, bolus, and then a continuous infusion bolus alone or infusion alone?

David Zimmerman: So, most of the dosing, if you look at doing a bolus, we'll kind of do a weight-based of 1.5 mg/kg and this is usually capped at 200 milligrams. So, if you have somebody that weighs like over 130 or 140 kilos you just cap it at 200mg. Some studies just did a flat dose of a hundred milligrams. It's kind of either an option. What we did in our protocols, we did 1.5 mg/kg and then we infuse that over at least 30 minutes. As you pointed out there's kind of three different options, bolus only, bolus plus infusion or infusion only. And it really kind of depends on what you're treating pain wise for the patient and what's their game plan. You know, if it's somebody that's not, you're not planning on admitting, you know,



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continuous infusion probably isn't going to be the route that you go. Maybe just give a bolus dose.

David Zimmerman: If you look at doing a continuous infusion dosing here usually starts from the lower end of like 0.5 mg/kg/h and then can be titrated up. We do know that if you don't bolus that may take a little bit longer for that continuous infusion to have its analgesic effect. Again, another thing to look at is kind of just hospital protocol. At my institution we in the ED are allowed to do boluses of lidocaine for analgesia, but we are not allowed to do the continuous infusion part our anesthesia and pain team has to do that. When you're initiating or looking to at initiate lidocaine and doing a bolus of it, you know, this is something we also want to make sure everyone's onboard, pharmacy, nursing, emergency medicine, pain team, you know, whoever else you want to bring to the table.

Vicki Basalyga: Aimee, do you have at your institution protocols or plans to introduce a protocol using lidocaine for pain?

Aimee Mishler: Currently we don't have any protocols in place for this, but we do use it primarily for renal colic and it is one thing that we're looking at kind of as a whole institution in trying to, again, avoid those opioids. So, we don't currently have any policies or protocols, but we do use it for renal colic.

Vicki Basalyga: Let's stop and talk a minute about medication safety when it comes to lidocaine. We know that lidocaine comes in different concentrations and sizes with different doses being used for different indications. Can you guys share with me what you have in place at your institutions to ensure safe administration?

David Zimmerman: Yeah, absolutely. I'll kind of talk about what we did, but first off, if you're looking at the bolus that should not be given as an IV push. This would be given as an infusion, typically over 30 minutes. Some of the studies that are a little bit faster at 10 minutes. I recommend at least doing 30 minutes if not longer, just 60 minutes. So, I know lidocaine is stable in either normal saline or D5W. When kind of planning this, we have tons of different lidocaine preparations as you mentioned Vicki and our ED, you know, 1% 2% with EPI without EPI. So, what we did from a medication safety standpoint, we don't have 24/7 ED pharmacy coverage. We always have a pharmacist in the hospital but not always in the ED. So, we had to try to come up with a plan to try to prevent, you know, any type of medication misadventure from occurring.

David Zimmerman: So we decided that it would always be prepared by pharmacy, either our ED pharmacists or central pharmacy and then sent down. We do not have a pharmacy satellite or anything like that in our ED. So this is something where there might not be one size fits all approach. It



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could depend on kind of your institution and coverage. I helped the hospital in Arizona implement IV lidocaine in their ED and when I was talking about what we did and they said well we don't always have a pharmacist in the hospital, but they said that's not as feasible.

David Zimmerman: So, what we came up with was creating an IV lidocaine kit that pharmacy could prepare. It could be stocked in the safety cabinet in the ED and then when ordered a nurse could remove it and it would give compounding directions. It would have the IV lidocaine preparation in there. It would have the bag of fluid and a label and then it could be prepared. So again, they're not going to be one size fits all approach. But this is a situation where you do have to consider a big med safety component because of the different lidocaine preparations. When it comes to the continuous infusion this is a lot easier because there is a pre-mix. So I would highly recommend utilizing that if you're going to continuous infusion around.

Aimee Mishler: I think we we're pretty similar to what David was just explaining. Again, we don't have 24-hour ED pharmacy for us either. So, when the ED pharmacist is not here, it does dispense from the main pharmacy. But if I'm here or if my counterparts here then we'll often make at bedside for our nurses and we just use the prefilled syringes that you would use like during a code is what we would use if I'm preparing it at bedside. But I think David makes really great points about medication safety and there are so many different products out there that when an ED pharmacist is not making it, it really should be coming from the inpatient pharmacy.

Aimee Mishler: We also have a satellite campus for us that doesn't have 24-hour pharmacy. They're only there 12 hours a day. And so, it's very similar to what David said. We stock it in the Pyxis for them to dispense from and for the nurses to prepare it from. And we have for many of our infusions we have a book for them that goes through step by step of how to prepare it and how to label it and how to administer it and what to watch out for. So even if the pharmacy is not there then they have some information that they can use.

Vicki Basalyga: Thanks Aimee and Dave. So what sort of things should we be recommending to our physician and nursing colleagues to keep an eye out when monitoring for adverse events?

Aimee Mishler: Yeah, definitely. Like with any medication there's always going to be side effects. Some of the more mild ones for a lidocaine would be dizziness, nausea and vomiting, similar to a lot of our other medications. And these are also the most commonly reported in that review that David mentioned earlier. These are the most commonly reported side effects.



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Some of the other more moderate ones that were mentioned were peri-oral numbness, somnolence, and this happened in about 78% of the patients. And then the more severe side effects that you should watch out for would be seizures or cardiac dysrhythmias and these would be your higher doses kind of breaking that max dose recommendation. And then the cardiac dysrhythmia as there was only one study in that review that noted a cardiac event. And that was a patient who was on hospice who died suddenly, and they couldn't determine specifically if it was from the lidocaine or not, but they did mention that in the study.

**Aimee Mishler:** But overall there aren't a lot of serious or severe adverse events reported in those studies that we're looking at where it's used for pain. And if a patient does develop a serious adverse effect from the lidocaine the first thing, you'd want to do would be to just stop it immediately. And if it was due to like an overdose situation or if it's a seizure or something like that, then you could always administer intralipid. And for information on that you could visit the [lipidrescue.org](http://lipidrescue.org) website.

**Vicki Basalyga:** I'm so glad that you mentioned cardiac effects, as most of us are familiar, lidocaine is often used to control arrhythmias. From a monitoring standpoint with the ED and I'd also kind of like to know what happens once you transfer those patients to the inpatient area if they're admitted. Do you recommend telemetry monitoring for those who present to the ED for pain and you want to use lidocaine, do you rule out patients with structural heart anomalies or are known to have dysrhythmias?

**Aimee Mishler:** Yeah, sure. I think that my approach I always ask the provider what's the patient's history, do they have any cardiac history are they otherwise pretty young and healthy or what else is going on with them? Just so that I have an understanding of who we're going to be administering this to and I always recommend that they get put on the cardiac monitoring. In the renal colic study, they did exclude anyone that had cardiac disease, renal disease or liver disease. But all of the other studies that were in that review included those patients. 26% of those patients did have a cardiac history and 10% did have an Arrhythmia history.

**Aimee Mishler:** Those patients that did have that history were included in those studies without any significant adverse effects, but I think my approach is just a little bit more conservative and that I would rather have them on the monitor just in case anything does go wrong. It can alert somebody if they're not immediately in the room and having them on the monitor is not very invasive or cumbersome and it may be that the benefit of having them on a monitor outweighs the risk of not having them on the monitor, but again in those studies they did include those patients with that history and didn't see any significant effects from that.



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Vicki Basalyga: Great, thanks Aimee. Dave mexiletine is often considered the oral lidocaine since we have patients who may be started on an IV lidocaine and we find that it's effective, sometimes there's an interest to convert them from an IV formulation to an enteral formulation. So I was just wondering what you guys do when it comes to transition to these patients and if you ever recommend mexiletine.

David Zimmerman: There's a little bit of evidence out there with mexiletine for chronic neuropathic pain. This is an area that I will defer to the inpatient team or pain service or outpatient pain service. From my viewpoint, I don't think it does in our purview as from an emergency medicine side. So, if I get asked that I think that I'd say that's something you can consider, but also typically defer to our pain team and let them make that recommendation if they decided to add it or to not add it.

Vicki Basalyga: So now we've given the medication, it's been administered safely. The next question we often ask is when will we see this drug start to work. Can you share with us what you guys tell your team once you have administered IV lidocaine?

Aimee Mishler: Yeah, that's a really good question. It's difficult to say that all patients will respond by X time, especially with different uses that we may be using the lidocaine for or the different dosing strategies that are out there, but overall in the studies that are available, it looks like the pain reduction was in about 30 to 60 minutes and it was pretty split between those indications. So, somewhere between 30 and 60 minutes is usually what I will tell the providers and the nurses if they're asking.

Vicki Basalyga: Finally, in closing, what would be the number one piece of information that you would want your colleagues to know about using lidocaine in the pain free day?

Aimee Mishler: I work a lot with the residents, and I feel like at my institution it's still not very widely used. So, I think the first thing that I always tell them is don't forget about it. I think that oftentimes it's overlooked. Or even if I bring it up and recommend it, they're like, Oh I've, I've never heard about that or what do you mean? So, I think the first thing that I would say is just don't forget about it. And then if you do want to use it, you know, just kind of everything that we've talked about that there are benefits for using it. It can be opioid sparing and then you can see some relief in about 30 to 60 minutes. So especially if you've tried something else and it's not working, lidocaine can be an option.

David Zimmerman: Yeah, I would echo that. I don't think lidocaine is the wonder drug that's going to, you know, take all the pain away. But I think it's a great addition to our treatment of pain in the ED. Going back to what Aimee mentioned and the ALTO movement. You know alternative to



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opioids one of the things we do is try to hit a multimodal effect. You know, different receptors, different channels to treat a patient's pain and certainly try to reduce our opioid use, as in lidocaine, is a good addition. I think you can consider it. A lot of the studies look at lidocaine versus an opioid or lidocaine versus ketorolac. I don't think it's wrong sometimes to give the patient, especially if they come in in severe pain. Let's say it's Renal Colic to give both ketorolac and IV lidocaine. So, it's something you can certainly use up front and you know not always by itself.

Vicki Basalyga: That's all the time we have today. I want to thank both Dave and Aimee for joining us today to discuss IV lidocaine in the ED for pain management. Join us here every Thursday while we will be talking with ASHP member content matter experts on a variety of clinical topics.

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