DPM NEWS

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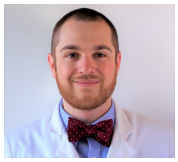
Reducing the Use of Lights and Sirens

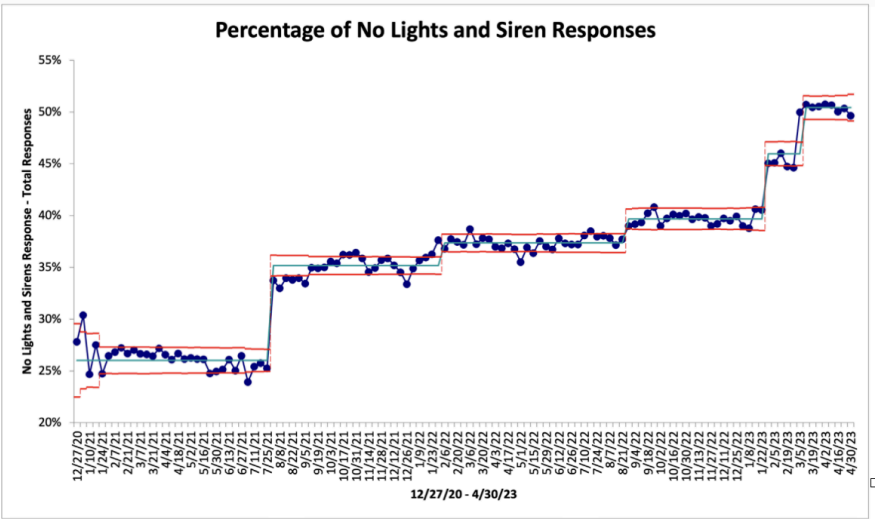


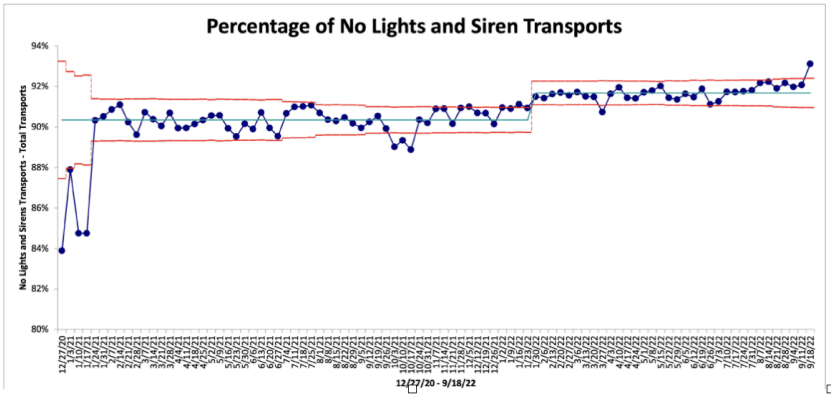
Tyler Lemay MD, NRP

We've been using lights and sirens to get to our patients and then to get them to the hospital since before a formal EMS system existed. Many early systems relied on Law Enforcement for transport with no medical treatment, and early Fire-based systems adopted their regular use of lights and sirens from fire calls to all medical complaints. Over the last 60 years we have built a complex system for identifying emergencies, triaging patient acuity, assigning the closest and most appropriate resources and bringing treatment for most emergencies directly to the patient. If you're routinely using lights and sirens to get to your patients or to get them to the hospital, it's time for an update.

Thankfully, the lion's share of the important work has already been done! Researchers have spent the last 30 years studying the topic, and we now know that the use of lights and sirens to get to our patients typically saves 1-3 minutes. Very few of our patients require emergency treatment in the first 3 minutes, and nearly all of these will be identified by modern Emergency Medical Dispatch. We know that the risk of an ambulance crash increases 50% with lights and sirens response, and triples when transporting patients to the hospital. We also believe that for every ambulance crash there are likely several 'wake effect' crashes affecting the public. Unfortunately, national data shows EMS used L&S to respond to ~83% of calls and transport ~40% of patients last year. So what's an EMS provider to do?

Beginning in 2020 a group of EMS experts working within the National EMS Quality Alliance created the Lights and Sirens Collaborative. They set a goal of >70 of EMS responses and >95% of EMS transports without L&S. Working as a collaborative they developed, trialed, revised and shared quality improvement interventions from 50 agencies over three years. Here is what they accomplished:





These graphs show substantial and sustained change across small rural agencies, large county based agencies and everything in between. You can read about the collaborative and individual success stories and challenges at https://www.nemsqa.org/lights-siren-collaborative. The big lessons learned? System change is hard but it is possible! Since the collaborative we even have a joint position statement on L&S use from 14 organizations governing US and Canadian Fire and EMS systems (https://tinyurl.com/4wcv9afm). Locally we have agencies that are already meeting this metric, and agencies with room to grow. So here's my recommendations to you:

1. Measure your performance! If you don't already know how often your agency uses lights and sirens ask about it. Learn how to measure this and bring that information back to your agency leadership and medical director.
2. If you are meeting the goals (70% of responses and 95% of transports without L&S) share your success. We can only learn best practices from the agencies around us if you share your performance and your process to get there.
3. If you aren't meeting the goals, read the Change Package (https://tinyurl.com/3recz624) and ask about starting a quality improvement project at your agency.

Thank you to everyone who already limits L&S and all of you who are now inspired to measure and then improve these numbers. Until we measure and discuss this we won't know how much room we have for improvement. But I have no doubt you can learn to measure this and then lower the rate of L&S use at your agency - ultimately this means YOU can improve safety for your colleagues, our patients and the public.

References:

Kupas, D. et al. (2022). Joint Statement on Lights & Siren Vehicle Operations on Emergency Medical Services (EMS) Responses. International Journal of Paramedicine, (1).

Jarvis JL, Hamilton V, Taigman M, Brown LH. Using red lights and sirens for emergency ambulance response: How often are potentially life-saving interventions performed? Prehosp Emerg Care. 2021; 25(4): 549-555.

Clawson, J. J., Martin, R. L., Cady, G. A., & Maio, R. F. (1997). The wake-effect—emergency vehicle-related collisions. Prehospital and disaster medicine, 12(4), 41-44.

Kupas DF, Zavadsky M, Burton B, et al. Joint statement on lights & siren vehicle operations on emergency medical services responses. Prehosp Emerg Care. 2022;26::459-461.
NEMSQA . Improving safety in EMS reducing the use of lights and siren. 2023. Accessed March 30, 2024.

NEMSIS. V3 public performance measures dashboard. 2023. Accessed August 13, 2023. https://nemsis.org/view-reports/public-reports/version-3-public-dashboards/v3-public-performance-measures-dashboard/

Protocol Changes and Treatment Decisions: Amio vs Lido

Kevin Gustina EMT-P

The New York State Collaborative Protocol update for 2025 includes parity for lidocaine with amiodarone in the setting of Vf/VT arrest or stable VT cardioversion. But which should we choose for our patients?

Most of the time it doesn't matter and comes down to provider discretion. In a small number of our patients the choice depends on the underlying pathology.

Hopefully this article will offer some guidance.

For witnessed out-of-hospital cardiac arrest (OHCA) with shockable rhythms, previous studies showed no survival benefit difference between amiodarone and lidocaine.[1] Interestingly, there was also no difference in the two antiarrhythmics when compared with placebo in unwitnessed OHCA arrest.[2] A more recent study of in-hospital cardiac arrest demonstrated some statistical benefit of lidocaine over amiodarone,[3] and a retrospective cohort study on this issue, published in March of this year, shows ROSC benefit to lidocaine over amiodarone in both refractory and recurrent Vf/VT.[4]

The Pharmacology

Amiodarone is a class III antiarrhythmic. Drugs in this class primarily act on cardiac potassium (K) channels. Amiodarone also exhibits action on sodium and calcium channels, but to a significantly lesser degree. K-blocking medications slow the re-polarization phase of cell action potential; the T-wave.[5] Besides heart blocks, amiodarone should be cautiously administered to patients with an iodine allergy or sensitivity. This allergy contraindication is mostly theoretical due to amiodarone being comprised of 30% iodine. The half-life of amiodarone is 58 days.[6]

Lidocaine is a class 1b antiarrhythmic. Drugs in this class are sodium channel blockers. Class 1 antiarrhythmics act on the de-polarization cardiac action potential phase, exclusively in the ventricles; the QRS complex.[5] Contraindications include heart blocks, sensitivity to amide-type anesthetics, and patients with Wolff Parkinson White syndrome. The IV route half-life of lidocaine is 7-30 minutes and may require a follow-up dose.[7]

For the great majority of our patients in cardiac arrest, you will be correct no matter which one you choose. When considering therapies based on the cause of arrest, there may be considerations for one over the other. A few circumstances that occasionally come up:

- Dialysis or rhabdomyolysis (athlete) arrests
    - If the patient was hyperkalemic prior to arrest, we want to manage the electrolyte derangement with calcium first, then sodium bicarbonate. Utilizing either lidocaine or amiodarone is not addressing the underlying cause for their arrhythmia (in this case, hyperkalemia) and would be appropriately deferred.
- QTI prolongation arrests
    - Amiodarone prolongs the QTI and lidocaine shortens QT intervals. Why the patient presented with a prolonged QTI/QTc on their 12 lead prior to arrest may drive this decision. If there was evidence of polymorphic VT consider magnesium before other antiarrhythmics.

Toxicology

When neither are appropriate:

- Sodium channel blocking medication overdose
    - For a few years diphenhydramine abuse was a significant concern, especially on college and high school campuses. Diphenhydramine has Na++ blocking activity and the acute stages of overdose present as an almost sinewave, or VT-appearing cardiac dysrhythmia. Other medications with Na++ blocking actions include anticonvulsants like phenytoin, carbamazepine, and lamotrigine. When a patient with hyper-wide QRS complexes (200ms or greater) arrests, sodium channel poisoning should be considered. Both lidocaine and amiodarone are inappropriate; sodium bicarb is the antidote.

Dr. J Cushman's take:

- **Ischemic arrest** - lidocaine may be better but amiodarone is acceptable
- **Electrolyte, QT prolongation, or tox arrest** - neither is better so treat the underlying cause
- **If you're not sure** - electricity is best and wait for the ED to choose

Ultimately, the choice is yours and in the great majority of our patients there is no benefit in one over the other. Just make sure to consider the "why" before you decide the "what".

References

1) **Sandilippo, F. et al. Amiodarone or lidocaine for cardiac arrest: A systemic review and meta-analysis. Resuscitation, Volume 107, 31-37, 2016.**

2) **Kudenchuk PJ, Leroux BG, Daya M, Rea T, Vaillancourt C, Morrison LJ, Callaway CW, Christenson J, Ornato JP, Dunford JV, Wittwer L, Weisfeldt ML, Aufderheide TP, Vilke GM, Idris AH, Stiell IG, Colella MR, Kayea T, Egan D, Desvigne-Nickens P, Gray P, Gray R, Straight R, Dorian P; Resuscitation Outcomes Consortium Investigators. Antiarrhythmic Drugs for Nonshockable-Turned-Shockable Out-of-Hospital Cardiac Arrest: The ALPS Study (Amiodarone, Lidocaine, or Placebo). Circulation. 2017 Nov 28;136(22):2119-2131. doi: 10.1161/CIRCULATIONAHA.117.028624. Epub 2017 Sep 13. PMID: 28904070; PMCID: PMC5705566.**

3) **Wagner D, Kronick SL, Nawer H, Cranford JA, Bradley SM, Neumar RW. Comparative Effectiveness of Amiodarone and Lidocaine for the Treatment of In-Hospital Cardiac Arrest. Chest. 2023 May;163(5):1109-1119. doi: 10.1016/j.chest.2022.10.024. Epub 2022 Nov 2. PMID: 36332663.**

4) **Tanner Smida, Remle Crowe, Bradley S. Price, James Scheidler, P.S. Martin, Michael Shukis, James Bardes, A retrospective 'target trial emulation' comparing amiodarone and lidocaine for adult out-of-hospital cardiac arrest resuscitation, Resuscitation, Volume 208, 2025, 110515, ISSN 0300-9572, https://doi.org/10.1016/j.resuscitation.2025.110515.**

5) **King GS, Goyal A, Grigorova Y, et al. Antiarrhythmic Medications. [Updated 2024 Feb 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482322/**

6) **https://pubchem.ncbi.nlm.nih.gov/compound/2157#section=Metabolism-Metabolites**

7) **https://pubchem.ncbi.nlm.nih.gov/compound/3676#section=Metabolism-Metabolites**

2024 MLREMS Award Recipients

Congratulations to all the nominees and winners!

ALS Provider of the Year: **Meghan Kiefer**

BLS Provider of the Year: **Connor Thayer**

EMS Communications Specialist of the Year: **Corey Gavette**

EMS Educator of Excellence: **Tova Tomer**

Harriet C. Weber EMS Leadership Award: **Andrew Perez**

RN of Excellence: **Cherie Gibson**

Paramedic Rookie of the Year: **Sarah Bracy**

Administrative Support Person of the Year: **Mindy Cannuli**

Agency of the Year: **Rochester institute of Technology Ambulance**

Thank you to **Rochester Regional Healthcare** and **UR Medicine** for sponsoring the awards again this year