2021 ESO EMS INDEX:

INSIGHTS AND BEST PRACTICES FOR EMS AGENCIES

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CONTEXT AND OVERVIEW FOR THE INDEX

In the immortal (paraphrased) words of Jerry Garcia, what a long, strange trip 2020 was. When the year started, we could not have anticipated the many obstacles we would face as individuals, families, communities, and as a nation. COVID-19 upended our "old" normal and replaced it with a radically different "new" normal. We've learned to be flexible and adaptable, as well as adjust on the fly to ensure the health and safety of the communities in which we live.

Now, in our fourth full year of producing the ESO EMS Index, we also need to show adaptability and flexibility. We will continue to make necessary adjustments when and where it makes sense to deliver even more relevant insights. In doing so, we are bringing new metrics into the discussion aimed to further quality improvement.

INTENT

For the 2021 Index, we are making our biggest update yet. While we are keeping stroke assessment performance and lights and siren use for scene-to-hospital transports, we've rotated out end-tidal carbon dioxide ($EtCO_2$) after advanced airway procedure, 12-lead performance for adults with chest pain, and aspirin administration for adults with chest pain in this current edition (they will be back in future editions). We are adding patient weight documentation for ketamine administrations and characteristics of patients who were not transported by EMS. We will also continue with two key surveillance measures: percent of patients suffering from overdose and COVID-19 and influenza-like illness (ILI) impressions.

As always, the appropriate metrics for evaluating the success of your EMS organization will vary depending upon a number of factors, including, but not limited to, the size of the population served and the geographic location. However, we believe an objective look at aggregate data across the United States can provide a starting point or benchmark that you can use to evaluate performance compared to your peers.

The purpose of this Index is to serve as a point of reference for EMS organizations to identify which areas are in alignment and which areas represent opportunity for improvement, more intensive local monitoring, or at least further assessment and evaluation. This quantitative approach to measuring performance gives EMS organizations a framework to continually refine tactics, improve efficiency and outcomes, and allocate resources appropriately. To that end, here are some of the questions we hope the 2021 ESO EMS Index will help you ask and investigate using your own data:

- **Is my organization performing similarly to other organizations around the country when it comes to best practices surrounding certain clinical presentations, such as stroke identification and assessment?**
- **Are we properly monitoring our use of ketamine in emergent situations?**
- **Are we practicing judicious use of lights and siren?**
- **How do our responses ending in non-transport compare to the national average?**
- **Are we above or below the national average when it comes to responding to overdose events?**
- **Are we adequately equipped to handle a spike in flu-related calls (especially in light of the coronavirus)?**
- **What are the best practices for each metric in this Index and how can I make sure we are following these at our organization?**

The Index uses data from the ESO Data Collaborative, comprised of more than 2,000 agencies and departments across the country and represents 8.8 million 911 calls (out of 10.5 million total calls) between January 1, 2020-December 31, 2020.

8.8 MILLION RECORDS

KEY METRICS

STROKE ASSESSMENT PERFORMANCE

KETAMINE ADMINISTRATION WITH WEIGHT RECORDED

TRANSPORTS WITHOUT LIGHTS AND SIREN

NON-TRANSPORT DISPOSITIONS

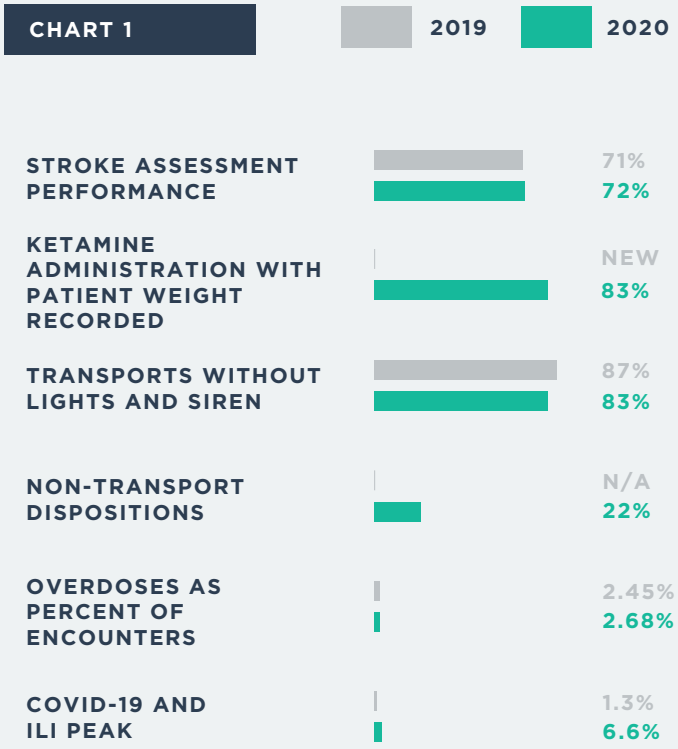
PERCENT OF PATIENTS WITH SUSPECTED OVERDOSE

COVID-19 AND INFLUENZA-LIKE ILLNESS (ILI) IMPRESSIONS

LIMITATIONS

This Index is retrospective and looks at aggregate data from 2020. There are no universal rules designed around these measures. The purpose of the Index is to be informative and directional, but it is not intended to be a scientific study. Nor is it intended to be comprehensive in nature. We hope this document serves as a body of literature that adds to the discussion and conversation around best practices and quality improvement efforts to improve positive patient outcomes.

CHART 1



KEY FINDINGS

The 2021 ESO EMS Index looks at 8.8 million 911 calls (out of 10.5 million total calls) from January 1, 2020-December 31, 2020. At a macro level, the data revealed the following:

Stroke Assessment Performance: When looking at documented stroke assessment completion rate, we continue to see steady performance from 2019 to 2020. The Cincinnati Prehospital Stroke Scale (CPSS) was most commonly used.

Encounters involving patients with suspected overdose ↑9.4% accounted for 2.68% of 911 calls in 2020, which is slightly higher than 2019 at 2.45%.

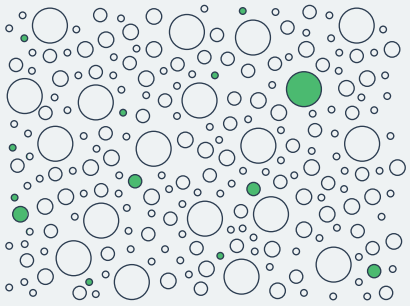
83%

of patients administered ketamine had weight recorded. Although this measurement is undoubtedly an estimate in most cases, it is nevertheless important to ensure appropriate dosing.

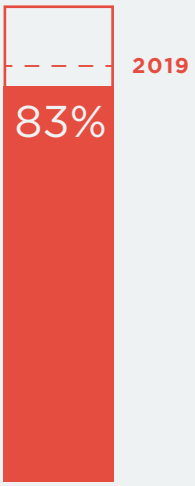
22%

of EMS encounters did not result in transport to a hospital

COVID-19 and Flu-like primary impressions accounted for 3.8% of all encounters, with the majority coming in March and April, and a resurgence in December. The continued correlation of the EMS impressions vs. CDC and other data reaffirms the accuracy of EMS impressions as a key component of overall surveillance.



Most patients were transported without lights and siren (83%). Given the ability of EMS professionals to provide stabilization for critically ill and injured patients and the known risks of lights and siren transportation, we were surprised to see an increase in lights and sirens transport of 4% compared to the prior year.



INDEX METRICS

STROKE ASSESSMENT

The stroke assessment performance metric looks at how many patients with an EMS primary impression of stroke received a formal stroke assessment as part of a 911 call (not interfacility transfers and other types of encounters) that was appropriately documented. The conversation around stroke continues to evolve, and it is becoming increasingly important to not only identify a stroke, but to determine the severity of the stroke using a validated, complete, formal stroke assessment. The treatment options and hospital destinations for patients will vary depending on a number of factors, including the severity as determined by a formalized assessment.

Chart 2 below shows there were 130,221 calls where the EMS provider impression included stroke. Of those encounters, 92,740 had a stroke assessment documented – or 71%. Stroke encounters were 1.5% of all 911 calls.

Chart 2

NO ASSESSMENT PERFORMED
37,481

ASSESSMENT PERFORMED
92,740

PERCENT OF A DOCUMENTED COMPLETE STROKE ASSESSMENT 71%

INSIGHT

According to the Centers for Disease Control and Prevention (CDC), stroke kills about 140,000 Americans each year. Every 40 seconds, someone experiences a stroke. Stroke costs the United States about $34 billion each year in medical expenses, lost wages, etc. In addition to being one of the leading causes of death, stroke is also one of the leading causes of long-term disability and the leading preventable cause of disability, according to the American Stroke Association.

EVERY 40 SECONDS SOMEONE EXPERIENCES A STROKE IN AMERICA

Early identification of patients possibly experiencing stroke promotes better outcomes by getting the patient to the right treatment faster. With the expansion of endovascular treatment windows, there is greater reason to focus on appropriate EMS screening and severity scoring such that patient routing for endovascular treatment can be accomplished consistent with the local community's plan.

BEST PRACTICE

Performance of a stroke assessment in patients with sudden onset of even vague neurological systems can be the difference between a successful or unsuccessful patient outcome.

Ensuring accurate documentation of Last Known Well Time or Time of Onset plays an important role in determining treatment.

The availability of enhanced care at specialized centers, including mechanical thrombectomy, makes formal stroke assessment and stroke severity assessment all the more important.

A recent study by ESO scientists comparing the predictive performance of the CPSS, RACE, LAMS and VAN for detecting large vessel occlusion stroke showed similar results across scales. While there is no clear best prehospital stroke severity scale, performing a complete assessment using a validated tool is key. The choice of screen will depend on local and agency factors including considerations related to implementation and training costs.

Properly document stroke assessment using ePCR tools that yield discrete data to enable retrospective analysis of the predictive value of these tools.

Monitor stroke-assessment rates for patients with sudden onset of neurological symptoms and provide performance feedback often.

Look at how your organization is performing with stroke assessment completion rates for patients with suspected stroke against the data in this Index.

INDEX METRICS

KETAMINE ADMINISTRATION WITH DOCUMENTED PATIENT WEIGHT

The ketamine metric looks at both ketamine administration and if patient weight was documented at the time of administration. Ketamine is a potent analgesic and sedative medication that has many favorable characteristics for use in the prehospital setting. Nevertheless, its use is not without risk and requires close assessment and monitoring. Recent discourse on ketamine has questioned its safe use in out-of-hospital care. Documenting appropriate dose for the patient's weight is a key factor to monitor for systems who use ketamine.

Chart 3 shows there were 18,939 calls involving ketamine administration. Of those encounters, 15,670 included a recorded or documented weight. In other words, 83% of patients administered ketamine had a weight recorded.

Chart 3

ADMINISTRATION WITHOUT RECORDED WEIGHT
3,269

ADMINISTRATION WITH RECORDED WEIGHT
15,670

INSIGHT

Ketamine made the news headlines in 2020 — from local stories to national media coverage. A handful of city and state governments have moved to either limit the use of ketamine for EMS or outright ban ketamine. Unfortunately, much of the news coverage presented misleading information regarding the use of ketamine in emergent situations.

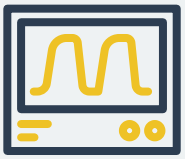
ALMOST ALL DEATHS COULD BE ATTRIBUTED TO UNDERLYING CONDITIONS

We recently conducted a study based on more than 11,000 EMS encounters where ketamine was administered. In almost all cases, patient death following EMS use of ketamine was clearly attributable to serious underlying medical conditions or traumatic injuries.

PERCENT KETAMINE ADMINISTRATIONS 83%

BEST PRACTICE

Ensure accurate weight estimates are recorded to guide dosing and serve as supportive documentation after the EMS encounter.



Implement pulse oximetry, $EtCO_2$, and cardiac monitoring as soon as practical.

Be prepared to immediately treat hypoventilation and hypoxia.

Rapid IV administration can result in transient apnea. Except for use during rapid sequence intubation, when administering ketamine by IV, administer the medication slowly over one minute or greater.

INDEX METRICS

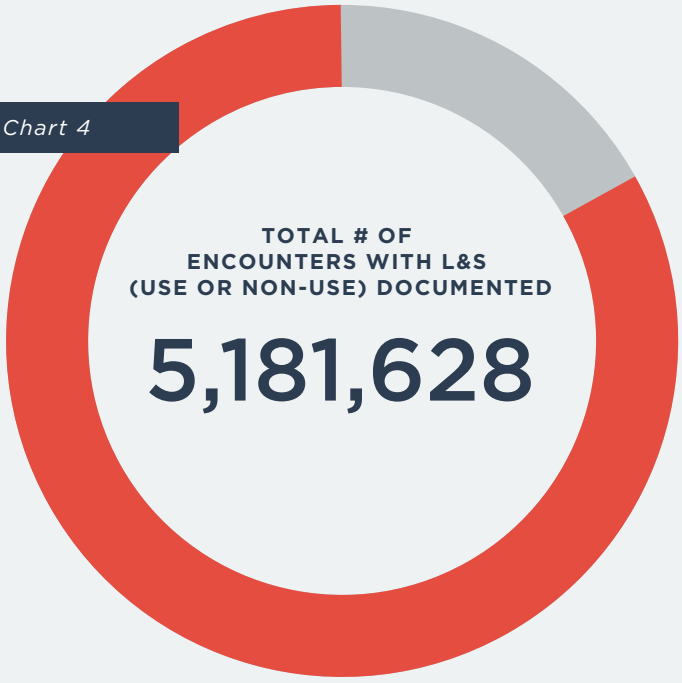
USE OF LIGHTS AND SIRENS FOR PATIENT TRANSPORT

The Lights and Sirens (L&S) metric explores transport of a patient or patients from the scene to a hospital without the use of L&S. In alignment with the National EMS Quality Measure set released by the National EMS Quality Alliance in September of 2019, the use of standard scoring where higher scores indicate better quality, was employed for this measure. This means that we are focusing on the percentage of calls in which lights and sirens were **NOT** used.

Chart 4 below shows there were 5,181,628 patient transports included in the analysis for this metric. There were 4,297,124 documented patient transports that **DID NOT** use lights and sirens, or 83% of transports. Not surprisingly, L&S usage varies across agencies, with the median agency transporting without using L&S 90% of the time or more, while one-in-ten agencies transported without L&S less than 50% of the time.

There are a number of factors that affect the use of L&S, including rural versus urban settings, type of encounter, etc. Nevertheless, there are industry guidelines that support limiting the use of lights and sirens to protect the patient, EMS providers, and the public.

Chart 4



INSIGHT

In the early days of EMS, most agencies used lights and sirens for nearly every call – whether en route to the scene or transporting a patient from the scene. In the spirit of "do no harm," a number of studies have been conducted and have provided clear evidence regarding the potential negative consequences of "overusing" lights and sirens – including added stress and anxiety on the patient, disrupting normal traffic flow to create an even more congested transport route, noise pollution, and increased risk of ambulance crashes.

L&S TRANSPORT RATE

<5%

SAFE FOR PATIENTS

According to a 2017 study by the U.S. Department of Transportation National Highway Traffic Safety Administration Office of Emergency Medical Services (OEMS), a rate of L&S use below 5% of 911 scene responses is likely safe for patients, with some agencies striving for a feasible zero L&S transports.

DID NOT USE LIGHTS AND SIRENS	LIGHTS AND SIRENS
4,297,124	884,504

BEST PRACTICE

While it is recognized that the use of lights and sirens can be proscribed by state or local legislation/protocols, this metric is based on published guidance and national performance measures for safety with the intent to help drive improvement in this area, leveraging the power of data.

Create policies and guidelines around judicious L&S use during response and patient transport.

Minimize L&S use to only critical situations.

Per the OEMS, agencies should regularly measure their percentage of L&S use during 911 scene response and patient transport.

Agencies should consider a target usage rate of less than 5% for L&S responses.

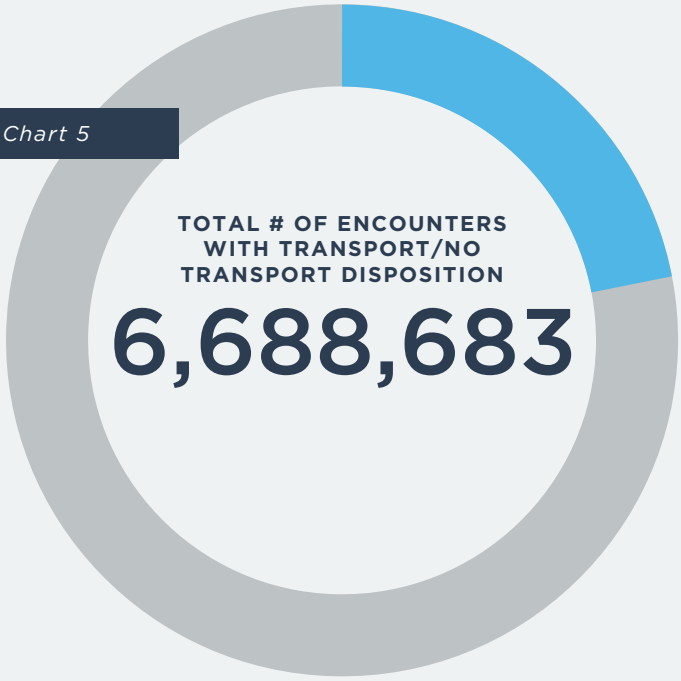
INDEX METRICS

EMS NON-TRANSPORT DISPOSITIONS

The non-transport disposition metric looks at the number of patients not transported by EMS for a 911 call. COVID-19 has had a significant impact on EMS agencies and personnel in a variety of ways. One particular area that stood out in 2020 is the increased rate of non-transport dispositions, especially in the early days of the pandemic (March and April). Fear of the unknown about COVID-19 drove many people to isolate and outright avoid medical treatment of any sort – even refusing emergency department visits for some serious conditions.

In Chart 5, we see that there were 1,506,784 non-transports out of 6,688,683 911 calls where EMS disposition was recorded (transfer of care to other EMS units excluded). Stated differently, 22% of all 911 calls resulted in non-transport by EMS.

Chart 5



CALLS RESULTING IN TRANSPORT BY EMS
5,181,899

CALLS RESULTING IN NON-TRANSPORT BY EMS
1,506,784

INSIGHT

The non-transport of patients by EMS is affected by many variables. During the beginning of COVID-19 in 2020, there was quite a bit we didn't know. People were scared – and this affected decision making when it came to going to the emergency department or riding in an ambulance.

COVID-19 AFFECTED TRANSPORT PATTERNS

A recent study from ESO looked at the impact of COVID-19 on transport patterns for patients with acute coronary syndrome.

PERCENT OF ALL 911 CALLS RESULTING IN NON-TRANSPORT BY EMS 22%

BEST PRACTICE

Use objective criteria to risk stratify patients when making transport/non-transport decisions.

Use a standardized escalation strategy for those who are refusing care and are at higher risk. Examples include requesting a supervisor to the scene or discussing with on-line medical control.

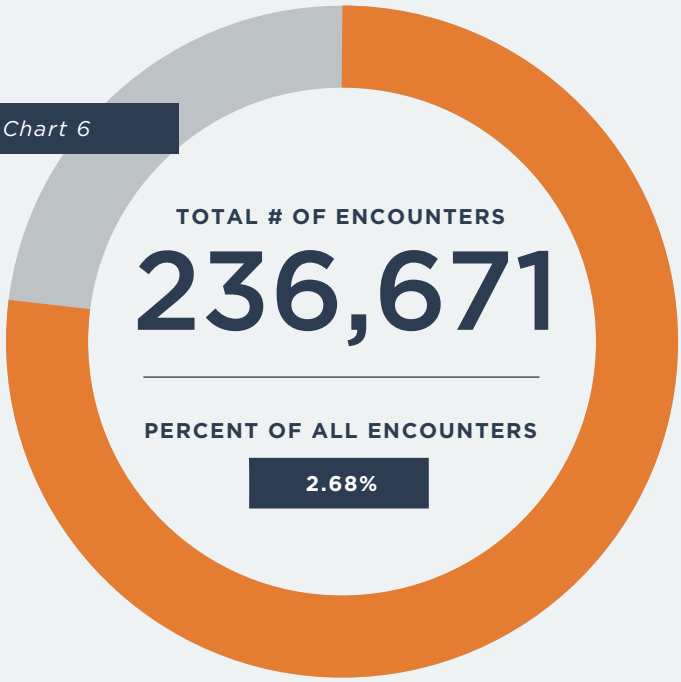
Review demographic data to monitor for unconscious bias or other non-clinical factors that may be affecting non-transport patterns.

INDEX METRICS

OVERDOSE

The overdose metric looks at the number of patients with an EMS provider impression related to overdose compared to the total number of 911 calls. Chart 6 shows that of the 8.8 million 911 calls in our sample, 236,671 had a primary impression related to overdose (or 2.68%). The overall percentage of 911 calls related to overdose is higher than last year. Of these encounters for overdose, opioids were suspected in 183,188, or 77%. Other sources have reported an increase in opioid-related fatalities during the pandemic. While the causes are multi-factorial, access to treatment may have been reduced and more people may have been using drugs in isolation and were not found in time for medical treatment.

Chart 6



OPIOIDS SUSPECTED IN OVERDOSE
183,188

OTHER
53,483

INSIGHT

Between 1999 and 2016, more than 630,000 people died from drug overdose in the United States. Overdose continues to be a national problem, with the CDC reporting more than 81,000 deaths in a 12-month span ending in May 2020. This is the largest number of drug overdoses recorded in a 12-month period. And COVID-19 only exacerbated the issue.

>630,000

1999-2016

81,000

12 MO. PERIOD 2019-2020

BEST PRACTICE

Monitor incidents involving suspected overdose in your community and anticipate trends. Look for geographic hotspots in your community (based on data from your ePCR) to create preventative and harm reduction programs in areas with particularly dense activity.

If your ePCR vendor offers extended data collection for opioid cases, make this a validation rule. More data and information on the incident and situational issues related to overdose events will provide valuable insights.

Investigate novel approaches to encourage overdose patients to seek rehabilitation and connect patients with continued care.

INDEX METRICS

COVID-19 AND INFLUENZA-LIKE ILLNESS IMPRESSIONS

The COVID-19 and influenza-like illness metric looks at the number of patients identified with a primary impression of COVID-19 or flu-like illness. These impressions accounted for 3.8% of all 911 calls in 2020, more than stroke encounters and overdose encounters combined.

In Chart 7, we see three distinct phases or spikes in the data, indicating a resurgence of infections and exposure after a period of "flattening the curve." The first phase occurred in March/April, the second occurred in July, and the third occurred in November/December.

INSIGHT

While flu numbers remained relatively low in 2020 due to measures to combat COVID-19 – especially compared to previous flu seasons – COVID-19 made up for it in spades. While vaccines are currently available, accessibility to the vaccines is limited.

KEEP AN EYE ON VACCINATIONS

We continue to see significant spikes in infection rates – particularly as new variants enter the fray. We are cautiously optimistic late summer/early fall will see widespread vaccination of the population at large.

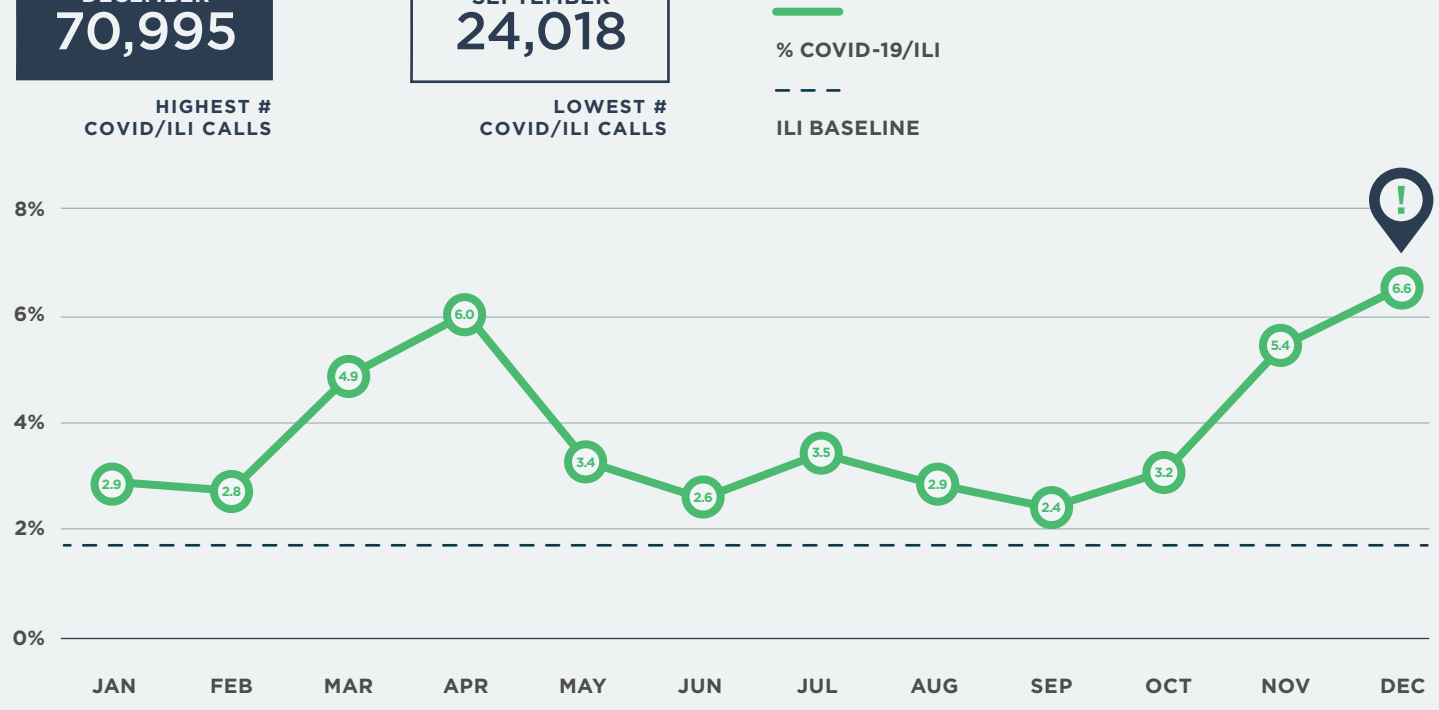
Chart 7

3.8%
PERCENT OF ALL ENCOUNTERS

339,378
TOTAL # OF ENCOUNTERS

DECEMBER 70,995
HIGHEST # COVID/ILI CALLS

SEPTEMBER 24,018
LOWEST # COVID/ILI CALLS



BEST PRACTICE

Use EMS data to help inform local surveillance as part of an overall public health effort.

Encourage EMS and fire responders to document PPE use. This provides an important overview of supply use and facilitates quarantine decisions after potential provider exposure to COVID-19.

Appropriate documentation of first–time use versus reuse of PPE articles is imperative to enable logistics to plan and order appropriate supplies.

Atypical presentations of COVID-19 disease certainly occur; however, documentation of body temperature and pulse oximetry represent important baseline vital signs and should be captured by EMS.

CONCLUSION

SO, WHAT DOES THIS MEAN?

2020 was a different year, which means 2021 will be a different year as we continue to adjust to our changing and evolving world. Adjustment also requires new perspective. The metrics we analyzed in the Index have a familiar feel, but they have a slightly different sheen when viewed through the COVID-19 lens.

STROKE ASSESSMENT
(OR DOCUMENTATION OF STROKE ASSESSMENT)

SHOWS SOLID PERFORMANCE AT

71%

HOWEVER

more needs to be done to ensure patients with neurological symptoms are receiving full assessments for presence of stroke, the severity, and time of symptom onset.

PATIENT WEIGHT DOCUMENTATION
FOR KETAMINE ADMINISTRATION IS AT

83%

HOWEVER

agencies and providers need to pay particular attention to ensure accurate dosing.

NON-TRANSPORTS
REQUIRE FOCUSED REVIEW

we look forward to additional details as results of the ET3 pilot program become available during 2021.

OVERDOSE
CONTINUES TO BE A PROBLEM

especially in light of increases in non-transport dispositions and reluctance to seek medical attention.

RED LIGHTS AND SIREN
USAGE NEEDS TO BE EXPLORED

83%

OF PATIENTS

were transported without lights and siren, which signals room for improvement. Further, the proportion of transports without lights and siren varied substantially across agencies, suggesting that organizational, local, and even state related factors may have a role in this important safety measure.

EMS DATA
offer unique, timely, and accurate insights for the purposes of surveillance.

METHODOLOGY

The dataset from the ESO Data Collaborative used for the ESO EMS Index is real-world, de-identified data, compiled and aggregated from more than 2,060 agencies across the United States that use ESO's products and services and agreed to have their data used for research purposes. These data are based on 8.8 million anonymized 911 calls between January 1, 2020 and December 31, 2020, representing a full calendar year.

THERE IS A 95% CONFIDENCE LEVEL IN THE NUMBERS USED IN THIS REPORT WITHIN A 1% +/- RANGE.

OK, NOW WHAT?

Organizations should use this information to understand why metrics are important and which metrics and drivers can have the biggest effect on your organization and the patients you serve. With this Index as a foundation, you can do your own analysis to serve as the basis for other modeling and outcomes.

The metrics shown in this Index are by no means exhaustive. Every organization is unique and has its own strengths, structure, and goals. Because of these attributes, results achieved by one organization may not be attainable by another for a variety of reasons. However, these metrics should provide a foundation to compare your measurements and outcomes to what we are seeing nationally.

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