

2020 ESO EMS INDEX:

COVID-19 SPECIAL EDITION

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CONTEXT AND OVERVIEW FOR THE INDEX

At the beginning of the year, we released our 2020 ESO EMS Index. We looked at data across six metrics from January 1, 2019 – December 31, 2019: 1) Stroke assessment performance, 2) percent of patients suffering from overdose (with a deeper dive into opioid overdoses specifically), 3) end-tidal carbon dioxide after advanced airway procedure, 4) 12-lead performance for adult patients experiencing chest pain, 5) aspirin administration for adult patients experiencing chest pain, and 6) influenza surveillance.

Traditionally at this time of the year, we provide a Mid-Year Index with updates on the core metrics we track (referenced above); however, in light of the ongoing pandemic, we've put together this COVID-19 Special Edition. We are focusing on 911 calls, Personal Protective Equipment (PPE) usage, and other metrics related specifically to COVID-19. For comparison, we look at 2020 data compared to 2019 data to see year-over-year change to help us determine what impact COVID-19 is having on our industry.

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 2020 ESO EMS Index: COVID-19 Special Edition update will help you ask and investigate using your own data:



IS MY ORGANIZATION'S EXPERIENCE SIMILAR TO OTHER ORGANIZATIONS AROUND THE COUNTRY WHEN IT COMES TO 911 CALL VOLUME AND COVID-19?



ARE WE TRACKING AND DOCUMENTING PPE USAGE?



IF SO, WHAT IS OUR RATE OF REUSE FOR PPE?



ARE WE PROPERLY DOCUMENTING KEY VITAL SIGNS, INCLUDING BODY TEMPERATURE AND OXYGEN SATURATION?



WHAT LEARNINGS CAN WE TAKE FROM THE INITIAL SURGE THAT CAN HELP US PREPARE FOR POTENTIAL FUTURE SURGES?



DOES MY ORGANIZATION HAVE A BIDIRECTIONAL DATA EXCHANGE WITH HOSPITALS IN ORDER TO MONITOR FOR COVID-19 DIAGNOSIS FROM RECEIVING CENTERS?

The COVID-19 Special Edition Index uses data from the ESO Data Collaborative, representing approximately 2,000 agencies and departments across the country and more than 4.1 million 911 calls between January 1, 2020 – July 31, 2020.



**4.1
MILLION
911 CALLS**

KEY METRICS

SECTION 1: 911 CALLS

Overall 911 Call Volume

Percentage of 911 Responses for Acute Coronary Syndrome

Non-Transports Among all 911 Responses

Percentage of 911 Responses with Documented COVID-19/Influenza-Like illness (ILI) EMS Impressions

Comparison of trends before and during COVID-19 for:

Motor Vehicle Crashes

Stabbings, Gunshot Wounds, and Penetrating

Trauma

Cardiac Arrests

Opioid Overdose

LIMITATIONS

This index is retrospective and looks at aggregate data from the first half of 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 it serves as a body of literature that adds to the COVID-19 discussion and conversation around best practices and quality improvement efforts to improve positive patient outcomes, as well as provider safety.

SECTION 2: PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment Use and Reuse

Mask Use and Reuse

Face Shield Use and Reuse

Gown Use and Reuse

Isolation Coveralls Use and Reuse

SECTION 3: VITAL SIGN DOCUMENTATION

Temperature Documentation

Pulse Oximetry (SpO2) Documentation

SECTION 4: CONNECTING THE DOTS

COVID-19 Hospital Diagnoses

Documented Mask Use

KEY FINDINGS

The 2020 ESO EMS Index: COVID-19 Special Edition looks at 4.1 million 911 calls from January 1, 2020–July 31, 2020. April was a special month and was during the broadest “stay-at home” orders/recommendations issued by states. At a macro level, the data reveal the following:

TOTAL 911 CALLS DROPPED...FOR A BIT

Overall, we noticed a decrease in total 911 call volume since early January 2020 by as much as 18% through the end of April. Motor Vehicle Crash calls in particular experienced a significant drop, down by 40%. However, starting in May through the end of July, we see a steady upward trend.

NON-TRANSPORTS JUMPED...FOR A BIT

Coupled with 911 call volume dropping, non-transporters increased – by as much as 33% in April 2020.

CARDIAC ARREST SPIKES

Substantial increases in the number of out-of-hospital cardiac arrests have been observed, particularly in regions with increased COVID-19 cases. As a whole, in April 2020, EMS responses for cardiac arrests spiked by 36% compared to the prior year.

PENETRATING INJURIES ARE UP

While warmer months are often associated with a rise in penetrating trauma, the rate of increase appears higher in 2020 compared to the previous year.

QUESTIONS REMAIN ABOUT PPE USAGE

In up to 20% of patients with documented COVID-19 disease at the receiving hospital, there is no documentation of appropriate PPE usage in the EMS patient care record. It is unclear whether this reflects lack of actual use of PPE or simple lack of documentation.



MASKS ARE BEING REUSED AT A HIGH RATE

We see that in more than 40% of patient encounters, masks are being reused.

TEMPERATURE DOCUMENTATION IS LOW

EMS providers are recording/documenting temperature for patients with COVID-19 or influenza-like illness impressions about 64% of the time. That means that this key vital sign is not being recorded for about 1 in 3 patients.

OPIOID OVERDOSE CALLS ARE UP

Between January 1, 2020 and July 31, 2020, opioid overdose responses jumped 30%. The numbers increased in particular in May and June by approximately 41% and 53% respectively.

LINKED HOSPITAL OUTCOMES PROVIDE VALUABLE INFORMATION

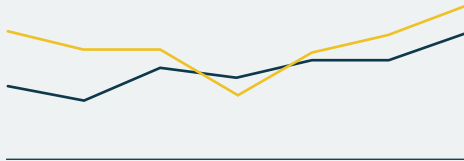
The COVID-19 specific diagnosis code was officially implemented April 1 and provides a HIPAA-compliant, automated mechanism for EMS providers and administrators to determine whether a possible COVID-19 exposure occurred. This also allows population-level monitoring of trends and helps communities plan for next steps.

SECTION ONE OVERVIEW



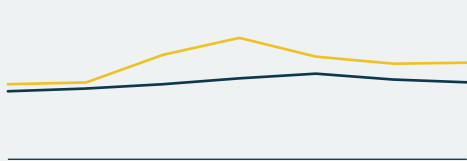
911 CALLS

TOTAL CALL VOLUME



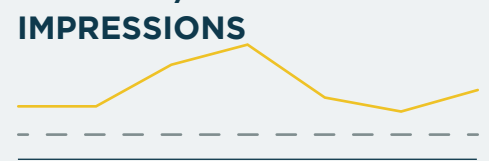
-18% APRIL

PERCENT OF NON-TRANSPORTS



+33% APRIL

PERCENT WITH COVID-19/ILI IMPRESSIONS



6% APRIL

PERCENT OF CARDIAC ARREST (CPR) RESPONSES



+35% APRIL

PERCENT OF PENETRATING TRAUMA RESPONSES



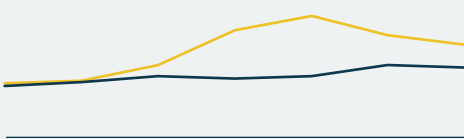
+60% MAY

PERCENT OF MVC RESPONSES



-40% APRIL

PERCENT OF OPIOID RESPONSES



+33% MAY

911 CALLS

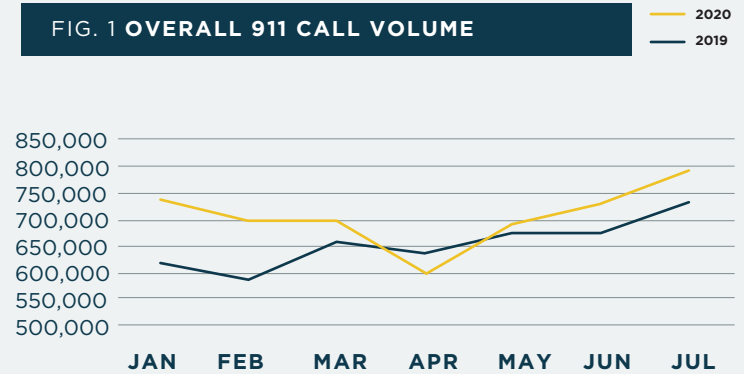
In many ways, data from EMS and the fire service are leading indicators when it comes to infectious diseases. Case in point, our friends in Washington state were among the first in the country to encounter COVID-19 when calls started coming in from a skilled nursing facility. We see this as well during flu season. Our data reliably demonstrate annual increases and decreases in EMS impressions of influenza-like illness (ILI), allowing us to evaluate the timing, as well as the relative severity, of a typical (or even atypical) flu season.

Figure 1 shows that overall 911 call volume started trending downward as early as February 2020, counter to 2019 - which saw a steady increase in 911 call volume through the first half of the year. The 2020 decrease hit its low point in April, dropping by as much as 18% before beginning a steady increase through July. Even responses for time-sensitive conditions like suspected acute coronary syndrome declined substantially in April.

Coupled with a decrease in overall 911 call volume, the data also show a 30% spike in non-transports in April (see figure 2). Compared to 2019, the spike in non-transports appears to reflect patient reluctance to leave the safety of home for the uncertain hospital environment (and aligns with the broad “stay-at home” orders across multiple states). This combination of decreased call volume and increased non-transport rates demonstrates two major concerns: 1) EMS patients are seemingly reluctant to be transported to a hospital, and 2) revenue impact from transports on EMS agencies to pay salaries, purchase PPE, etc. We see non-transports returning closer to baseline in May and June. July shows a slight uptick, which needs to be closely monitored in coming months.

April in particular experienced a significant spike in 911 responses with documented COVID-19/ILI impressions, peaking at 6% of all calls as seen in figure 3. There was a steady decline through June as we headed toward a baseline number of 1.73% (typical % of ILI impressions for the time of year); however, we are again seeing an increase through July, well above the expected baseline.

FIG. 1 OVERALL 911 CALL VOLUME



* 2020 data include approximately 600 additional agencies

PERCENT OF 911 RESPONSES ACUTE CORONARY SYNDROME

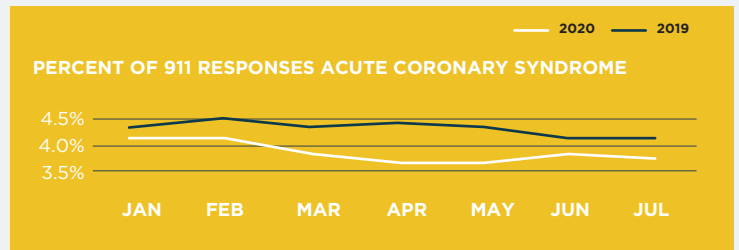


FIG. 2 NON-TRANSPORTS AMONG ALL 911 RESPONSES

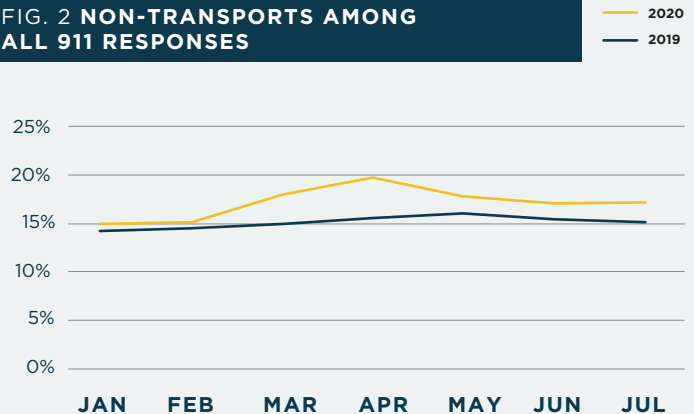
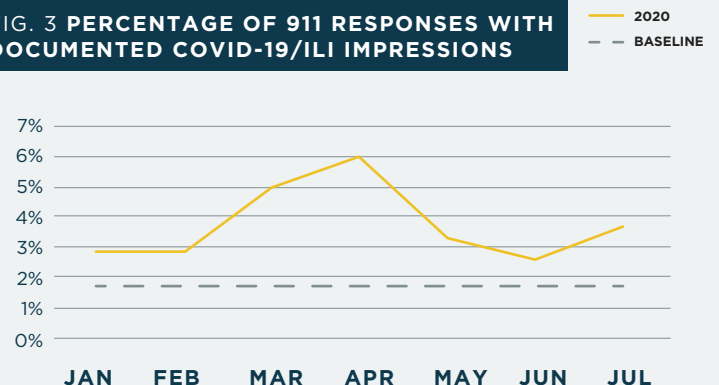


FIG. 3 PERCENTAGE OF 911 RESPONSES WITH DOCUMENTED COVID-19/ILI IMPRESSIONS



Per earlier comments, with broad and sweeping stay-at-home orders implemented across the country, as well as many businesses requiring/allowing employees to work from home, there was a significant drop in Motor Vehicle Crashes (MVC) as people stayed off the road. The decrease reached its peak in April 2020, with a nearly 40% drop in calls. See figure 4.

Dispatches for stabbings, gunshot wounds, and other penetrating trauma experienced a disturbing increase since the beginning of year. And while these calls represent a small proportion of overall EMS responses, there has still been more than a doubling of penetrating trauma calls when compared with the same timeframe in 2019. Figure 5 shows the biggest spike occurred April to June of 2020. While 2019 also saw an increase during the same time period, the progression was less pronounced.

Let's talk about cardiac arrest. While many of the metrics we are measuring in this Index may be influenced by COVID-19 (such as fewer drivers on the road related to MVC or "cabin fever" related to gunshots and stabbings), the increase in cardiac arrests are likely largely due to COVID-19, as well as potentially due to decreased transports for acute coronary syndrome (ACS). Figure 6 shows that 911 responses for cardiac arrest are up in 2020, especially between the months of March and May. In April, cardiac arrests jumped as much as 35%. 2019 showed a 5% decrease during the same time period.

Opioids continue to represent an important public health concern, even during the COVID-19 pandemic. During the spread of COVID-19 across the country, 911 responses to opioid overdose increased by as much as 33%, especially during April and May of 2020, as seen in figure 7. We hope the declining trend from June and July continues.

FIG. 4 911 RESPONSES FOR MOTOR VEHICLE CRASHES

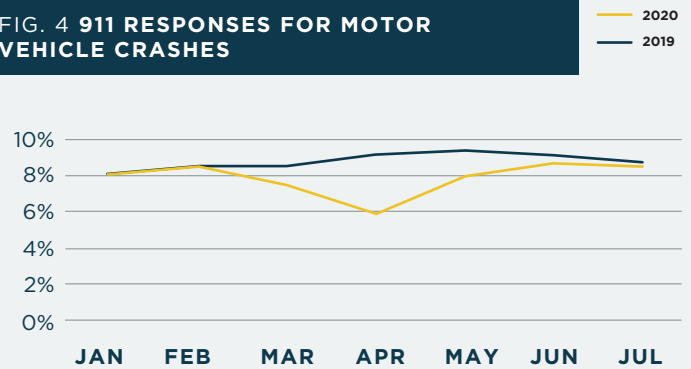


FIG. 5 911 DISPATCHES FOR STABBINGS, GUNSHOT WOUNDS, AND PENETRATING TRAUMA

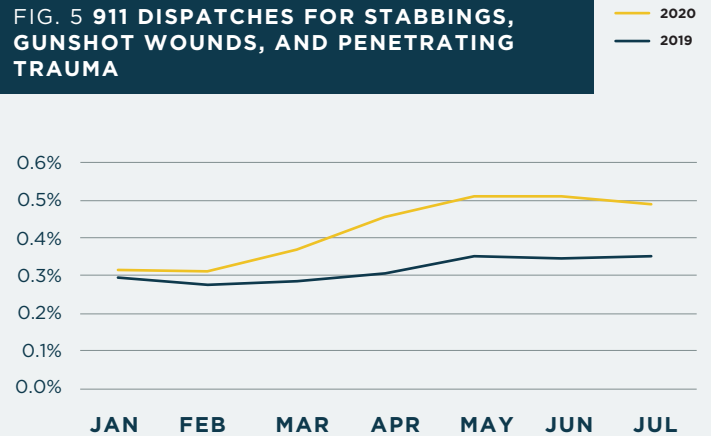


FIG. 6 911 RESPONSE FOR CARDIAC ARRESTS

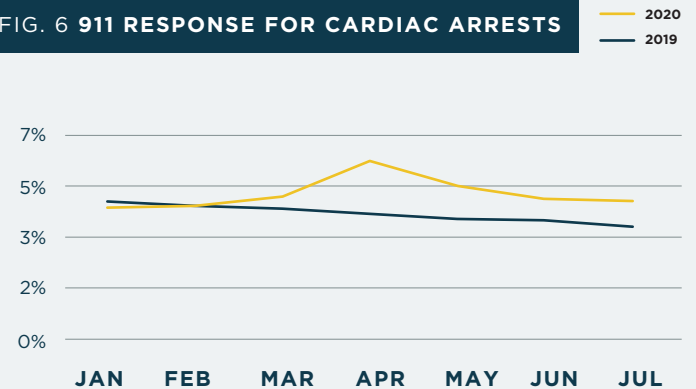
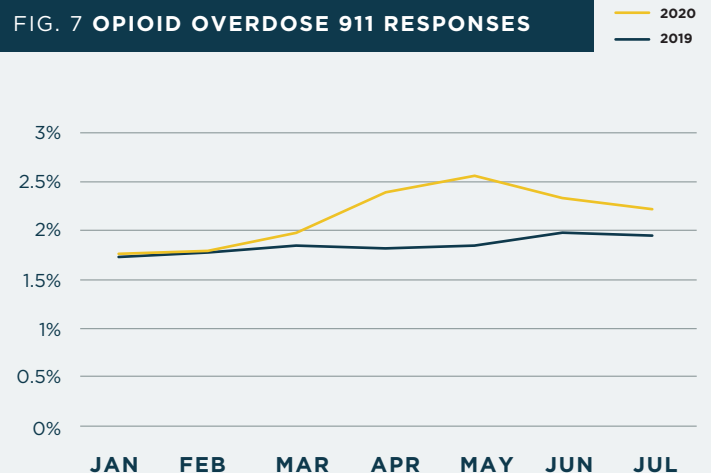
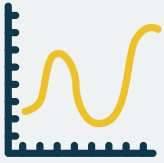


FIG. 7 OPIOID OVERDOSE 911 RESPONSES



BEST PRACTICE



Increased cardiac arrest responses are associated with increased COVID-19 cases in a community. EMS agencies should be prepared for this possibility, including PPE guidance, transport recommendations, and education for providers who will be called upon to provide death notifications.



In cooperation with hospital systems, public health, and/or other partners, consider community educational initiatives regarding safety of EMS transport and hospital evaluation to ensure that patients experiencing health issues are not afraid to call 911 or be transported to the hospital.



As the pandemic continues, be prepared for increases in overdose and penetrating trauma responses.

SECTION TWO OVERVIEW



PERSONAL PROTECTIVE EQUIPMENT

FACE SHIELD USE AND REUSE

41% REUSE

MASK USE AND REUSE

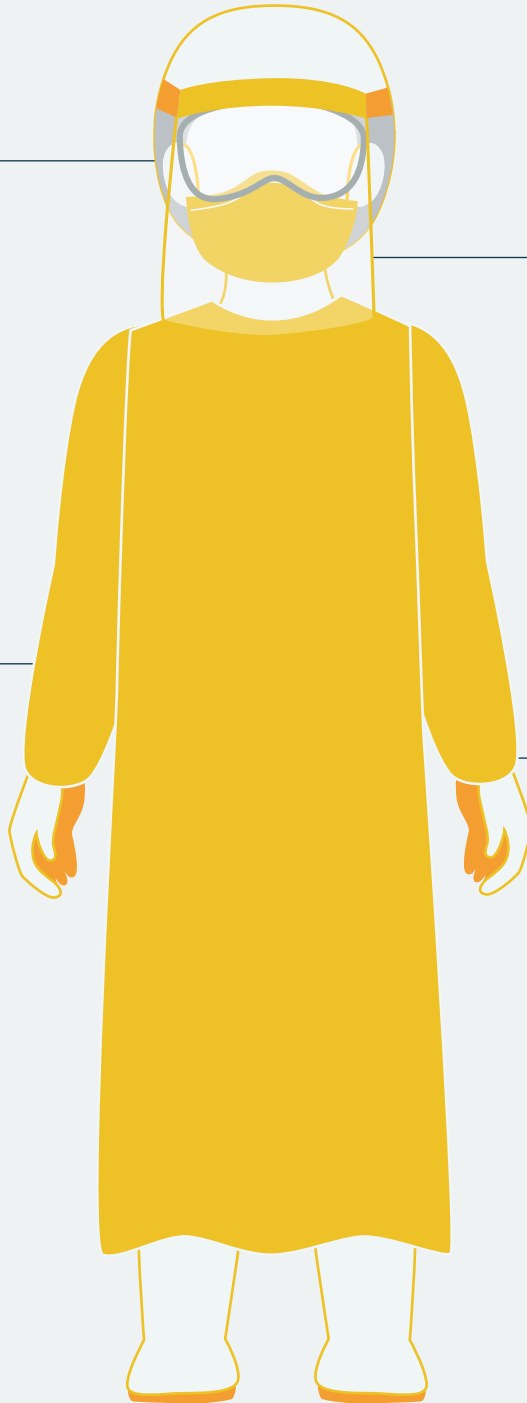
REUSE **40%**

ISOLATION COVERALL USE AND REUSE

42% REUSE

GOWN USE AND REUSE

REUSE **7.4%**

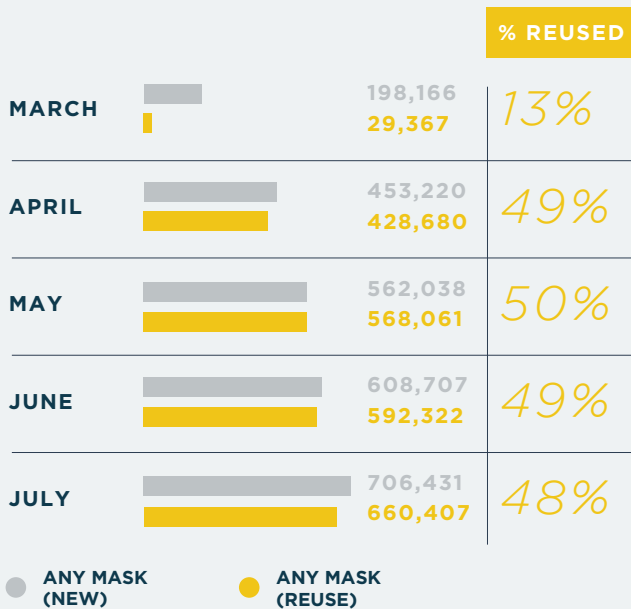


PPE

By and large, providers are documenting PPE usage when responding to calls related to COVID-19.

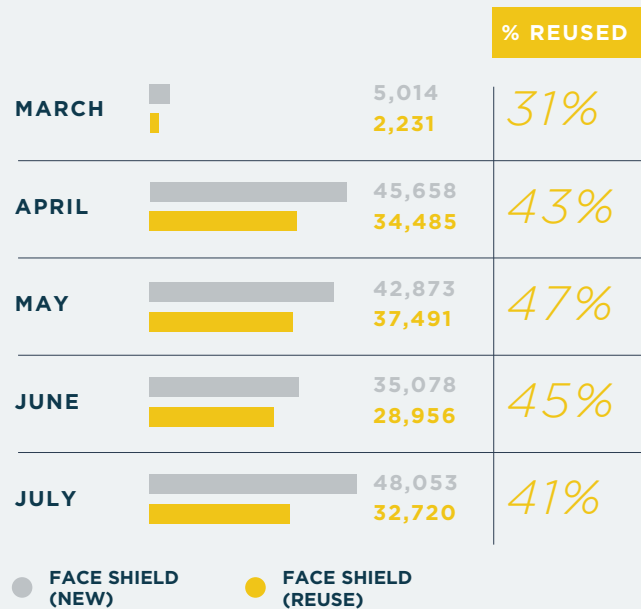
Mask reuse (this is any type of mask – N95, N100, P100, or surgical mask) is common, with nearly 50% mask reuse across all 911 responses since April (overall, we’re seeing about a 40% reuse of masks). See figure 8.

FIG. 8 MASK USE AND REUSE FOR ALL 911 RESPONSES



AVERAGE REUSE OF MASKS

FIG. 9 FACE SHIELD USE AND REUSE FOR ALL 911 RESPONSES



AVERAGE REUSE OF FACE SHIELDS

Face shields and isolation coveralls usage are similar to mask usage, with a 40%-45% reuse rate. See figures 9 and 10.

Gown reuse hovers right around 10% as seen in figure 11. We see a steady decrease in gown usage through June, with a big jump again in July - consistent with an increase in COVID-19/ILI impressions.

FIG. 10 ISOLATION COVERALLS USE AND REUSE FOR ALL 911 RESPONSES

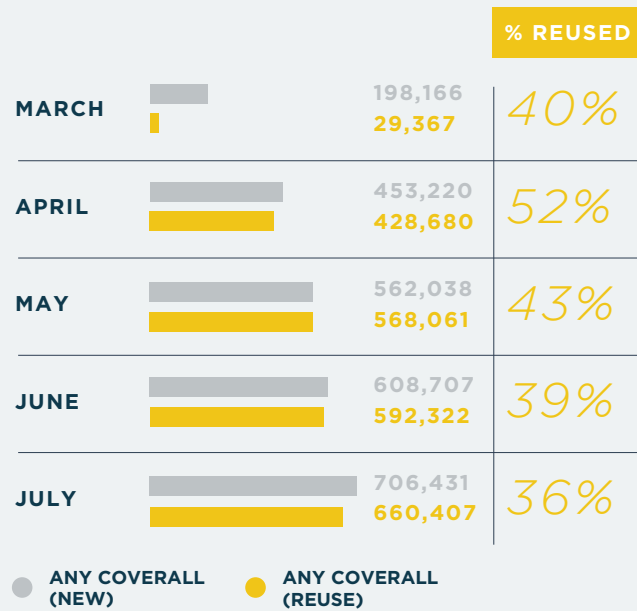
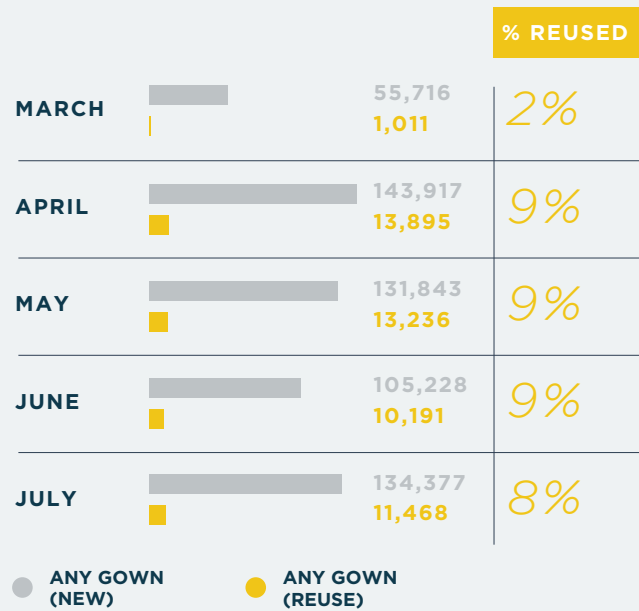


FIG. 11 GOWN USE AND REUSE FOR ALL 911 RESPONSES



BEST PRACTICE



Recall that PPE use is cumbersome and, particularly at this time of the year, associated with heat stress for our fire and EMS responders. While we encourage compliance regarding safety, all measures to provide the most comfortable - yet appropriate - PPE should be considered.



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.



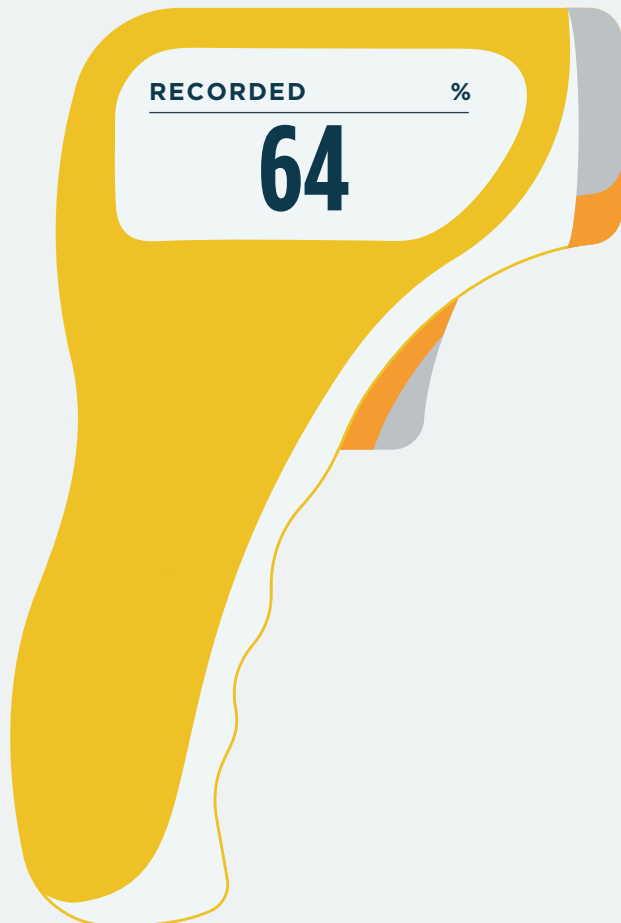
Appropriate documentation of first-time use versus reuse of PPE articles is imperative to enable logistics to plan and order appropriate supplies.

SECTION THREE OVERVIEW



VITAL SIGN DOCUMENTATION AMONG PATIENTS WITH SUSPECTED COVID-19/ILI

TEMPERATURE DOCUMENTATION



PULSE OXIMETRY VALUE DOCUMENTATION



VITAL SIGNS

Fever and hypoxia are two important signs associated with COVID-19. EMS documentation of patient body temperature and oxygen saturation is an important part of the clinical evaluation.

Figure 12 shows that in 64% of cases, the temperature of suspected COVID-19/ILI patients was documented or recorded. That means temperature was not documented 36% of the time. There is a significant opportunity for improvement with temperature documentation, as the presence of fever serves to raise suspicion of COVID-19, ultimately informing PPE usage and transport destination.

Evidence strongly suggests that patients with COVID-19 may have significant hypoxia, often without the expected symptoms such as sensation of significant shortness of breath. A low oxygen saturation reading may be the first finding that prompts consideration of COVID-19 disease and should therefore be obtained on a wide array of patients (see figure 13).

FIG. 12 TEMPERATURE DOCUMENTATION



FIG. 13 PULSE OXIMETRY READING DOCUMENTATION



BEST PRACTICE



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.



Screening for fever and hypoxia are relatively simple elements of a screening process.

SECTION FOUR



CONNECTING THE DOTS: LINKING EMS AND HOSPITAL

Closing the loop with our hospital partners is essential, especially as we are still learning and evolving in our understanding of this disease. The more information we have at our disposal, the better prepared we will be to respond accordingly.

Nearly 20% of responses involving patients who were diagnosed with COVID-19 at the hospital did not have mask use documented.

Non-documentation hit a peak in March and April at 31%, steadily decreased in the subsequent months, then jumped again in July. More needs to be done to ensure providers and responders are protected by appropriate PPE and are documenting mask usage so that these data can be used to help determine provider exposure (see figure 14).

Figure 15 looks at the number of 911 calls with a confirmed COVID-19 hospital diagnosis. During the month of March, hospitals, in partnership with the Centers for Disease Control and Prevention (CDC), were implementing the COVID-19 specific diagnosis code, with full deployment completed April 1. Thus, the increase we are seeing in July 2020 is almost assuredly related to increased burden of disease rather than adoption of the new code (see document from [Center for Medicare & Medicaid Services](#)).

The real-time availability for EMS data assists hospitals as they triage and treat potential COVID-19 patients. Automated outcome information allows EMS agencies to rapidly identify transported patients who are diagnosed with COVID-19 and implement appropriate steps to protect first responders and their families.

FIG. 14 DOCUMENTED MASK USE BY EMS FOR COVID-19 DIAGNOSED 911 PATIENTS

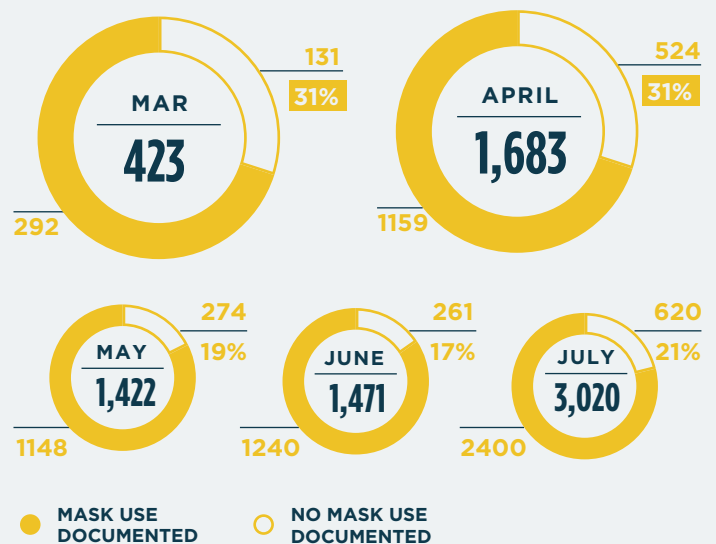
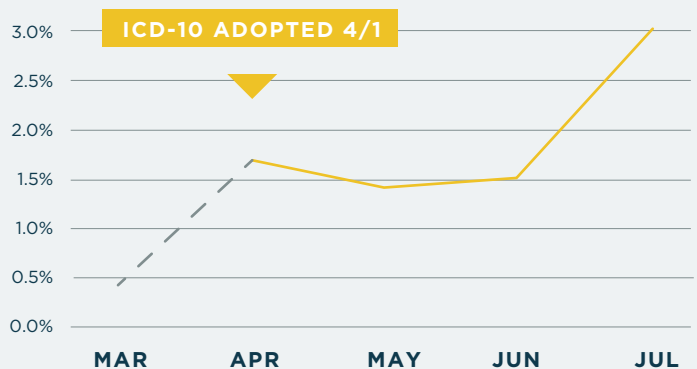


FIG. 15 COVID-19 HOSPITAL DIAGNOSES



PLEASE NOTE The Hospital Diagnoses chart above takes into account that the ICD-10 code from CMS for COVID-19 did not go live until April 1. Additionally, the chart does not include COVID-19 hotspots (such as those in New York City).

BEST PRACTICE



The bidirectional exchange of data is critical, particularly when there is increased COVID-19 case volume. From the hospital perspective, initial vital signs and overall patient conditions are available for the in-hospital treatment team to make the best decision possible as it relates to observation versus discharge, level of patient care required, etc. From the EMS perspective, better access to positive-case information is essential to making improvements in the field.

CONCLUSION

SO, WHAT DOES THIS MEAN?

COVID-19 is impacting all of us, highlighting the need for better and more informed data around EMS responses, PPE usage, hospital outcomes, and other measures to ensure we are keeping everyone involved safe and healthy – including patients and first responders.

911 CALLS

INITIALLY DROPPED OFF WHILE CALLS RELATED TO COVID-19/ILI INCREASED.

Look at how this is affecting your own agency or department to staff and resource adequately, with anticipation that call volumes are likely to return to normal as communities progress through the phases of re-opening.

PPE USAGE

CAN HELP PROTECT PROVIDERS AND RESPONDERS.

Encourage teams to better document PPE usage to know if you have a shortage or if you have ample supply, as well as understand how much of your team is potentially being exposed to patients with COVID-19. Appropriate documentation of PPE may decrease unnecessary quarantine and therefore contribute to resiliency during this pandemic.

TEMPERATURE AND PULSE OXIMETRY

DOCUMENTATION CAN BE IMPROVED.

These vital signs may help identify more COVID-19 patients and thus inform PPE usage and hospital alerting.

BIDIRECTIONAL DATA EXCHANGE

CAN IMPROVE PATIENT CARE AND PROVIDER SAFETY.

Increased partnership with hospitals to exchange data bi-directionally can help ensure and expedite notification of EMS personnel who may have had contact with a patient diagnosed with COVID-19.

METHODOLOGY

The dataset for the ESO EMS Index is from the ESO Data Collaborative. It is real-world, de-identified data, compiled and aggregated from more than 2,000 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 4.1 million anonymized 911 calls between January 1, 2020 and July 31, 2020.



**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 during COVID-19. 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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