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Mike Taigman

Better EMS Performance

Evidence-based pandemic leadership

Tracking COVID-19 cases, PPE supply and ambulance turnaround times to inform EMS response

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By Jay Arthur, Scott Dorsey, and Mike Taigman

It's becoming clear that this pandemic is going to be with us for quite a while. Between [telemedicine](#), decreased use of [aerosolizing procedures](#), new dispatch protocols and learning to [reuse personal protective equipment](#), we are adapting to this new reality. Control charts or Shewhart charts are one of the most powerful tools leaders can use to make decisions, answer questions and anticipate the future. In this article, we will look at how Snohomish County Fire District 7 in Washington state – the department that cared for [the first known COVID-19 patient in the U.S.](#) – uses this powerful tool.

The leadership team at Snohomish began [tracking COVID-19-related data](#) right at the beginning of the pandemic. They work to understand the prevalence of disease in their community and how that compares to other parts of the country. They track call volume, use of PPE and the relationship between COVID-19 and other infectious diseases.



Between telemedicine, decreased use of aerosolizing procedures, new dispatch protocols and learning to reuse personal protective equipment, EMS is adapting to this new reality. (Brian Ach/AP Images for NYC Healthcare Heroes)

TRACKING COVID-19 CASES

To properly manage EMS response to the pandemic, they needed a way to monitor the number of COVID-19 cases. The state and national cumulative cases and deaths widely reported in the media were insufficient to get a handle on the pandemic as it spread in the local community.

Chief Dorsey started using control charts – a traditional statistical process control (SPC) tool – to track key metrics related to the pandemic. Control charts can spot trends and runs, common indicators of changes in behavior.

Figure 1 shows the new cases in Snohomish County, the initial rise and stepwise fall. Currently, cases per day have leveled out at an average of 24 per day.

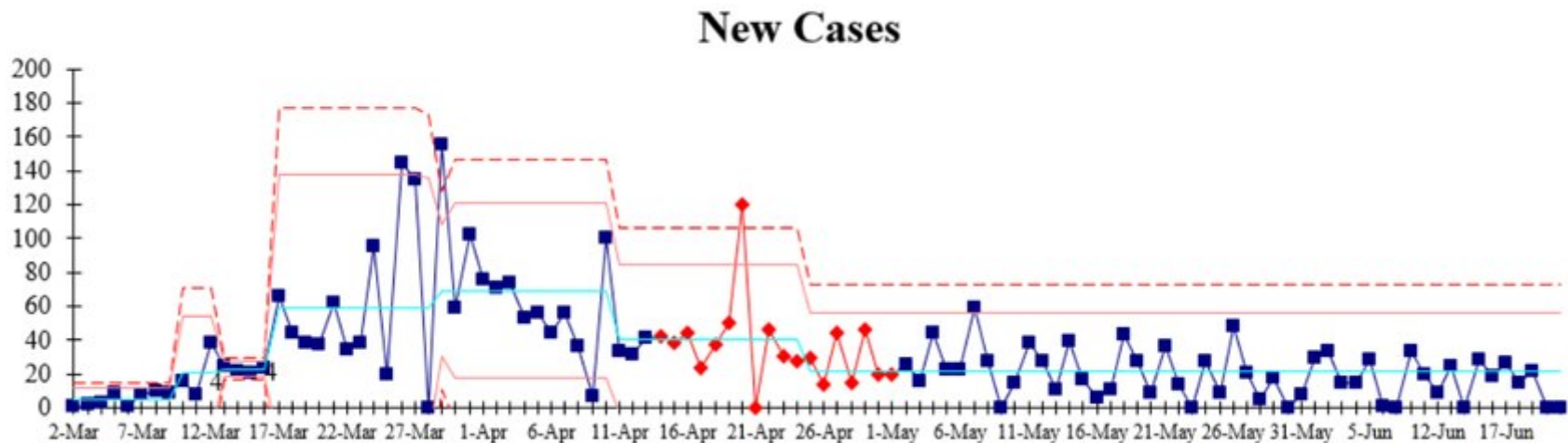


Figure 1

Figure 2 shows the deaths. There are occasional spikes when several days' deaths are combined into one day. Note that deaths are dropping toward zero.

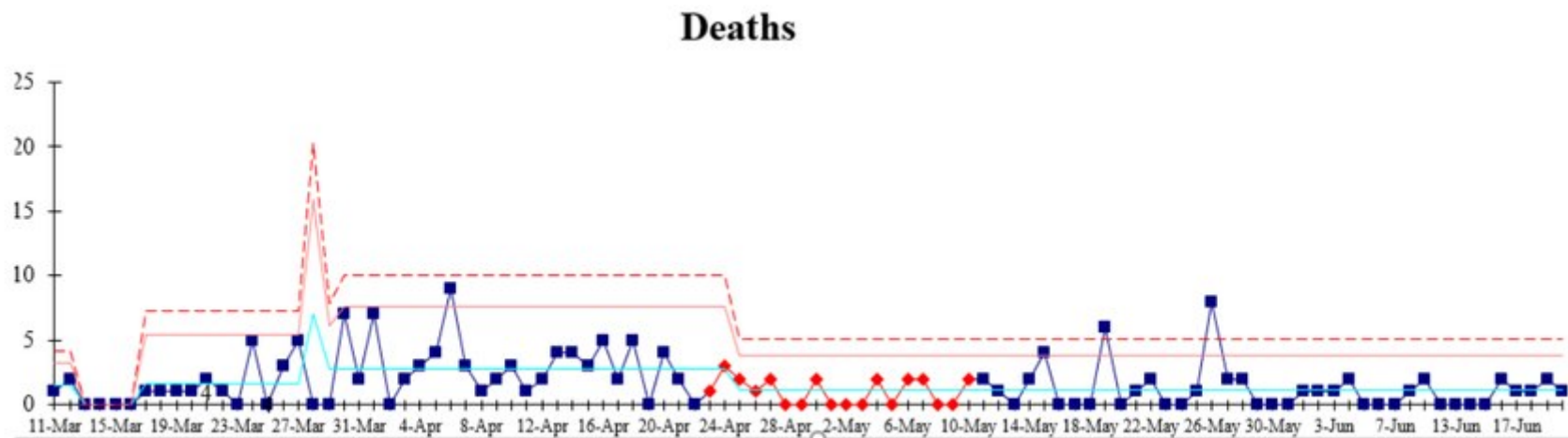


Figure 2

Now that the local number of daily cases has stabilized and deaths have declined significantly, efforts are underway to develop a family of measures to provide situational awareness. These measures are meant to be early warning signals that a change in behavior has occurred and leaders need to evaluate whether or not that change requires action or is just normal variation.

TRACKING PPE SUPPLY

At the outset of the COVID-19 pandemic, PPE was not readily available due to the increased global demand. Early in March, Snohomish County EMS leaders came together to source PPE as a group rather than each individual agency seeking it on their own. This collaboration resulted in the ability to [provide adequate PPE for first responders](#) to date.

Tracking the daily use and re-use of PPE helps leaders have a sense of how long the PPE lasts and what will be needed in the future to sustain the response. County EMS providers all use the same electronic health record system, so gathering the data on what is being used on a day-to-day basis is easy to do. The electronic health record vendor improved the ability to track which PPE was being used throughout the pandemic, so the information became more and more accurate. Leaders made documentation of PPE a required field so that providers could not close out their record without documenting this critical information.

Once the data was extracted from the electronic health record, they wanted to know the [“burn rate” for PPE gear and reuse](#) (Figures 3 and 4). This data helps optimize ordering of PPE and correlate it with COVID-19 patients.

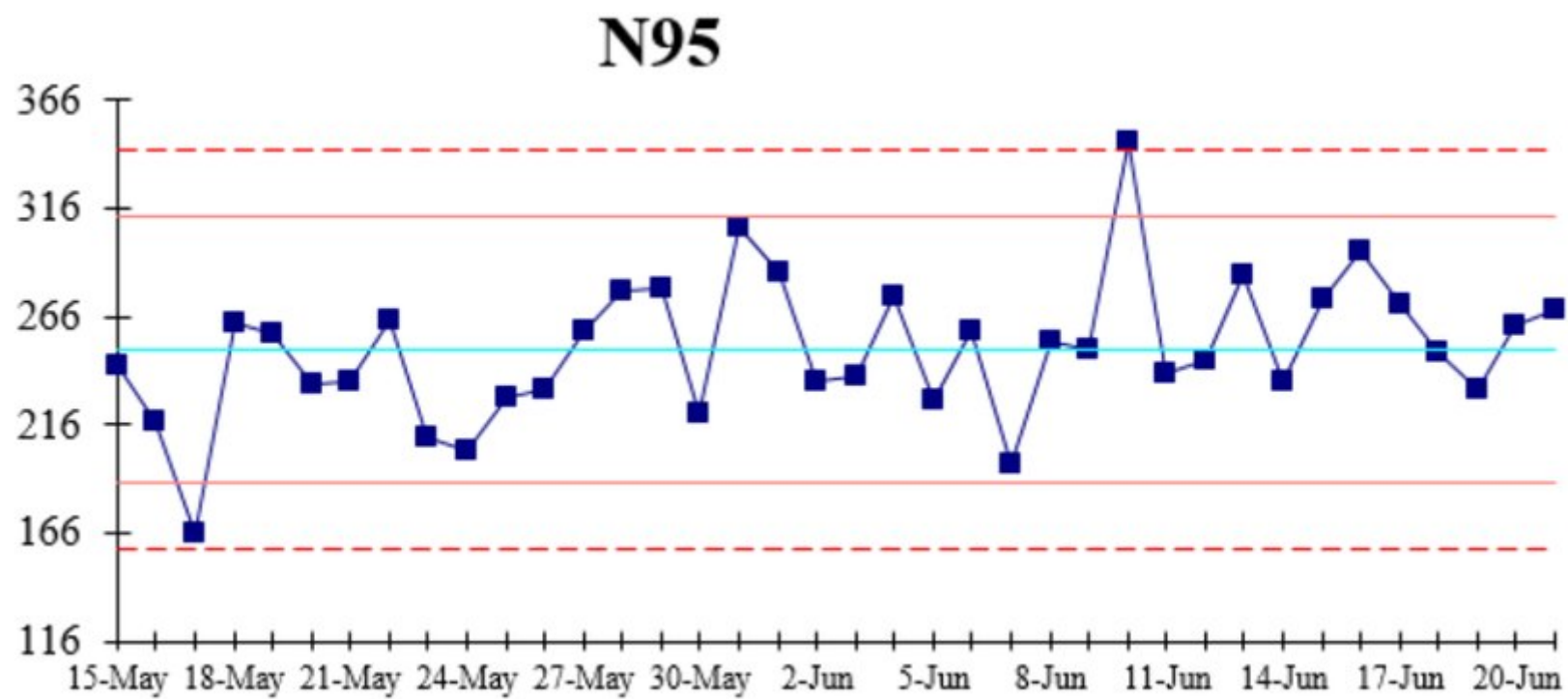


Figure 3

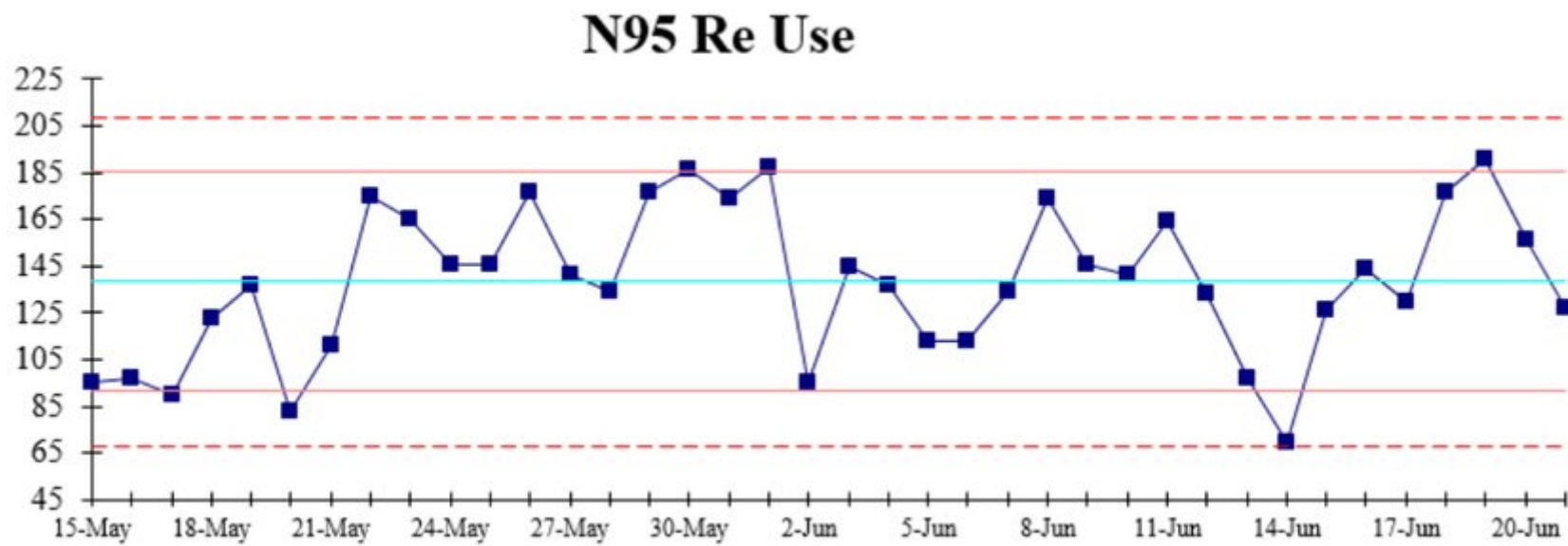


Figure 4

TRACKING EMS TURNAROUND TIMES

COVID-19 increased time to [clean and prepare ambulances for the next transport](#) after dropping a patient at the hospital (Figure 5).

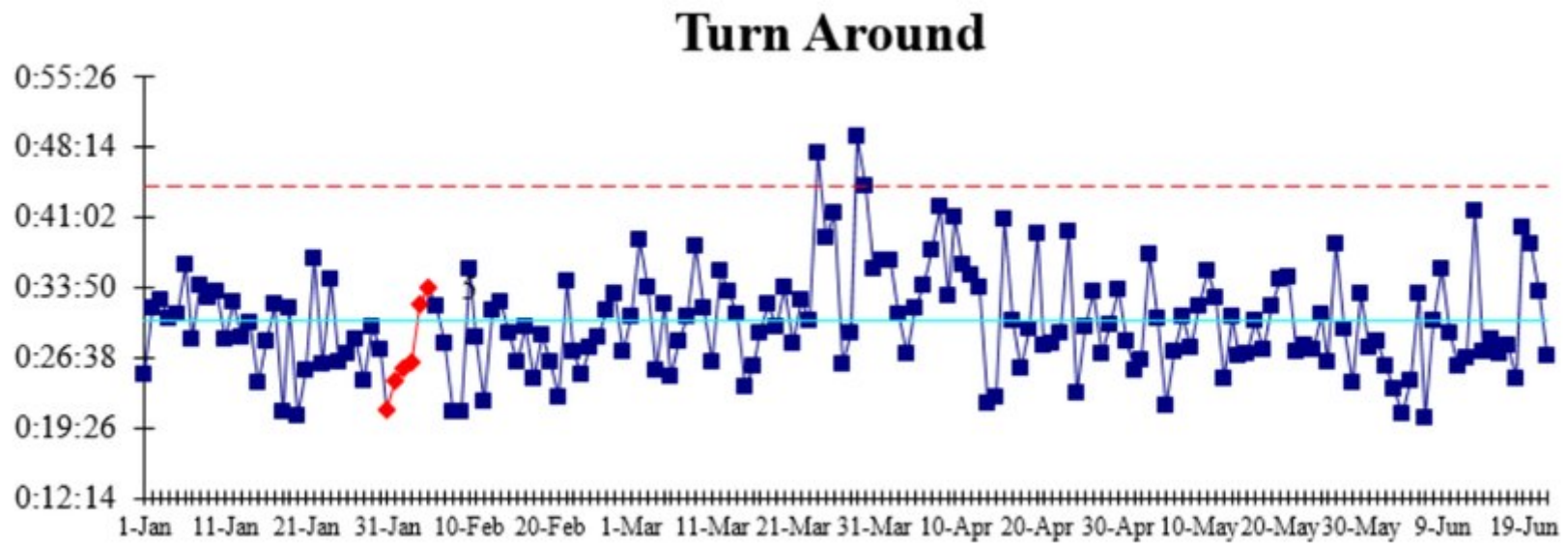


Figure 5

METRICS TO INFORM THE PANDEMIC RESPONSE

Transport rates are tracked daily. There was a dip from mid-March to mid-April when the pandemic first started and has not quite recovered to pre-COVID rates (Figure 6).

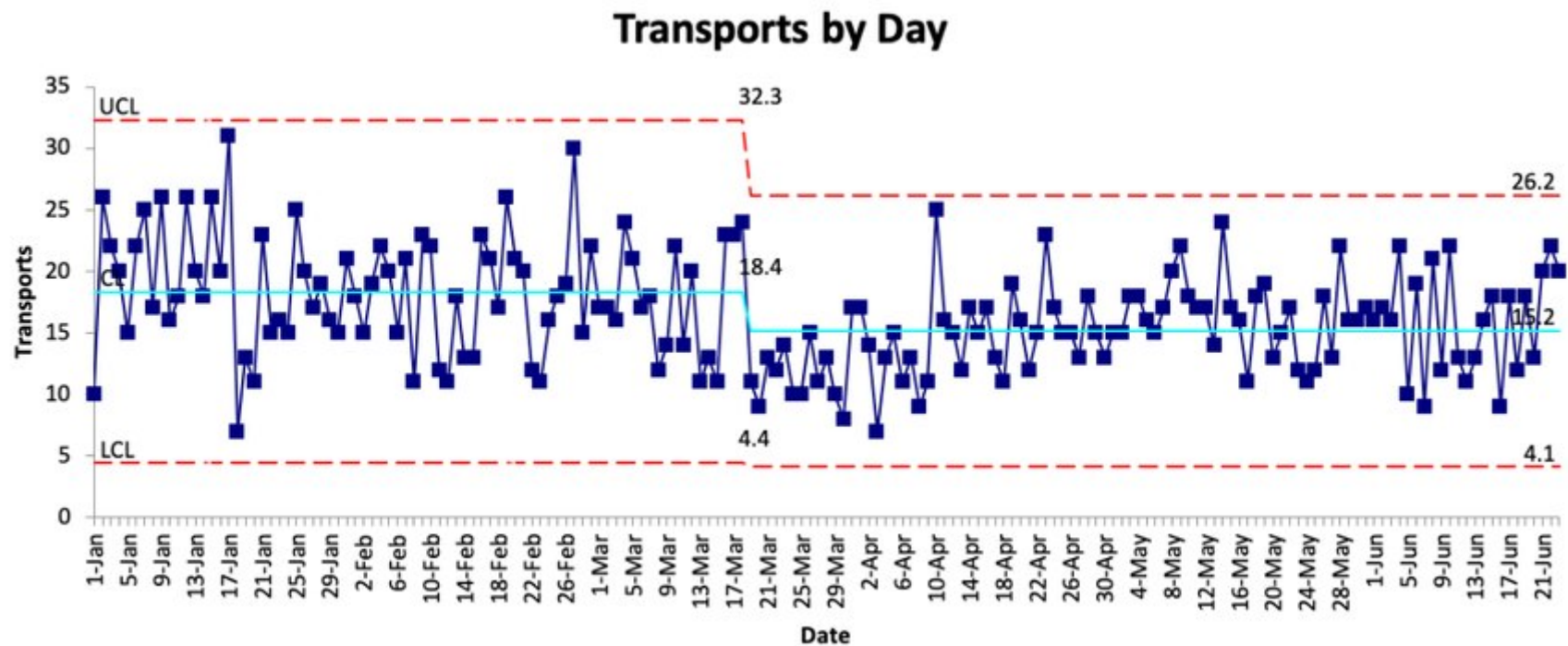


Figure 6

The local public health agency provides EMS with a list of COVID-19 positive patients each week. This list is compared to the electronic health record database to determine how many of those patients were treated or transported by EMS. The department uses that same list to evaluate a number of criteria in the electronic health record to determine what commonalities may exist.

EMS uses Pareto charts to identify which symptoms patients reported to paramedics most frequently (Figure 7). Shortness of breath, fever and weakness accounted for most of the calls.

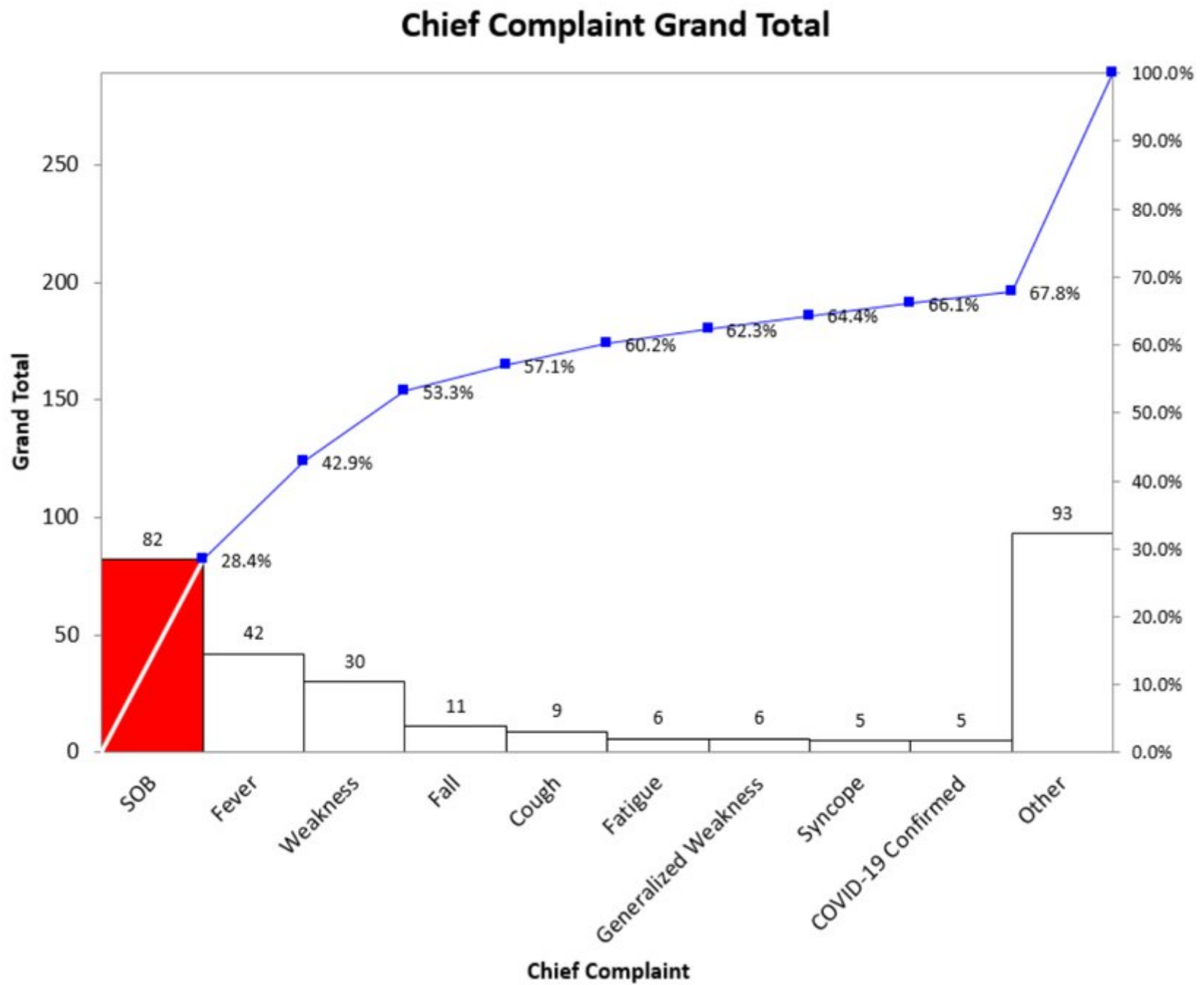


Figure 7

This information is included in the family of measures that leaders are using to improve situational awareness.

EMS also wondered about the interaction between the Flu and COVID-19 (Figure 6). There is an unproven theory that some of the early flu cases may have been COVID-19. Another unproven theory is that the later COVID-19 cases are possibly flu. Questions included whether a lack of appropriate tests could lead to misdiagnosis and how the upcoming [flu season](#) will be impacted by COVID-19.

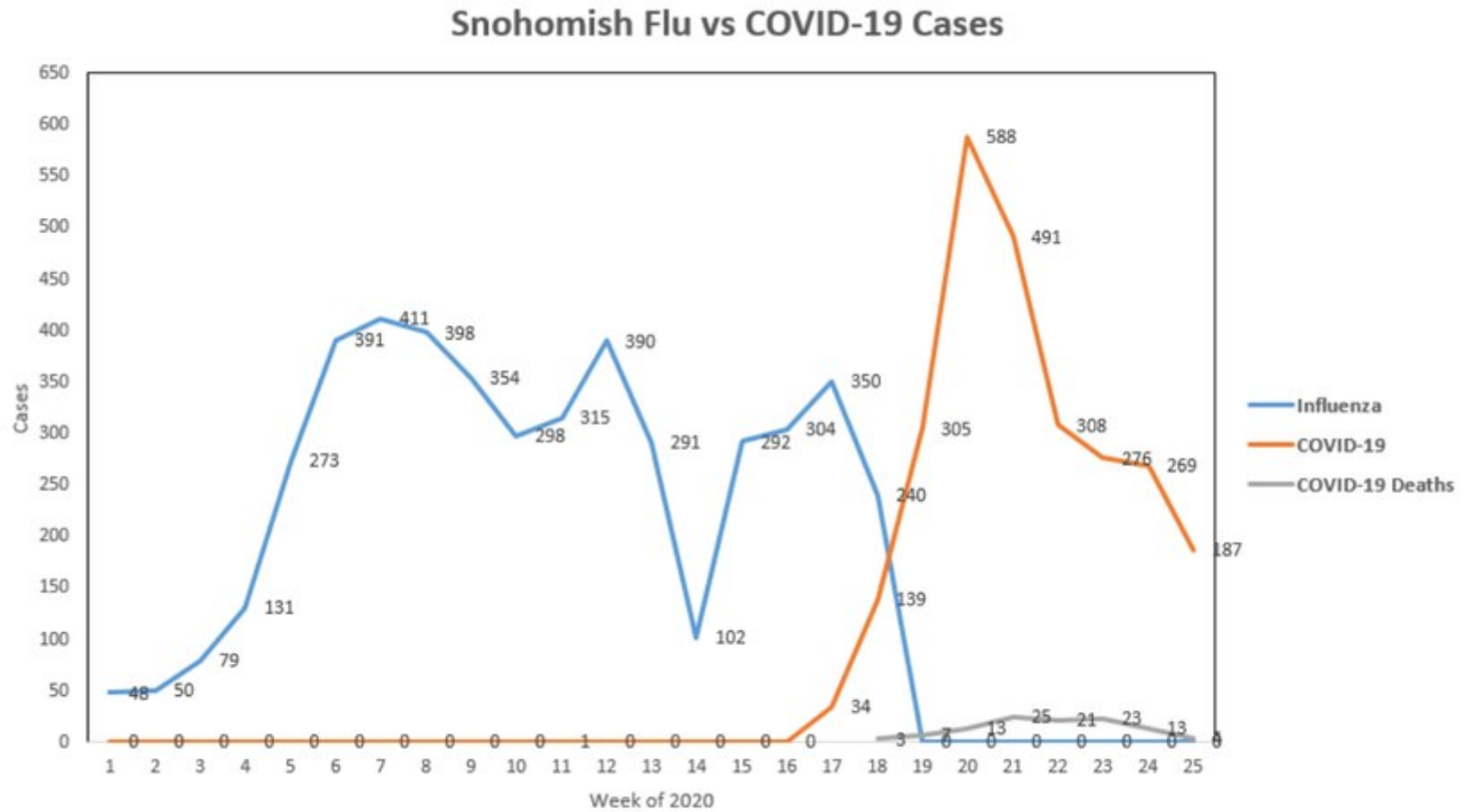


Figure 8

While cases and deaths may be increasing across a state, localized analysis of County data reveals a clearer picture of the state of the pandemic. Flu season historically drops to near zero in late March early April.

Control charts can be a powerful tool for tracking and monitoring COVID-19 or other diseases. While it's interesting and important to watch national and international data related to COVID-19, the real value for day-to-day leadership comes from plotting your own data on your own charts and updating them daily.

Read next: [Data-driven EMS staffing for COVID-19: Leaders from Montgomery County Fire & Rescue Service and Snohomish County Fire District detail how they're monitoring the COVID-19 surge and preparing for the worst-case scenario](#)

ABOUT THE AUTHORS

Scott Dorsey is the deputy chief of strategic analysis and improvement for Snohomish County Fire District 7 in Washington State. District 7 is a fire-based EMS system providing both BLS and ALS transport service from 11 career fire stations. Scott has been in the fire service for 30 years and has been a paramedic for 22 years. He holds a masters degree in Healthcare Informatics from Grand Canyon University.

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About the author

Mike Taigman uses more than four decades of experience to help EMS leaders and field personnel improve the care/service they provide to patients and their communities. Mike is the Improvement Guide for [FirstWatch](#), a company which provides near-real time monitoring and analysis of data along with performance improvement coaching for EMS agencies.

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