

Dane County EMS

High-Performance CPR Summary

June 2020 - December 2022

Background & Welcome

It has long been the goal of Dane County EMS (DCEMS) to be a national leader in cardiac arrest resuscitation and survival. Beginning in 2020, DCEMS continued this pursuit by implementing the cardiac arrest summary initiative. These summaries provide detailed feedback to crews for cardiac arrest incidents based on high-performance CPR (HPCPR) metrics identified as core measures for maximizing neurologic outcomes. 865 cardiac arrest summaries have been disseminated to date, which will serve as the sample for this report. Moving forward, the DCEMS office will continue tracking and sharing this information to identify areas of success and further opportunities to improve the care provided to victims of sudden cardiac arrest. Patient outcomes for 2022 will be available from the Cardiac Arrest Registry to Enhance Survival in May of 2023, and will be disseminated once received.

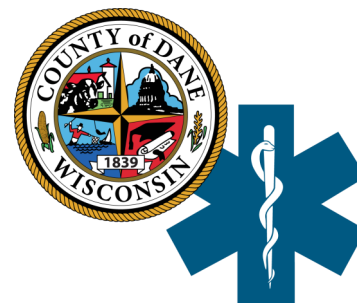
Since the beginning of this project, the providers who make up our healthcare system have shown their dedication to improvement and optimizing patient care. In addition to the continued advances shown in this report, the quality of data submissions have become noticeably more detailed, giving better context to the objective cardiac monitor data used to create cardiac arrest summaries. Better data allows us to reflect and perform better as a prehospital care system. It is also the foundation on which we build partnerships and drive nation-wide change leading to more patients experiencing a higher quality of life after their cardiac arrest event. This program and its successes are attributable to all of our public safety and healthcare partners. These improvements, along with those we will continue to make, are a testament to your hard work. Looking to the future, we will continue our efforts towards the best possible outcome for victims of sudden cardiac arrest in Dane County.

Thank you to all area EMS providers for your hard work and dedication to providing excellent care to our patients. I would also like to recognize our 911 dispatch professionals, the Dane County Medical Advisor team, area hospitals, the Dane County EMS Association, the Dane County EMS Commission, Director Charles Tubbs, Deputy Director Carrie Meier, and Courtney Morency for their tireless commitment to our community and support of this initiative. I offer this report as an overview of the progress we've made in high-performance resuscitation as a prehospital care system to date.

Respectfully,

Eric Anderson, NREMT-P

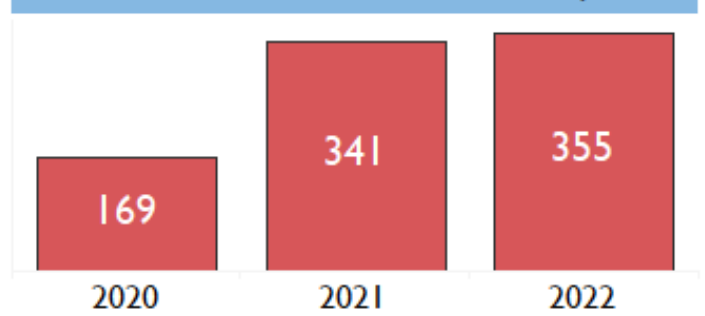
DCEM Data Analyst



Data Capture

For 2022, 15 of the 19 EMS agencies in Dane County submit data with the ability to review, edit, and disseminate detailed feedback on cardiac arrest resuscitation performance. Our capture rate for reviewable cardiac arrest cases was 80.3% for 2022, which is an improvement from the 78% capture rate we had in 2021.

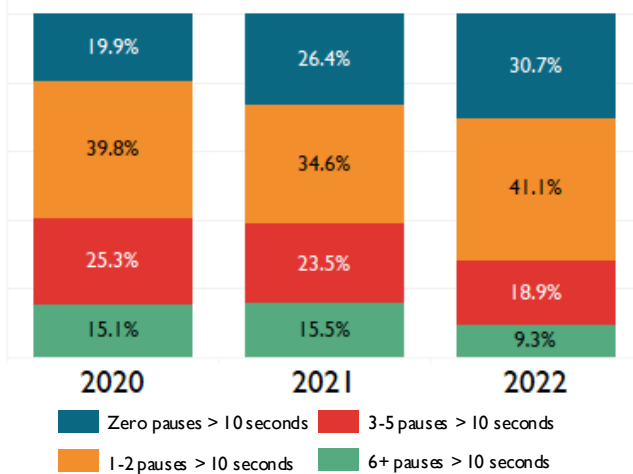
Volume of Cardiac Arrest Summaries by Year



Metric 1: Prolonged Pauses (>10 Seconds)

Coronary artery perfusion is directly associated with continuous CPR, and it takes roughly one minute of compressions to build up effective pressure. Any pause results in an immediate drop of perfusion pressure resulting in longer times of inadequate perfusion. This metric seeks to minimize the impact of the built-in pauses during resuscitation, most notably pauses for ventilation during 30:2 resuscitation and rhythm/pulse checks. There are situations where a prolonged interruption may be difficult to avoid (i.e. patient movement, safety concerns, etc.), and it's important to remember your documentation can give context to these pauses. One of our greatest opportunities to reduce prolonged pauses is the efficient and rapid evaluation of PEA rhythm checks. As a county we continue to have **more cases without a prolonged interruption in compressions**, along with fewer cases having **three or more** prolonged interruptions. **Our goal for 2023 is to see 40% of cases with zero prolonged interruptions.**

Cases with Number of Pauses > 10 Seconds



How do we achieve our goal?

1. Palpate a femoral pulse during compressions 15-20 seconds before stopping for a rhythm check. If a pulse can be associated with compressions, hold that spot during your rhythm check to help quickly determine if a cardiac rhythm is producing a pulse. If a pulse cannot be rapidly associated with the cardiac rhythm, resume compressions.
2. Charge your monitor before every rhythm check. This helps reduce pre-shock pauses should the patient present in a shockable rhythm.
3. Practice mechanical CPR application.

Metric 2: Chest Compression Fraction (CCF)

CCF is the percentage of time chest compressions are happening during a resuscitation. An increased CCF is independently associated with improved survival. Our goal at the start of the program was a CCF of 80% or higher. EMS agencies in Dane County quickly demonstrated their ability to achieve much higher averages, and this goal was adjusted to a minimum goal CCF of 90%. There are, of course, situations where a CCF of 90% becomes difficult to achieve. For example, a patient with a return of spontaneous circulation (ROSC) after a single defibrillation and brief time on the chest will likely not meet the goal, as any pauses will significantly impact the CCF. These situations are infrequent, but are important to identify to let crews know while a metric may not have been met, the outcome for the patient is the driving factor behind this process and should therefore be recognized.



Cases Meeting CCF Goal

The associated graph shows the percent of cases each year where the CCF met the goal of 90% or higher. There has been a sustained and marked improvement in the percent of cases meeting this metric. **Moving into 2023, our goal is to see 80% of cardiac arrest cases with a CCF of 90% or higher.**

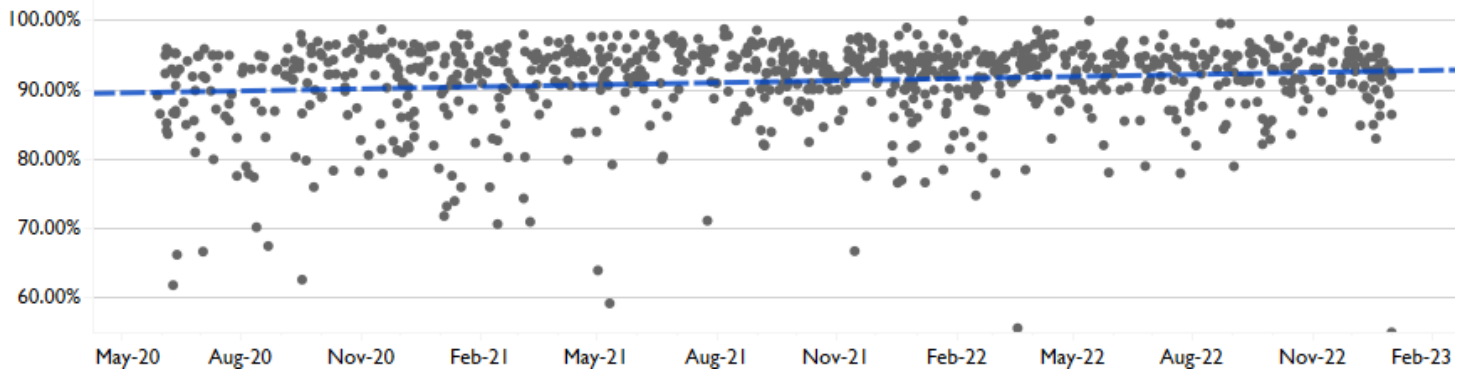
Percent of Cases in Goal CCF

The goal chest compression fraction is 90%.

	2020	2021	2022
Above 90%	59.76%	77.13%	77.18%
Below 90%	40.24%	22.87%	22.82%

Chest Compression Fraction Over Time

The trend in chest compression fraction [continues to increase](#).

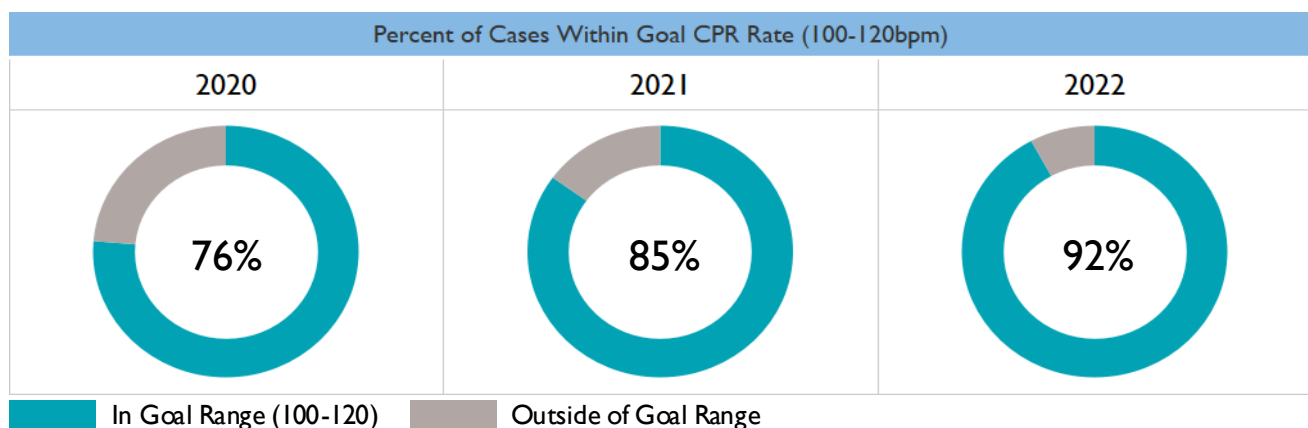


How do we achieve our goal?

The three most common opportunities to maximize time on the chest (and therefore increase your CCF) are to: 1) Shorten pauses for ventilation during 30:2. Deliver your ventilations quickly with a good seal. After three seconds, resume compressions. 2) Reduce time taken to evaluate PEA rhythms (more on this later). And 3) charge your monitor before every rhythm check to help reduce pre-shock pauses should the patient present in a shockable rhythm.

Metric 3: Chest Compression Rate

Excess rate in chest compressions has been shown to decrease depth and consistency, which is essential in high quality CPR. 92% of cardiac arrest summaries had an [average chest compression rate between 100-120 in 2022](#). **Our goal for 2023 is to see 95% of cases with manual compressions with an average rate of 100-120 compressions per minute.**



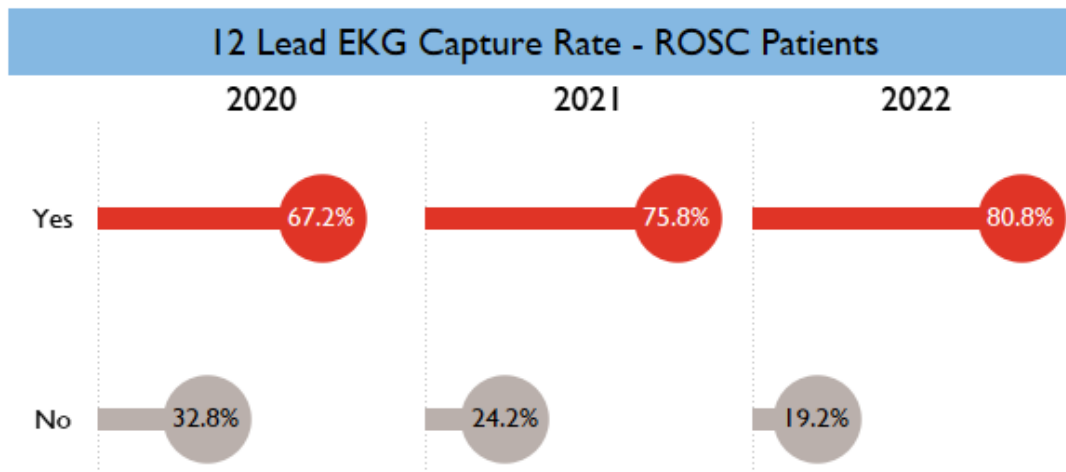
How do we achieve our goal?

Cardiac arrest events are often high-stress incidents. When not compressing at an appropriate rate, providers tend to skew faster than needed, which may not allow full recoil of the patient's chest between compressions. The easiest way to bring stability and accuracy to your manual compressions is to use a metronome. There are a number of apps available for use on a smartphone, and some cardiac monitors have an internal metronome built in.



Metric 4: Post-ROSC 12 Lead EKG

One of the most common cardiac arrest etiologies is myocardial infarction. Post-ROSC 12 leads provide valuable information both in the field and hospital to guide the patient's treatment path. As a county, we captured 12 lead EKGs on nearly 81% of our ROSC patients in 2022. Our goal to reach in this metric is 100% for patients where ROSC lasts at least 5 minutes without documented conflicting priorities (i.e. optimizing hemodynamics & oxygenation).

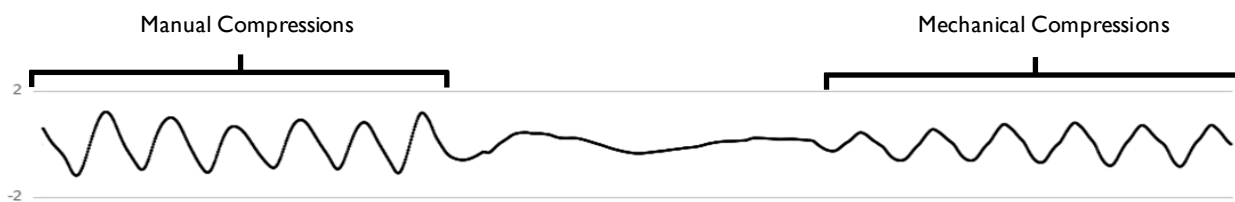


How do we achieve our goal?

When ROSC is achieved, and resources are available to address hemodynamic & oxygenation stability, a 12 lead should be captured on every ROSC patient, regardless of the arrest etiology. If a situation arises where a 12 lead cannot be captured (rapid re-arrest, equipment malfunction, etc.), context should be provided in the ePCR.

Bonus Metric: Mechanical CPR Application

Overall, mechanical CPR (mCPR) devices were applied in 30% of all cardiac arrest events in 2022. We can determine the time at which mCPR was applied by a change in compression rate stability and waveform shape (see below).



As a county, we are getting better at deploying mechanical CPR without prolonged interruptions with 41% of mechanical CPR deployments in 2022 done in under 10 seconds. It is also worth noting 22% of cases with mCPR had the device in place before the cardiac monitor. While mCPR offers convenience, it should only be deployed once other key aspects of resuscitation are in place. Our goal for 2023 is for 60% of mCPR deployments to be completed in 10 seconds or under.

How do we achieve our goal?

1. Train regularly on the device your agency uses.
2. If using the LUCAS, deploy in two stages with manual compressions resuming immediately after the back plate is placed.
3. If mCPR application is approaching 10 seconds off the chest, stop the attempt and resume manual compressions. Evaluate the issue and re-attempt application once ready.

	2020	2021	2022
10 Seconds & Under	22.7%	25.4%	41.0%
Over 10 Seconds	77.3%	74.6%	59.0%

