

# 2025 ANNUAL REPORT





Medic One/Emergency Medical Services (EMS) serves more than 2.3 million people in Seattle and King County and provides life-saving services on average **every 2 minutes**.

It is available to everyone, whatever and wherever the emergency. Every year, **the Medic One/EMS System saves thousands of lives:**

In 2024,

**Emergency Medical Technicians (EMTs)** responded to over 250,000 calls regionwide.

**Paramedics** responded to more than 48,000 calls for advanced life support.

Compared to other communities, cardiac arrest victims are **two to three times more likely to survive** in Seattle and King County from out-of-hospital cardiac arrest.

**Strong, effective medicine is the hallmark of the regional Medic One/EMS system.**

# Directors' Message & Executive Summary

Greetings from the Directors,

We are pleased to present the **2025 Emergency Medical Services (EMS) Division Annual Report**, as required by King County Ordinance #12849.

This year marks the sixth and final year of the current Medic One/EMS Strategic Plan and levy. As such, the 2025 annual report provides an ideal opportunity to highlight accomplishments from the past year and reflect on what the system has achieved over the 2020-2025 levy span.

Under the guidance of the *EMS Advisory Task Force*, the region recently completed an extensive process to develop recommendations for the next Strategic Plan and levy. The resulting six-year, 25-cent levy will maintain existing services, enhance programs to meet emerging regional needs, and develop new projects to improve patient care and outcomes. The recommended levy rate supports a financial package sufficient to fund the EMS system including appropriate reserves.

The first half of 2025 was spent ushering the *EMS Advisory Task Force* recommendations through the 11 city councils with populations over 50,000 and the King County Council, as required by state law to place the countywide levy on the November ballot for voter approval. The process reflected strong regional support for the Medic One/EMS system, with elected officials consistently acknowledging its extraordinary value to the community and working to ensure sufficient and uninterrupted funding for the next levy period.

Some of the accomplishments from over this past levy span include:

- Responding with extraordinary resiliency and tenacity to an eight-wave **COVID-19 pandemic** that deeply impacted our region and our first responders.
- Initiating a **mental health-focused initiative** with a trauma-informed, resilience-based approach to support first responders, including telecommunicators.
- Continuing **equity and inclusivity efforts** to ensure historically underrepresented communities have the tools they need to access and navigate the EMS system (Vulnerable Populations Strategic Initiative).
- Implementing a new **EMS personnel training platform** (STRIVE Strategic Initiative) to meet increasingly complex training requirements.
- Addressing the **complex health needs of more residents** by expanding Mobile Integrated Healthcare (MIH) across most of the region.

We appreciate the opportunity to share solid evidence of our continued commitment to excellence in King County's EMS system, and we thank you for your ongoing support.



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Seattle & King  
County



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## Acknowledgements

We would be remiss if we didn't acknowledge the deep commitment and collaboration of our EMS partners throughout King County. The time, expertise, and investments they contribute demonstrate exactly why the EMS system in King County is so successful and serves as an international role model.

### Dispatch Centers

NORCOM  
Port of Seattle

Seattle Fire Alarm Center  
Valley Communications Center

### BLS Providers

Bellevue FD  
Bothell FD  
Eastside Fire & Rescue  
Enumclaw FD  
KCFD #2 (Burien)  
KCFD #11 (North Highline)  
KCFD #20 (Skyway/Bryn Mawr)  
KCFD #27 (Fall City)  
KCFD #47 (Kangley-Palmer)  
KCFD #50 (Skykomish)  
KCFD #51 (Snoqualmie Pass)  
Kirkland FD

Mercer Island FD  
Mountain View Fire & Rescue  
Port of Seattle FD  
Puget Sound RFA  
Redmond FD  
Renton RFA  
Seattle FD  
Shoreline FD  
Snoqualmie Fire & Rescue  
South King Fire  
Valley RFA  
Vashon Island Fire & Rescue

### ALS Providers

Bellevue Medic One  
King County Medic One  
Northeast King County Medic One

Seattle Medic One  
Shoreline Medic One

We would like to thank those who contributed in various ways to the content, writing, design and production of the EMS Division 2025 Annual Report.

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**Medic Unit photo credit:** DJ Sonsteng

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# IT TAKES A SYSTEM

King County EMS personnel responded to over **1568** out-of-hospital cardiac arrests in 2024.

## COMMUNITY

**65** median age of cardiac arrest patient | **68%** were male.

**51%** of cardiac arrests were witnessed

**67%** of cardiac arrests occurred at home

## 911 DISPATCH

**73%** received bystander CPR

**129** had an AED applied prior to EMS

**89%** of CPR assisted by 911

911

## EMS RESPONSE

Median response

**5** minutes BLS

**8** minutes ALS

**87%** first intubation attempt success\*

## ADVANCED CARE

**45%** survived to hospital admission

**272** patients discharged alive

**44%** Utstein Survival  
**17%** Overall Survival

**92%** of survivors had favorable neurologic outcomes

\* Indicates data for all King County agencies minus Seattle Fire Department.

# EMS SYSTEM OVERVIEW

## EMS Tiered Response System

Any time residents of Seattle and King County call 9-1-1 for a medical emergency, they are using the Medic One/EMS system. The internationally renowned regional system responds to an area of 2,134 square miles and serves a population of more than 2.3 million people. The system is managed by the Emergency Medical Services (EMS) Division, Public Health – Seattle & King County and relies on complex partnerships with fire departments, paramedic agencies, EMS dispatch centers, and hospitals for the program's success. The Medic One/EMS system in Seattle and King County is distinct from other systems in that it is medically based, regional, and uses a tiered system for out-of-hospital response. There are four major components in the tiered regional Medic One/EMS system, described below.

**EMS System Access** - A patient or bystander accesses the Medic One/EMS system by calling 9-1-1 for medical assistance. Bystander reactions and rapid responses to the scene can greatly impact the chances of patient survival.

**Telecommunicator (Dispatcher) Triage** - 9-1-1 calls are received and triaged by telecommunicators at one of four dispatch centers. Following medically approved guidelines, telecommunicators determine the most appropriate level of care needed and resource(s). Providing pre-arrival instructions for most medical emergencies, the dispatcher guides the caller through life-saving steps, including CPR/AED instructions, until the Medic One/EMS provider arrives.

**Tier One Response - Basic Life Support (BLS) Services** - Emergency Medical Technicians (EMTs) respond to 100 percent of emergency medical services calls. Arriving on scene in 5.2 minutes on average, BLS provides advanced first aid to stabilize the patient. EMTs are certified by the state and are required to complete initial and ongoing education and training to maintain certification.

**Tier Two Response - Advanced Life Support (ALS) Services** - Paramedics usually arrive second on scene to provide emergency care for critical or life-threatening injuries or illness. Regional paramedic services are provided by five agencies operating 27 ALS units throughout King County, including fire departments in Bellevue (4), Redmond (3), Shoreline (3), Seattle (8), and King County Medic One (9).

## EMS TIERED RESPONSE SYSTEM



### ACCESS TO EMS SYSTEM

Bystander calls 9-1-1



### TRIAGE BY DISPATCHER

Use of Emergency Medical Response Assessment Criteria



### FIRST TIER OF RESPONSE

Basic Life Support (BLS) by firefighter/EMTs



### SECOND TIER OF RESPONSE

Advanced Life Support (ALS) by paramedics



### ADDITIONAL MEDICAL CARE

Transport to hospital

## 2025 EMS DIVISION HIGHLIGHT: EQUITY WORK

Over the 2020-2025 levy span, the EMS Division committed to integrating equity into all areas of its work. We focused on addressing racial and social inequities with EMS and community partners as well as internally to improve health outcomes and work toward a more equitable, just, and healthy society.



As part of this commitment, we recently launched the region-wide training initiative “**Stronger Together**” to comply with the 2023 state mandate requiring first responder training on implicit bias and healthcare disparities. The training promotes cultural competency and fosters equitable, affirming care across diverse communities. This effort reflects our ongoing commitment to advancing inclusive, patient-centered emergency care and improving outcomes for historically underrepresented populations.

To more closely reflect an equity focus, we now include a **Media Inclusion Statement** across all online courses and training modules, affirming our commitment to producing content that is inclusive, respectful, and reflective of the diverse communities it serves. This emphasizes the importance of representation and cultural awareness in emergency medical education and reinforces our commitment to high quality care.

Collaborating directly with community and academic partners is an important part of our work to reduce disparities and tailor education efforts to specific needs. Our **Fall Prevention** and **Community CPR/AED** programs, in partnership with the University of Washington (UW) and the Vulnerable Population Strategic Initiative, bring EMS education, fall prevention, and bystander CPR to historically underrepresented communities, including older adults and people with limited English proficiency (LEP). Working with students from UW’s Global Health Capstone and the UW School of Public Health, the programs create accessible trainings, videos, and community workshops to address health disparities and expand the reach of EMS education. This work also extends to the **Child Passenger Safety** program which provides guidance and support to organizations serving refugee, LEP and other underrepresented families as well as the **Center for the Evaluation of EMS (CEEMS)**, whose research, data driven evaluations, and community partnerships align science with social impact to improve cardiac arrest outcomes.



Fire and EMS professions, both nationally and locally, lag in demographic representation within their rosters and throughout their employment structures. The King County **EMS Diversity, Equity and Inclusion (DEI) Network** was created in 2022 to help King County agencies create and foster workforces that reflect the communities they serve. The DEI Network has hosted Interview Preparation Workshops to provide individualized interview practice and feedback from King County agency providers. Additionally, the Network contracted a consultant to improve conflict navigation and communication skills of our providers. Our region’s diverse communities will be better served by a representative workforce that fosters a learning environment.

## 2025 EMS DIVISION HIGHLIGHT: EQUITY WORK



To build an EMS workforce that is more representative of King County, we have long supported programs and workshops that provide opportunities for priority populations including women and underrepresented individuals. These equity-driven efforts reduce barriers and create inclusive career pathways. The **Future Women\* in EMS and Fire (FW\*IEF)** workshops occur twice a year and led by women from more than 18 fire departments, providing mentorship and hands-on guidance to women exploring emergency service careers. Similarly,

the **Strategic Training and Recruitment (STAR)** program offers tuition assistance, mentorship, study groups, and job readiness workshops. Both opportunities help participants succeed in training and navigate entry into EMS careers.

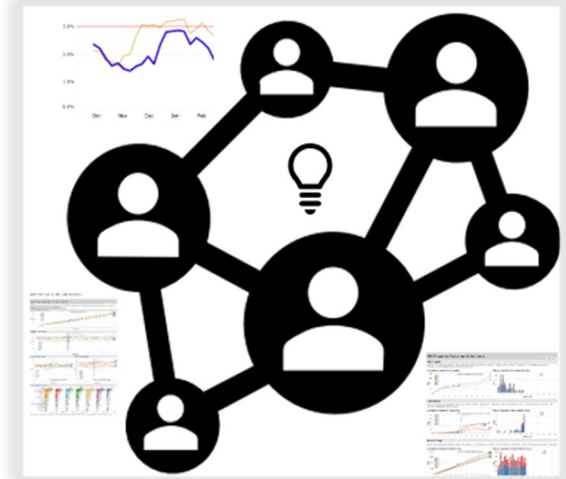
We have also focused inward and taken steps to have an inclusive, affirming and accountable work environment. We hired an **Equity, Inclusion, and Belonging Manager** to integrate ERSJ values across EMS. This leadership role drives inclusive policies, supports staff development, and strengthens engagement with underserved communities. Helping to guide this work is the **ERSJ Workplan**, a strategic framework which ensures equity remains an EMS Division priority. The workplan emphasizes leadership development, anti-racism training, and meaningful community engagement, to ensure equitable care across King County.

\*This workshop is inclusive of underrepresented genders including women, women-identifying individuals, non-binary, trans, and gender non-conforming people who are comfortable in a space that centers the experiences of women in EMS/Fire.

## 2025 EMS DIVISION HIGHLIGHT: INNOVATION

This year marks the end of the current levy period, during which we've advanced the delivery of pre-hospital care through targeted innovations that align with our commitment to operations excellence, continuous improvement, and equitable care. Our focus on strengthening systems, processes, programs, and partnerships enabled the implementation of multiple programs designed to enhance the system's high-quality, patient-centered care.

We continue to leverage EMS data to support public health initiatives and drive system wide improvements. Our internationally recognized EMS system continues to set the global standard for out-of-hospital cardiac arrest (OHCA) care through on-going quality improvement, data-driven decision-making, and evidence-based protocols. We've integrated multiple systems with our primary **record management system (RMS)** and enabled data sharing capabilities across fire, EMS, and public health partners. This provides a comprehensive picture of the community's health needs that extend beyond hospitals, clinics, and other healthcare settings.



By utilizing **visual data tools**, we've provided various partners with the ability to accurately measure improvement through multiple programs within our region. We've built dashboards that measure the utilization of the newly built crisis center and improve how data is analyzed and shared with programs that improve mental health care, specifically around [opioid overdoses](#).

Recognizing that accurate data collection is essential for understanding community needs, we've also **invested in technology** that streamlines patient documentation while maintaining the highest standards established by our medical program directors. By piloting new applications such as **iOS patient documentation** during encounters, we strive to create ways to capture more essential data in efficient and effective ways.

Our data is not only used to measure when EMS responds, but also how it responds. By compiling provider documentation data with insights from community programs, we can assess the appropriateness of tiered responses, ensuring that advanced life support (ALS) and basic life support (BLS) units are dispatched appropriately. **Investments in communication center tools** have enabled lower priority calls to be routed to a **Nurseline**, preserving ALS and BLS availability for higher-acuity emergencies. Additionally, the integration of Mobile Integrated Health (MIH) systems into our electronic health records (EHR) allows providers to access information to resources already utilized or those potentially beneficial for patients in their care, preventing a revolving door of ineffective approaches.

## 2025 EMS DIVISION HIGHLIGHT: INNOVATION

We've maintained our commitment to building equity and accessibility within our region throughout this levy span. In alignment with ongoing public health initiatives, we embedded equity, racial, and social justice training and practices into our policies and operations, reinforcing our commitment to fostering inclusivity, fairness, and dismantling systemic barriers in emergency care. We have built our vision toward innovations that ensure our system enhancements reach all community members equitably.

Recognizing that the complex health needs of our residents in King County can be as diverse as our communities themselves, we've committed to expanding innovative programs like **MIH** and the **Taxi Transportation Voucher Program (TTVP)** to connect them to the most appropriate care and resources. The MIH network has expanded from 5 to 11 established programs over the past six years, providing coverage to over 1.8 million residents, or roughly 80% of the county's population. Clients and their families consistently express appreciation for the support MIH provides, and first responders also value MIH's role in connecting clients to the appropriate resources. TTVP has helped hundreds of community members increase accessibility to healthcare services, providing a transportation option for low-acuity patients who need non-emergent care. These efforts reflect our commitment to building an equitable and data informed EMS system that meets the diverse needs of King County's residents. We are dedicated to effective, patient-centered strategies that ensure high-quality care across the region.



Redmond's Mobile Integrated Health (MIH) program works alongside paramedics, firefighters, and care coordinators to provide enhanced care for frequent 911 callers, complex patients, and those with non-emergent medical or social needs.

## 2025 EMS DIVISION HIGHLIGHT: FIRST RESPONDER MENTAL WELLNESS

First responders experience many issues related to mental health fatigue, stress, and even suicide due to the nature of the emergency medical response work<sup>1</sup>. In an effort to prevent and/or mitigate these impacts, the EMS Division partnered with the King County Fire Chiefs Association in 2017 to create a Mental Wellness Subcommittee with the goal of building awareness, training, and advocacy for first responder mental health and wellness.



In early 2018, a survey was distributed to fire and EMS personnel, 9-1-1 call receivers, and dispatchers to establish a baseline understanding of the mental health issues and needs in our region. The survey results of nearly one thousand responders have helped shape much of the work conducted during the 2020-2025 EMS levy period, including:

- Trainings on mental wellness related topics for EMS leadership, Chief Officers, first responders, and other 9-1-1 personnel;
- Advocacy and support to build a resilient peer support system;
- Policies to improve mental wellness culture and access to mental health resources; and
- Regular standing Mental Wellness Subcommittee meetings to ensure oversight and advocacy by leadership.

Since its inception, the Mental Wellness Subcommittee has met regularly to organize and implement activities guided by the survey results. The following reflects the accomplishments of this work group during the 2020-2025 levy period:

- Sponsored speakers at four annual KCFCA Leadership Conferences;
- Hosted four basic mental wellness trainings at the Fire Academy;
- Sponsored six basic and advanced peer support trainings;
- Organized 16 focused trainings, included mental wellness basics, sleep and wellness, healthy retirement, financial management, secondary trauma and resiliency, and the neuroscience of trauma;
- Hosted four self-care retreats for current and emerging leaders;
- Sponsored the purchase of two massage chairs for telecommunicators (NORCOM and Port of Seattle); and
- Sponsored three telecommunicators to attend a conference.

In anticipation of the next EMS levy period, the Mental Wellness Subcommittee has prioritized creating a comprehensive mental wellness program that reflects the needs of frontline workers and garners the expertise of leaders in the mental wellness field. In 2024, the group partnered with Seattle University to conduct a thorough year-long assessment of regional mental wellness perspectives and needs which will culminate in the development of a *Road Map for EMS Agencies* to implement best practices in the next levy period.

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<sup>1</sup> Understanding the Increased Mental Health Risks Facing Emergency Medical Service, Peter Huston, *Journal of Emergency Medical Services (JEMS)*, October 18, 2024

## 2025 EMS DIVISION HIGHLIGHT: DEVELOPING THE NEXT EMS LEVY

Since its inception in 1979, the Medic One/EMS system serving Seattle and King County has been primarily funded through a countywide, voter-approved EMS levy. Mandated by state law to be exclusively used to support emergency medical services, the levy provides reliable and secure funding for our successful and highly acclaimed system.

With the current six-year levy expiring on December 31, 2025, the region recently undertook an extensive planning process to develop a new Strategic Plan and levy for King County voters to renew in 2025. This process brought together regional leaders, decision-makers and partners to assess the needs of the system and collectively develop recommendations to direct the system into the future. As in past years, an EMS Advisory Task Force, comprised of regional elected officials, oversaw the development of the levy recommendations and was responsible for endorsing broad policy decisions, including the levy rate, length, and ballot timing.

The Task Force used four subcommittees to conduct the bulk of the program and cost analyses. Each subcommittee was chaired by an EMS Advisory Task Force member and consisted of EMS partners and subject matter experts from all aspects of the Medic One/EMS system. These groups met monthly and generated programmatic and financial recommendations that the Task Force endorsed on September 26, 2024. For more detailed information on the process, please see the 2024 Annual Report.

The Task Force recommendations formed the basis of the Medic One/EMS 2026-2031 Strategic Plan that the King County Executive forwarded to the King County Council for discussion and approval. Accompanying it was a 25-cent EMS levy ordinance that would fully support the programs and services outlined in the Plan. On July 1, 2025, the King County Council unanimously passed the Medic One/EMS 2025-2031 Strategic Plan and EMS levy ordinances, clearing the way for **the EMS levy to be run at the November 2025 general election ballot as King County Proposition 1**.



RCW 84.52.069 requires that 75% of cities with 50,000 or more in population must approve placing a county-wide EMS levy on the ballot. As of January 1, 2024, King County was home to 11 such sized cities: Auburn, Bellevue, Burien, Federal Way, Kent, Kirkland, Redmond, Renton, Sammamish, Seattle and Shoreline.

Obtaining council support required the EMS Division to travel the region earlier this year, briefing elected officials on the planning process and resulting levy proposal. The proposal was extremely well received by the many different councils and committees, reiterating just how valued the system is, with all 11 cities confirming their support for the levy by June 2025.

## 2025 EMS DIVISION HIGHLIGHT: DEVELOPING THE NEXT EMS LEVY

The levy package developed collaboratively by regional EMS partners and the EMS Advisory Task Force is designed to meet the needs of the EMS system, its users, and the community. It provides the means to continue high-level service to residents along with the flexibility to address and adapt to emerging challenges to the system. It endorses:

### Adopted 2026-2031 Medic One/EMS Strategic Plan

- A six-year Medic One/EMS levy at \$.25 per \$1,000 Assessed Value (AV);
- Fully funding eligible Advanced Life Support (referred to as ALS, or paramedic services) costs;
- Including a medic unit “placeholder” should service demands increase beyond what is anticipated and new units are needed;
- Increasing funding for Basic Life Support (referred to as BLS, or “first responders”);
- Continued commitment to Mobile Integrated Healthcare (MIH) to support community needs;
- Sustained funding and enhancements for regional programs that provide essential support to the Medic One/EMS system and are critical for providing the highest emergency medical care possible;
- Initiatives that encourage efficiencies, innovation, and leadership and build upon previous efforts to improve patient care and outcomes;
- Reserve funding that provides additional protection and flexibility against unforeseen financial risks;
- Carrying forward \$64 million of 2020-2025 reserve funding to help reduce the initial levy rate; and
- Running the EMS levy at the November 2025 general election in King County.

Reflected throughout the Medic One/EMS 2026-2031 Strategic Plan is the system’s long and vibrant legacy of regional collaboration and commitment. The proposals incorporated within it support the Medic One/EMS system’s strong tradition of service excellence, effective leadership, and regional collaboration. The well-balanced approach outlined in this plan will allow the system to meet the needs and expectations of residents now and in the future.

## TRAINING & EDUCATION

The Training & Education section provides initial training, continuing education, and recertification for nearly 4,700 Emergency Medical Technicians (EMTs) that practice throughout King County. Training & Education collaborates with regional EMS partners and the King County Medical Program Director (MPD) to develop curricula that meet agency, state, and national training requirements. In addition, the Training & Education section serves as a liaison between King County's 23 fire agencies that provide basic life support services and the Washington State Department of Health to support initial EMT certification, training authorizations, certification renewals, and regulatory or policy updates affecting the delivery of EMS services.

### Initial and Ongoing EMT Training

Over the course of the 2020-2025 levy span, the EMS Division has made substantial training investments to address regional system needs and workforce development. In response to a significant increase in new EMT hires, Training & Education launched a regional instructor mentorship and proficiency program to ensure consistent instructional quality across fire agencies. This program has strengthened the training pipeline and supported the professional development of King County's EMS educators.

To expand educational access and align with evolving learning needs, the EMS Division designed and published a suite of online EMS courses accredited through the Commission on Accreditation for Prehospital Continuing Education. Easy access to diverse course content has resulted in first responders meeting or exceeding recertification requirements as outlined in King County's Ongoing Training and Evaluation Program (OTEP). These online modules reflect best practices in prehospital care, use inclusive language and content, and have been completed more than 200,000 times throughout the levy period.

Starting in 2023, the Facilitating Airway Control Trial (FACT) required the rapid and coordinated training of thousands of EMTs in a new airway management technique. Training & Education developed a standardized curriculum and skill-check process and integrated reporting tools into existing systems. This training effort in response to the implementation of a new study highlights the region's ability to lead in EMS innovation while maintaining operational excellence.



The Training & Education Section will continue offering expanded EMT and instructor development opportunities through regional workshops, initial training support, and competency-based evaluations. With the reaccreditation of the training program in 2026 comes a renewed OTEP plan featuring asynchronous online content designed to meet new state-mandated requirements. Course content will include workplace safety, provider wellness, and equity-focused

training. Following the conclusion of the FACT Study in the next levy span, airway management training outcomes will be reviewed for possible integration into ongoing EMT curricula.

## EMERGENCY MEDICAL DISPATCH

The Emergency Medical Dispatch (EMD) Program is an integral component of King County's regional EMS system, ensuring timely, appropriate, and effective responses to 9-1-1 medical calls. Trained by the EMS Division in criteria-based dispatch (CBD) guidelines, telecommunicators assess calls, provide life-saving pre-arrival instructions, and match patients with the appropriate level of care. Over the past year, the EMS Division undertook activities that enrich EMD through enhanced training, guideline revisions, and programs that support patient and system needs.

### EMD Training and Continuing Education

This year, EMD training transitioned onto the EMS Division's interactive online education platform, EMS Online. Telecommunicators can now complete structured modules, engage in scenario-based exercises, and take comprehension tests that reinforce key learning objectives. EMS Division instructional designers work closely with subject matter experts, communication center training leads, and MPDs to ensure course content is both clinically and operationally relevant. Courses focus on critical thinking, accurate resource allocation, teamwork, and equity and social justice principles, equipping telecommunicators to make confident, informed decisions in high-pressure situations.

### Telephone Referral Program/Nurseline

The Telephone Referral Program (TRP) has been a regional service funded through the Medic One/EMS levy for more than 25 years. The program transfers non-emergent 9-1-1 medical calls to a 24-hour consulting Nurseline for medical advice and care instructions in lieu of dispatching EMS resources. This approach avoids unnecessary EMS responses and allows crews to be available for higher-acuity and life-threatening medical emergencies.

This year, following the transition to a new service provider, the enhanced TRP officially launched with expanded capabilities and renewed focus. An early review of the program shows positive outcomes, with the majority of referred callers receiving self-care guidance from the nurses. Nurses have also directed callers requiring medical attention to alternative healthcare resources such as telehealth visits and have helped facilitate transportation via rideshare and private ambulance. A low number of calls are returning to the 9-1-1 communication centers for medical dispatch, suggesting that regional telecommunicators are triaging calls accurately.

#### SURVEY SAYS...

Everyone referred to the TRP receives a patient satisfaction survey that evaluates the quality of services offered by nurses. Results thus far show high satisfaction with an average rating of 4.8 out of 5.0, indicating that callers are finding the Nurseline effective.

### EMD Quality Improvement Efforts

The CBD guidelines have steered medical call triage and dispatch decisions in King County for over 35 years. Reviewed every three years, the guidelines are updated through the Dispatch Review Committee which includes participants from communication centers, fire agencies, paramedic programs, MPDs, and EMS Division staff. Past updates to CBD guidelines were based on analyses of EMS data including trends in cancellations and types of transport.

## EMERGENCY MEDICAL DISPATCH

The work undertaken this year on what will become the 10<sup>th</sup> Edition of the CBD guidelines signifies an important evolution in the evaluation process. For the first time, the analysis includes a clinical assessment of actual EMS interventions, such as using airway management devices (e.g., intubation), vascular access, cardiac care procedures, and administering medication. This innovative review provides a more accurate picture of patient needs out in the field. The DRC is evaluating the data and recommending changes to simplify the use of CBD guidelines and reserve EMS resources for higher acuity medical emergencies

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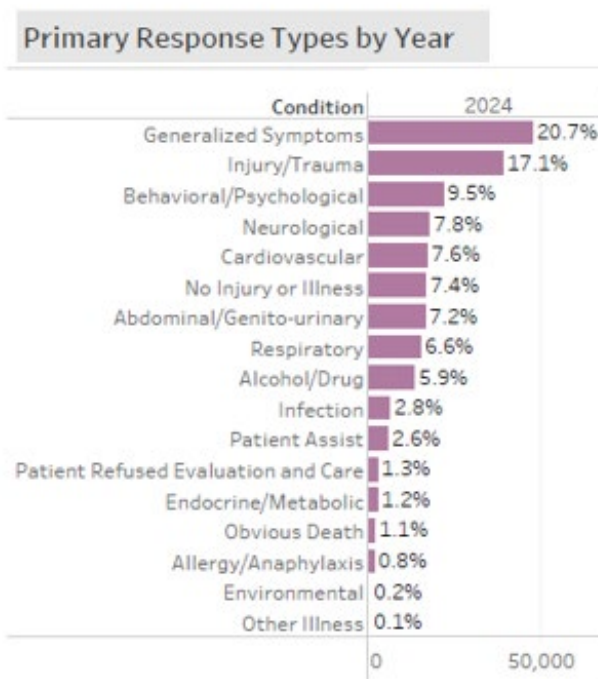
EMD training will expand its online course catalog to provide telecommunicators with access to relevant training and best practices for handling medical 9-1-1 calls. The Joint Operating Committee that guides the implementation of the TRP will continue to meet regularly to monitor call trends, refine protocols, and address emerging needs. Also on the horizon is an initiative to develop a referral pathway to connect high utilizers of the TRP with local area MIH programs for complex care support. The 10<sup>th</sup> Edition of the CBD guidelines, expected to be implemented in late 2025, will enhance alignment between caller needs and EMS response level and expand the use of the TRP for non-emergent calls.

## MEDICAL QUALITY IMPROVEMENT

The Medical Quality Improvement (QI) section plays a key role in collaborating with EMS agencies, hospitals, academic partners, and other Public Health - Seattle & King County Divisions to support high quality data sharing, analysis, research, and system wide improvements. Medical QI ensures clinical and operational decisions are grounded in accurate, timely, and actionable data. Focus on region-wide initiatives help align EMS practices with evidence-based care and evolving public health priorities. In addition, the projects and programs maintained within the Medical QI section ensure not only regulatory compliance but data integrity and a shared commitment to improving outcomes for pre-hospital services for patients and communities across the region.

### EMS Dashboards: Data-Driven Approaches and Decision-Making

Work undertaken by the Medical QI section supports over two dozen EMS agencies, hospitals, dispatch centers, and community partners in helping ensure that valuable health data leads to real time insights, improved outcomes, and evidence-based decision making. Medical QI has supported opioid overdose responses and equity initiatives by developing dashboards and reports on naloxone leave-behind programs, buprenorphine initiation, and CPR training disparities based on language access. In addition, Medical QI pioneered data analysis related to the new crisis center in Kirkland, providing essential information that allowed for planning, preparation, and quality improvement efforts to better support community mental health needs. Data analysts developed and maintained customized datasets and visual dashboards to support internal clinical improvement, research efforts, and regional partner needs. These dashboards track key EMS conditions of focus such as stroke, STEMI, cardiac arrest, and opioid-related incidents. Monthly updates provide real-time reports of conditions of focus and track system-level metrics that inform regional discussions aiming to improve county-wide EMS care.



### Quality Improvement Reports

Delivering the highest quality patient care requires establishing standardized protocols for EMS personnel, mechanisms for monitoring the delivery of care, and systematically identifying how patient care can be improved across the region. One way the EMS Division supports regional quality improvement is through conducting quality improvement reports to evaluate how BLS and ALS respond

to a wide variety of conditions. Report findings are distributed to all King County medical directors, EMS agency chiefs, training officers, dispatch center leaders, and hospital cardiac and stroke coordinators to encourage an ongoing culture of evaluating and improving patient care.

The following is a summary of a quality improvement report conducted this year.

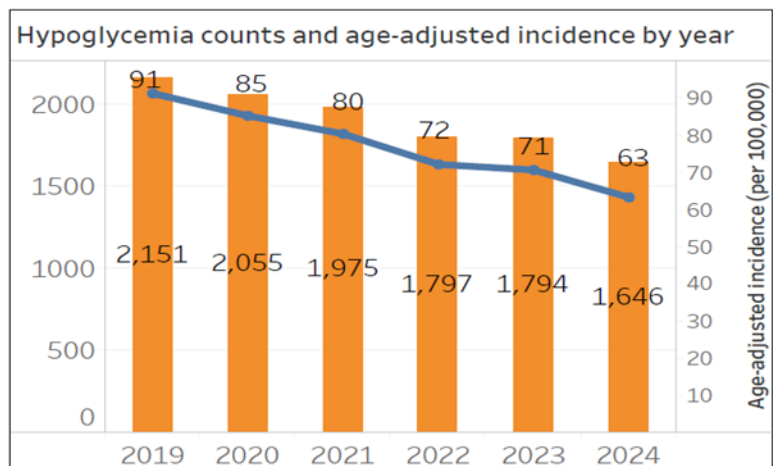
## Hypoglycemia and EMS: The Impacts of Medical Progress

With diabetes, the body’s pancreas ceases to produce insulin (Type 1), or the body’s cells become resistant to insulin (Type 2), resulting in abnormal blood sugar regulation. A foundational treatment for diabetes care is the management of blood sugar, with Type 1 requiring treatment with insulin and Type 2 usually treated with oral medications, insulin, and/or other injectables. Although these medicines aim to normalize blood sugar, some have a potentially serious side effect to lower blood sugar too much, possibly causing low blood sugar, or hypoglycemia. Hypoglycemia requires timely treatment since the brain needs glucose to function normally. In critical hypoglycemia, the brain is in crisis and may result in seizures and/or coma.

Over the past several years, there have been important advances that help patients manage their blood sugar and limit side effects. The first development is new classes of medications that treat high blood sugar without causing hypoglycemia. The most common are called GLP-1-agonists (e.g., Ozempic) and SLGT-2 inhibitors (e.g., Jardiance). These newer medicines not only do not cause hypoglycemia (when used alone) but have the added health benefits of weight loss and reduced risk of kidney and heart disease. The second development in diabetes management is the advance of continuous glucose monitors (CGMs) which continuously measure a person’s blood sugar through a sensor. The blood sugar data can be transmitted to multiple devices and alert the patient to blood sugar problems at a very early and actionable stage.

Wanting to better understand how these new developments medications or monitors affect EMS calls for hypoglycemia, the EMS Division reviewed six years of patient care records to determine if the frequency of 9-1-1 calls for hypoglycemia was changing over time, the initial blood sugar level for these calls, and the types of diabetes medications patients were prescribed.

Analysts found that the number of 9-1-1 EMS calls related to hypoglycemia in King County decreased by about 30% over the six-year period from 2,151 in 2019 to 1,646 by 2024. Although this is still a substantial number of calls, the result represents a major decline. Over the same time frame, there was a modest increase in the median blood sugar, suggesting less severity of hypoglycemia over time. Use of GLP-1 agonists and SLGT-2 inhibitors was also reported more frequently in 2024 vs 2019.



## MEDICAL QUALITY IMPROVEMENT

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There were some limitations to this evaluation. First, there was no way to measure the use of CGMs in King County. Second, information about the patient's home medications was missing from the EMS record in about 20%, potentially underestimating use of certain diabetes medications. Third, medication profiles were not captured among individuals who did not call 9-1-1. If the new medicines reduce hypoglycemia risk, then these new medicines are being used more often among people who are not experiencing hypoglycemia.

As care and chronic disease management advances, the frequency and clinical presentation of "emergency patients" can change. The frequency and severity of hypoglycemia appears to be "improving" - with fewer calls and less severe hypoglycemia. The hope is that these calls will continue to diminish as more people are managed with better treatments and techniques.

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Stronger clinical research, improved data quality, and expanded access to EMS data have helped generate insights to inform patient care and system-wide improvements. The Medical QI section will maintain its focus on data integrity, performance reporting, and regulatory compliance, while supporting inclusivity in the workforce through targeted outreach and engagement. It remains committed to building a responsive, equitable, and evidence-based EMS quality improvement system to meet community's evolving needs.

## CENTER FOR THE EVALUATION OF EMS (CEEMS)

The Center for the Evaluation of Emergency Medical Services (CEEMS) undertakes rigorous evaluations to advance the science of pre-hospital emergency care. CEEMS research and quality improvement efforts involve collaborations between field providers, clinicians, and researchers. These alliances include personnel from the EMS Division, King County providers, the University of Washington, and other experts from around the world. This past year included ongoing investigations and important reports on cardiac arrest resuscitation combining best practices and advanced technologies to improve patient care and outcomes.

### **Evaluation of Provider Interventions during Cardiac Arrest:**

During an out-of-hospital cardiac arrest (OHCA), numerous potentially life-saving interventions are administered by EMS providers. To better understand intervention efficacy, all aspects of the intervention are examined. For OHCA, guidelines recommend advanced airway management, such as endotracheal intubation, without interrupting chest compressions. However, the extent and impact of interrupting ventilation remain unknown. This recent investigation suggests that shorter interruptions in chest compressions during advanced airway application may be associated with more favorable outcomes.

**Publication:** [The Apnea Interval: Ventilation Interruption during Tracheal Intubation and Its Association with Cardiac Arrest Resuscitation Care and Outcome.](#)

### **Machine Learning and Predictive Analytics:**

Ongoing investigations use machine learning techniques to improve resuscitative efforts in the field. This includes evaluating the electrocardiogram (ECG) during cardiac arrest to better understand a patient's underlying physiological state and determine the optimal use of defibrillator technology and interventions during OHCA. The overarching goal is to use multiple inputs and predictive modeling to measure a patient's clinical status and guide care specific to that individual's needs. This project connects the EMS Division with experts in emergency medicine, cardiology, bioengineering, and mathematics from the University of Washington to achieve a "precision medicine" approach that can match the best treatment options to the individual patient.

**Publication:** [Implications of an Individualized Resuscitation Strategy Using Continuous Rhythm and Physiologic Status Assessment during Ongoing CPR.](#)

### **Evaluation of Patient Populations in Cardiac Arrest:**

Utilizing statistical methodologies and a large cardiac arrest database, data on race collected from EMS, hospitals, and death certificates were evaluated for data quality and potential bias when assessing outcomes and other metrics.

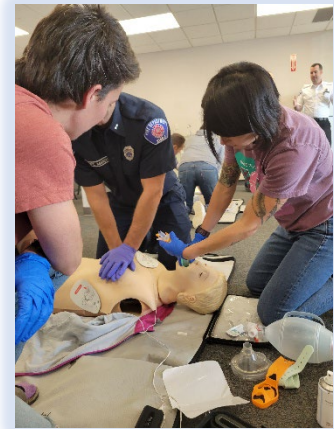
**Publication:** [Classifying Race in Out-of-Hospital Cardiac Arrest and Potential Disparities: A Retrospective Cohort Study](#)

## CENTER FOR THE EVALUATION OF EMS

### First responder Airway & Compression rate Trial (FACT):

FACT evaluates clinically approved interventions in OHCA to determine whether certain interventions lead to improved survival outcomes. This multi-year countywide investigation compares primary EMT airway interventions and EMT compression rates within American Heart Association guidelines. 2024 marked the trial start date, along with the initial Data Safety Monitoring Board review of the initial eight months of the trial. EMS providers and the FACT study team continue to implement the randomized study arms and gather data.

Additional ongoing collaboration and research topics include participation in the Pediatric Emergency Care Applied Research Network (PECARN), the Cardiac Arrest Registry to Enhance Survival (CARES) research network, brain oximetry during cardiac arrest, PulsePoint technology in cardiac arrest, and additional machine learning and waveform analyses to improve outcomes from cardiac arrest.



Over the next levy period, CEEMS aims to continue to leverage King County's incredible field providers, rich data sources, and advanced technology to continue striving for improvements in EMS care. These include rigorous analysis of current technology and protocols as well as advancing technology using the latest in machine learning, AI and other emerging research and technologies.

## KING COUNTY MEDIC ONE

King County Medic One (KCM1) is one of the five ALS paramedic agencies in the regional EMS system. KCM1 serves approximately 557 square miles of South King County, including Vashon Island, with a population of nearly 750,000 people. In 2024, KCM1 responded to over 18,600 calls for advanced care, including cardiac emergencies, pediatric patients, mass casualty, and motor vehicle crashes.



### Preparing for the Unknown

A Mass Casualty Incident (MCI) Plan is critical to ensure EMS providers respond in a coordinated and effective way when large-scale emergencies overwhelm available resources due to the number and severity of people needing emergency services. The goal is to provide the highest possible care for as many patients as possible. Responding to these types of events can involve many disciplines and agencies to mitigate the incident and provide medical treatment to patients.

To keep the MCI plan relevant and effective, updates are regularly made to help minimize damage and safeguard lives by ensuring a high level of preparedness. KCM1 recently worked closely with its regional partners and external subject matter experts to revise the Seattle - King County MCI Plan, improving preparedness for large scale emergencies.

In addition, the region recently revised the ALS Patient Care Guidelines, which serve as the foundation of EMS training and outline the standards for providing pre-hospital patient care. KCM1 worked with its physician leadership and King County ALS providers to modify the countywide guidelines, ensuring paramedics are using the most up-to-date best medical practices.

The updates of the MCI Plan and the ALS Patient Care Guidelines were well timed with the necessary planning efforts for the upcoming FIFA World Club Cup. Seattle will be hosting six soccer matches in June of 2025, bringing many excited fans from all over the world to the region.

In preparation for this large-scale event, KCM1 is collaborating with a variety of other preparedness partners across the county and state. Efforts include developing and participating in MCI and scenes of violence drills in partnership with the South King County Fire Training Consortium, as well as developing plans for both the EMS system impacts and coordination of EMS standbys for FIFA related events.

### Handing Over the Baton

Like many of its fire partners, KCM1 has been experiencing staffing challenges in recent years. Part of this pertains to retirements, as long-time medics who have dedicated years of service to the people of South King County step away. Another factor is a growing pursuit toward work-life balance, and the reduced desire to take on additional shifts. To address these challenges, KCM1 has doubled its recruitment efforts, which will bring on six new paramedics later this year, and up to 12 next year. KCM1 is grateful for those who have committed themselves to a legacy of medicine and excellence over the past 30 to 40 years and proudly welcomes its new medics that will assume the pledge of excellence in serving South King County residents.

## STRATEGIC INITIATIVES

The Medic One/EMS 2020-2025 Strategic Plan includes Strategic Initiatives that leverage previous investments made by the region to improve patient care and outcomes. Areas identified include sustaining focus on vulnerable populations, enhancing quality improvement capabilities, and modernizing the continuing medical education program. Based on the regional needs and issues identified by partners over the course of levy planning, the following strategic initiatives are centered on using a solid regional approach to strengthen standardization, coordination, inter-connectedness, and partnerships.

### Vulnerable Populations Strategic Initiative

Since its inception in 2014, the Vulnerable Populations Strategic Initiative (VPSI) has collaborated with EMS agencies, community leaders, and organizations to reduce disparities in accessing EMS services and improve health outcomes across diverse communities. VPSI has fostered strong alliances with five organizations which support VPSI's mission of concentrating on communities that have distinct challenges in accessing EMS care, including cultural disparities, communication difficulties, disabilities, language access, historical injustices and systemic racism.



Community educational outreach includes 9-1-1 education, hands-on CPR and AED utilization, stroke awareness, stroke recognition and response, choking response, and falls prevention, with VPSI/EMS resources now available in 17 languages. Students from the UW School of Public Health have authored numerous publications that explored diverse aspects of EMS care. Student-led projects have highlighted the positive interaction between vulnerable communities and EMS agencies. The increased use of social media across all communities has enhanced effective information sharing

related to EMS services and connection to care. Additionally, the growth of video conferencing platforms like Zoom has increased participation among groups that previously avoided in-person care due to travel obstacles.

VPSI outreach and education have helped communities build trust with EMS providers, leading to fewer barriers in accessing care and better health outcomes. As a result of these efforts, communities now have improved awareness about preventive measures and EMS resources.



VPSI plays a critical role in empowering communities to actively engage with EMS agencies and reduce disparities in access to service. Continued support for VPSI efforts throughout the 2026-2031 levy span will further enable communities to remain actively engaged with EMS agencies. This includes expanding community partnerships, connecting local EMS agencies to community-led organizations, and introducing new education and outreach topics to meet the evolving needs of the communities. To better represent this

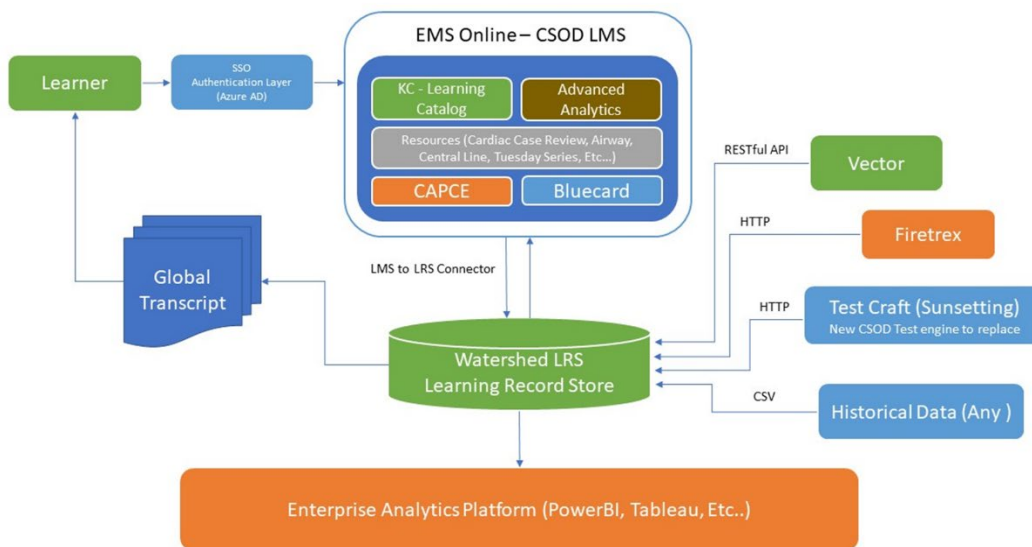
work and align with the commitment to equity and social justice, VPSI will be renamed EMS Community Health Outreach (ECHO) for the 2026-2031 levy span.

**STRIVE Strategic Initiative**

The STRIVE (Strategic Transition in Regionalized Innovation, Value & Education) Strategic Initiative was launched during the 2020-2025 EMS levy to modernize how King County EMS delivers and manages online training for first responders across the region.

This initiative implements a Learning Management System (LMS) which supports on-demand, asynchronous learning using a single online platform designed to comply with national accreditation standards and ensure consistent access to current online content. LMS reduces duplication, increases efficiency, and supports King County in meeting the eLearning expectations of its EMS workforce members.

A key achievement during this levy span was transitioning from the legacy EMS Online platform to a vendor-hosted LMS paired with a Learning Record Store (LRS). This conversion to a more integrated and modernized platform has allowed King County to standardize course content and track real-time user engagement while securely storing training materials across agencies. The new platform has advanced regional efforts to deliver nationally accredited online curricula with uniform instructor tools and scalable learning environments. Investing in upgraded training technology has enabled EMS agencies to more effectively and consistently train King County’s first responders. The LMS/LRS pairing has also enabled regional training leaders and system administrators to monitor and evaluate first responder performance. Finally, LMS/LRS provides secure storage and retrieval of training records, leading to more accurate reporting and better compliance with regional and state-level training requirements.



EMS Online - Modernization Design



STRIVE will transition from a strategic initiative into an enduring component of EMS system operations for the 2026-2031 levy span. The LMS and LRS will remain critical infrastructure supporting scalable education, workforce readiness, and data-informed system evaluation. The investments made through STRIVE position King County EMS to continue delivering high-quality training through the next levy cycle and beyond.

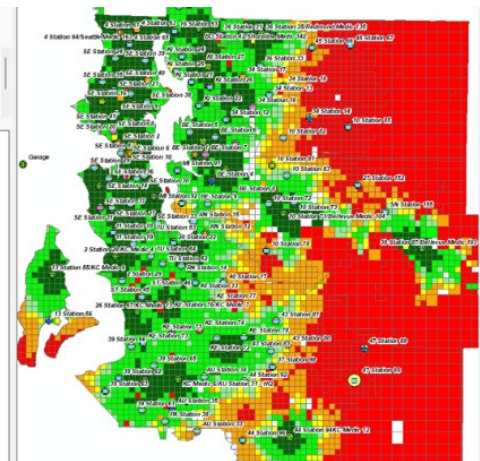
# STRATEGIC INITIATIVES

## AEIOU Strategic Initiative

The AEIOU Strategic Initiative focuses on advancing regional quality improvement through commitment to evaluation, innovation, and operational excellence. Over this levy span, AEIOU aimed to accelerate EMS data access, analysis, and application, identifying areas for improvements and enhancements throughout the region. The four core objectives identified in AEIOU are (1) Enhancing EMS analytical capabilities; (2) Accelerating evaluation towards data and information; (3) Targeting training and education towards best documentation practices in the ESO electronic health record system; and (4) Accelerating innovation related to projects that elevate quality improvement.

Significant progress was made in building foundational tools and systems to support long-term evaluation. Statistical platforms such as SAS and R were utilized, along with various visualization tools like Tableau, which better equip the region with the capacity to analyze big data. The regional QI team, in partnership with KCIT, integrated agency data into tools such as Snowflake for data mining and Insights for customized reporting. In addition, the replacement of the medic unit modeling tool, DECCAN, was implemented, allowing for more accurate forecasting and planning based on response data from 2022-2024. AEIOU also aided in funding the implementation of the FACT Study (see page 22) which aligns with the system’s objective to elevate quality improvement in innovative ways through clinical research.

Response Criteria	Time Target	Incident Average	Incident Percent	Resp Average	Resp Percent
Response Criteria for Medical Units - response ALS Resp.	00:00:00	00:03:00	90.98%	01:08:16	47.18%
Resp ALS Unit Travel Time (En Route to On Scene)	00:10:00	00:07:04	96.23%	01:12:42	32.47%
Resp MED Unit Travel Time (En Route to On Scene)	00:08:00	00:05:26	95.95%	01:08:36	37.7%
Resp MED Unit Response Time (Dispatch to On Scene)	00:10:00	00:07:30	95.08%	01:11:30	38.34%
Resp Min Unit Travel Time (En Route to On Scene)	00:08:00	00:05:52	95.89%	01:24:48	18.33%
Resp MSD Chief Travel Time (En Route to On Scene)	00:10:00	00:12:40	34.19%	01:24:53	11.11%
Multiple ALS Incident (2+ ALS units, 1 MSD On Scene)	00:10:00	00:13:30	23.8%	01:26:38	5.89%
Response Criteria for Medical Units - Low severity incident	00:00:00	00:00:00	0%	00:00:00	0%
Resp ALS Unit Travel Time (En Route to On Scene)	00:10:00	00:04:23	96.12%	01:08:16	47.2%
Resp ALS Unit Response Time (Dispatch to On Scene)	00:12:00	00:07:17	92.4%	01:13:46	40.02%
Resp MED Unit Travel Time (En Route to On Scene)	00:08:00	00:04:58	92.02%	01:08:53	42.34%
Resp MED Unit Response Time (Dispatch to On Scene)	00:10:00	00:07:32	93.96%	01:11:37	38.8%
Resp Min Unit Travel Time (En Route to On Scene)	00:08:00	00:10:16	35.43%	01:24:36	8.14%
Resp MSD Chief Travel Time (En Route to On Scene)	00:10:00	00:13:37	27.75%	01:25:34	5.41%
Multiple ALS Incident (2+ ALS units, 1 MSD On Scene)	00:10:00	00:14:13	18.54%	01:26:08	5.09%
Response Criteria for All Incidents	00:00:00	00:00:00	0%	00:00:00	0%
Resp ALS Unit Travel Time (En Route to On Scene)	00:10:00	00:04:19	98.2%	01:08:10	47.81%
Resp MED Unit Travel Time (En Route to On Scene)	00:08:00	00:05:15	91.95%	01:13:44	38.81%
Resp MED Unit Response Time (Dispatch to On Scene)	00:08:00	00:05:02	91.19%	01:08:58	42.02%
Resp Min Unit Travel Time (En Route to On Scene)	00:10:00	00:07:30	88.09%	01:11:21	38.24%
Resp Min Unit Response Time (Dispatch to On Scene)	00:08:00	00:10:49	39.44%	01:24:21	8.44%
Resp MSD Chief Travel Time (En Route to On Scene)	00:10:00	00:13:29	29.64%	01:25:23	5.67%
Multiple ALS Incident (2+ ALS units, 1 MSD On Scene)	00:10:00	00:14:07	19.21%	01:25:51	5.21%



As the levy period closes, several AEIOU efforts continue into their final implementation stages, including continued enhancements to ESO functionality, efficient collection of demographic data in clinical research trials, and technical advancement of out-of-hospital cardiac arrest data systems.

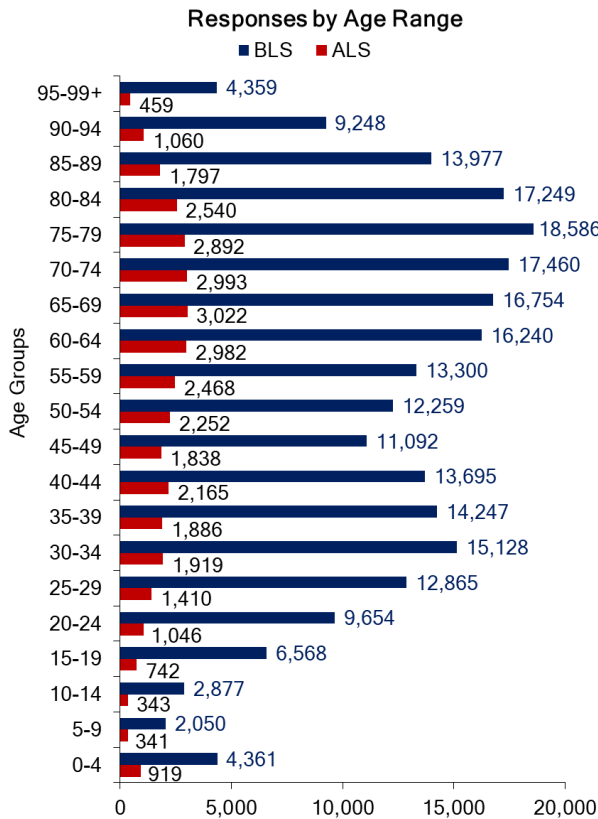
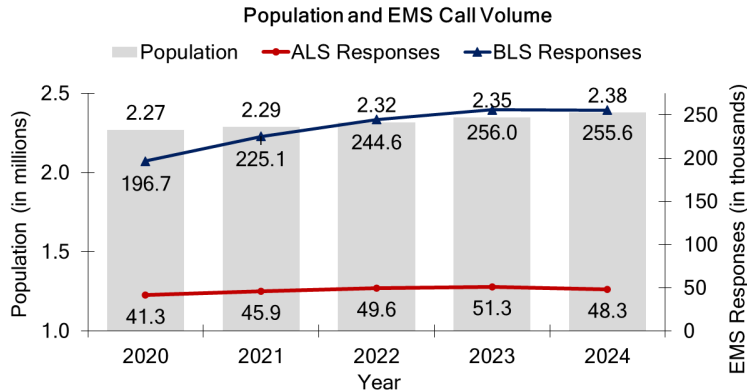


Providing accurate and timely data requires the continuous evaluation of technical systems and processes in data analysis and evaluation. For the next levy span, AEIOU will transition into PRIME, a new strategic initiative that will build on the objectives from AEIOU with a deeper focus on ESO trainings and improved data linking, sharing, and analysis. PRIME will additionally resume building on ESO enhancements and integrate with systems used in community programs, MIH, and hospitals.

# MEASURING AND IMPROVING

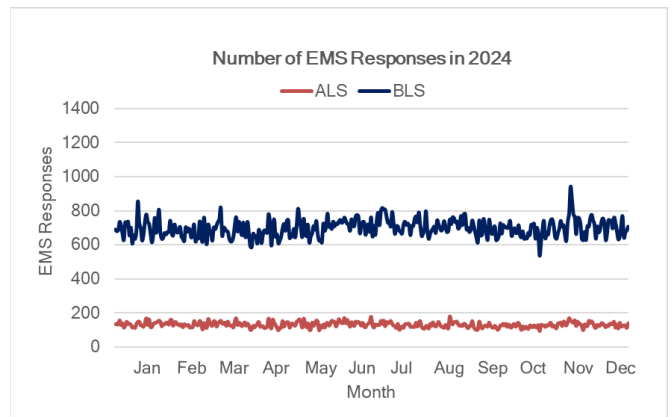
## EMS System Operational Statistics

Population serves as an important indicator to predict the trend in the number of emergency medical responses.<sup>2</sup> This means that the demographic profile of King County matters: When King County’s population increases, the number of emergency medical responses and call volume typically increase.



In the tiered EMS response system, BLS responds to 100 percent of all EMS calls. Cancelled enroute calls accounted for approximately 24.9 percent (11,994) of all ALS calls, compared to 4.5 percent (11,497) of all BLS calls.

The following graph shows the patterns for ALS and BLS responses in 2024.



### 2024 STATS

**255,602**  
Total EMS Responses

**159,086 (77%)**  
BLS-Only Responses

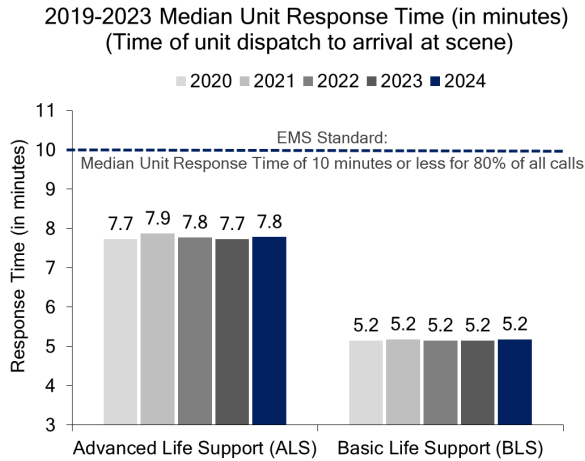
**48,258 (23%)**  
BLS & ALS Responses

Average # of Calls Per Month  
**21,300 BLS**  
**4,022 ALS**

Average # of Calls Per Day  
**698 BLS**  
**132 ALS**

<sup>2</sup> [https://ofm.wa.gov/sites/default/files/public/dataresearch/pop/april1/ofm\\_april1\\_poptrends.pdf](https://ofm.wa.gov/sites/default/files/public/dataresearch/pop/april1/ofm_april1_poptrends.pdf)

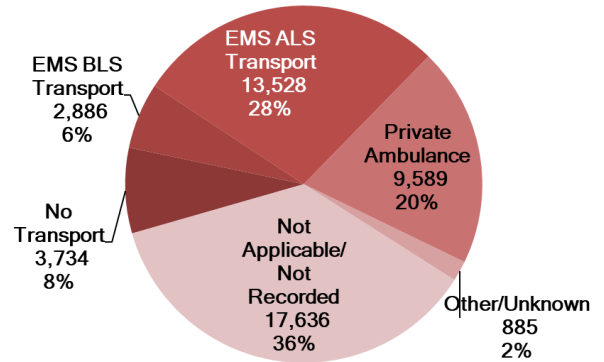
Unit response time serves as a key performance indicator of operational efficiency in any EMS system. Two important metrics include the total response time – the time between the 9-1-1 call being received by the dispatch center and the EMS unit’s arrival on scene – and the unit response time. The unit response time is the time between the unit dispatched and EMS arrival on scene. Across the last five years, ALS consistently met the standard performance goal of a median response time of 10 minutes or less, and 80 percent of all calls within 14 minutes or less.



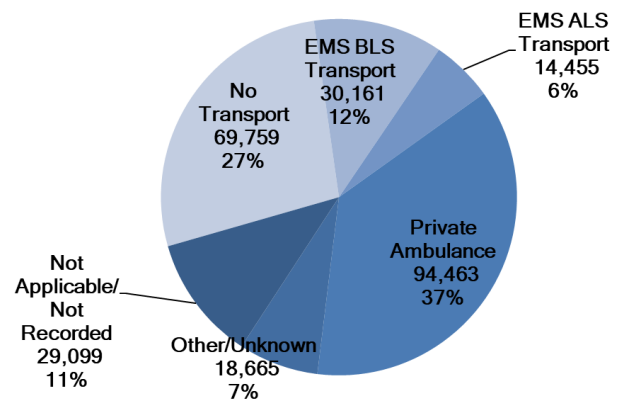
Transport Type is an important component of providing EMS care. Once a patient is stabilized, EMS personnel use their skills and knowledge to determine whether transporting the patient to a hospital is needed for further medical attention. Based on the clinical needs of the patient, a decision to identify the most appropriate transport resource is made. The charts shown below identify the transport types for EMS responses across 2024, broken into two categories for ALS and BLS responses.

EMS Call Types: EMS responds to a wide variety of emergency medical calls. In 2024, nearly 50 percent of ALS responses involved serious, life-threatening emergencies such as cardiovascular, respiratory, and neurological calls, with a higher percentage of calls to patients 65 years or older. BLS responds to 100 percent of all calls, which are comprised of nearly 20 percent involving trauma, with a higher percentage of patients who are 65 years or younger.

Transport Type  
ALS Responses 2024



Transport Type  
BLS Responses 2024



MEDICAL TYPE	ALS		BLS	
	Count	Percentage	Count	Percentage
Cardiovascular	8,178	26.9%	16,132	7.4%
Respiratory	3,781	12.4%	14,532	6.7%
Neurological	2,920	9.6%	17,343	7.9%
Behavioral/Psychological	2,670	8.8%	20,487	9.4%
Trauma	2,409	7.9%	42,070	19.3%
Alcohol/Drug	2,211	7.3%	14,231	6.5%
Abdominal/Genito-Urinary	1,347	4.4%	15,979	7.3%
Infection	796	2.6%	5,897	2.7%
Allergy/Anaphylaxis	785	2.6%	1,841	0.8%
Endocrine/Metabolic	727	2.4%	2,711	1.2%
OB/Perinatal	306	1.0%	1,036	0.5%
Environmental	111	0.4%	520	0.2%
Obvious Death	130	0.4%	2,467	1.1%
Other Medical	3,722	12.2%	45,885	21.0%
No Injury/Illness	332	1.1%	17,104	7.8%
<b>Total Medical Calls*</b>	<b>30,425</b>	<b>98.9%</b>	<b>218,235</b>	<b>92.2%</b>

## MEASURING & IMPROVING

### Cardiac Arrest Statistics – Seattle and King County 2024 Overview

Cardiac arrest is a public health challenge with stark health consequences. It occurs when a person’s heart stops working suddenly, often without warning. As a consequence, blood stops circulating and the body is deprived of oxygen. The person collapses, loses consciousness, and their breathing becomes agonal (gasping) or stops completely. The sudden nature of cardiac arrest always leads to death unless there is rapid action by a series of rescuers.

The assistance during those immediate first few minutes of a cardiac arrest is the most critical. This quick and coordinated action has been described by the “links in the chain of survival” that include prompt recognition, early CPR (chest compressions to resume or improve blood circulation), and defibrillation (electrical shock to restore the heart’s rhythm), and advanced EMS and hospital care. The actions taken by laypersons, law enforcement, telecommunicators and EMS personnel (firefighter/EMTs and paramedics), and hospitals influence the chances of a successful resuscitation. Success is defined when the arrest victim is resuscitated and ultimately discharged alive from the hospital. This measure of success is a key benchmark for a regional EMS system. Seattle and King County use a comprehensive surveillance system to capture and review each cardiac arrest as the foundation to continuously strive to improve patient care and health outcomes.

### Cardiac Arrest Data Reporting

Cardiac arrest data reported each year combines both Seattle and the balance of King County, providing a snapshot of outcomes and treatment for two specific groups of cardiac arrest victims:

#### Overall Group

Persons suffering arrest who are two years or older who received ALS treatment and had no advanced directives to limit care

#### Utstein Group

Persons in the overall group whose cardiac arrests were witnessed by bystanders are primarily due to a medical condition of the heart with an initial heart rhythm that requires a defibrillator shock.

Although cardiac arrest calls comprise only about 1 percent of the total EMS call volume, performance and outcome are considered good proxies for the performance of an entire EMS system. This is because cardiac arrest resuscitation tests every component of the emergency response. The “Utstein” group provides a closer look at a specific population of cardiac arrest patients for whom each link in the chain of survival has special importance. This particular group was defined nearly three decades ago when the international community recognized a need for standardization for reporting about cardiac arrest to help compare performance across different systems. As a result, the Utstein cardiac arrest survival rate is considered the benchmark for EMS systems. Although special emphasis is placed on the Utstein group, both groups are informative and drive quality improvement initiatives and innovative practices to enhance care.

The following page presents results from the cardiac arrest surveillance system from years 2020-2024 for Seattle and King County. The report presents 2024 results and five-year cumulative results. The five-year cumulative results provide the best general gauge of EMS system performance as there can be year-to-year variability caused by circumstances outside the EMS system control.

## MEASURING & IMPROVING

Overall number of cardiac arrests for which ALS resuscitation efforts were attempted for patients two (2) years or older with no advance directives to limit care:

Year	2020	2021	2022	2023	2024
Cardiac Arrests	1,350	1,499	1,598	1,669	1,568

- 2024 Highlight: Overall survival to hospital discharge based on arrest before or after arrival of EMS personnel and initially monitored cardiac arrest rhythm:

Initial Cardiac Arrest Rhythm	Patients Treated	Patients Survived to Hospital Discharge	Percent Survived
<b>Arrest <u>Before</u> Arrival of EMS</b>			
	<b>1,361</b>	<b>209</b>	<b>15%</b>
Ventricular Fibrillation/Pulseless Ventricular Tachycardia (VF/pVT)	303	118	39%
Asystole	655	10	2%
Pulseless Electrical Activity (PEA)	298	58	19%
Not Shockable, unknown if PEA or asystole	85	7	8%
Pulses on First Check	16	12	75%
Paced	0	0	n/a
Unknown	4	4	100%
<b>Arrest <u>After</u> Arrival of EMS</b>			
	<b>207</b>	<b>63</b>	<b>30%</b>
Ventricular Fibrillation/ Pulseless Ventricular Tachycardia (VF/pVT)	41	24	59%
Asystole	31	5	16%
Pulseless Electrical Activity (PEA)	120	26	22%
Not Shockable, unknown if PEA or asystole	6	4	67%
Pulse on First Check	3	1	33%
Paced	0	0	n/a
Unknown	6	3	50%
<b>Total</b>	<b>1,568</b>	<b>272</b>	<b>17%</b>

- Utstein Group: Survival to hospital discharge for non-traumatic arrests, witnessed by bystanders (excludes EMS-witnessed), with an initial rhythm of ventricular fibrillation/pulseless ventricular tachycardia (VF/pVT):

Year	2024	5-year Cumulative Total 2020-2024
Survival Rate	99/226 (44%)	473/1,028 (46%)

- Overall CPR initiated by bystanders, limited to arrest before arrival of EMS personnel:

Year	2020	2021	2022	2023	2024
Bystander CPR	880/1,157 (76%)	966/1,292 (75%)	976/1,378 (71%)	1,095/1,448 (76%)	1,000/1,361 (73%)

# FINANCIAL MANAGEMENT

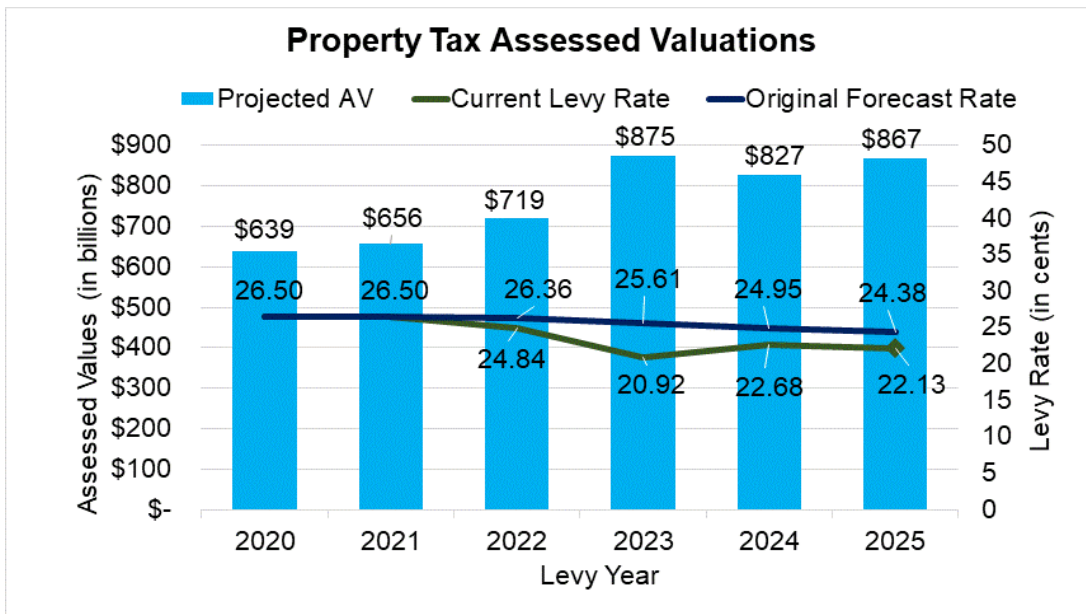
## EMS Funding & 2024 Financial Plan Overview

The 2020-2025 EMS levy was developed in 2018, during the ninth year of a historical economic expansion. Due to economic influences, such as the COVID-19 pandemic in 2020 and the rising inflation beginning in 2021, the region's economic realities have shifted from what was originally projected. Higher than anticipated revenues, attributed to increased Assessed Valuations (AV) and interest income, have helped offset increased inflation and allowed the region to expand programs supporting new EMTs and paramedics.

The financial information in this report is based on the March 2025 forecast by the King County Office of Economic and Forecast Analysis. An Interlocal Agreement between King County and the City of Seattle allows for EMS levy funds collected within the Seattle city limits to go directly to and be managed by the City. As a result, this section focuses specifically on funds within the King County EMS Fund.

### Updated Levy Forecast

**Assessed Valuations (AV) in the Region.** Per the Revised Code of Washington, the total increase in EMS property taxes collected per year is limited to 1 percent plus new construction. As a result, when AV increases at a rate higher than 1 percent per year, levy rates decrease to stay within the legal limit. Forecasted increases in AV project that 2020-2025 levy rates will decrease from 26.5 cents/\$1,000 AV in 2020 to 22.1 cents/\$1,000 AV by 2025.



**Reserves & Contingencies.** The 2020-2025 Medic One/EMS Strategic Plan included reserves and contingencies to mitigate financial risk. These reserves consist of a 90-day Rainy Day Reserve, an ALS Reserve, and Supplemental Reserves, all of which provide fiscal stability to the EMS system.

Contingencies are being allocated to fund limited support for programs including \$263,775 in 2024 for the Paramedic Training program at Harborview and \$601,407 in 2024 for the ALS Support for BLS Activities program, which assists ALS agencies conduct BLS quality improvement and training responsibilities. Both programs will continue through the next levy period.

**Financial Plan**

The following financial plan provides an overview of the EMS Fund 1190, including a summary of revenues, expenditures, fund balance, and reserves and designations based on the 2024 actuals and a 2025 estimated forecast. In alignment with King County’s strategic goal of financial stewardship, this plan is regularly reviewed by EMS regional partners to ensure sound financial management.

<b>EMS FUND 1190 FINANCIAL PLAN</b>	<b>2024 Actuals</b>	<b>2025 Estimate</b>
<b>BEGINNING FUND BALANCE (A)</b>	<b>109,779,858</b>	<b>120,812,783</b>
<b>REVENUES</b>		
Property Taxes	118,793,971	125,891,678
Interest Earnings/Miscellaneous Revenue	6,642,279	4,461,986
<b>TOTAL REVENUES (B)</b>	<b>125,436,250</b>	<b>130,353,664</b>
<b>EXPENDITURES</b>		
Advanced Life Support Services	65,798,876	75,590,645
Basic Life Support Services	27,819,263	31,297,603
Regional Services	12,078,447	13,994,987
Strategic Initiatives	2,685,806	987,549
Mobile Integrated Healthcare	6,053,232	8,686,674
Grants, Entrepreneurial & Donations	470,971	363,000
<b>TOTAL EXPENDITURES (C)</b>	<b>114,906,595</b>	<b>130,920,458</b>
<b>TOTAL REVENUES LESS TOTAL EXPENDITURES (D)</b>	<b>10,529,655</b>	<b>(566,794)</b>
<b>Other Fund Transactions (E)</b>	503,270	503,270
<b>ENDING FUND BALANCE (A+D+E=F)</b>	<b>120,812,783</b>	<b>120,749,259</b>
<b>RESERVES AND DESIGNATIONS</b>		
Designations (incl Program Balances)	55,853,166	46,513,287
Reserves	64,959,617	74,235,972
<b>TOTAL RESERVES AND DESIGNATIONS (G)</b>	<b>120,812,783</b>	<b>120,749,259</b>
<b>ENDING UNDESIGNATED FUND BALANCE</b>	-	-

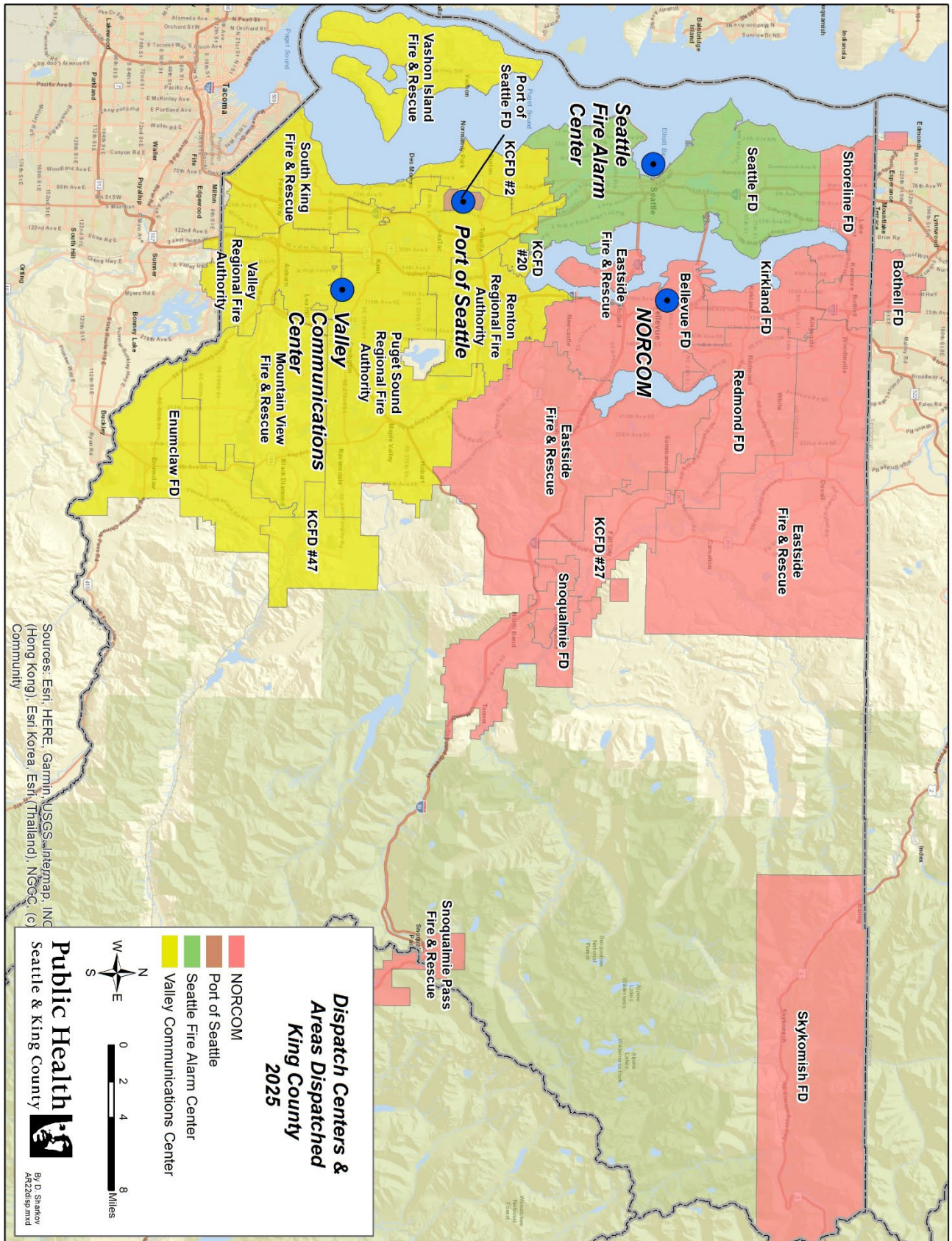
**Conclusion**

The structure of the EMS levy, which includes elements to address unforeseen financial risks, continues to accommodate changing economic conditions and emerging needs.

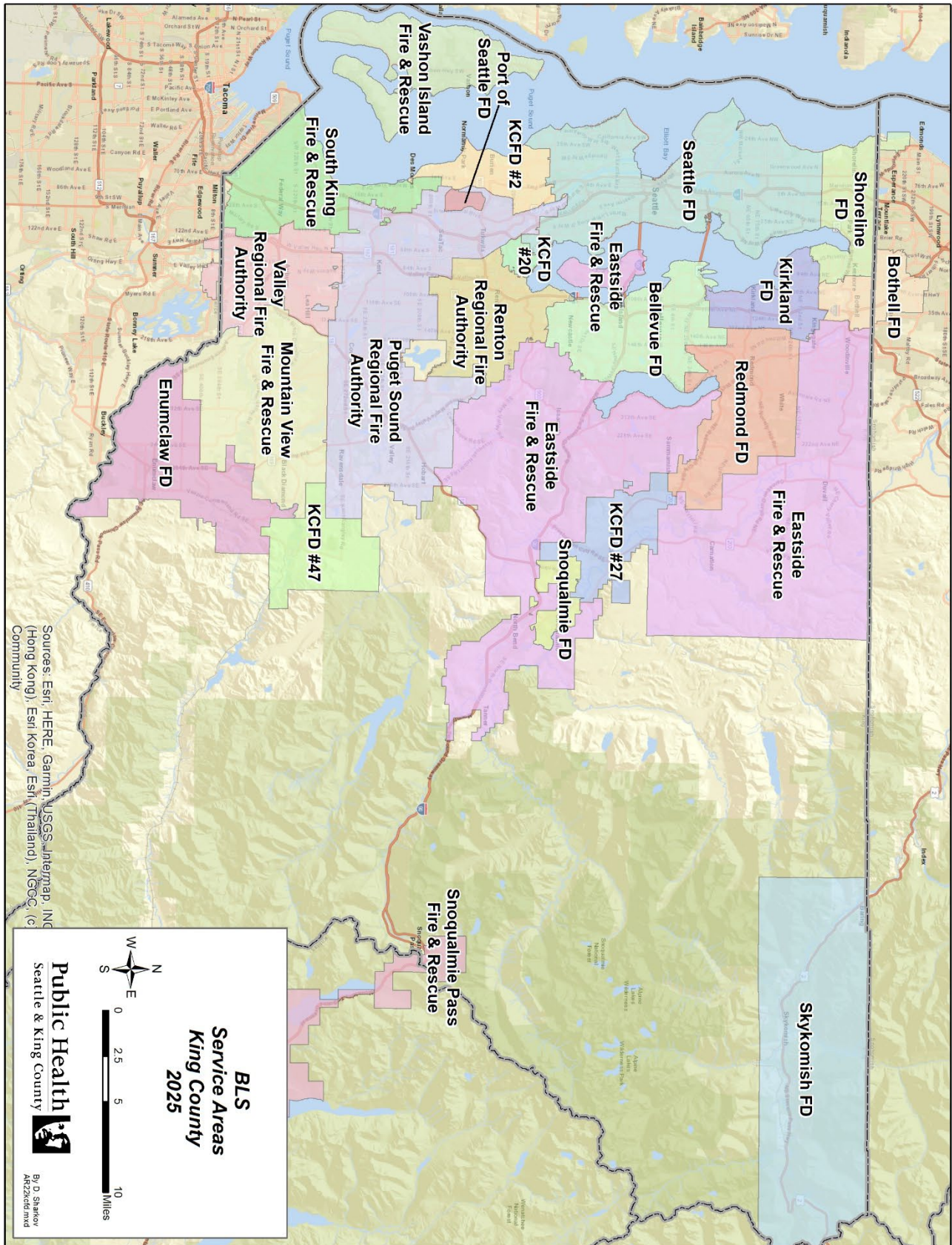
## Appendix A: EMS Performance Measures

Resource Category	Performance Measure & Definition	2024 Results
Systemwide	<b>Rate of cardiac arrest survival (Utstein)</b> % of patients discharged alive from hospital for all non-traumatic bystander witnessed cardiac arrests with an initial arrest rhythm of VF/VT	44%
	<b>Rate of bystander CPR in cases of cardiac arrest</b> % bystander CPR provided for cardiac arrest cases where the arrest occurred before arrival of EMS personnel. Includes only non-traumatic etiology that received ALS care in patients 2 years of age or older	73%
	<b>Rate of correctly identified cardiac arrest by telecommunicators</b> % of confirmed cardiac arrest cases that were correctly identified by dispatcher when provided opportunity to assess	82%
Dispatch	<b>% of bystander CPR resulting from telecommunicator-assisted CPR instructions</b> % bystander CPR provided in cases for cardiac arrest where the arrest occurred before arrival of EMS personnel and CPR was not initiated until after telecommunicator instructions were delivered	89%
	<b>Rate of correctly transferred T-IDC calls</b> % of T-IDC calls that were sent to the Nurseline versus received a BLS response	No Nurseline
	<b>% that response time standards are met for emergency BLS calls</b> Urban response areas: 10 minutes or less, 80 % of all calls Suburban response areas: 20 minutes or less, 80% of all calls Wilderness response areas: As soon as possible	Urban: 4.5 Suburban: 5.9 Rural: 6.5 Wilderness: -
Basic Life Support (Emergency Medical Technicians)	<b>Rate of EMTs documenting FAST and glucometry for suspected stroke patients*</b> % of EMS-suspected stroke patients with EMT documentation of FAST exam and glucometry results	74%
	<b>Rate that "on scene time" standards are met</b> % of suspected CVA and suspected TIA patients with < 15-minute BLS scene time	35%
	<b>Rate of taxi transported patients</b> % of taxi transports of all BLS transports	<1% 1063 vouchers issued
	<b>Compression fraction during resuscitation attempts</b> % of time that compressions are actively applied to the chest, until efforts are ceased, or until sustained ROSC is achieved (whichever event comes earliest)	90%
	<b>% that response time standards are met</b> Respond on average 10 minutes or less, 14 minutes or less, 80% of all calls	=<10 min. 75% =<14 min. 94% Median time 7.8 min.
Advanced Life Support (Paramedics)	<b>Rate of paramedics documenting a 12-lead ECG for STEMI patients</b> % of suspected STEMI cases where paramedics documented use of a 12-lead ECG	90%
	<b>Rate that "on scene time" standards are met</b> % of suspected STEMI patients with < 15 minute on scene time	27%
	<b>Rate of paramedics documenting Glasgow Coma Scale for trauma patients</b> % of trauma patients transported to Harborview Medical Center by paramedics where GCS was documented	90%
	<b>Rate of scene time for trauma patients</b> % of trauma patients taken to Harborview Medical Center by paramedics with < 15 minutes ALS scene time	55%
	<b>Rate of successful first attempt intubations</b> % of successful first attempt intubations	87%
Regional	<b>Rate of cancelled enroute ALS calls</b> % of cancelled enroute ALS calls to all ALS calls	25%
	<b>% of calls where no upgrade or downgrade was needed</b> % of calls where ALS was not cancelled and not requested from scene	51%
	<b>Rate of ALS requests from scene</b> % of BLS requests for ALS from scene of all ALS calls	24%
	<b># of mandatory overtime hours for paramedics</b> # of non-voluntary hours that paramedics were required to work to fully staff medic units	12,693 hours

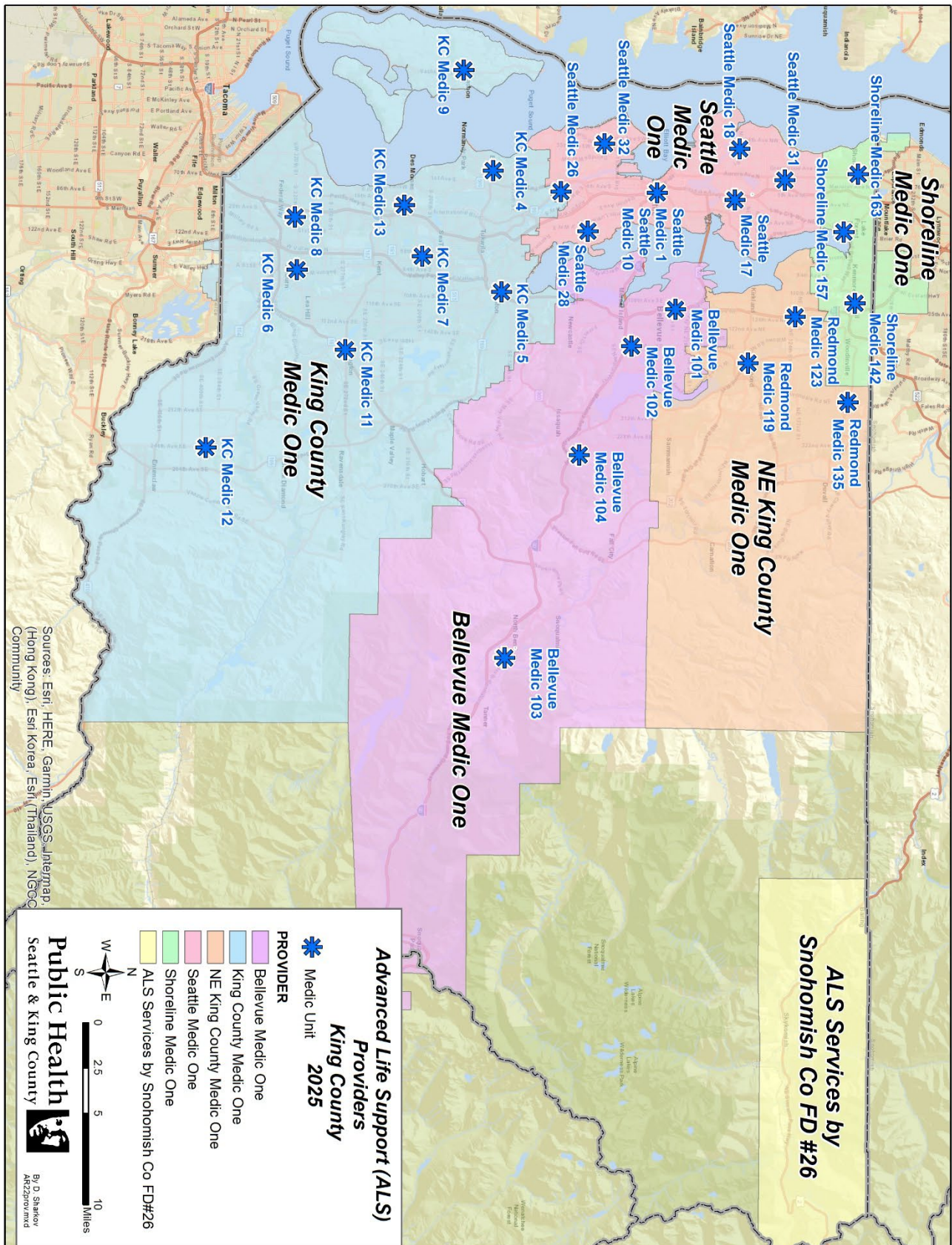
# Appendix B: Regional Dispatch Centers



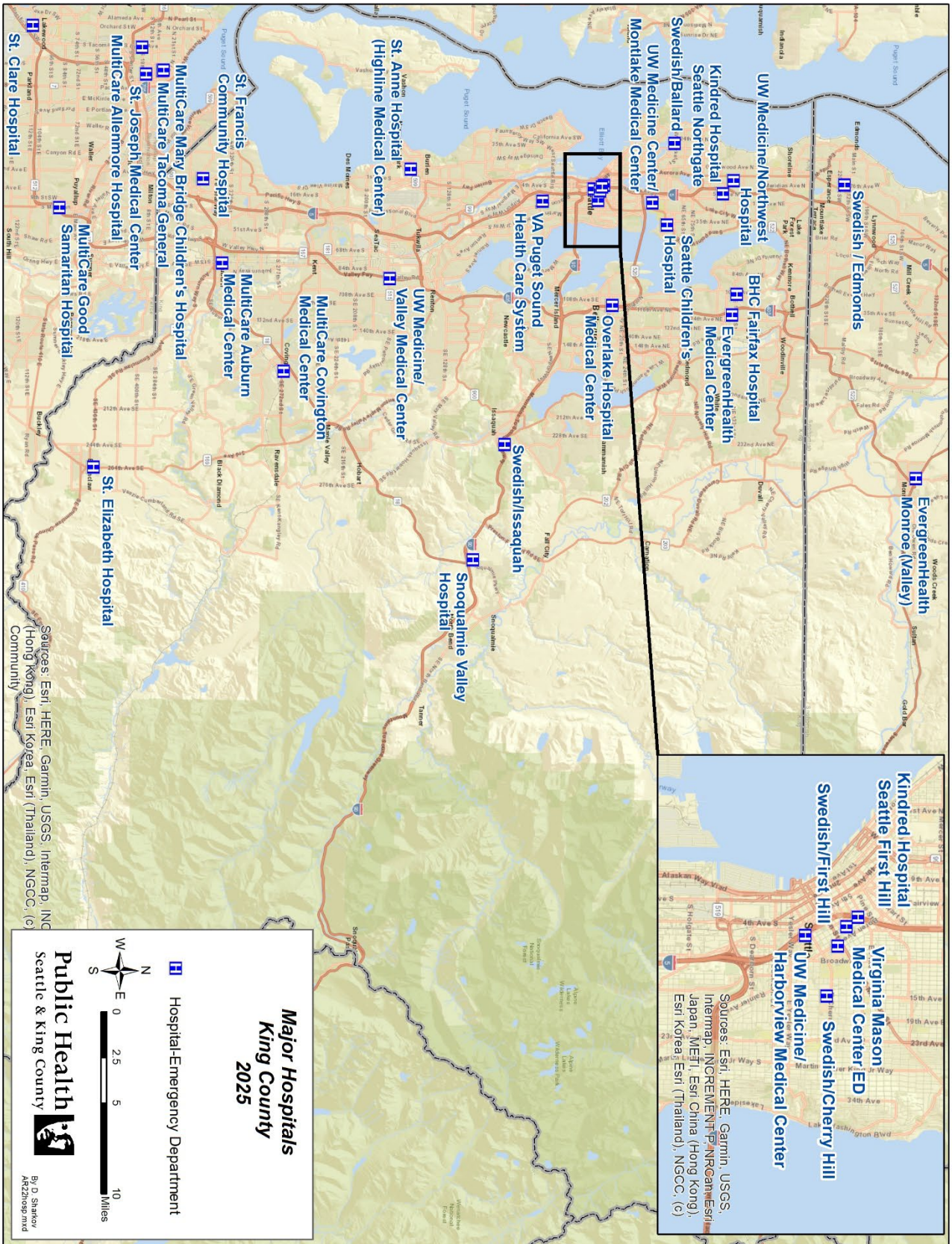
# Appendix C: Basic Life Support (BLS) Service Areas



# Appendix C: Advanced Life Support (ALS) Service Areas



# Appendix E: Major Hospitals



## Appendix F: EMS Advisory Committee (EMSAC)

Formed in 1997, the EMS Advisory Committee (EMSAC) monitors the uniformity and consistency of the Medic One/EMS system. It consists of approximately 20 members representing all aspects of the EMS system and provides key counsel to the EMS Division regarding regional Medic One/EMS policies and practices in King County. Members convene on a quarterly basis to review implementation of the Strategic Plan as well as other proposals put forth, including Strategic Initiatives, consolidations, and medic unit recommendations.

Name	Representation	Title/Organization
Michele Plorde, Chair	Emergency Medical Services Division	Director
Faisal Khan	Public Health - Seattle & King County	Director
Dave Tait	ALS Providers - Bellevue	Chief, Bellevue Fire Department
Andrea Coulson	ALS Providers - KC Medic One	Chief, King County Medic One
Adrian Sheppard	ALS Providers - Redmond	Chief, Redmond Fire Department
Harold Scoggins	ALS Providers - Seattle	Chief, Seattle Fire Department
Matt Cowan	ALS Providers - Shoreline	Chief, Shoreline Fire Department
Brad Thompson	BLS in Cities > 50,000 (Auburn)	Chief, Valley Regional Fire Authority
Jason Gay	BLS in Cities > 50,000 (Burien)	Chief, Fire District #2
Vacant	BLS in Cities > 50,000 (Federal Way)	Chief, South King Fire
Brian Carson	BLS in Cities > 50,000 (Kent)	Chief, Puget Sound Regional Fire Authority
Joe Sanford	BLS in Cities > 50,000 (Kirkland)	Chief, Kirkland Fire Department
Steve Heitman	BLS in Cities > 50,000 (Renton)	Chief, Renton Regional Fire Authority
Ben Lane	BLS in Cities > 50,000 (Sammamish)	Chief, Eastside Fire & Rescue
Dr. Tom Rea	King County	Medical Program Director
Dr. Peter Kudenchuk	Chair, Medical Directors' Committee	Medical Program Director, King County Medic One
Dr. Michael Sayre	Seattle	Medical Program Director
Anita Sandall	KC Fire Commissioner's Assn. - Rural	Fire Commissioner, Eastside Fire & Rescue
Vacant	KC Fire Commissioner's Assn. - Urban	
Ryan Simonds	Labor - BLS	Renton Regional Fire Authority
Steve Perry	Labor - ALS	Paramedic, King County Medic One
Vonnie Mayer	Dispatch	Director, Valley Communications Center
Brant Butte	Private Ambulance	American Medical Response
Ed Plumlee	Citizen Representative	
Vacant	Health Care System	

## Appendix G: Bibliography

1. Berg KM, Bray JE, Ng KC, et al. 2023 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. *Resuscitation*. 2024;195:109992. doi:10.1016/j.resuscitation.2023.109992
2. Greif R, Bray JE, Djärv T, et al. 2024 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. *Resuscitation*. 2024;205:110414. doi:10.1016/j.resuscitation.2024.110414
3. Greif R, Bray JE, Djärv T, et al. 2024 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. *Circulation*. 2024;150(24):e580-e687. doi:10.1161/CIR.0000000000001288
4. Muldowney M, Counts CR, Maider MC, et al. A Comparison of Ketamine to Midazolam for the Management of Acute Behavioral Disturbance in the Out-of-Hospital Setting. *Ann Emerg Med*. 2025;85(5):411-420. doi:10.1016/j.annemergmed.2024.09.003
5. Montgomery EE, Anderson IM, Scherzer DJ, et al. A National Simulation-Based Study of Pediatric Critical Care Transport Teams Performance. *J Pediatr*. 2025;276:114303. doi:10.1016/j.jpeds.2024.114303
6. King J, Blackwood J, Kwok H, Sharar S, Rea T, Murphy D. Abstract Sa103: Characterizing the Apnea Interval During Endotracheal Intubation and Out-Of-Hospital Cardiac Arrest Resuscitation. *Circulation*. 2024;150(Suppl\_1):ASa103-ASa103. doi:10.1161/circ.150.suppl\_1.Sa103
7. Dahmouh H, Gaddam DS, Ho ML, et al. ACR Appropriateness Criteria® Back Pain-Child: 2024 Update. *J Am Coll Radiol*. 2025;22(5S):S79-S107. doi:10.1016/j.jacr.2025.02.037
8. Sandelich S, Hooley G, Hsu G, et al. Acute opioid overdose in pediatric patients. *J Am Coll Emerg Physicians Open*. 2024;5(2):e13134. doi:10.1002/emp2.13134
9. Cabañas JG, Sasson C, Abella BS, et al. American Heart Association Automated External Defibrillator Symposium: Summary and Recommendations. *J Am Heart Assoc*. 2025;14(7):e039291. doi:10.1161/JAHA.124.039291
10. Tunc E, Utarnachitt R, Latimer A, Wall J. Authors' Response. *Air Med J*. 2024;43(5):375. doi:10.1016/j.amj.2024.08.002
11. Shah K, Wang A, Chen Y, et al. Automated loss of pulse detection on a consumer smartwatch. *Nature*. Published online February 26, 2025. doi:10.1038/s41586-025-08810-9
12. Shin J, Liu J, Parayil M, et al. Classifying Race in Out-of-Hospital Cardiac Arrest and Potential Disparities: A Retrospective Cohort Study. *Circ Cardiovasc Qual Outcomes*. 2025;18(3):e011446. doi:10.1161/CIRCOUTCOMES.124.011446
13. Ramsey JT, Pache KM, Sayre MR, Maynard C, Johnson NJ, Counts CR. Comparison of Intubating Conditions with Succinylcholine Versus Rocuronium in the Prehospital Setting. *Prehosp Emerg Care*. 2024;28(4):537-544. doi:10.1080/10903127.2023.2285399

14. Berg KM, Bray JE, Ng KC, et al. Corrigendum to “2023 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces” [Resuscitation 195 (2024) 109992]. *Resuscitation*. 2024;201:110262. doi:10.1016/j.resuscitation.2024.110262
15. Johnson NJ, Rea TD. Defining, divining, and defeating recurrent cardiac arrest. *Resuscitation*. 2024;198:110175. doi:10.1016/j.resuscitation.2024.110175
16. Schwarz ES, Dietrich AM, Sandelich S, et al. Emergency department management of opioid use disorder in pediatric patients. *J Am Coll Emerg Physicians Open*. 2024;5(5):e13265. doi:10.1002/emp2.13265
17. Aljanoubi M, Almazrui AA, Johnson S, et al. Emergency front-of-neck access in cardiac arrest: A scoping review. *Resusc Plus*. 2024;18:100653. doi:10.1016/j.resplu.2024.100653
18. Girotra S, Dukes KC, Sperling J, et al. Emergency Medical Service Agency Practices and Cardiac Arrest Survival. *JAMA Cardiol*. 2024;9(8):683-691. doi:10.1001/jamacardio.2024.1189
19. Tunc EM, Utarnachitt RB, Latimer A, Calhoun A, Gamache D, Wall J. Erratum to “Air Medical Transport of a 12-Year-Old Girl With Cerebral Gas Embolism Due to Helium Inhalation” [Air Medical Journal 42/5 (2023) 377- 379]. *Air Med J*. 2024;43(5):466. doi:10.1016/j.amj.2024.08.001
20. Collins HN, Poel AJ, Liu J, Parayil M, Gimbel S, Hood JE. Evolution of a Post-Overdose Outreach Program in King County, Washington: Lessons Learned Through Continuous Quality Improvement. *Prehosp Emerg Care*. Published online September 17, 2024:1-4. doi:10.1080/10903127.2024.2399214
21. Jarvis JL, Sayre MR, Crowe RP, Menegazzi JJ, Wang HE. “Head Up CPR” Is Not Ready for Widespread Adoption. *Prehosp Emerg Care*. 2024;28(5):745-747. doi:10.1080/10903127.2024.2319697
22. Kwok H, Coult J, Blackwood J, King JA, Kudenchuk P, Rea T. Implications of an individualized resuscitation strategy using continuous rhythm and physiologic status assessment during ongoing CPR. *Resuscitation*. 2025;209:110520. doi:10.1016/j.resuscitation.2025.110520
23. Katsandres SC, Hall J, Danielson K, et al. Inflammation, endothelial injury, and the acute respiratory distress syndrome after out-of-hospital cardiac arrest. *Resusc Plus*. 2024;17:100590. doi:10.1016/j.resplu.2024.100590
24. Meurer WJ, Schmitzberger FF, Yeatts S, et al. Influence of Cooling duration on Efficacy in Cardiac Arrest Patients (ICECAP): study protocol for a multicenter, randomized, adaptive allocation clinical trial to identify the optimal duration of induced hypothermia for neuroprotection in comatose, adult survivors of after out-of-hospital cardiac arrest. *Trials*. 2024;25(1):502. doi:10.1186/s13063-024-08280-w
25. Marin JR, Lyons TW, Claudius I, et al. Optimizing Advanced Imaging of the Pediatric Patient in the Emergency Department: Policy Statement. *Pediatrics*. 2024;154(1):e2024066854. doi:10.1542/peds.2024-066854
26. Marin JR, Lyons TW, Claudius I, et al. *Optimizing Advanced Imaging of the Pediatric Patient in the Emergency Department: Technical Report*; 2024:e2024066855. doi:10.1542/peds.2024-066855
27. Lewis MM, Pache K, Guan S, et al. Pediatric Out-of-Hospital Cardiac Arrest: The Role of the Telecommunicator in Recognition of Cardiac Arrest and Delivery of Bystander Cardiopulmonary Resuscitation. *J Am Heart Assoc*. 2024;13(2):e031740. doi:10.1161/JAHA.123.031740

28. Maloney LM, McKissic DA, Anderson IM, et al. Perspectives on Simulation-Based Pediatric Critical Care Transport Team Education: Qualitative Analysis of Interviews With Transport Program Leaders in the ImPACTS Transport Simulation Study. *Air Med J.* 2025;44(3):179-183. doi:10.1016/j.amj.2025.01.007
29. Perry J, Brody JA, Fong C, et al. Predicting Out-of-Hospital Cardiac Arrest in the General Population Using Electronic Health Records. *Circulation.* 2024;150(2):102-110. doi:10.1161/CIRCULATIONAHA.124.069105
30. Wender ER, Counts CR, Van Dyke M, Sayre MR, Maynard C, Johnson NJ. Prehospital Administration of Norepinephrine and Epinephrine for Shock after Resuscitation from Cardiac Arrest. *Prehosp Emerg Care.* 2024;28(3):453-458. doi:10.1080/10903127.2023.2252500
31. Licona-Freudenstein A, Morgan L, Barry D, et al. Prehospital use of levetiracetam in pediatric status epilepticus. In: *Pediatric Academic Societies.* ; 2025.
32. Shin J, Rea T. Race and Resuscitation: Taking the Next Steps. *J Am Heart Assoc.* 2025;14(4):e039353. doi:10.1161/JAHA.124.039353
33. Krychtiuk KA, Starks MA, Al-Khalidi HR, et al. RANdomized Cluster Evaluation of Cardiac ARrest Systems (RACE-CARS) trial: Study rationale and design. *Am Heart J.* 2024;277:125-137. doi:10.1016/j.ahj.2024.07.013
34. Meitlis I, Hall J, Gunaje N, et al. Regional variation in temperature control after out-of-hospital cardiac arrest. *Resusc Plus.* 2024;20:100794. doi:10.1016/j.resplu.2024.100794
35. Rea T. Resuscitation Research: Best Laid Plans and the Real World. *Circ Cardiovasc Qual Outcomes.* 2024;17(3):e010607. doi:10.1161/CIRCOUTCOMES.123.010607
36. Bjelic M, Goldenberg I, Younis A, et al. Risk Prediction in Male Adolescents With Congenital Long QT Syndrome: Implications for Sex-Specific Risk Stratification in Potassium Channel-Mediated Long QT Syndrome. *J Am Heart Assoc.* 2024;13(3):e028902. doi:10.1161/JAHA.122.028902
37. Okubo M, Komukai S, Izawa J, et al. Survival After Intra-Arrest Transport vs On-Scene Cardiopulmonary Resuscitation in Children. *JAMA Netw Open.* 2024;7(5):e2411641. doi:10.1001/jamanetworkopen.2024.11641
38. Doerning R, Danielson KR, Hall J, et al. Targeted temperature management at 33 versus 36 degrees after out-of-hospital cardiac arrest: A follow-up study. *Resusc Plus.* 2025;22:100921. doi:10.1016/j.resplu.2025.100921
39. McBride O, Poel A, Counts C, et al. Temporal Patterns in Out-of-Hospital Cardiac Arrest Incidence and Outcome: *JAMA cardiology.* Published online March 7, 2005.
40. Jones M, Osborne C, Shekhar R, Pienaar J, Harris M, Foster E. Testing Likely Response to Behavioral Nudges and Shoves to Promote COVID-19 Vaccine Uptake Amongst Segments of the Unvaccinated Population of South Africa. *J Health Commun.* 2023;28(sup2):5-14. doi:10.1080/10810730.2023.2231373
41. Murphy DL, King JA, Blackwood J, et al. The apnea interval: Ventilation interruption during tracheal intubation and its association with cardiac arrest resuscitation care and outcome. *Resuscitation.* Published online March 17, 2025:110588. doi:10.1016/j.resuscitation.2025.110588
42. Rea TD, Kudenchuk PJ. The Details Matter for Defibrillator Pad Placement and Cardiac Arrest Resuscitation. *JAMA Netw Open.* 2024;7(9):e2431630. doi:10.1001/jamanetworkopen.2024.31630

43. Baldi E, Klersy C, Chan P, et al. The impact of COVID-19 pandemic on out-of-hospital cardiac arrest: An individual patient data meta-analysis. *Resuscitation*. 2024;194:110043. doi:10.1016/j.resuscitation.2023.110043
44. Hershkowitz M, Davis-Allen P, Kniest L, et al. Transcutaneous Pacing-A Prehospital Study. In: ; 2025.