

Public Health
Seattle & King County



**Division of
Emergency
Medical
Services**



2019 Annual Report

to the King County Council
September 2019

Medic One/Emergency Medical Services (EMS) serves nearly 2.2 million people in Seattle & King County and provides life-saving services on average **every 3 minutes**.

It is available to everyone, whatever and wherever the emergency.

Every year, **the Medic One/EMS System saves thousands of lives:**

In 2018, Emergency Medical Technicians (EMTs) responded to approximately 270,000 calls regionwide.

Paramedics responded to over 50,000 calls for advanced life support.

Compared to other communities, cardiac arrest victims are 2 to 3 times more likely to survive in Seattle & King County.

Over the past year, 289 people in Seattle & King County were saved from cardiac arrest.

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

Directors' Message

We are pleased to present the Emergency Medical Services (EMS) Division 2019 Annual Report to the King County Council, per King County Ordinance #12849.

The 2019 report highlights the different operational, programmatic and financial aspects of our Medic One/EMS system. You will find information on the EMS Division's regional services undertaken with its wide array of regional partners, and examples of our shared commitment to quality, equity, fiscal responsibility and community.

While all our activities deserve to be in the spotlight, two programs initiated this year in response to emerging needs really stand out. One is caring for the **mental wellness of our providers**. A recent assessment of our regional EMS workforce revealed that nearly half of first responders have experienced symptoms of depression or sleep disruptions, yet few have used the limited existing support programs for assistance. The interest in having more resources and support for stress management sparked the development of several strategies to come to the aid of our EMS providers. This includes fire and EMS personnel, 9-1-1 call receivers and dispatchers as well as administrative and support staff. The strategies range from changing the culture about mental wellness to increasing the awareness of, and access to, wellness training and programs.

Another is the launch of the **opioid dashboard** displaying EMS responses to suspected opioid overdose incidents. Data collection and surveillance is a high priority in Seattle & King County as the region deals with this widespread public health crisis. The dashboard, with its close-to-real-time information, can help detect clusters of overdoses, indicating a potent or toxic influx of drugs or an increase in use. Armed with this type of cluster analysis, our partners can target communication to users and be better equipped to save lives.

Also worth mentioning is the **endorsement and formal adoption** of the **2020-2025 Strategic Plan and EMS levy** package. Last year, the EMS Advisory Task Force oversaw an extensive regional process that created the Strategic Plan and supporting levy. This year, per state law, that package required regional buy-in by 11 of the cities over 50,000 in population and the King County Council in order for an EMS levy to be placed on the ballot. The EMS Division supported this endeavor by briefing different councils, committees and boards on the proposed levy in collaboration with our EMS partners. The Strategic Plan and levy package was endorsed throughout the region this past June, clearing the way for an EMS levy to be put before the voters in November, 2019. Many, many thanks to our EMS partners for their support in championing the process.

This is just a sample of what can be found in the pages of this year's Annual Report. We appreciate the opportunity to showcase how exceptional our EMS system is here in King County, and that it reflects an uncommon commitment of the people who plan, prepare and deliver it.



Patty Hayes, RN MN
Director, Public Health - Seattle & King County



Michele Plorde, MPH
Division Director, EMS

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Commonly Used Acronyms

EMS - Emergency Medical Services
 ALS - Advanced Life Support
 BLS - Basic Life Support
 EMD - Emergency Medical Dispatch
 EMT - Emergency Medical Technician
 MIH - Mobile Integrated Healthcare

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ACKNOWLEDGEMENTS

We would like to thank all of the individuals who contributed to the EMS Division 2019 Annual Report, including the staff members of the Emergency Medical Services Division, King County Medic One, the University of Washington, and our regional partners.

We recognize below those who contributed in various ways to the content, writing, design, and production of this document.

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Executive Summary

The EMS Division's Annual Report showcases the variety of disciplines needed to pursue excellence in serving our community. Every year, it allows us to highlight those lesser seen programs and activities that help make the "lights and sirens" part of our system so effective. As the final year of this levy period comes to a close, the 2019 report provides us the perfect opportunity to reflect on how our initiatives have become deeply rooted in our everyday practice.

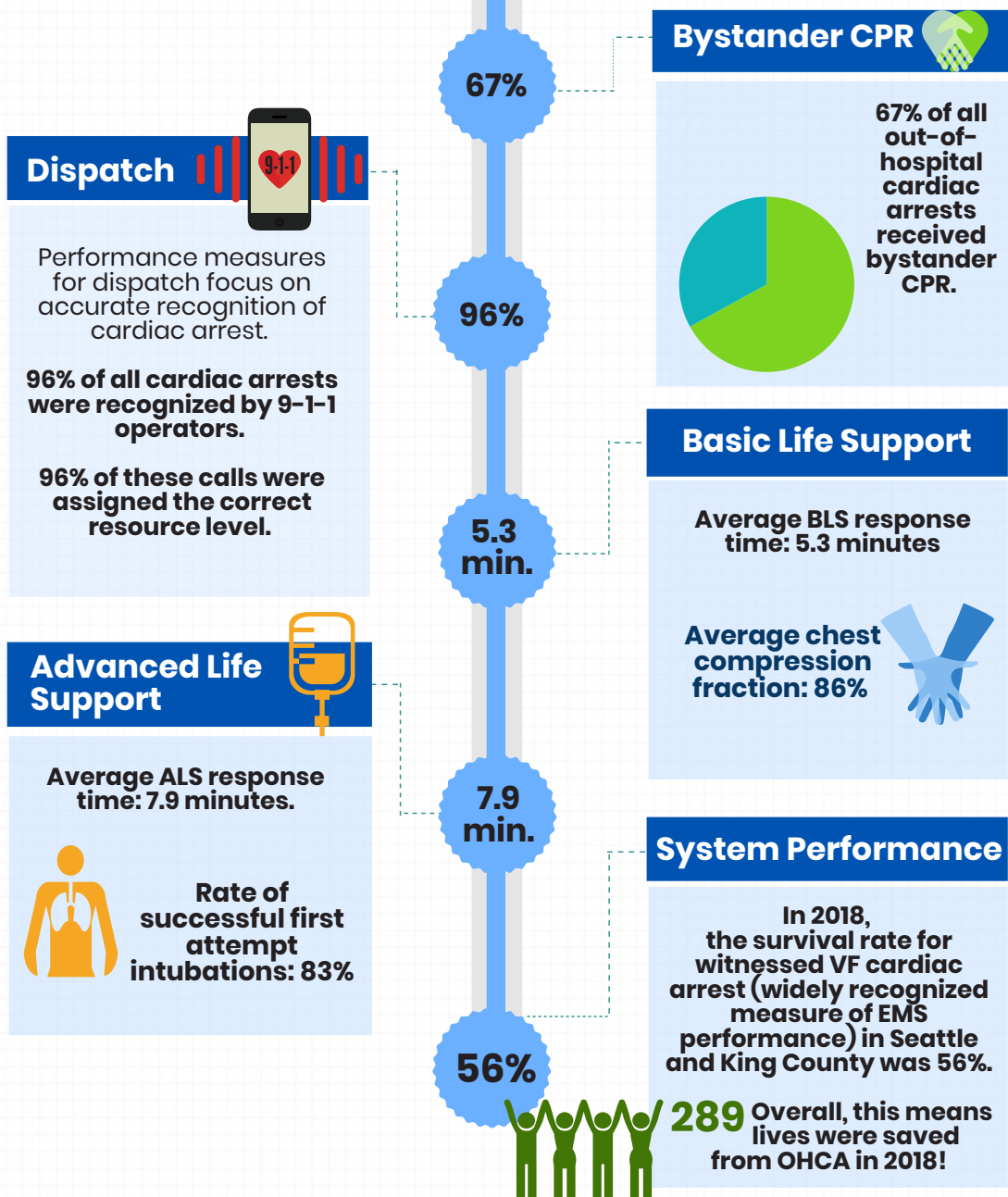
Regional EMS partners embraced efforts to address emerging needs of local areas and communities. The Community Medical Technician model proved to be effective with regional support to expand to the rest of the County in the next levy period. The Vulnerable Populations initiative helped expose some of the gaps in our system and let us better understand how to serve all aspects of our EMS community. The Equity and Social Justice Project that focused on workforce diversity and equitable hiring practices has branched out into a multi-faceted strategy that the King County Fire Chiefs hope to extend to all EMS partners.

Finally, in preparation for the expiring Strategic Plan and EMS levy, EMS partners collaboratively identified how best to move existing regional programs and services forward to meet future needs. We convened our partners to discuss how to modify our programs and practices to ready them for their next iterations. The 2020-2025 Strategic Plan and levy proposal assures that programmatic needs will be met, our system's configuration and strengths remain intact, and the entire EMS program be protected from financial risk.

Reflecting our commitment to innovation, evidence-based practice and "measuring and improving," the 2019 report shows how our regional programs and services are critical to providing the highest quality of out-of-hospital emergency care.

It takes a SYSTEM to save a victim.

In order to increase survival from out-of-hospital cardiac arrest (OHCA) and to ensure high quality patient care, King County EMS tracks a number of performance measures designed for continuous quality improvement. Selected 2018 performance measures are highlighted below.



*Cardiac Arrest survival rate data reflect King County and City of Seattle.

System Overview

Any time residents of Seattle and King County call 9-1-1 for a medical emergency, they are using the Medic One/EMS system. This internationally-renowned regional system responds to an area of 2,134 square miles and serves a population of nearly 2.2 million people. The EMS system is managed by the King County (KC) Emergency Medical Services (EMS) Division, and relies on complex partnerships with fire departments, paramedic agencies, EMS dispatch centers, and hospitals to make the program seamless and successful. 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 out-of-hospital response**.

MEDICALLY-BASED MODEL

The medical model is the core of the EMS program in King County. In essence, it asserts that direction and practice must be derived from the highest standards of medical training and medical care. Accordingly, the EMS Division strives for emergency medical care that is founded on the highest standards of training, best medical practice, scientific evidence, and close supervision by physicians experienced in EMS.

The leadership of the Medical Program Director (MPD), Dr. Thomas Rea, ensures the success and the ongoing medical quality improvement of the EMS system. A Professor of Medicine at the University of Washington and Harborview Medical Center, Dr. Rea has spent the past decade working with the King County Medic One paramedics, overseeing the continued high standard of EMS care. As MPD, Dr. Rea's responsibilities include writing and approving medical protocols, approving all initial Emergency Medical Technician (EMT) and continuing EMT medical education, undertaking new and ongoing medical quality improvement activities, and initiating disciplinary actions when necessary.

To support the best possible outcomes of care, Dr. Rea oversees medical quality improvement activities, such as the review of cardiac arrest events and patient protocol compliance audits. Dr. Mickey Eisenberg, former MPD, also provides regional medical quality improvement direction to KC EMS. The result of this ongoing quality improvement is enhanced patient outcomes and an excellent cardiac arrest survival rate that has been among the highest reported in the nation.

REGIONAL PARTNERSHIPS

Regional partners sustain uniformity and consistency across the entire EMS system. Dr. Rea coordinates policies and procedures among the ALS Program Medical Directors of the region's five paramedic programs: Dr. Michael Sayre of Seattle; Dr. Jim Boehl of Bellevue; Dr. Adrian Whorton of Redmond; Dr. Andy McCoy of Shoreline; and Dr. Peter Kudenchuk for south King County.

Dr. Rea also works closely with the Central Region EMS and Trauma Care Council and the EMS Advisory Committee (EMSAC) which provide key counsel to the EMS Division on regional Medic One/EMS policies and practices in King County, including major governance issues, strategic plan implementation, and other proposals.

TIERED OUT-OF-HOSPITAL RESPONSE SYSTEM

The Medic One/EMS system operates in a coordinated partnership among numerous stakeholders across the region to provide high quality prehospital medical care. It is this continuum of consistent, standardized medical care and collaboration that allows the system to excel and obtain the best possible patient outcomes. The use of a tiered response system ensures the most appropriate care provider responds to each 9-1-1 call. The tiered regional Medic One/EMS system consists of the following five major components:

EMS Tiered Response System



Access to EMS System:

Bystander calls 9-1-1



Triage by Dispatcher:

Use of Emergency Medical Dispatch (EMD) Response Assessment Criteria



First Tier of Response:

All EMS service requests receive a first tier response from Basic Life Support (BLS) by firefighter/EMTs, CMTs, and Nurseline



Second Tier of Response:

Advanced Life Support (ALS) by paramedics



Additional Medical Care:

Transport to hospital

EMS SYSTEM ACCESS: A patient or bystander accesses the Medic One/EMS system by calling 9-1-1 for medical assistance. Bystanders' 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) (e.g., BLS, ALS) to dispatch to the scene, or refer the caller to the Nurseline. Pre-arrival instructions for most medical emergencies guide the caller through life-saving steps, including CPR and instructions to use an AED, until the Medic One/EMS provider arrives.

FIRST TIER RESPONSE - BASIC LIFE SUPPORT (BLS) SERVICES:

Emergency Medical Technicians (EMTs) respond to 100% of emergency medical calls and usually arrive first on scene. Approximately 4,500 EMTs are employed by 30 fire-based agencies. BLS provides medical care (advanced first aid, CPR/AED) to stabilize the patient. BLS units arrive at the scene in 5.3 minutes, on average. EMTs are certified by the State of Washington and are required to complete initial and ongoing continuing education and training to maintain certification. In response to low-acuity calls, Community Medical Technician (CMT) units may be dispatched to respond.

SECOND TIER RESPONSE - ADVANCED LIFE SUPPORT (ALS) SERVICES:

Paramedics respond to about 20% of all calls and usually arrive second on scene to provide emergency care for critical or life-threatening injuries and illness. Regional paramedic services are provided by five (5) agencies operating 26 ALS units throughout King County, including fire departments in Bellevue (4), Redmond (3), Shoreline (3), Seattle (7), and King County Medic One (9). A contract

with Snohomish County Fire District 26 provides EMS services to the Skykomish and King County Fire District 50 area, from Baring to Stevens Pass. The 270 paramedics in our system have received over 2,500 hours of intensive training through the University of Washington/Harborview Medical Center Paramedic Training program.

ADDITIONAL MEDICAL CARE - TRANSPORT TO HOSPITALS: Once a patient is stabilized, EMS personnel determine whether transport to a hospital or clinic for further medical attention is needed. Transport is provided by an ALS or BLS agency, private ambulance, or taxi for lower-acuity situations.

EMS Division Programs Overview

BACKGROUND

The Medic One/EMS 2014-2019 Strategic Plan, approved by the King County Council and voters in 2013, is the primary policy and financial document that directs the system into the future. Built upon the system's successful medical model and regional approach, the plan establishes policy directions, outlines the development of new or enhanced programs and initiatives, and presents a financial plan to support the Medic One/EMS system through 2019. The plan was developed collaboratively through a regional process with stakeholders, and guides the EMS Division in managing the regional system.

OVERVIEW

The EMS Division manages the core Regional Services and Strategic Initiatives that support the key elements of the system. These programs help tie together the regional medical model by providing consistent regional medical direction, standardized EMT training and continuing medical education, uniform EMS training for emergency dispatchers, centralized data collection and expert analysis, paramedic service planning and evaluation, and financial management of the regional EMS levy fund. Coordinating these programs on the regional level ensures prehospital patient care is delivered at the same standards across the system, policies and practices reflecting the diversity of needs are maintained, and local area service delivery is balanced with centralized interests. All EMS Division programs are designed to enhance the integrated Medic One/EMS services and regional approach, and are developed through strong partnerships with other regional EMS agencies and innovative leadership in the emergency medical field.

The EMS Division acknowledges the extraordinary efforts of all the EMS partners involved in implementing established programs and developing new programs. The time, expertise and collaborative efforts required of the EMS community demonstrate exactly why the EMS system in King County is so successful and serves as an international role model.

This section of the report highlights some of the Division's many successful programs and activities from the past year. For more information about other EMS regional programs, please refer to the EMS webpage: www.kingcounty.gov/health/ems.aspx.

2019 EMS Division Highlight

Mobile Integrated Healthcare (MIH) Update

Managing the rate of call growth in the EMS system remains a regional priority and ongoing focus since 2002. Potential impacts of unmanaged growth of calls may reduce EMS' ability to respond to true medical emergencies, provide quality patient care, and achieve performance standards such as response times in accordance with national standards. The EMS Division continues to work with fire departments and agencies and other community partners to efficiently and effectively identify non-emergency patients and callers to provide alternatives to dispatching a BLS unit.

MOBILE INTEGRATED HEALTHCARE (MIH) BRIDGE TO THE 2020-2025 LEVY PERIOD

As highlighted in the 2018 Annual Report, Mobile Integrated Healthcare programs have gained increasing support with community members and EMS providers alike.

MIH programs connect individuals accessing the EMS system to the most appropriate health care providers and social services. This includes linking frequent and lower acuity caller with an appropriate level of service, improving integration with behavioral health, and referring individuals to community-based services, among other activities.

During the 2014-2019 levy span, the EMS Division worked closely with agencies to support the development of five MIH programs, operating in multiple areas throughout King County. MIH programs currently operating in King County include:

- Shoreline Fire Department MIH program, which also works with Bothell Fire & EMS and Woodinville Fire and Life Safety
- Redmond Fire Department's MIH program
- Bellevue Fire Department's CARES program that delivers MIH services
- Puget Sound Regional Fire Authority's FDCARES program that delivers MIH services, with plans to expand its services in collaboration with Renton Regional Fire Authority
- Valley Regional Fire Authority and South King Fire and Rescue's MIH program.

By having personnel dedicated to connecting callers to the correct resources, EMS is given the tools to provide a meaningful intervention and truly impact the patient's well-being.



LOOKING AHEAD: *The region identified extending the MIH network to all parts of King County as a priority for 2020 and beyond. The Medic One/EMS 2020-2025 Strategic Plan commits to exploring a MIH model using a regional, coordinated, and inclusive approach. Prior to the MIH start in 2020, regional partners have been meeting to identify goals and objectives for MIH work, and create consistency around data collection, measures and program reporting to help evaluate the effectiveness of the programs delivering MIH services.*

2019 EMS Division Highlight

Levy Planning for the 2020-2025 Medic One Reauthorization

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.

With the current six-year levy expiring on December 31, 2019, the region recently undertook an extensive planning process to develop a new Strategic Plan and levy for King County voters to renew in 2019. This process brought together regional leaders, decision-makers and Stakeholders to assess the needs of the system and develop recommendations to ensure continued emergency medical services in 2020 and beyond. As in past years, an EMS Advisory Task Force oversaw the development of the recommendations, and was responsible for endorsing broad policy decisions, including the levy rate, length, and ballot timing.

Mandated by state law to be exclusively used to support emergency medical services, the EMS levy is a reliable and secure source for funding our world-renowned system.

The Task Force used four subcommittees to conduct the bulk of the program and cost analyses. Each was chaired by an EMS Advisory Task Force member and comprised of EMS Stakeholders and subject matter experts from all aspects of Medic One/EMS system. These groups met monthly and generated final programmatic and financial recommendations that the Task Force endorsed on September 18, 2018. For more detailed information on the process and the Task Force's recommendations, please see the **2018 Annual Report**.

The King County Executive developed the Medic One/EMS 2020-2025 Strategic Plan based directly on the Task Force Recommendations, and forwarded it the King County Council for discussion and deliberation. Accompanying it was a 26.5-cent EMS levy ordinance, reflecting an updated levy rate based on a more recent financial forecast, that will fully support the programs and services outlined in the Plan. On June 26, 2019, the King County Council unanimously passed the Medic One/EMS 2020-2025 Strategic Plan and EMS levy ordinances, clearing the way **for the EMS levy to be run at the November 2019 general election ballot as King County Proposition 1**.

Getting to this point was not a straight line...

RCW 84.52.069 mandates that: 75% of cities with 50,000+ in population must approve placing a county-wide EMS levy on the ballot. As of January 1, 2018, King County was home to 11 such sized cities: Auburn, Bellevue, Burien, Federal Way, Kent, Kirkland, Redmond, Renton, Sammamish, Seattle and Shoreline. To support the endeavor, the EMS Division briefed 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 early July 2019.

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

ADOPTED 2020-2025 MEDIC ONE/EMS STRATEGIC PLAN



- A six-year Medic One/EMS levy at \$.265 per \$1,000 Assessed Value (AV)
- Fully funding eligible Advanced Life Support (referred to as ALS, or paramedic services) costs
- Including a "placeholder" should service demands increase beyond what is anticipated, requiring new units
- Continued funding for Basic Life Support (referred to as BLS, or "first responders"), with simplified and streamlined administration of the funds
- A commitment to the continued exploration of Mobile Integrated Healthcare (MIH) models to address community needs
- Sustained funding 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 by building upon existing investments
- Policies that provide additional protection and flexibility to protect the system from unforeseen financial risks, including the ability to direct balances into reserves or buy down a future levy rate
- Carrying forward \$20 million of 2014-2019 levy period reserves into the 2020-2025 levy period reserves for additional security
- Running the EMS levy at the November 2019 general election



LOOKING AHEAD: *Reflected throughout the Medic One/EMS 2020-2025 Strategic Plan is our system's long and vibrant legacy of regional collaboration and commitment. As such, activities will remain conducted on a regional/ multi-agency/zonal level; standardization, consistency and coordination will remain on the forefront; and expanding these benefits to all agencies, throughout all tiers, regardless of agency size or budget, will remain a priority. The resulting Plan is a well-balanced approach that builds upon the system's current successful medical model and allows for continual improvement and innovation.*

2019 EMS Division Highlight

Future Women in EMS & Fire Academy

CREATING PATHWAYS TO CAREERS IN FIRE & EMS

Beginning spring of 2018, King County EMS has partnered with various regional Fire Departments to sponsor three Future Women in Fire and EMS Workshops for females, 18 years and older. Geared toward encouraging women to join the fire and EMS service as a career, each workshop included interactive interview panels, hands-on stations, lectures, and real-life demonstrations for 20 participants. The curriculum provided opportunities for participants to engage, network and interact with women currently employed in fire and EMS agencies across King County, including female ranking officers, paramedics, and firefighters. Additionally, all workshops were volunteer-run by women from 13 different regional fire departments in the region that they represent.

LEARNING OPPORTUNITIES

The workshops covered topics relevant to both fire and EMS and real-world scenarios to expose attendees to the vast variation that the career encounters. Participants rotated through a number of stations to learn and practice critical skills including: stroke identification, backboard use, patient assessment, wound care, mass casualty incidents, ladder use, forcible entry, donning personal protective equipment, administering CPR/first aid, using hoses, and low-angle rescue response. The academy aimed to engage women interested in pursuing a career in fire and EMS and to empower them to take the next steps. Special thank you to the volunteer staff that supported the workshop.



The goal is to host the Future Women in EMS and Fire workshop twice a year, with host locations alternating between the north and south ends of the region to fully engage all fire departments and to establish pipelines for future women in EMS. Refer to page 15, for more information about the EMS Division's Equity and Social Justice efforts.

EMS Division Update

Promoting Equity and Social Justice in EMS

The EMS Division initiated its Equity and Social Justice (EMS/ESJ) Diversity Project in 2015 to integrate ESJ values and themes into the EMS Division workplace and programs. When compared to other divisions within Public Health – Seattle & King County, EMS ranked low in terms of gender and ethnicity diversity in its workforce, and disparity in relation to pay scale. Developed in response to this finding, the EMS Diversity Project initiative uses a multi-faceted approach to increase the diversity in the emergency medical technicians (EMT) and paramedic workforce, and within the EMS Division.

Strategies for working on ESJ Initiatives in EMS include four objectives:

1. Improve recruitment of diverse candidates
2. Improve hiring of diverse candidates
3. Develop standardized internal hiring processes
4. Continue education in the division

The 2018-2019 EMS ESJ Work Plan addresses these objectives across five different tasks described on the next page, which include: 1) community outreach, 2) working with King County Medic One, 3) recruitment and training, 4) working with the fire chief's group, and 5) working internally with the EMS Division.



EMS Division Update

Promoting Equity and Social Justice in EMS

TASK #1: COMMUNITY OUTREACH

The EMS Division's ESJ Core Team attended school career days, community fairs and festivals, and other various educational and community outreach opportunities to raise awareness of EMS career opportunities. The team worked with integral partners such as regional fire departments, public health, explorer programs, and law enforcement, to make outreach efforts successful.

TASK #2: KING COUNTY MEDIC ONE

The EMS/ESJ Core Team continues to work with King County Medic One (KCM1) to identify ways to increase recruitment and hiring to under-represented groups and opportunities. Adopting similar strategies to King County EMS, KCM1 is committed to continued outreach and education in the community, educating the leadership team at KCM1, hosting open house events, and ensuring that training and learning opportunities are advertised and open to KCM1.

TASK #3: RECRUITMENT AND TRAINING

Increasing the diversity of the EMS workforce by raising awareness and providing training opportunities for traditionally under-represented students are two primary goals of the Strategic Training and Recruitment Program (STAR Program). Students selected for the STAR program enroll in a 14-week EMT training course, free of charge. Upon completion of the program, students take certification tests aligning with their desired EMS career path. Program instructors also provide mentorship to students both during and after the class for career assistance and potential job placement. Based on the results of the STAR program evaluation and direct feedback from students and instructors, the Division focuses on continually improving the program's class structure and selection process.

Recommendations from the evaluation in addition to direct feedback from the students and instructors led changes to the application and selection process to identify appropriate program candidates. These changes included a larger screening panel, reformatting interview questions, creating an introductory course so candidates can better understand what and how they will be learning if they are selected, and expanding the interview panel. The program has seen an increase in the number of STAR students who have successfully completed the course and continued on to their desired career paths in both the public and private EMT industry.

Opportunities to establish partnerships and create a pipeline to careers in EMS were explored. The female firefighter volunteers from the Future Women in EMS and Fire Workshop have expressed interest in forming networking and support groups for current and future female firefighters and paramedics. Additionally, to strengthen relationships with partners and stakeholders, EMS sponsors three campers to attend Camp Blaze. Camp Blaze is an all-female-run fire service immersion camp whose mission is to empower, inspire, and support strong women leaders in both personal and future professional lives, which occurs every other calendar year.

TASK #4: FIRE CHIEFS WORK PLAN

Similar to the partnership with KCM1, the EMS Division is working collaboratively with the King County fire chiefs to create a work plan to roll out to the regional fire departments, consisting of the following tasks:

- Regional outreach, including engagement in schools and communities across the region
- Recruitment, identifying current firefighters and paramedics to create a pool of mentors for current and future recruits and workforce, including establishing mentorship opportunities
- Identifying and addressing issues with testing requirements by engaging and opening dialogues associated with third-party vendors responsible for administering the pre-hiring testing to join EMS or the fire service
- Establishing mentors throughout the hiring process including pre-hiring, during the hiring process, and post hire
- Reviewing and revising hiring practices and engaging the hiring leadership

TASK #5: EMS DIVISION

The EMS Division continues to focus on raising the awareness of equity and social justice across EMS, and building the knowledge, skills, and behaviors necessary to build an organizational culture that promotes fairness and opportunity. Since 2016, the EMS/ESJ Core Team has worked collaboratively with Public Health ESJ trainers and EMS leadership in developing standard and consistent hiring practices and training for the Division. In 2019, one of the Division's priorities focused on continuing education and fostering healthy dialogue with its workforce members on a multitude of ESJ topics. Innovative ways of promoting ESJ in EMS included hosting a monthly EMS/ESJ forum involving the entire Division to engage in honest and open conversations about ESJ topics. EMS leadership engaged in growth and development through training opportunities such as the Building a Racially Just King County training sponsored by King County's Office of Equity and Social Justice featuring Heather Hackman. Offering these opportunities to EMS Division staff has been made possible by identifying and advertisement of appropriate training events. Lastly, having good representation throughout the division to engage in these discussions and core activities.



EMS Division Update

King County Medic One

King County Medic One (KCM1) is one of the five Advanced Life Support (ALS) paramedic agencies in the regional EMS system. KCM1 now serves approximately 557 square miles of south King County, including Vashon Island, with a population that is now close to 750,000 people. In calendar year 2018, KCM1 responded to over 19,000 calls for advanced care, including cardiac emergencies, pediatric patients, mass casualty, and motor vehicle crashes.

STOP THE BLEED CAMPAIGN

Blood loss is the leading cause of preventable death after a traumatic injury occurs. Having bystanders trained in how they can help control bleeding until help arrives can often make the difference between life and death.

That's where life-saving [Stop the Bleed](#) training comes in. Tailored to a non-medical audience, this one-session training is designed to help people recognize life-threatening bleeding, and intervene. The training includes hands-on practice of direct pressure application, wound packaging and the use of a tourniquet.

Initially developed as a national campaign, many of our local EMS agencies are providing Stop the Bleed trainings, along with partners at UW Medicine, Harborview Medical Center, and the [Harborview Injury Prevention and Research Center](#). Staff from Harborview Medical Center's Department of Surgery and King County Medic One staff and other local fire agencies trained Community Emergency Response Teams (C.E.R.T) from various communities consisting of volunteers to respond in the event of an emergency or disaster to use their valuable training. King County Medic One recently hosted the Stop the Bleed training in the Somali community pictured to the right.

A second component to our local Stop the Bleed program is providing bleeding control kits in public places - such as schools, college campuses, airports, and businesses - next to the automated defibrillators (AEDs) we use for cardiac arrest. Each kit comes with gloves, packing gauze, compression bandage, tourniquet, marking pen, and patient mover. More kits are continuing to be added in the community – look for them next to AEDs!

For more information about the national Stop the Bleed program, visit: bleedingcontrol.org.

Want to get trained in Stop the Bleed? For class availability and to learn more about the Stop the Bleed program in Washington State, visit: StoptheBleedWA.org.

In theory, Stop the Bleed uses a "ripple" approach:

Your King County Medic One paramedics train community partners, and in turn, they train others.



CARING FOR THE MENTAL WELLNESS NEEDS OF OUR PROVIDERS

First responders face challenging emergency medical situations that constantly expose them to mental, physical, and emotional stress. It takes a certain type of person to dedicate their lives to helping patients in their time of need. From 9-1-1 call receiving to arriving at the hospital, each call is an investment in another person's life. This can take a toll on EMS providers' health, not just in the moment, but also over time.

To better understand these challenges, King County Medic One staff joined nearly 1,000 regional EMS providers in a countywide wellness needs assessment that reviewed both the health of the local EMS workforce, and existing resources for personnel. Although most respondents reported to be in good or excellent health, work-related stress was identified as a significant issue that could lead to sleep deprivation, symptoms of depression, or a similar degree of sleep problems. In general, awareness of symptoms of stress and Post Traumatic Stress Disorder (PTSD) was high.

The assessment revealed that while some resources and employee assistance programs (EAPs) are accessible, only a few EMS providers reported having used existing programs. In addition, there was significant interest in having additional resources and support for stress management be made available.

In response, the King County Fire Chiefs Association and its regional EMS partners are developing several strategies to support local EMS providers, including fire and EMS personnel, 9-1-1 call receivers and dispatchers, and administrative and support staff. This includes:

- New and ongoing trainings to support mental wellness
- New policies to improve mental wellness culture and access to resources and being implemented
- Building and managing a common registry of peer support counselors in King County and increasing the awareness of peer support training opportunities
- Increasing the awareness and availability of wellness training/programs
- Improving access to health professionals and counselors (available in person, online, and via phone)
- Emotional wellness and behavioral health



LOOKING AHEAD: *Psychological preparedness for first responders is an integral, yet commonly overlooked, part of training. Programs like Peer Support and THRIVE: A Psychological Preparedness Program for First Responder Wellness provides support, education, and training to paramedics on topics such as behavioral health awareness, prevention and intervention strategies. For more information about the THRIVE Program, visit: <https://www.firstresponderps.com/training.html>.*

Training & Education

The Training & Education Section is responsible for the initial training, continuing education, instructor training, and recertification oversight for the more than 4,500 Emergency Medical Technicians (EMTs) that practice throughout King County. It works collaboratively with its regional EMS stakeholders and the King County Medical Program Director (MPD) to develop and support the curricula so that state, national and agency requirements are met. In addition, the Training & Education Section serves as the liaison between King County's 28 fire agencies that provide basic life support services and the Washington Department of Health (WA DOH) in regard to initial certification, training authorizations, certification renewals, and regulatory or policy updates affecting the delivery of EMS.

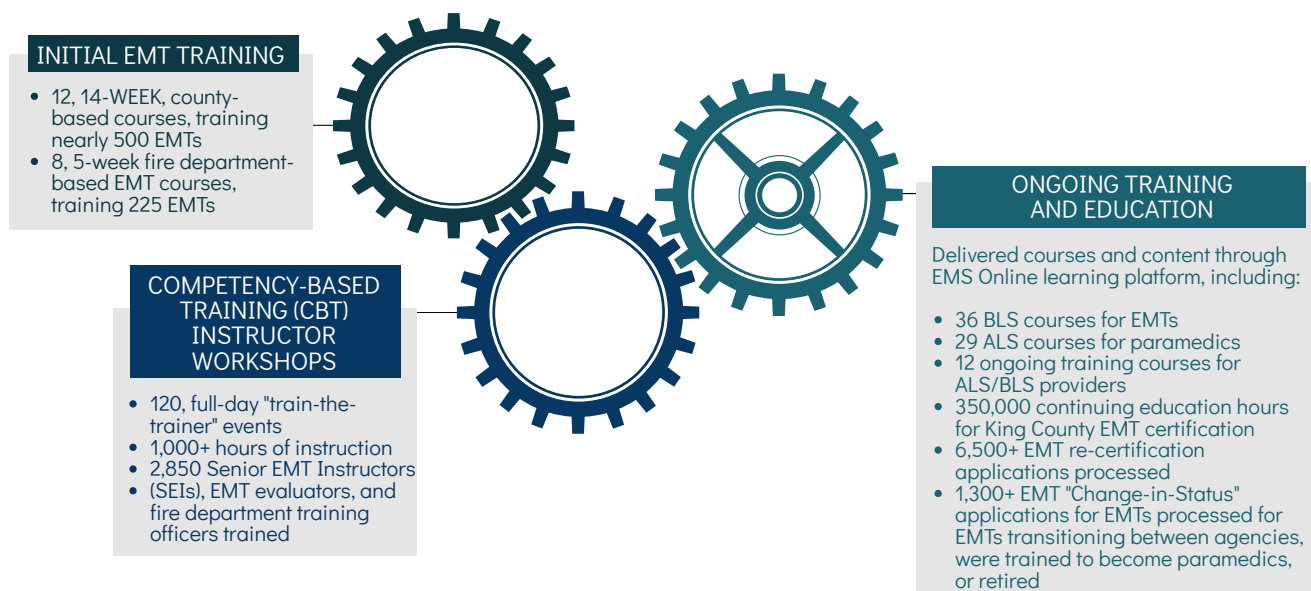
INITIAL EMT TRAINING

Through its initial EMT training classes, the EMS Division provides the foundation for EMT success through the provision of 132 hours of classroom and practical instruction accompanied by a minimum of ten hours of hospital observation time. Two 14-week classes are offered annually with lectures and dynamic scenario testing occurring both evenings and weekends throughout the course.

While these 14-week programs certified and prepared more than 80 new EMTs to deliver among the highest quality BLS care throughout the region, the longer programs sometimes fall outside of the staffing needs as expressed by the regional fire departments. Therefore, the EMS Division has continued to support the ability of Zone 1 and Zone 3 to host their own intensive five-week initial EMT training for their new recruits using the Training & Education section's curriculum, materials, and Senior EMT Instructors. As highlighted in the 2018 Annual Report, this collaboration between the EMS Division and its partners allows for agencies to provide training sessions based on hiring demands and the needs of the new recruits. Students, trainers and EMS staff agree that these additional classes are a great way to provide agencies with flexibility yet still ensure continued excellence in training EMTs across the area.

ONGOING EMT TRAINING

The State of Washington requires that EMTs complete ongoing continuing education and training to maintain certification. The Training & Education Section is committed to providing peer-reviewed, evidence-based educational opportunities to ensure every King County EMT can meet the state-mandated recertification requirements.



Emergency medical providers can access, complete, and get credit for continuing education courses via King County's EMS Online. These interactive courses are created through the collaborative efforts of local Subject Matter Experts, Harborview Medical Center's physicians' group, and the regional medical program directors. Each course is designed to meet or exceed the EMT renewal requirements as outlined by the State of Washington Department of Health.

Following the creation of each course and prior to distribution, the Training & Education section hosts an intensive "train-the-trainer" event; the Competency Based Training (CBT) workshop. Over a period of 25 days; Senior EMT Instructors, EMT Evaluators, and fire department training officers are provided standardized training, in-depth scenarios, and orientation to the coming year's online courses as well as the annual "State of the EMS System" update by the MPD. In 2019, 475 trainers were certified by the state and authorized by King County to return to their home departments in order to provide our training curricula to their 4500 individual providers.

In 2019, EMS Online offered six BLS and six ALS courses as well as four state-mandated courses focused towards ongoing training. These 16 online courses represent more than 70,000 Continuing Education Hours (CEHs) provided by the EMS Online system and earned by the county's 4,500 EMTs. Every CEH is accredited through the recognized industry standard in distributive, online learning for prehospital professionals, the Commission on Accreditation for Prehospital Continuing Education (CAPCE). Our CAPCE accredited courses enable King County's EMTs to utilize every hour of their online education towards both their Washington state and National Registry of Emergency Medical Technicians (NREMT) certifications. The CEH(s) earned by King County EMTs are administered through the Training & Education section to both the providers' home agency for tracking competency and to the state for adherence to regulatory mandates. In support of our regional agencies, this section processed more than 1,100 individual EMT recertification applications throughout the year.

TRAINING EXCELLENCE

In its third year of national accreditation from the Commission on Accreditation for Prehospital Continuing Education (CAPCE), the Training and Education Section provided more than 140,000 hours of distributive education to 4,500 King County EMTs. Earning the CAPCE accreditation demonstrates the Division's commitment to excellence in EMS Continuing Education (CE) and leadership in the EMS arena.



King County EMS also once again received Washington State Department of Health's approval and authorization to continue providing initial and ongoing EMT training and other educational opportunities designed to enable the recertification of EMTs in alignment with the Ongoing Training and Evaluation Program (OTEP) Plan. In addition, the Division hosted its fourth Annual King County EMS Health & Education Symposium, including more than 500 attendees participating in 36 training sessions.



LOOKING AHEAD: *The Training and Education Section will lead a new strategic initiative, referred to as the "Strategic Transition in Regionalized Innovation, Value, & Education (S.T.R.I.V.E)." Endorsed in the 2020-2025 Medic One/EMS adopted Strategic Plan, this Initiative focuses on strategic investment updates to EMS Online to keep pace with the region's changing educational, data, and technological needs such as: enhanced functionality between EMS Online and King County partners; continued support for King County BLS and Harborview's ALS OTEP plans; collaboration with training officers to meet identified needs; learning management system (LMS) functionality for agencies not yet using a LMS platform; interoperability between identified platforms; and rapid deployment of customized micro-learning opportunities to partners. This Initiative aims to reduce the overall costs as KCIT expenses transition into maintenance and support expenditures.*

Medical Quality Improvement

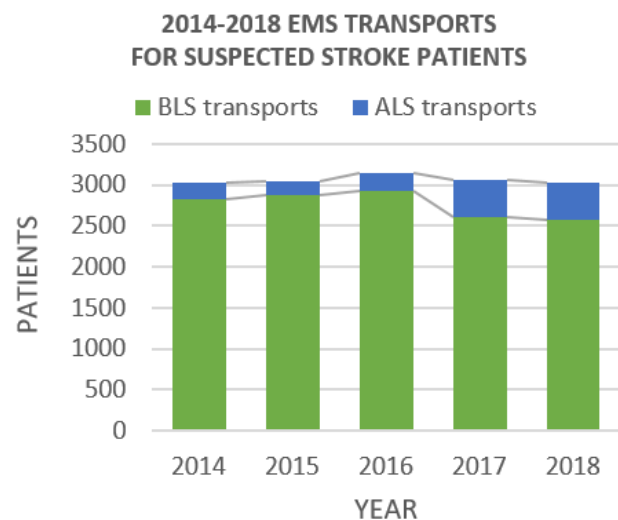
Seattle & King County Stroke Initiative Update

The Medical Quality Improvement (QI) section conducts programmatic, scientific, and case-based evaluation of the EMS system to improve the quality of EMS patient care in King County. To advance the science of resuscitation and EMS care, it partners with investigators in the EMS Division and at the University of Washington on research projects. This allows for productive and unique collaboration across the academic and operational EMS community, the results of which improve care, outcomes, and subsequently, the health of King County residents.

In King County, stroke is the 5th leading cause of death, the 10th leading cause of hospitalizations, and occurs in approximately one out of every ten of adults over the age of 65 years.¹ Stroke is caused by an acute disruption of the blood supply within the brain, most often due to an obstruction (ischemia) or rupture (hemorrhage) of a blood vessel. Prompt recognition and rapid treatment are paramount to mitigating long-term, adverse impacts resulting from a stroke event.

TRENDS IN EMS RESPONSES

EMS plays a pivotal role in the stroke system of care with its prehospital clinical assessment, rapid transport to an appropriate hospital, and early notification to hospitals to activate stroke response teams and prepare for the patient's arrival. Since the start of the current levy period in 2014, EMS agencies in King County (including Seattle) cared for approximately 3,000 patients per year with suspected stroke. Although the majority of stroke patients are transported by BLS, the revised stroke triage tool prompted a slight increase in the number of ALS transports beginning in 2017.



OUR COMMUNITY'S ROLE IN STROKE CARE

Recognizing the signs and symptoms of stroke (in yourself or a loved one) can be difficult due to the numerous signs and symptoms with which it may be present. Immediately calling 9-1-1 is critical. The FAST exam represents some of the most common signs and symptoms of stroke: facial droop, arm and speech difficulty. If you recognize any of these symptoms, it's time to call 9-1-1 immediately.

Our stroke system of care starts with our community. It starts with YOU.

Stroke patients who activate the 9-1-1- system, as opposed to using private transportation to get to a hospital, are more likely to have shorter treatment times and better health outcomes.

To learn more about the EMS Division's collaborative efforts with the University of Washington to educate community members about the signs and symptoms of stroke, refer to page 35 of this report.



HOW IS STROKE CARE CHANGING?

King County's stroke system of care continues to evolve in response to changes in national guidelines for emergency stroke treatment. In 2017, KC EMS implemented a revised stroke triage tool to transport suspected high severity stroke patients to hospitals capable of performing a specialized clot retrieval procedure, known as a thrombectomy, for large vessel occlusive (LVO) strokes. Fire department personnel screen for stroke using the Face-Arm-Speech-Time (FAST) exam and, if FAST is positive, then assess for severity of symptoms. ALS responded to any suspected high severity stroke patients within a six-hour window of time the patient was last known normal or well. KC EMS continues to work closely with hospitals to evaluate the triage tool and saw a significant increase countywide of successful thrombectomy procedures as compared to previous years.

In 2018, the American Heart Association (AHA) and American Stroke Association (ASA)'s new guidelines recommended thrombectomy for LVO patients in a time window of up to 24 hours after time last known well.² As a result, starting in 2019, King County EMS revised its stroke triage tool by extending the screening tool's time window from 6 to 24 hours. As EMS implemented these stroke triage tool changes, several hospitals in King County expanded their services to provide thrombectomy procedures on a 24/7 basis. In 2017, three comprehensive stroke centers located in downtown Seattle provided this service. By 2019, two more hospitals in the east and south of King County came onboard, allowing for shorter transport times for patients in those geographical areas.



LOOKING AHEAD: Thanks to the tremendous efforts of our regional partners over the past decade, King County EMS will continue to work collaboratively with hospitals in King County and with other state and national organizations to ensure our stroke system of care operates at optimal levels. In June 2019, King County EMS signed on as a partner to the Washington State Coverdell Stroke program led by the Centers for Disease Control and Prevention (CDC). The goal of the Coverdell Stroke program is to create high quality stroke systems of care to save lives and reduce disabilities due to stroke. For more information, visit the CDC website (https://www.cdc.gov/dhdsdp/programs/about_pcnasp.htm).

References:

1. Public Health-Seattle & King County. Community Health Indicators: A gateway to King County Data. Accessed July 1, 2019.
2. 2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2018 Mar;49(3):e46-e110. Accessed via <https://www.ahajournals.org/doi/full/10.1161/STR.000000000000158>. Last accessed July 22, 2019.

STROKE SYSTEM OF CARE IN KING COUNTY TIMELINE



2010

WA State law creates Emergency Cardiac and Stroke (ECS) System

2011

KC EMS evaluates suspected stroke population

2012

WA State ECS establishes stroke performance goals
KC EMS pilot links stroke registry hospital data to EMS database to evaluate ECS measures

2013

Countywide Stroke Quality Improvement (QI) program launched by KC EMS

2014

KC EMS QI program includes 16 ECS-certified stroke treatment hospitals

2015

KC EMS issues updated EMS stroke policy
International trials indicate new therapy for select stroke patients

2016

KC EMS, WA State ECS, and hospitals refine pre-hospital stroke triage guidelines

2017

KC EMS implements revised stroke triage tool and real-time stroke surveillance

2018

New AHA/ASA guidelines for ischemic LVO stroke recommend clot retrieval in an extended time window of up to 24 hours
KC EMS and hospitals evaluate the revised stroke triage tool changes

2019

KC EMS revises its stroke triage tool to expand the stroke screening time window from 6 to 24 hours
KC EMS joins the CDC and State of WA Department of Health Coverdell Stroke Program

Public Health Highlight

Public Health's Response to the Opioid Crisis in King County

Opioid overdose is a growing cause of mortality in the U.S. It is of particular concern in King County, where rates of drug-related deaths have increased by nearly 15% in the last decade. Unfortunately, Public Health – Seattle & King County is not alone in declaring opioid use a public health crisis.

An opioid overdose is a potentially life-threatening medical emergency, which has resulted in a growing number of fatal and non-fatal overdose incidents treated by EMS. All King County EMTs and paramedics are equipped with naloxone and bag valve masks to treat those experiencing an opioid overdose, and the vast majority of overdoses seen by King County EMS personnel will survive the overdose event. Please refer to page 26 for more information on BLS naloxone administration.

MONITORING THE OPIOID CRISIS IN OUR COMMUNITIES

Within the past year, Public Health – Seattle & King County and the Opioid Taskforce made the data collection and monitoring of opioid overdoses in Seattle & King County a high priority. This led to Public Health developing a public-facing dashboard to display EMS responses to suspected opioid overdose incidents. Data on the Probable Opioid Overdose Treated by King County can be found at the following webpage: <https://kingcounty.gov/depts/health/overdose-prevention/non-fatal.aspx>.

Public Health's dashboard and surveillance efforts focus on:

- Identifying trends over time across the region and our communities;
- Having the ability to support surveillance efforts at a regional and local levels;
- Providing near-real time monitoring to identify clusters; and
- Increasing visibility, transparency and availability of information to the public.

Opioid Overdoses Treated by King County Emergency Medical Service Agencies

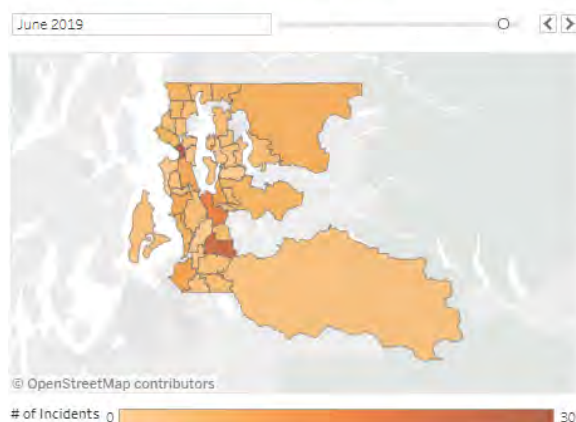
(As of 7/30/2019)

This dashboard summarizes probable opioid overdoses in King County attended to by Emergency Medical Services (EMS) in response to a 911 call. Nearly all overdoses treated by EMS personnel are non-fatal. See the NOTES tab for details about the data source.

Monthly # of Probable Overdoses treated by KC EMS



Location of Probable Drug Overdoses, by month
Attended by KC EMS Agencies, 6/1/2018 - 7/30/2019



Weekly # of Probable Opioid Overdose Treated by KC EMS
6/1/2018 - 7/30/2019



PROBABLE OPIOID DASHBOARD

The Probable Opioid Dashboard provides the following critical information:

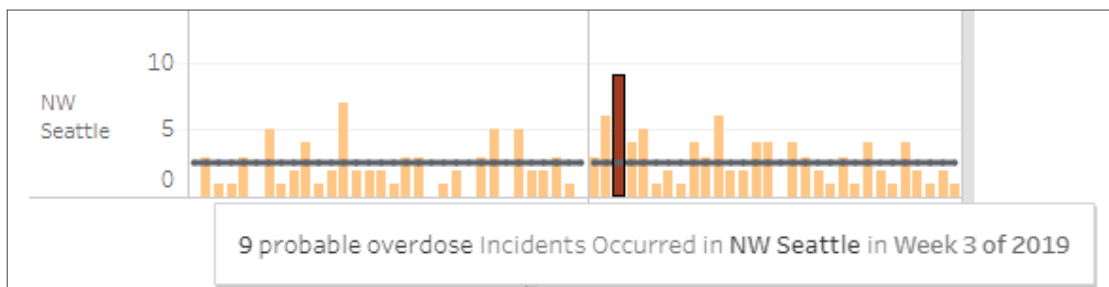
Dashboard Area #1 – Number of Probable Overdoses Treated by EMS: The top left bar chart shows the number of probable overdoses separated by month and year to detect seasonal trends and/or any increases in opioid use across years.

Dashboard Area #2 - Location of Probable Drug Overdoses: The geographic map shows EMS responses involving potential opioid overdoses across King County. The interactive dashboard allows the user to filter the data by time period (month, week) and by selected neighborhoods. These neighborhoods encompass 48 Health Reporting Areas that represent city boundaries and unincorporated areas of King County. Access to location information may aid communities in considering issues related to local health status or health policy.

Dashboard Area #3 - Weekly Number of Probable Opioid Overdose Treated by EMS: The right side of the dashboard displays bar charts that indicate the number of probable overdoses separated by selected neighborhood in alphabetical order across one-week time periods. The horizontal line represents the average number of overdoses for each neighborhood. If the bar is light orange, this indicates the number of overdoses that occurred during the week is within a normal range of what is expected. Conversely, if the bar is dark red, this indicates that the weekly number of probable opioid overdoses is outside of the normal range and represents a potential cluster and further surveillance such as case reviews and coordination is needed with local stakeholders.

THE IMPORTANCE OF EMS DATA TO IDENTIFY CLUSTERS

King County EMS provider's documentation proves to be the most reliable source of data to identify non-fatal overdose events. Its successful transition to an electronic health record system allows access to near-real time data and enables active surveillance of non-fatal overdoses in King County. Identification of clusters yield potentially life-saving targeted outreach including harm reduction strategies for opioid users. In January 2019, a concentration of overdose incidents occurred in the Fremont area. Using the probable opioid overdose dashboard, the following image depicts how this cluster event would be identified:



LOOKING AHEAD: With EMS playing direct role in treating patients experiencing opioid overdoses, its data provides excellent surveillance of the non-fatal overdoses that occur in King County. Making King County EMS opioid overdose data available to stakeholders such as the King County Opioid Taskforce, the Medical Examiner's Office, Police Departments, Public Officials, and other first responders will be instrumental in the identification of and preparation for a cluster event that occurs in Seattle & King County. This data can be used to detect clusters of overdoses, indicating a toxic or potent batch of drugs or an increase in use. Using data, public officials can better direct resources and communication to users and first responders to be better equipped to save lives.

Medical Quality Improvement

King County BLS Naloxone Administration Update

EMS RESPONSE TO THE OPIOID CRISIS IN KING COUNTY

A 2015 report by the Centers for Disease Control and Prevention (CDC) recommended that training basic EMS providers to administer naloxone could reduce drug overdose deaths that involve opioids. Naloxone is the current standard of treatment for opioid overdose and is commonly used to reverse the effects of an opioid overdose.

A year later, King County initiated a six-month pilot to have emergency medical technicians (EMTs) administer nasal naloxone to suspected opioid overdose. EMTs were trained to recognize opioid overdose, begin bag-valve-mask ventilations, and administer only one dose of nasal naloxone before returning immediately to bag-valve-mask ventilation. Characteristics of an opioid overdose may include slow breathing, altered mental status, pinpoint pupils, and/or high blood glucose levels. Other indicators of opioid use may be evident by a high-risk clinical scene where drug use is apparent or if drug paraphernalia is present. A review of all cases showed no safety concerns or adverse outcomes as a direct consequence of EMT providing Naloxone, and the new protocol was applied across the region.



MEASURING AND IMPROVING: MEDICAL QUALITY IMPROVEMENT EVALUATION

In support of its motto of “measuring and improving,” the EMS Division has continued to monitor and review suspected opioid overdose to determine the optimal role of EMT nasal naloxone in King County’s high-functioning two-tier EMS system. One such regional medical quality improvement effort has focused on assessing the accuracy of EMTs in King County on the identifying and treating suspected opioid overdose events. This evaluation excluded Bellevue Fire Department who transitioned to the regionally used electronic health record system after this time period and the Seattle Fire Department, who followed a different patient care protocol. The evaluation involved a detailed review of over 200 cases involving EMT administration of intranasal naloxone from August 2017 through mid-June 2018. King County EMS reviewed patient care reports from the regionally used electronic health record system to determine the final diagnosis of patients who were given naloxone as a result of a suspected opioid overdose or other cause. Additionally, this assessment identified opportunities for improvement in documentation of vitals taken and recorded by BLS.

During the evaluation period, EMTs administered naloxone autonomously 102 times. Of these 102 cases, 97 (95%) were determined to be opioid overdoses, while 98% of these cases met three or more of the BLS naloxone administration criteria with 90% meeting the inadequate effort for ventilation criteria. Vital signs including respirations, level of consciousness, and oximetry significantly improved, regardless of ultimate diagnosis. Only two cases reported withdrawal symptoms of agitation or aggressive behavior after administration. Of the 5 patients who received naloxone, but were not experiencing an opioid overdose, diagnoses including alcohol use, marijuana use, pneumonia, and traumatic brain injury and subsequent cardiac arrest.



LOOKING AHEAD: *Monitoring the opioid crisis in King County remains a priority condition of focus. Evaluating EMT administration of nasal naloxone in King County will continue to ensure that we are accurately identifying opioid overdose and successfully administering naloxone when following a set of criteria that incorporates clinical judgement. This strategy will continue to achieve the primary goal of EMTs to increase respirations without withdrawal side effects.*

Center for the Evaluation of EMS Grant-Funded Projects and Programs

The Center for the Evaluation of Emergency Medical Services (CEEMS) works collaboratively with academic and clinical faculty from the University of Washington to implement and evaluate research studies. Working under the direction of King County Medical Program Director and UW Professor of Medicine, Dr. Thomas Rea, CEEMS program managers conduct studies aimed at improving the delivery of pre-hospital emergency services and advancing evidenced-based care and treatment.

2014-2019 LEVY PERIOD ACCOMPLISHMENTS

Innovation and strategic partnerships with academic organizations, EMS agencies, and industry leaders continues to drive defibrillator software enhancements and support EMS communities by developing and implementing enhanced response models. CEEMS' staff participation in global and nationwide partnerships focused on improving out-of-hospital sudden cardiac arrest survival rates. Notably, a number of peer-reviewed publications and a wealth of data have resulted from mentorship opportunities, often advancing scientific understanding of sudden cardiac arrest and improving outcomes.

CEEMS PATENT REVENUE FUND: REAL-TIME RHYTHM IDENTIFICATION/MEASURE THROUGH CHEST COMPRESSIONS

When it comes to treating sudden cardiac arrest (SCA), one size does not fit all. However, current defibrillator technology requires that nearly all SCA patients be treated in the same manner. Among other things, this involves stopping chest compressions in order to analyze heart rhythms. This sharply contrasts with multiple peer reviewed publications which have shown that SCA outcomes improve when pauses in chest compressions are minimized.

This conundrum led the EMS Division to the University of Washington to collectively seek an alternative to this standard procedure. Beginning as a two-year Life Sciences Discovery Fund (LSDF) matching grant in 2015, researchers at King County EMS, in collaboration with the UW Bioengineering Department, have worked to advance automatic external defibrillator (AED) device technology. The team has developed algorithms that can "read through" chest compressions to obtain real time feedback and information, thus reducing the length and frequency of pauses in chest compressions throughout resuscitation.

Continuing on this path with additional patent funding, research is continuing to focus on identifying underlying rhythms and the viability of these rhythms while chest compressions are ongoing. These refinements bring the region (and the EMS community as a whole) closer to using this new and improved technology in the field.

HEARTRESCUE PROGRAM, MEDTRONIC FOUNDATION

King County is among the leaders of the **HeartRescue Project**, which is a collective effort to increase sudden cardiac arrest (SCA) survival rates throughout the United States. Generously funded by the Medtronic Foundation and partnering with the country's leading emergency and resuscitation experts, the project focuses on systemically expanding successful cardiac arrest systems of care to regional and statewide levels.

Since January 2011, Washington State has participated in this data driven approach to develop action plans for improving survival across the US. Monthly conference calls and annual HeartRescue meetings at resuscitation conferences allow stakeholders and partners across the nation to continually engage in these efforts.

The creation of Cardiac Arrest Registry to Enhance Survival (CARES) gave communities access to data so they can measure and report on their EMS system performance. King County has been involved in CARES since 2011 when it was invited to help launch Washington State's data collection effort.

Center for the Evaluation of EMS

Grant-Funded Projects and Programs

CARES and the importance of data collection is one of the principles stressed at the Resuscitation Academy. This collaboration between King County EMS and Seattle Medic One focuses on strategies to improve cardiac arrest survival. Participants are provided with resources and essential tools so that they can return to their communities and develop a concrete plan of action for increasing survival. For more information about the Resuscitation Academy, please visit its website at: <http://www.resuscitationacademy.org/>.

King County's ability to engage stakeholders to embrace best practices is possible due to the support of the Medtronic Foundation. For more information about their efforts, please visit: <http://www.heartrescueproject.com>.

BRAIN OXIMETRY DURING CARDIAC ARREST

In many cases of out-of-hospital cardiac arrest, the arrest victim succumbs even though the heart has been successfully resuscitated. Most often these deaths are due to global anoxic brain injury (starving the brain of oxygen), which underscores the importance of cerebral oxygenation, or getting oxygen to the brain, during CPR.

Recent advances in technology have enabled real-time measurement of cerebral oxygenation during CPR, which could help optimize brain recovery during resuscitation. In January of 2015, The King County EMS Division, in collaboration with Puget Sound Regional Fire Authority, and Nonin Medical, Inc. – a manufacturer of noninvasive patient monitoring devices – launched a study using regional oximetry sensors to evaluate cerebral oximetry profile during cardiac arrest resuscitation. The results of the study will be used to enhance medical instrumentation used by EMS providers to improve pre-hospital patient care during an out-of-hospital cardiac arrest incident.



AED LIFESAVER EARLY RESPONDER TRIAL (ALERT) STUDY

Resuscitation of sudden cardiac arrest relies on early CPR and early defibrillation. Even in communities with a mature emergency response, only about half of cardiac arrest victims receive CPR prior to EMS arrival, and less than 5% receive defibrillation prior to EMS arrival. Survival could be improved substantially if these formidable gaps in resuscitation care could be addressed.

The AED Lifesaver Early Responder Trial (ALERT study) began in April 2016 to enlist volunteer verified off-duty professionals to respond to proximal cardiac arrests (using the PulsePoint phone app), equipped with an AED, potentially during all hours and to all locations and settings. The ability to respond to all locations rather than public locations only has the potential to dramatically decrease time from collapse to chest compressions and/or defibrillation as approximately 80% of all cardiac arrests occur in private residences.

This project to address a persistent and detrimental gap in resuscitation care is a collaboration among the University of Washington, Public Health-Seattle & King County, PulsePoint, Philips, and five select participating communities that cover a population of over 2.2 million residents. The insight related to process evaluation of this program will provide a constructive platform to effectively target or expand this type of innovative program to additional communities.

MENTORSHIP

Each year, affiliate clinicians and researchers, such as medical students, physicians and EMS professionals, have the distinctive opportunity to engage in a research project under the mentorship of CEEMS staff. As a direct result, a number of peer-reviewed publications and a wealth of data have resulted from these opportunities, often advancing scientific understanding of sudden cardiac arrest and improving outcomes.


Community Programs

Emergency Medical Dispatch

As the first point-of-contact with the public, Emergency Medical Dispatchers, also referred to as “telecommunicators,” play a vital role in the EMS Chain of Survival. Trained by the EMS Division in Criteria Based Dispatch, telecommunicators “triage” calls using specific medical criteria that are based on the signs and symptoms of the patient. This informs the proper level of care needed with the proper urgency. Telecommunicators also provide pre-arrival instructions for most medical emergencies and guide the caller through life-saving steps – including Telecommunicator CPR (T-CPR), choking, and even emergency childbirth – until the Medic One/EMS providers arrive on scene. Using EMD efficiently also means doing outreach and education to communities that may frequently call 9-1-1 for emergency medical services.

COMMUNITIES OF CARE PROGRAM: WHAT TO DO WHEN CALLING 9-1-1

The **Communities of Care Program** continues to build upon its success in improving the efficiency of the 9-1-1 call and EMS patient contact. Within the past year, King County EMS convened a workgroup comprised of leaders from King County EMS Fire Departments, assisted living facilities (ALFs), and ALF advocate groups – LeadingAge and Washington Healthcare Association – to create an easy-to-read, visual resource for individuals who frequently call for EMS services from a licensed care community. Developing clear messaging and education materials on what to do when calling 9-1-1 and preparing for EMS arrival were key objectives in revising the “Guidelines for EMS Response and Transport Requests” as shown below to the left. The new and improved materials shown below in the images to the right were well-received by ALFs to better prepare its employees to answer the critical medical questions telecommunicators ask, and to be led through pre-arrival instructions.

 GUIDELINES FOR EMS RESPONSE AND TRANSPORT REQUESTS King County Emergency Medical Services	
CALL 911 TO REQUEST EMS RESPONSE FOR THE FOLLOWING: <ul style="list-style-type: none"> Acute, life-threatening medical condition or complaint Medically unstable patient Immediate health risk 	
When calling 911: Be ready to relay the following information: Your Name/Name of facility Address where help is needed Call-back number Patient Information: <ul style="list-style-type: none"> Age Gender Specific medical complaint or problem, i.e. “Chest Pain”, “Shortness of Breath”, etc. Medical history Any medical treatment provided and status change <p>***Remember to call 911 again if conditions worsen</p>	When EMS Arrives: They will expect to be met by a Physician, Nurse or health care provider, who can provide the following information: <ul style="list-style-type: none"> Patient age and gender Details of medical complaint/problem Level of consciousness Vital signs (BP, HR, Respiratory rate, ECG, O2 saturation) Medical history Medications Care provided: oxygen, ECG, IV, medications etc. Plan and transport destination Medical orders/directives
<p><u>Private ambulances should be called for inter-facility transports of medically stable, non-acute patients.</u></p> <p>Private Ambulance _____</p> <p>Phone Number _____</p>	
<p>Your local fire/EMS agencies are dedicated to providing emergency medical response and transport services for acutely ill or seriously injured patients. To accomplish this, units must remain available to respond to life-threatening situations within the community...</p> <p>“HELP US SERVE THE COMMUNITY!”</p>	

CALLING 911: WHAT TO DO 	
	TELL 911 THIS IS A MEDICAL REQUEST
	PROVIDE YOUR ADDRESS Address includes room patient is in What entrance should EMS use? Our address is: _____
	IS THE PATIENT AWAKE? What happens when you touch or talk to them? Are you doing CPR? Can I speak to the patient?
	WHAT IS WRONG WITH THE PATIENT TODAY? How old is the patient? Don't hang up until told to do so.
	PREPARE FOR EMS Stay with patient Get paperwork for EMS Get area ready for EMS to evaluate patient
For more info: kingcounty.gov/ems/care	

PREPARING FOR EMS ARRIVAL 	
	STAY WITH THE PATIENT Call 911 again if the patient gets worse
	SEND SOMEONE TO MEET EMS SHOW EMS WHERE THE PATIENT IS Tell EMS the level of care of the patient
	PROVIDE PAPERWORK AND SHORT REPORT OF PATIENT
	STAY WITH PATIENT AND ANSWER EMS QUESTIONS You may be asked about the patient's baseline, medication and history
For more info: kingcounty.gov/ems/care	



LOOKING AHEAD: Next steps include determining how best to reach additional adult family home caregivers, and what specific resources could better these communities.

Community Programs

CPR & Public Access Defibrillation

The King County EMS/Medic One system has a track record of successfully educating local communities so that more people survive cardiac arrest. Teaching the public to perform CPR is a critical link in the chain of survival, keeping a person in cardiac arrest alive until first responders arrive. Thanks to the work of many community partners – including workplace organizations, school-based training, and a range of civic groups and individual initiatives – about 80% of King County residents are trained in CPR and 70% of all out-of-hospital cardiac arrests in King County received bystander CPR.

“CPR IN A BOX” TRAINS MORE COMMUNITY LIFESAVERS

Long-standing efforts to engage the public in CPR have been crucial to improving patient outcomes throughout our community. To build upon bystander CPR success in King County and save even more lives, the EMS Division has developed a new self-guided CPR education kit called “CPR in a Box.” The Box kits were developed in collaboration with the University of Washington School of Public Health graduate student, Sarah Pennington, and King County EMS Division’s CPR/AED program manager Laura Miccile, and can be loaned to area businesses, organizations, and community partners.

“CPR in a Box” kits teach people how to do the most current training in hands-only CPR, emphasizing chest compressions only, with no rescue breaths. This ready-to-go training kit is an effective way for businesses and other partners to education their staff and communities on CPR and reach more people. Many partners are already committed to saving lives by purchasing Automated External Defibrillators (AEDs) to help bystanders check for abnormal heart rhythm and delivering controlled shocks that can restart a heart. To learn more about AEDs and how to register them with King County EMS, visit: www.kingcounty.gov/aed.



LOOKING AHEAD - HOW ORGANIZATIONS CAN GET CPR IN A BOX

“CPR in a Box” is designed as a perfect complement to support training on how to use AEDs and hands-only CPR. Businesses and organizations can use the kits during safety committee or department meetings, and as an opportunity to promote hands-only CPR education during health and wellness campaigns. “CPR in a Box” kits are portable, allowing for set-up in a breakroom or communal locations where employees may interact and train on the kit as their time allows. Four complete kits are available for loan to participating organizations for up to two weeks. For more information about the CPR in a Box program, please contact Laura Miccile at: Laura.Miccile@kingcounty.gov.

Injury is the leading cause of death for those 45 years or younger. The EMS Division continues to work collaboratively with its regional partners including fire departments, community agencies and organizations toward common goals of reducing injury and death through public awareness campaigns and direct intervention programs.

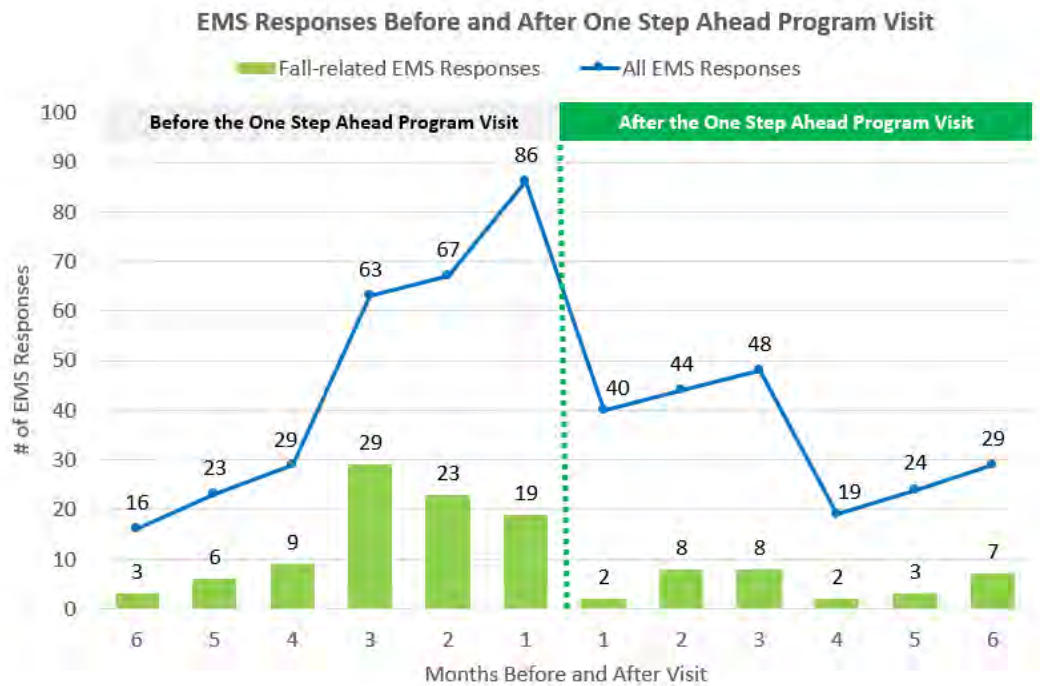
THE ONE STEP AHEAD FALL PREVENTION PROGRAM: REDUCING FALL-RELATED RESPONSES

Falls are the leading cause of fatal and non-fatal injuries for adults 65 years and older. One in three fall at least once every year, and two-thirds of seniors who experience a fall will fall again within six months. Falls are a high cost health care problem in our state, and a major threat to the independence and quality of life of older adults. However, they are NOT an inevitable part of aging, and there are proven effective strategies to help prevent falls among older adults.

One approach is the One Step Ahead Fall Prevention Program. Initiated by King County EMS and several agencies and community organizations in 2003, this program helps older adults over the age of 50 who have fallen and called 9-1-1, or are referred by a healthcare professional. The One Step Ahead program aims to reduce falls and death through public awareness campaigns and direct intervention programs. Fall prevention specialists provide in-home visits to assess factors such as the client's strength, balance, vision, and medication management, and physical environment and safety considerations (e.g., potential trip hazards, safety equipment). This results in a home safety plan and recommendations for safety equipment and exercises, as well as referrals to other community-based services. To date, over 3,000 residents of King County have taken action toward staying healthy, independent and safe in their homes by staying one step ahead.

MEASURING THE IMPACT OF THE ONE STEP AHEAD FALL PREVENTION PROGRAM

Across 2017 and 2018, the One Step Ahead Fall Prevention Program reached 108 participants who previously called 9-1-1 for a fall incident. The program reduced both the overall number of 9-1-1 calls and fall-related incidents, as shown in the graph to the right.



LOOKING AHEAD: This program continues to grow through referrals from Mobile Integrated Health-care programs described on page 11. We will also leverage opportunities to identify patients eligible for the One Step Ahead Program by analyzing the data available in our regional records management system, ESO.

2014-2019 Strategic Initiatives

The Medic One/EMS 2014-2019 Strategic Plan contains strategic initiatives that are designed to improve EMS services, manage growth of the EMS system and contain costs. Developed through strong partnerships with EMS agencies in the region, these innovative initiatives have allowed the Medic One/EMS program in King County to maintain its role as a national leader in its field. The following sections describe the strategic initiatives undertaken during the 2014-2019 levy span.

BLS EFFICIENCIES STRATEGIC INITIATIVE

The **BLS Efficiencies Strategic Initiative** focuses on mitigating the impact of increasing call volume, particularly from low-acuity calls. This initiative monitors the call volume demand and supports partnering agencies by seeking to develop and implement innovative strategies.

Objectives of the initiative include:

- Evaluating and reducing unnecessary EMT requests for medics from the scene;
- Evaluating and minimizing unnecessary BLS transports;
- Studying potential to expand EMT scope of practice to accommodate emerging community needs; and
- Providing EMTs with more training and skills to make more effective, confident decisions at the scene, with a focus on minimizing unnecessary transports.

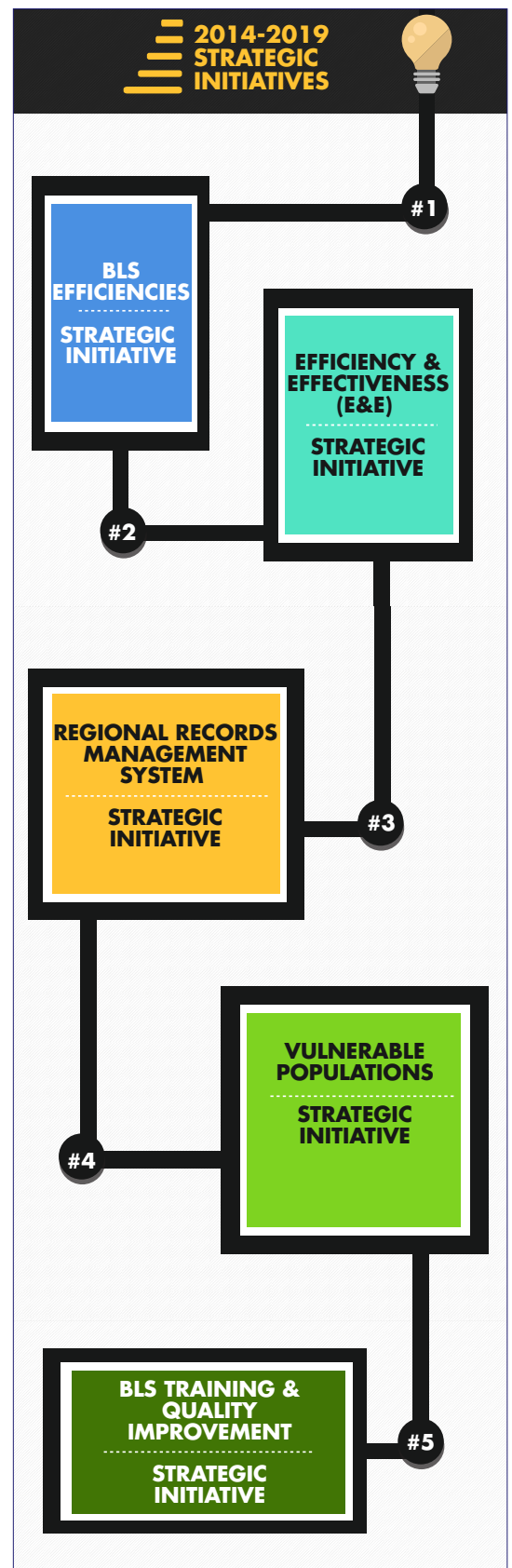
REGIONAL APPROACH TO INITIAL EMT TRAINING

2019 is the third year of the pilot that standardizes and expands the training options available to EMTs. Under this approach, agencies can offer additional EMT training opportunities that better meet their schedules and needs. King County EMS coordinates the trainings and provides the standardized curriculum used by the senior EMT instructors, giving fire departments flexibility while ensuring consistent and excellent EMT training in King County. Refer to pages 20 and 21 for more information about training.



LOOKING AHEAD - SUPPORT FOR CRITICAL PROGRAMS

The EMS Division continues to oversee programs including the Taxi Transport Voucher Program and partner with community-based clinics to better incorporate patients seen by the Community Medical Technician (CMT) units. Refer to page 11 for information about the Mobile Integrated Health update.



EFFICIENCY & EFFECTIVENESS STRATEGIC INITIATIVE

The **Efficiency and Effectiveness Strategic Initiative (E&E SI)** has supported agencies in testing innovative projects and studies to improve the EMS system. Regional partners work closely with the EMS Division to develop, implement and assess a proposal, and then broaden successful efforts throughout the region. This Initiative sponsored numerous projects over the 2014-2019 levy period:

Hope Academy – partnering with the Somali community to engage in focus groups and education to improve the exchange of critical information when calling 9-1-1 for emergency services

Bellevue Fire Department C.A.R.E.S. Program – identifying and linking individuals who frequently utilize emergency medical services for low-acuity events to the appropriate medical, social, and/or community services. This included a formal program evaluation and creation of an assessment tool to evaluate future changes to the program.

Ongoing Training for Paramedics – collaboratively working with University of Washington physician to develop specialized online training for paramedics available through EMS Online (the EMS Division’s training platform) to achieve consistency in learning core competencies. The use of the online format resulted in time and cost savings.

South King Fire and Rescue’s Fall Prevention Efforts – identifying and referring patients who are 50 years or older that called 9-1-1 for a fall-related reason to the EMS Division’s the One Step Ahead Fall Prevention Program to receive further assistance such as in-home assessments and plans aimed to improve the overall safety of client’s physical environments. Refer to page 31 for more information about the EMS Division’s One Step Ahead Fall Prevention Program.

Puget Sound Regional Fire Authority’s FDCARES Non-Emergency Medical Services (NEMS) - integrating a Master of Social Worker (MSW) resource to connect patients to appropriate care in response to a non-emergency medical services need such as minor falls without injury or other minor injuries.

BLS Medical Control into South King County - exploring the feasibility of expanding medical control to provide decision-making support for the BLS responders by connecting them with emergency department physicians on select incidents.

Equity and Social Justice in EMS – raising the awareness of equity and social justice across EMS by providing training opportunities with the goal of increasing the diversity of the EMS workforce. For more information, refer to page 15 of our Annual Report for the EMS Division update on ESJ in EMS.

South King Fire and Rescue’s Masters of Social Worker (MSW) Resource – integrating a MSW care coordinator into the fire/EMS system to identify and engage with individuals who suffer from chronic disease and frequently utilize EMS and the St. Francis Hospital in Federal Way emergency department.

Redmond Fire Department Mobile Integrated Healthcare Program – visiting and learning from other communities with MIH programs to inform the development of a Redmond-specific MIH program to identify and provide outreach to individuals in the community and refer them to appropriate resources.



LOOKING AHEAD: During the development of the 2020-2025 Strategic Plan and EMS levy, regional partners supported transitioning many of the projects and studies listed above into a Regional Service or Strategic Initiative, and sunsetting the E&E Initiative. For more information, refer to Mobile Integrated Healthcare Update on page 11 of this report and the Vulnerable Populations Strategic Initiative on page 35.

2014-2019 Strategic Initiatives

REGIONAL RECORDS MANAGEMENT SYSTEM (RMS) SI - 2014-2019 LEVY PERIOD ACCOMPLISHMENTS

Timely access to data and information provides valuable opportunities to improve patient care in King County. During the 2014-2019 levy period, the **Regional Records Management System Strategic Initiative** reached significant data integration and access milestones unifying our region with the adoption of a single electronic platform (ESO). This Initiative transferred the administrative and financial responsibility of the electronic healthcare record software to the EMS Division, supporting the region's commitment to programs aimed at reducing BLS costs and improving overall EMS system effectiveness.

As of 2019, nearly all EMS agencies have successfully transitioned from paper-based medical incident report forms and a myriad of disparate electronic health record systems (i.e., eMIRF, SunPro, Zoll, ESO, Firehouse) to a single, regional records management system, ESO EHR. Recognizing the benefits of having the region all on the same system, the EMS Advisory Task Force supported converting the RMS Initiative into an ongoing Regional Service for the 2020-2025 levy span.

EMS Transition to ESO Electronic Health Records

Year	ESO Records
2014	47,787 (20%)
2015	77,534 (31%)
2016	94,550 (36%)
2017	178,047 (71%)
2018	246,257 (99%)

Today, data and information flow seamlessly across our tiered EMS system:

When a 9-1-1 call is received, dispatch center data can be downloaded, allowing for BLS and ALS providers to easily access call information while en route to the patient. After arriving on scene, EMS providers use ESO's electronic health record (EHR) solution to create an electronic patient care record. The EMS information can be accessed by the hospital while a patient is being transported to the hospital by a KC EMS agency. Local hospitals using ESO's Health Data Exchange as part of this initiative enables the EMS patient care information to flow into the receiving hospital's EHR system, without any exchanges of paper forms. EMS providers involved in the incident can also access hospital patient care and outcome information.

Connecting to hospitals by establishing electronic interfaces remains a regional priority. King County EMS relies on timely access to hospital outcome information to support ongoing regional medical quality improvement efforts and to identify opportunities for training. In this current levy period, access to near-real time information has significantly reduced the average number of days from 38 days to the day following the incident.



LOOKING AHEAD - ACCELERATING EVALUATION & INNOVATION: AN OPPORTUNITY FOR UNPRECEDENTED (AEIOU) QUALITY IMPROVEMENT (QI) STRATEGIC INITIATIVE

To build upon of strong informational technological foundation of the last decade, the EMS Division will partner with dispatch centers, fire departments and hospitals to roll out the AEIOU Quality Improvement (QI) Strategic Initiative during the 2020-2025 levy span. This Initiative will focus on:

- **Accelerating case-base feedback and outcome** by improving the timeliness, quality and access to data and investments in technology and integration across platforms across the EMS system
- **Evaluating near real-time information** through systemwide surveillance to monitor conditions of focus and increase support to EMS agencies to conduct operational and clinical run reviews of EMS care and patient outcomes at the regional and local agency level
- **Innovation** by conducting innovative programs to strengthen quality improvement capabilities
- **Opportunities to increase KC EMS coordination role** to convene regional partners to lead QI projects and to address the real challenge and need to meaningfully use the wealth of data available
- **Unprecedented ability to improve** our approaches to quality improvement through training and education

These efforts will continue to support and enhance the region's use of ESO and will interface closely with the other proposed regional efforts and strategic initiatives such as the EMS Strategic Transition in Regionalized Innovation, Value, and Education (S.T.R.I.V.E) and Vulnerable Populations Strategic Initiative (VPSI). Refer to page 12: 2019 EMS Division Highlight - Levy Planning for the 2020-2025 Medic One/EMS Reauthorization for more information.

VULNERABLE POPULATIONS STRATEGIC INITIATIVE 2014 – 2019

The Vulnerable Populations Strategic Initiative (VPSI) represents a unique collaboration between Public Health – Seattle & King County, the EMS Division, fire departments, community-based organizations, and the University of Washington. VPSI’s activities focus on meeting the goal of ensuring that EMS provides the best possible care to all King County residents to address populations experiencing disparities across factors such as race, ethnicity, age, socioeconomic status, culture, gender, or language spoken.

2014-2019 LEVY PERIOD ACCOMPLISHMENTS

Over the 2014-2019 levy period, partners engaged in programmatic, scientific, and case-based evaluations of encounters between EMS and vulnerable populations to ensure that interactions are of the highest quality. The University of Washington’s School of Public Health students served as a common thread through the various outreach and education programs in the community. In 2019, VPSI activities focused on five main areas:

1. Conducting education and outreach activities on stroke awareness and emergency response in vulnerable communities such as the limited English proficient (LEP) and seniors;
2. Conducting pilot studies on alternative EMS care delivery to vulnerable populations;
3. Assessing mental wellness needs among EMS personnel in King County;
4. Continuing to support our strong collaborative relationships between VPSI activities and the UW School of Public Health by connecting students to the practice community via capstone, thesis, and practicum opportunities; and
5. Building career paths in EMS to promote diversity in the workforce.



COMMUNITY EDUCATION AND OUTREACH

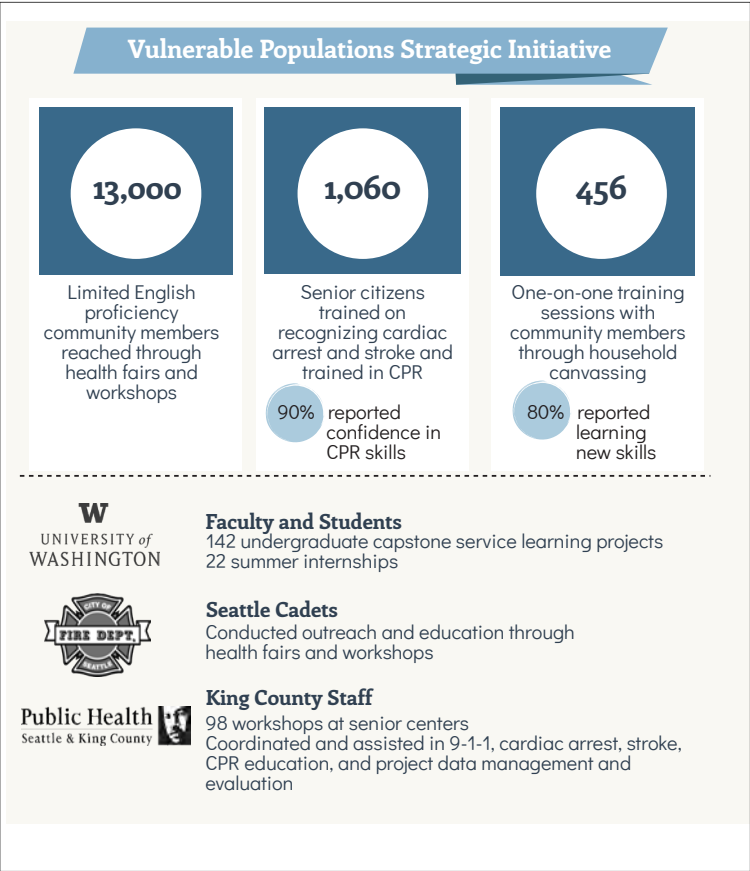
Community education and outreach efforts focuses on engaging with the 9-1-1 emergency response system and the provision of bystander CPR for limited English and senior groups. In an initial needs assessment, EMS responders identified encounters with LEP patients to be one of their greatest challenges. Community partners included Community Safety Ambassadors (Office of Emergency Management, City of Seattle), Community Fire Safety Advocates (Seattle Fire Department), the Somali Health Board, and the Chinese Information and Service Center. Culturally and linguistically relevant print materials were developed around introducing the King County EMS system, calling 9-1-1, recognizing cardiac arrest, and performing chest compression bystander CPR in Chinese, Korean, Oromo, Romanian, Russian, Somali, Spanish, Thai, and Vietnamese. The UW School of Public Health also developed YouTube video as a form of VPSI outreach to the Chinese community. VPSI also used public service announcements in ethnic media channels such as Somali radio and television stations and Russian language magazines.

2014-2019 Strategic Initiatives

UW faculty and students and EMS staff and providers conducted outreach and education through workshops, table events, health fairs, and door-to-door canvassing. Over 13,000 limited English proficient community residents were reached via one-on-one education at health fairs and workshops, staffed by EMS personnel, Seattle Fire Department cadets, and UW faculty and students.

In partnership with the UW School of Public Health, 164 undergraduate students provided educational information through outreach activities across King County. This includes 142 students who participated through a capstone course of 50 service learning hours over a 20-week period, and 22 students who participated in the summer internship program.

Together, they visited 2,925 King County households and educated 456 persons, mostly seniors, about calling 9-1-1, recognizing cardiac arrest, performing CPR, and symptoms of a stroke. Whenever possible, students evaluated the impact of the brief face-to-face education provided by asking residents several questions after they talk to them. This evaluation showed that about 80% of residents report they had learned something new. Concurrently, program staff conducted 98 workshops at senior centers to reach another 1,060 people with this educational information. Workshop participants were surveyed before and after each session. Prior to the workshop, approximately 20% knew how to perform CPR and about 40% knew the signs of a stroke. Following the workshop presentation and CPR practice, over 90% were very or somewhat confident in their ability to perform CPR.



FIRE-BASED PILOT STUDIES

VPSI conducted three pilot studies involving fire departments to address issues identified by an initial EMS needs assessment, including:

- Addressing the challenges faced by EMS providers to give quality care to patients experiencing problems with drugs or alcohol;
- Connecting 9-1-1 callers with a mental illness or substance use disorder to health care resources;
- Evaluating whether a sobering center might be an alternative destination to a hospital emergency department for patients who were acutely intoxicated but did not require further medical care;
- Referring patients to a non-profit organization providing street-based case management services; and
- Improving the identification and reporting of vulnerable adult abuse and neglect.

Eleven graduate students provided over 2,750 hours in free service to develop and evaluate the multiple fire-based and dispatch VPSI projects. Across these projects, EMS learned that the following efforts are needed in order to change Fire Department referral and care delivery practices for patients in need of social services by:

1. Providing regular, ongoing training to Fire Department personnel on how to identify, refer, and how to provide alternative care for vulnerable patients who are in need of social services rather than medical care
2. Making data collection for referrals by FD personnel and feedback to FD personnel easy and timely
3. Scheduling in-person patient visits preferably in real-time and with a warm hand-off from a referral
4. Adding dedicated staffing including Master of Social Work/Community Medical Technician/case managers to the provider team
5. Enabling 24/7 access to new services
6. Providing regular communication with stakeholders

Additional activities included two projects engaged with 9-1-1 emergency call taking. A simulation study was developed to test CPR instructions for the deaf/hard of hearing community, and online training for emergency medical call takers aimed to facilitate communication with LEP callers.

QUALITY WORKFORCE: CARING FOR THE MENTAL WELLNESS NEEDS OF OUR WORKFORCE

Since our 2018 Annual Report, the County shared the findings of its countywide mental wellness needs assessment involving personnel across the various tiers of the EMS system, including: firefighter/EMTs, paramedics, officers, call receivers and dispatchers at the communication centers, and administrators and administrative support staff. Survey results indicated that 1 in 4 experience stress most or all of the time, and 1 in 3 reported sleep disturbances all or most of the time, related to ability to fall asleep, to stay asleep, or to sleep too much. In response to these results, EMS and fire departments worked to develop and offer trainings for both active and retired personnel implemented on mental health awareness and developing resiliency.

2014-2019 Strategic Initiatives

EQUITY AND SOCIAL JUSTICE IN EMS

In 2019, the EMS Division continues to integrate ESJ values and themes into the EMS Division workplace and programs. These efforts focused on: community and vocational schools outreach, outreach and recruitment, continuing to support the Strategic Training and Recruitment Program, King County Medic One recruitment and hiring, and EMS Division supervisor hiring and training. Refer to page 15 for more information related to equity and social justice efforts in EMS.



LOOKING AHEAD - VPSI: PLANNING FOR THE 2020-2025 LEVY PERIOD

In the 2020-2025 levy period, VPSI will continue to work with its regional partners to achieve the following goals and objectives:

- *Expanding community outreach and education efforts to other language communities such as Russian or Spanish speakers for EMS to communicate effectively with the LEP population;*
- *Broadening the geographic area of the educational outreach to more distant parts of King County;*
- *Developing educational content to include other topic areas such as heart attack symptoms, choking, hypertension, and falls;*
- *Developing a train-the-trainer program for educational messages to assure standardized content delivery;*
- *Working collaboratively with the UW School of Public Health students to develop a systematic way to evaluate the impact of their education and outreach efforts;*
- *Conducting periodic needs assessments and evaluations of VPSI-related efforts to evaluate the effectiveness of recruitment efforts by developing position descriptions to recruit graduate public health students to work in partnership with the fire departments; and*
- *Improving access to mental wellness training and resources for King County personnel.*

BLS TRAINING & QUALITY IMPROVEMENT STRATEGIC INITIATIVE

The **BLS Training & Quality Improvement Strategic Initiative** (BLS QI) was developed in response to the region's collective pledge to continually measure and improve. This initiative provides a formal structure to more systematically and uniformly review data, and develop consistent training based on the results of the data review. This initiative better synchronizes the following existing training and QI opportunities:

1. High quality BLS initial training for KC EMTs

The EMS Division provides initial, basic, EMT training on a regional level to ensure that the medical triage and delivery is the same across King County. Additionally, it continues to work with its regional partners to pilot shorter-term, intensive initial training courses to better accommodate growing workforce requirements.

2. Consistent paramedic "run reviews"

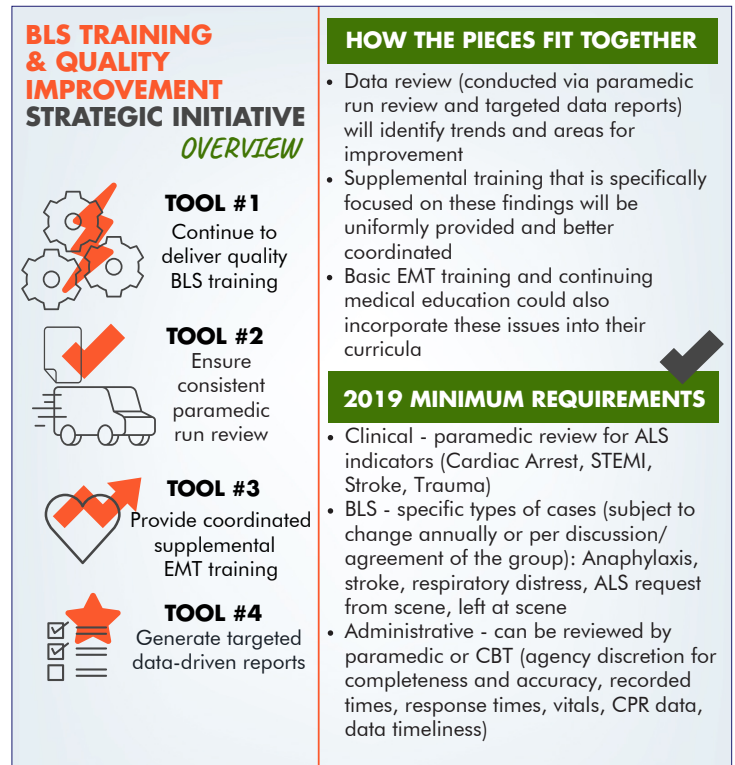
"Run reviews" are critical to improving EMT performance by examining medical performance, decision making and EMT understanding of current education concepts. This initiative develops a consistent run review program so that the level of review, including the types of calls reviewed, is the same across all agencies.

3. Coordinated supplemental EMT training

This initiative provides funding and oversight so that all agencies can receive supplemental training led by trainers with complementary skills, and focus on the same topics or trends of other agencies. This will help eliminate training inconsistencies and positively impact overall system performance.

4. Targeted data-driven reports on BLS performance to help inform training at both the local and regional levels

The EMS Division frequently evaluates BLS performance to determine if critical skills are being maintained and if protocols are being appropriately followed. These evaluations may be conducted regionally, or may focus on one or more agencies, per a recent occurrence, or agency request. This provides oversight to help ensure that these reviews are focused on the same topics and are coordinated with other agencies within the system.



RUN REVIEW

This is the second year of the region's implementation of the **Run Review** segment of the initiative. This portion provides BLS agencies with additional resources to have paramedics and certified competency-based training (CBT) instructors conduct a minimum standard level of patient care record review (run review) and related EMT training. The standard level of review is collaboratively defined by the EMS Division and its partners annually, and includes both clinical and administrative cases. Templates developed by the medical program director help guide reviews of the specific areas of focus. Agencies provide feedback to EMTs within 14 days of the call, and subsequent training focuses on the specifics of such cases. Run review narratives that identify areas of achievement, deficiencies and trends are shared with the EMS Training and Education Section for incorporation into future training opportunities.



LOOKING AHEAD: KC EMS will continue to work with agencies to operationalize run review within their departments as well as develop regional standards and guidelines so that the regional records management system can best support the run review process.

EMS Statistics: Operations & Key Performance Measures

Seattle & King County - 2018 Overview

BACKGROUND

The operational metrics and key performance measures presented in our EMS Statistics section reflect data collected from January 1, 2018 to December 31, 2018. The EMS Division's capabilities to collect and analyze data from 9-1-1 dispatch centers, EMS agencies, and hospitals continue to significantly improve due to the regional use of a single records management system and integration across technology platforms.

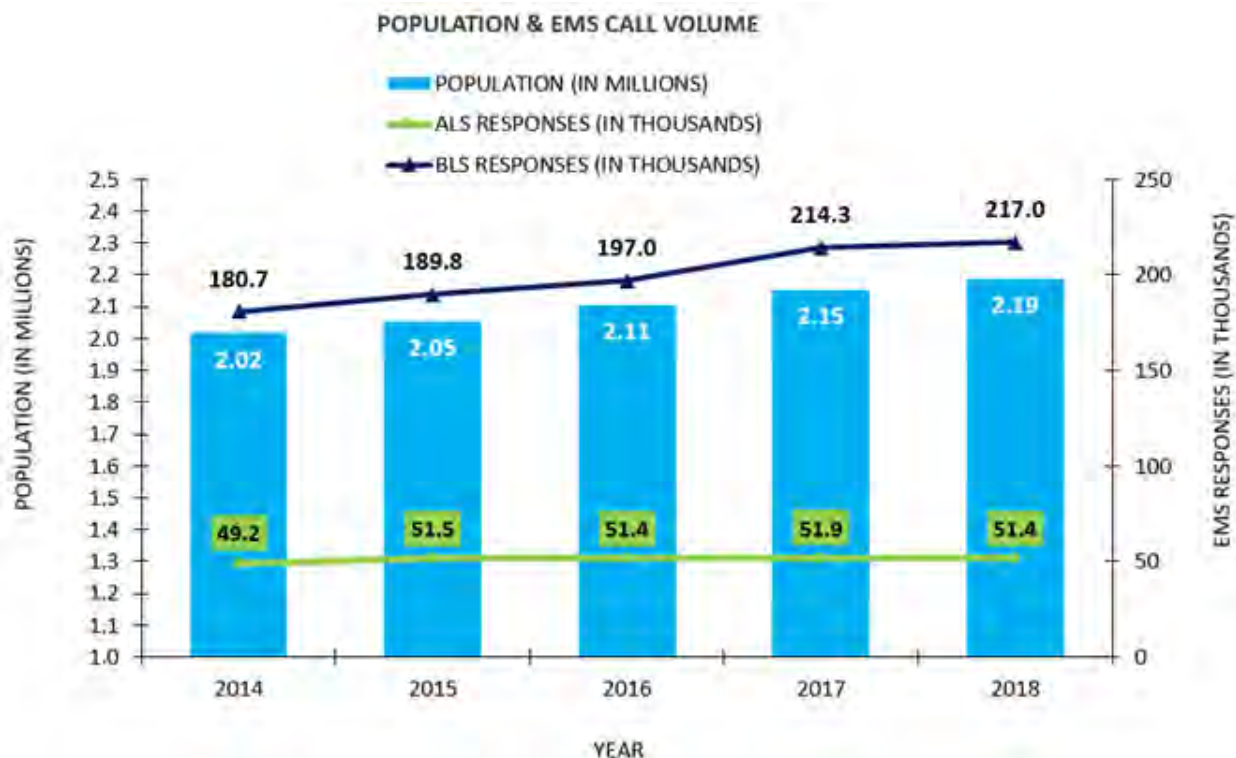
POPULATION

King County is the largest metropolitan county in the State of Washington in terms of population, number of cities (39), and employment. Ranked the 13th most populous county in the United States, King County's population growth remains steady. Since 2010, King County's population increased 13.4%, representing an increase of nearly 259,000 people, spanning across a geographic region of 2,132 square miles and 1,713 square miles of unincorporated King County.

Year	Population	% Growth (Annualized)
1980	1,269,898	
1990	1,507,305	1.87%
2000	1,737,034	1.52%
2010	1,931,249	1.12%
2018	2,188,649	1.67%

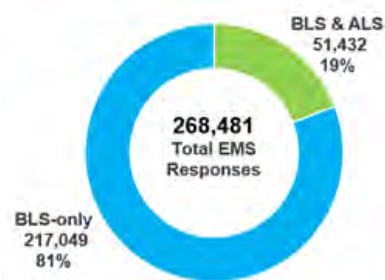
Population serves as an important indicator to predict the trend in the number of emergency medical responses. This means that the demographic profile of King County matters: *When King County's population increases, the number of emergency medical responses (call volume) increases. As population decreases, EMS responses decrease.*

The graph below demonstrates a strong correlation between the population increases being closely linked with the number of BLS calls. ALS calls remain relatively stable and unchanged over the 2014-2018 time period. Historically, decreases in ALS responses have occurred due to various factors such as economic recession and revisions to criteria-based dispatch guidelines that are used by 9-1-1 dispatch centers to determine the appropriate resource to send.



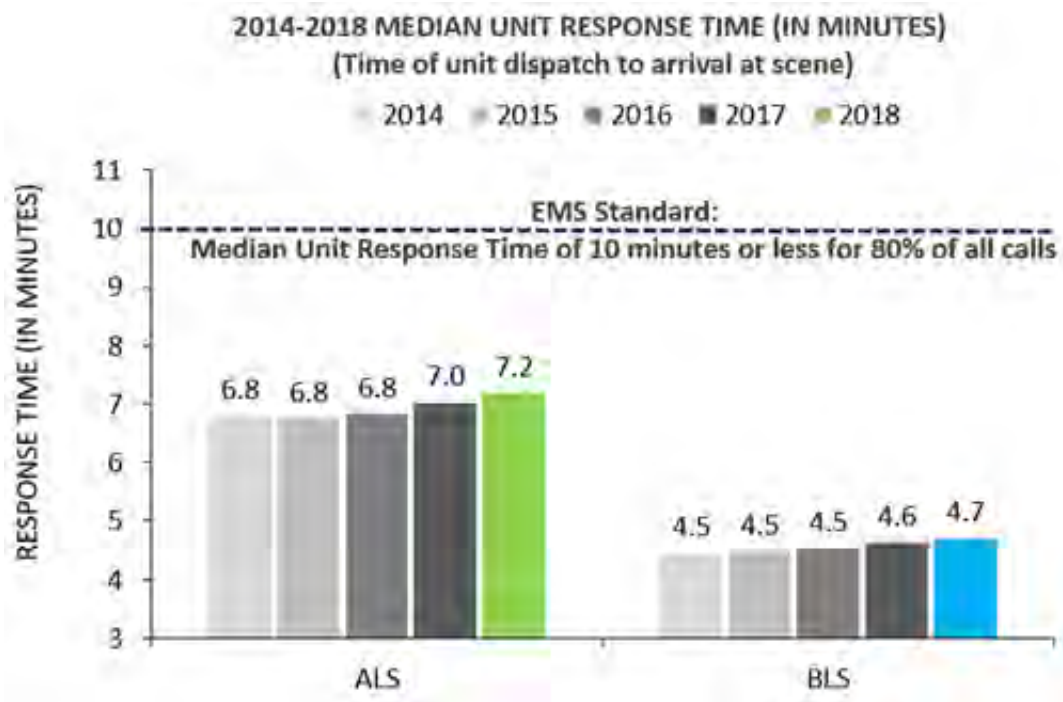
CALL VOLUME

In 2018, EMS responded to 268,481 calls where crews arrived on scene. BLS responds to 100% of all EMS calls. Of the total EMS responses, BLS-only responses accounted for 81% (217,049) of all total calls. BLS and ALS jointly responded to 51,432 calls, representing 19% of all EMS responses. Cancelled enroute calls accounted for approximately 22% (11,116) of all ALS calls compared to 3.5% of all BLS calls (7,586).



RESPONSE TIME

Response times serve as a key performance indicators 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 arrival on scene) and “Unit response time” 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 unit response time of 10 minutes or less, and 80% of all calls within 14 minutes or less.



ALS Response Times		
Measure	Total	Unit
Avg. time (in min.)	12.0	7.9
Median time (in min.)	9.9	7.2
8 minutes or less	33.6%	59.7%
10 minutes or less	51.0%	78.4%
12 minutes or less	64.1%	89.0%
14 minutes or less	72.6%	93.9%

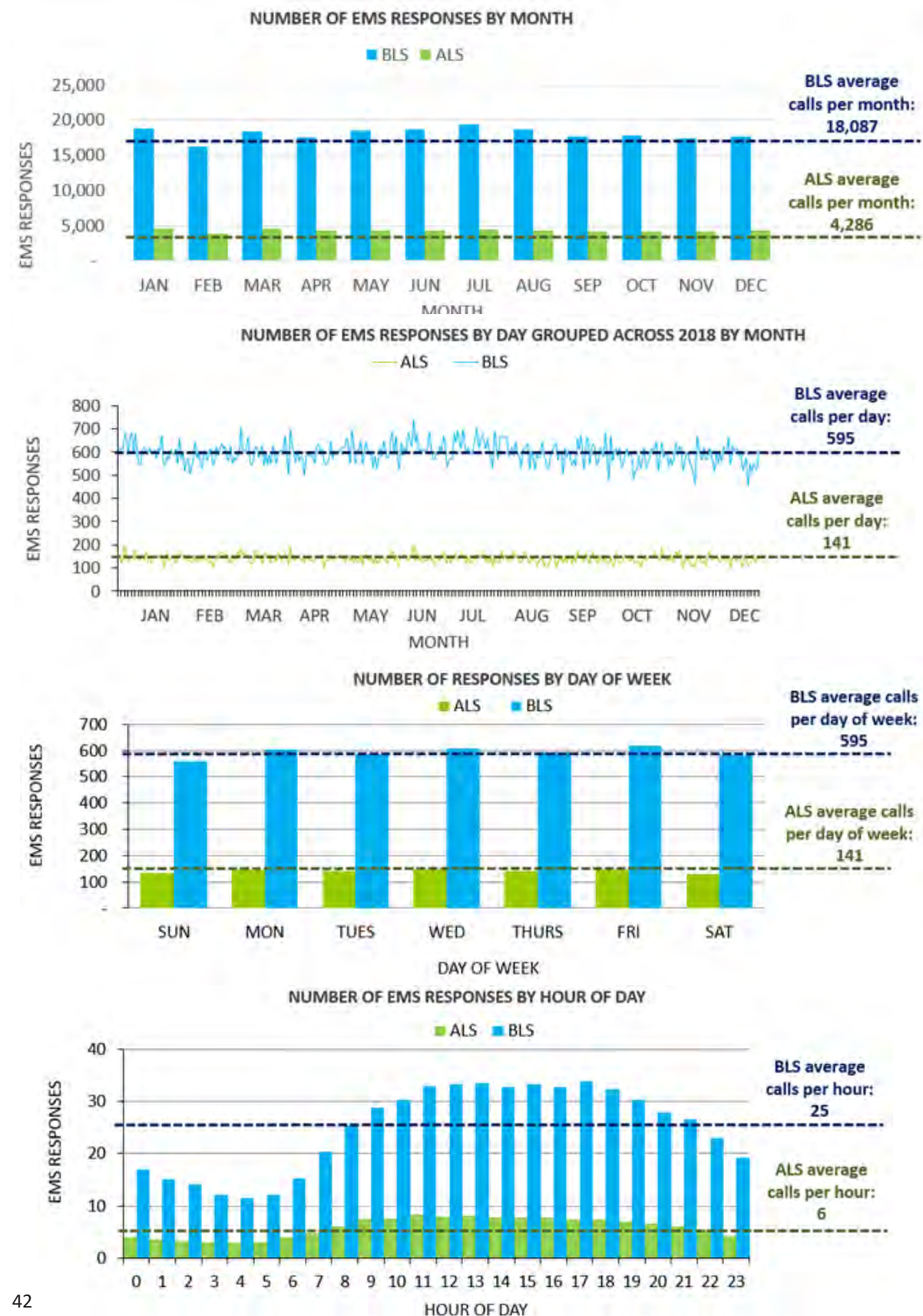
BLS Response Times		
Measure	Total	Unit
Avg. time (in min.)	6.7	5.3
Median time (in min.)	5.8	4.7
6 minutes or less	53.4%	71.4%

EMS Statistics: Operations & Key Performance Measures

Seattle & King County - 2018 Overview

CHARACTERISTICS OF RESPONSES

The following graphs reflect the patterns of ALS and BLS responses in 2018:



CALL TYPES

EMS responds to a wide variety of emergency medical calls. In 2018, nearly 50% 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% of all calls which are comprised of nearly 20% involving trauma, with a higher percentage of their patients who are less than age 65.

RESPONSES BY MEDICAL TYPE

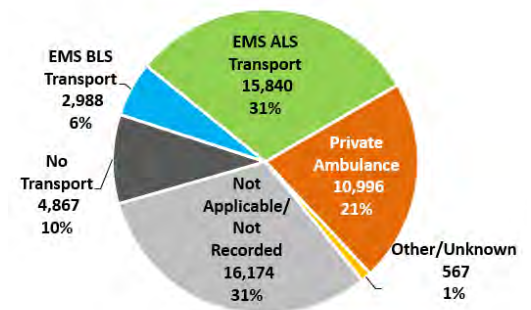
MEDICAL TYPE	ALS		BLS	
Cardiovascular	8,484	24.1%	13,336	6.9%
Respiratory	4,756	13.5%	12,303	6.3%
Neurological	3,768	10.7%	20,840	10.7%
Behavioral/Psychological	3,118	8.9%	16,786	8.6%
Trauma	2,452	7.0%	38,056	19.6%
Alcohol/Drug	2,328	6.6%	15,707	8.1%
Endocrine/Metabolic	1,147	3.3%	3,365	1.7%
Allergy/Anaphylaxis	826	2.4%	1,931	1.0%
Abdominal/Genito-Urinary	794	2.3%	8,695	4.5%
Pain	753	2.1%	6,011	3.1%
Infection	589	1.7%	3,792	2.0%
Obstetric/Gynecological	268	0.8%	885	0.5%
Obvious Death	151	0.4%	1,899	1.0%
Environmental Exposure	80	0.2%	325	0.2%
Other Medical	5,654	16.1%	50,248	25.9%
Total Medical Calls*	35,168	100.0%	194,179	100.0%

*Total medical calls excludes non-medical calls (i.e., standby, cancelled)

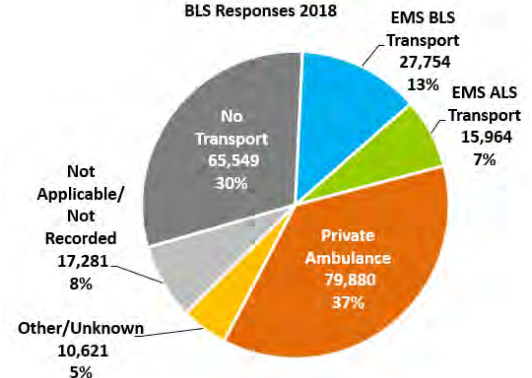
RESPONSES BY AGE GROUP

AGE	ALS	BLS
0-4	901 (2.5%)	4,489 (2.3%)
5-9	340 (1.0%)	2,205 (1.1%)
10-17	745 (2.1%)	6,237 (3.2%)
18-24	1,488 (4.2%)	13,277 (6.7%)
25-44	6,107 (17.3%)	45,608 (23.1%)
45-64	10,970 (31.0%)	52,405 (26.5%)
65-84	10,799 (30.5%)	49,925 (25.3%)
85+	4,022 (11.4%)	23,575 (11.9%)
Total	35,372	197,721

Transport Type
ALS Responses 2018



Transport Type
BLS Responses 2018



TRANSPORT TYPE

An important component of providing EMS care is appropriate triage. Once a patient is stabilized, EMS personnel use their skills and knowledge to determine whether transport the patient to a hospital is needed for further medical attention. Based on the clinical need of the patient, a decision to identify the most appropriate transport resource or outcome is made. The graphs shown to the right indicate the transport types for EMS responses across 2018 broken into two categories for ALS responses and BLS responses:

- EMS ALS ground transport via medic units and ALS air transport (e.g. AirLift Northwest)
- EMS BLS transport by fire departments via aid cars
- Private ambulance (e.g. AMR, TriMed, Falck)
- Other methods which may involve private vehicles such as taxis or cabulance
- No transport may occur if a patient refuses transport, or if it is deemed that transport is not needed.
- Not applicable or not recorded includes EMS responses that are cancelled enroute or at scene, and/or if no patient is present

Cardiac Arrest Statistics

Seattle & King County - 2018 Overview

BACKGROUND

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.

Successful resuscitation from a cardiac arrest requires the links in the "chain of survival." These links 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:

1. Overall Group: Persons suffering arrest who are two years or older who received ALS treatment and had no advanced directives to limit care, and
2. Utstein Group: Persons in the overall group whose cardiac arrests were witnessed by bystanders and 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% of the total EMS call volume, performance and outcome are considered good proxies for the performance of an entire EMS system because of how 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 2014 to 2018 for Seattle & King County. The report presents 2018 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.

- 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	2014	2015	2016	2017	2018
Cardiac Arrests	1,246	1,114	1,228	1,215	1,298

- 2018 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	# Treated	# Survived to Hospital Discharge	Percent Survived
Arrest Before Arrival of EMS:	1,114	236	21%
Ventricular Fibrillation/ Tachycardia (VF/VT)	292	142	49%
Asystole	491	16	3%
PEA	261	53	20%
Not Shockable, unknown if PEA or asystole	45	10	22%
Unknown	25	15	60%
Arrest After Arrival of EMS:	184	53	29%
Ventricular Fibrillation/Tachycardia (VF/VT)	36	24	67%
Asystole	33	7	21%
PEA	104	19	18%
Not Shockable, unknown if PEA or asystole	7	1	14%
Unknown	3	1	33%
Total	1,298	289	22%

- Utstein Group: Survival to hospital discharge for arrests due to heart disease, witnessed by bystanders (excludes EMS-witnessed), with an initial rhythm of ventricular fibrillation/tachycardia:

Year	2018	5-year cumulative 2014-2018
Survival Rate	118/209 (56%)	546/1,012 (54%)

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

Year	2014	2015	2016	2017	2018
Bystander CPR	734/1,093 (67%)	666/985 (68%)	791/1,086 (73%)	763/1,084 (70%)	747/1,114 (67%)

SUMMARY OF KEY POINTS FOR 2018:

- The EMS system successfully **resuscitated 22% of all EMS-treated cardiac arrest victims** in Seattle and King County, a success rate two to three times higher than most communities.
- This 22% represents **289 lives saved** by the EMS system, most of whom return home to resume their lives with loved ones, friends, and colleagues. This represents our EMS system's highest number of survivors in both the Utstein and overall groups.
- Survival to hospital discharge was 56%** for arrests among the Utstein group, which is an achievement rivaled by only a handful of exceptionally proficient EMS systems from around the world.
- Positive efforts were highlighted by a **bystander CPR rate of 67%**, among the highest rates ever reported.
- This resuscitation success is a tribute to the **immense dedication and efforts by all the stakeholders** involved in the EMS system.

Cardiac Arrest Highlight: It Takes A System to Save a Victim & the Integral Role of Law Enforcement

Out-of-hospital cardiac arrest (OHCA) challenges every component of an emergency medical services (EMS) system. Without laypersons, telecommunicators, law enforcement, and EMS personnel working together as a “team of resuscitators,” OHCA incidents will always lead to death.

Cardiac arrest is considered the ultimate team sport in an EMS system, with each person on the squad playing an important role along the chain of survival: activating the 9-1-1 system, promptly recognizing the arrest, initiating CPR and defibrillation (when appropriate), and administering advanced life-saving patient care and treatment. This is why the successful resuscitation with survival from out-of-hospital cardiac arrest to hospital discharge is considered the gold standard for assessing a community’s EMS system’s overall effectiveness.

Since the beginning of the current EMS levy period, 1,238 different teams have responded to save the lives of people in cardiac arrest. No two teams were identical - some involved only highly-trained EMS personnel, while others included bystanders willing to initiate hands-only CPR, often through the assistance from telecommunicators. Some teams needed to apply public access defibrillators (PAD) to the patient prior to EMS arrival, which is significant because the chance of surviving OHCA increases considerably if the patient has a heart rhythm that is shockable. However, in all cases, every minute counts, and minutes of resuscitative actions amount to savings of a lifetime.

**2014-2019 Levy
Highlight**

1,238

**different teams
of resuscitators
came together to save the
lives of people in
cardiac arrest.**

EMS TEAMWORK SAVES TEEN

One such team of resuscitators leapt into action on Tuesday March 5, 2019 at the Auburn District Pool where 16-year-old Reese Marlenee was practicing with her Auburn Mountainview High School water polo team. While on the pool deck, Reese collapsed, suffering cardiac arrest. Quick actions by school staff to initiate CPR and apply a PAD (located with the help of bystanders) gave Reese the best chances to survive her emergency. Auburn police officer was first on scene and assisted with CPR efforts until EMS arrived. Valley Regional Fire Authority firefighter/EMTs arrived on scene less than 4 minutes after the 9-1-1 call was made. Crews continued CPR and provided an additional shock to Reese’s heart, which helped return spontaneous circulation. King County Medic One paramedics provided advanced life support treatment and transported Reese to Mary Bridge Children’s Hospital within 30 minutes from arriving on scene.

Reese’s team of resuscitators included bystanders trained in CPR, telecommunicators, law enforcement, firefighter/EMTs and paramedics.

We recognize that not all resuscitations will have this team’s same lineup, but for Reese, the links in the chain of survival came together and resulted in a successful outcome.



King County is fortunate to have communities that have demonstrated their willingness to participate in resuscitations. Over the course of the 2014-2019 EMS levy period, bystander CPR participation rates achieved a milestone by exceeding 70%, which is ranked among the highest every reported in the nation. More than 3,000 individuals have provided telephone-assisted or unassisted CPR, in part due to telecommunicators from the four regional dispatch centers – North East King County Regional Public Safety Communication Agency (NORCOM), Valley Communications Center, Port of Seattle, and Seattle Fire Alarm Center Dispatch – correctly recognizing cardiac arrest calls 97% of the time, an accomplishment that exceeds national performance metrics.

THE INTEGRAL ROLE OF LAW ENFORCEMENT IN OHCA

One of the noteworthy elements of Reese’s story is that law enforcement participated. Over the past year, King County EMS identified a significant increase in the percentage of incidents involving law enforcement’s application of an AED – from less than 1% to nearly 10%. Because they typically arrive first on scene prior to EMS, our law enforcement partners play a critical role in the chain of survival.

As EMS Medical Program Director, Dr. Tom Rea affirmed:

“We are fortunate to have such an expert emergency dispatch and two-tier EMS system that excels at treating cardiac arrest. Even then, time can be the greatest challenge to successful resuscitation where seconds can make the difference between life and death. The involvement of law enforcement can achieve important time savings that may translate into better odds of survival. A law enforcement program of CPR/AED emergency response is a substantial undertaking by a police agency because it requires active collaboration with 9-1-1 emergency dispatch and local EMS, and a sustained commitment to train, equip, and support officers in the program. The rewards though are truly meaningful, as each life saved from the program improves the health of the community.”

Thank you to the law enforcement agencies that have contributed significantly to our EMS system’s success, including: Algona, Auburn, Bellevue, Black Diamond, Bothell, Burien, Clyde Hill, Covington, Enumclaw, Federal Way, Kenmore, Kent, Kirkland, Lake Forest Park, Medina, Mercer Island, North Bend, Pacific, Port of Seattle, Redmond, Renton, Sammamish, SeaTac, Shoreline, Snoqualmie, and Tukwila Police Departments, and the King County Sheriff’s Office.



CONTINUOUS QUALITY IMPROVEMENT

Providing the best possible patient care drives the EMS system of Seattle and King County. Continuous quality improvement, system surveillance, physician oversight and medical feedback are all critical to successful patient outcomes. Each cardiac arrest call is reviewed by King County’s EMS Division to better understand the challenges of recognition and the administration of CPR or a PAD by a bystander. This assessment goes to those involved in responding to a cardiac arrest incident to recognize the team’s efforts or to identify potential opportunities for improvement.

EMS Funding and 2019 Financial Plan

EMS LEVY STRUCTURE OVERVIEW

The Medic One/EMS system of Seattle and King County is primarily funded by a countywide, voter-approved regular property tax levy. Funds are restricted by state law and can only be spent on EMS-related activities. The levy growth is limited to a 1% increase from existing properties, plus assessment on new construction, per 84.55.101 RCW.

EMS levy funds are collected throughout King County and managed regionally by the EMS Division in accordance with RCW 84.52.069 Emergency Medical Care and Service levies, 2014-2019 Medic One/EMS Strategic Plan policies and guidelines, and recommendations from the EMS Advisory Committee (EMSAC). King County EMS funds are spent on four main areas: 1) Advanced Life Support (ALS), 2) Basic Life Support (BLS), 3) Regional Support Services, and 4) Strategic Initiatives.

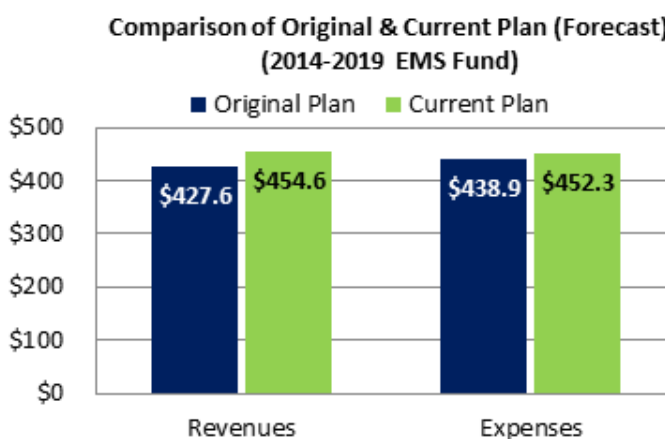
Per an agreement with King County in place since the creation of the countywide EMS Levy, Seattle receives all Medic One/EMS levy funds collected within the city limits. As such, the Finance section of the 2019 Annual Report excludes the City of Seattle and pertains only to the EMS fund within the remainder of King County (referred to as the KC EMS Fund).

With 2019 being the last year of the current levy, this year's report will summarize the 2014-2019 Medic One/EMS levy financials, and focus on some of the challenges, trends and decisions made over the past six years. 2019 numbers are estimates based on the most recent forecasts.

INTRODUCTION

In the final year of the current six-year levy, revenues and expenditures are both forecasted to be higher than anticipated in the original plan - revenues are up by \$27 million, and expenditures by \$13.3 million.

Both the revenue and expenditure increases are related to using conservative financial modeling when developing the 2014-2019 Financial Plan. This conservative revenue forecast, coupled with the experience of the economic downturn, led to decisions to tighten both the Advanced Life Support (ALS) and Regional Support Services (RSS) allocations. Because these reduced allocations left little room for programs to adapt to expenditure challenges, both programs accessed reserves to cover costs.



In 2016, the region supported a mid-levy adjustment for ALS, which provided additional funding to the ALS allocation for the final years of the levy. The earlier accessing of the reserves and the mid-levy adjustment were both possible because of increased revenue brought in by property taxes that were higher than originally anticipated.

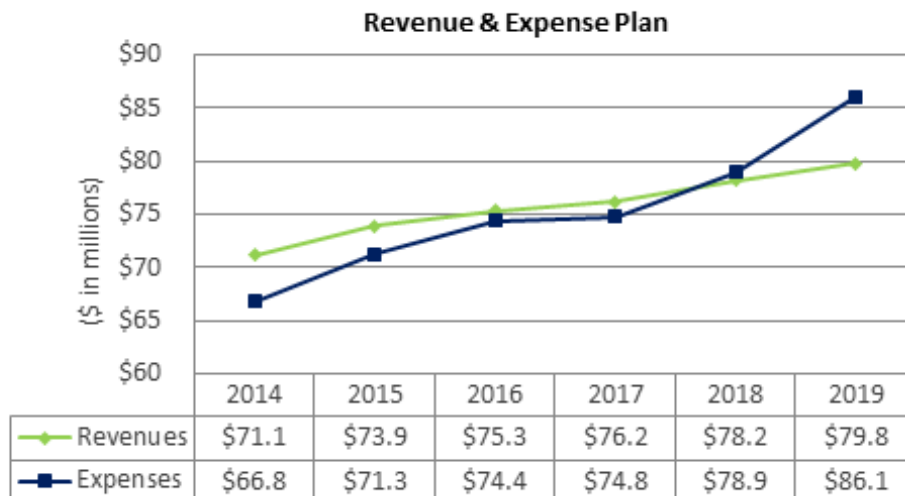
REVENUES

Approximately 98% of revenue for the EMS levy comes from taxes and income related to property taxes based on assessed valuations. In addition to increased property taxes, programs that were previously in the Public Health fund (Grants, Donations and Entrepreneurial) were moved into the EMS fund in 2016. As seen in the chart below, revenues related to charges for services and grants increased significantly in 2016. Due to economic conditions, interest income has increased significantly since 2014.

REVENUES: 2014-2019 LEVY PERIOD

REVENUE TYPE	2014	2015	2016	2017	2018	2019	Total
Property Taxes	70.30	72.89	73.38	74.32	76.18	77.89	444.96
Interest/Other Income	0.59	0.55	0.66	0.78	1.14	1.14	4.86
Charges for Services	0.25	0.50	0.70	0.67	0.56	0.41	3.09
Grants	0.00	0.00	0.60	0.40	0.31	0.34	1.65
Total	71.14	73.94	75.34	76.17	78.19	79.78	454.56

Note: Dollars in millions; Grants and Entrepreneurial income added to EMS Fund from Public Health Fund in 2016.



The EMS levy is structured to collect more revenue in the first years of the levy to pay for expenditures later in the levy.

EMS Funding and 2019 Financial Plan

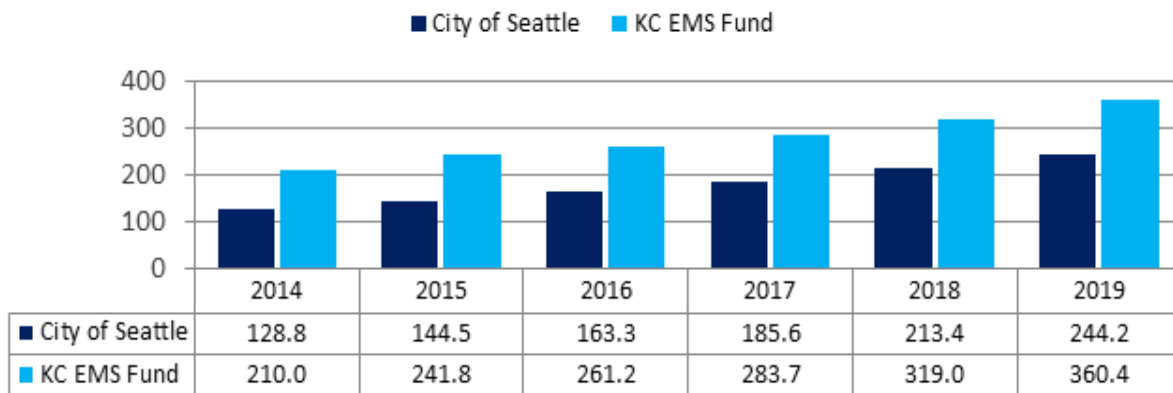
PROPERTY TAXES/ASSESSED VALUATIONS (AV)

The economic downturn and depressed Assessed Valuations (AV) from the previous levy span led the 2014-2019 levy rate to begin at 33.5 cents. As mandated by RCW, the total amount collected per year by the levy is limited to 1% plus new construction. When AV grows at a rate higher than 1%, the levy rate reduces to not exceed that 1% + new construction limit. The decrease in levy rate shown on the following chart is proportionate to the increase in AV. AV is projected to increase at a rate higher than the limit factor of 1% throughout the levy period, so the levy rate is projected to decrease from 33.5 cents/\$1,000 in 2014 to 21.8 cents/\$1,000 in 2019.

Although authorized at 33.5 cents per \$1,000 Assessed Valuation (AV), the levy rate for 2019 is 21.8 cents per \$1,000 AV – down from 23.9 cents per \$1,000 AV in 2018.

The region's AV has continued to grow, with 2019 AV 13.6% higher than that in 2018. As the graph below shows, the "split" of levy funds between Seattle and King County has changed. Seattle's AV has increased at a higher rate than the rest of the county, which resulted in King County's percentage of the levy (the AV outside the City of Seattle) decreasing in 2018, and continuing to slowly decrease through 2019.

Taxable Assessed Valuation (AV) (in billions)
2014-2017 Actual AV and 2018-2019 Projected AV



Taxable Assessed Valuation

	2014	2015	2016	2017	2018	2019
% City of Seattle	38.0%	37.4%	38.5%	39.6%	40.1%	40.4%
% KC EMS	62.0%	62.6%	61.5%	60.4%	59.9%	59.6%

Note: The KC EMS Fund taxable AV does not include AV related to Milton (Milton receives taxes directly from King County.)

REVENUE TRENDS

Most of the revenue trends relate to the upturn in the economy from the 2008 recession:

- Assessed Valuations (AV), including the first year of the levy were higher than planned.
- New Construction AV was higher than planned.
- Interest income has increased and is a bit higher than the original plan.
- The percent of AV related to the City of Seattle has increased. The impact of this to the KC EMS Fund was mitigated by the total increase in property tax revenue.

EXPENDITURES

EMS levy revenues support Medic One/EMS operations related to direct service delivery or support programs:

Advanced Life Support (ALS) Services (paramedics):

- Uses a standard unit cost allocation consisting of an operating and equipment allocation
- Allocations increase by a compound inflator that considers the different inflators for labor, pharmaceuticals, equipment and benefits
- Eligible for use of reserves as a “safety net,” should the standard allocation not cover unplanned or extraordinary costs

Basic Life Support (BLS) Services (EMTs):

- Distributed to individual agencies based on an allocation that includes the AV of the district and demand for services (call volume)
- Allocation increase based on consumer price index (CPI) inflator + 1%
- Includes the addition of a BLS Core Services Program beginning in 2015

Regional Support Services (RSS):

- Supports eight major areas – Training & Education, Community Programs, Emergency Medical Dispatch, Operations, Regional Medical Control/QI, Management/Finance, Infrastructure, and Overhead/Indirect Costs
- Allocation increase based on CPI inflator
- Eligible for use of reserves

Strategic Initiatives (SI):

- Funded with lifetime budgets (annual budget adjusted to reflect cash flow changes based on project needs)
- Includes the carryover of the Systemwide Enhanced Network Design (SEND) Strategic Initiative and Emergency Medical Dispatch Strategic Initiative from the 2008-2013 levy period

Community Medical Technician (CMT) Units/Mobile Integrated Health (MIH): New for 2014-2019 Levy Period

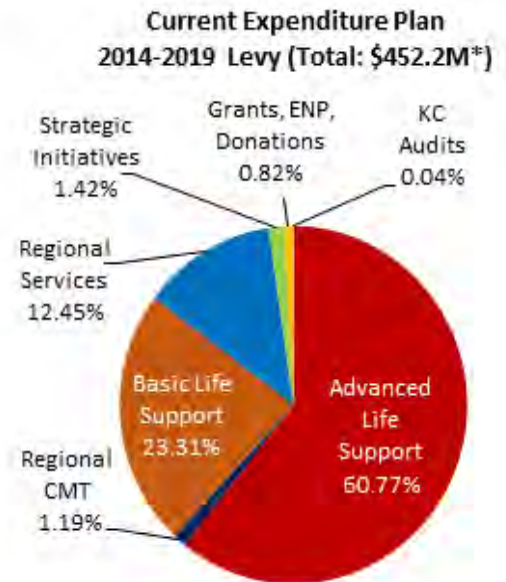
- Audits: Financial review and audits by the King County Auditor’s office complement and augment the oversight and accountability of the King County EMS Fund.

Grants, Entrepreneurial and Donations: moved from Public Health Fund to EMS Levy Fund in 2016

- Grants supporting Center for Evaluation of EMS (CEEMS) projects
- Entrepreneurial programs sharing EMS products with other agencies
- Donations

The following table presents the 2014-2019 levy period expenditures for each area listed above:

	2014 ACTUALS	2015 ACTUALS	2016 ACTUALS	2017 ACTUALS	2018 ACTUALS	2019 FORECAST	2014-2019 TOTAL
ALS	42,155,732	44,621,149	43,840,401	44,730,708	47,997,154	51,498,425	274,843,569
BLS	15,871,030	16,534,167	17,573,429	17,885,872	18,270,269	19,239,414	105,374,181
RSS	8,460,204	9,385,566	9,842,690	8,654,987	9,098,884	10,857,229	56,299,560
SI	311,242	387,245	661,211	1,058,714	1,639,115	2,351,508	6,409,035
CMT/MIH	-	294,672	1,086,034	1,477,626	1,093,750	1,473,667	5,425,749
Audits	-	38,913	158,384	-	-	-	197,297
Grants, ENP, Donations	-	-	1,226,788	946,311	828,204	710,403	3,711,706
TOTAL	66,798,208	71,261,712	74,388,937	74,754,218	78,927,376	86,130,646	452,261,097



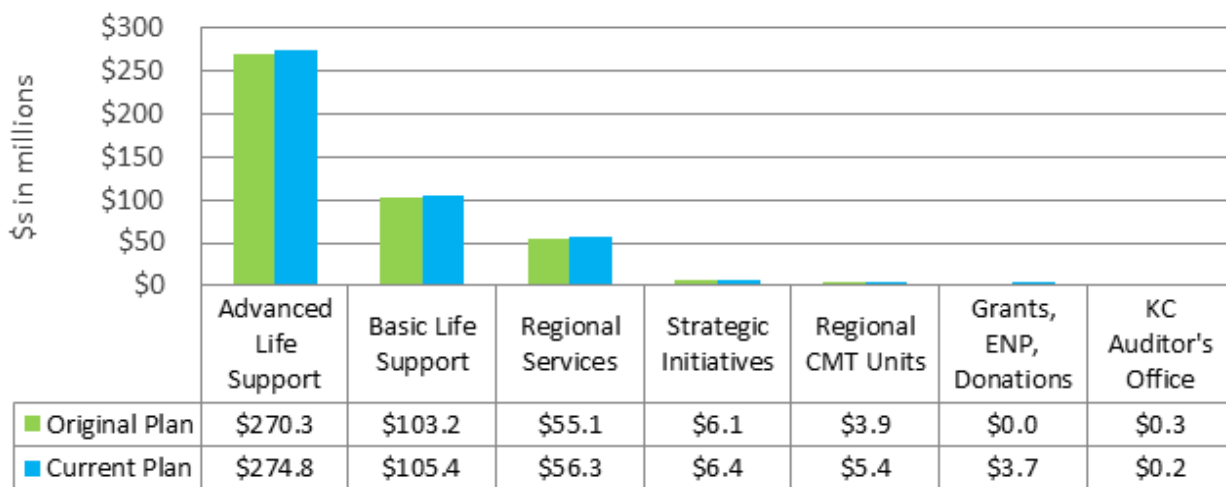
EMS Funding and 2019 Financial Plan

EXPENDITURE TRENDS

Major expenditure differences from the original Financial Plan include:

- Baseline ALS & BLS allocations decreased due to economic indices used for yearly increases (such as CPI) being less than projected.
- Increased costs led ALS providers to access reserve funding in order to cover costs above the allocation (see “Use of Reserves” table for more detailed information). The majority of increased costs were addressed by ALS mid-levy allocation adjustment in 2017.
- The BLS Core Services Program was added to help agencies with unanticipated costs (funded at \$3.7 million for the levy period).
- At the beginning of the levy period, the Regional Services allocation was supplemented by reserves to cover additional King County central rate costs (see “Use of Reserves” table for more detailed information). Regional Services was able to accommodate half of the increased costs in 2016 and all of the increased costs in 2017 & 2018.
- The ability to carry forward \$20 million from this levy to the 2020-2025 levy period to fund reserves.

**KC EMS Fund Expenditures
Comparison Original and Current Forecast**



STRATEGIC INITIATIVES (SIs)

The 2014-2019 Strategic Plan includes five Strategic Initiatives. Three are newly initiated - the Regional Records Management System, BLS Training and Quality Improvement Initiative (formerly titled "BLS Lead Agency), and the Vulnerable Populations. Two SIs are revised versions from the previous levy – BLS Efficiencies and the Efficiency & Effectiveness Studies. Funding from the 2008-2013 SEND and Emergency Medical Dispatch SIs are included below.

\$450,000 from the E&E Initiative was transferred into the BLS Efficiencies Initiative to pilot the regional approach to initial EMT training (see page 32).

STRATEGIC INITIATIVE EXPENDITURES

	2014 ACTUALS	2015 ACTUALS	2016 ACTUALS	2017 ACTUALS	2018 ACTUALS	2019 FORECAST	2014-2019 TOTAL
2014-2019 STRATEGIC INITIATIVES							
Regional Records Management System	33,750	162,719	203,445	107,971	163,499	183,327	854,711
BLS QI and Training	-	-	-	160,255	529,112	791,511	1,480,878
Vulnerable Populations	80,148	188,956	220,383	310,222	292,851	455,000	1,547,560
BLS Efficiencies	8,389	17,521	29,359	271,453	223,291	315,000	865,013
Efficiency & Effectiveness Studies	42,472	99,115	180,277	143,011	380,804	250,000	1,095,679
Total 2014-2019 SIs	164,759	468,311	633,464	992,912	1,589,557	1,994,838	5,843,841
2008-2013 STRATEGIC INITIATIVES							
Emergency Medical Dispatch (EMD)	77,523	(111,249)	18,804	28,402	30,858	350,996	395,334
Systemwide Enhanced Network Design (SEND)	68,960	30,183	8,943	37,400	18,700	5,674	169,860
Total 2008-2013 SIs	146,483	(81,066)	27,747	65,802	49,558	356,670	565,194
Total 2008-2019 SIs	311,242	387,245	661,211	1,058,714	1,639,115	2,351,508	6,409,035

EMS Funding and 2019 Financial Plan

RESERVES

The 2014-2019 Strategic Plan established four reserve categories focused on ALS: ALS Capacity, ALS Equipment, ALS Operational, and ALS Risk Abatement Reserves. It also created the Community Medical Technician (CMT) Reserve and KC required Fund Balance Reserve (90 day rainy day reserve). Policies governing the reserves specify that Regional Services may access the ALS Operational Reserve to cover specific expenses if higher than anticipated.

Over the current levy span, the reserves have gone through a litany of name and grouping changes, but the usage and policies have remained consistent. In 2017, EMS formally transitioned the 2014-2019 reserves to comply with categories in the updated King County Financial Policies. These categories included Expenditure Reserves, Rate Stabilization Reserves, and a Rainy Day Reserve (with a 90-day requirement for levy supported funds). EMS also reviewed reserves to determine if the reserve should be considered a contingency. King County EMS and its regional partners created a crosswalk to move existing reserves into the new financial structure as identified in the table below, and EMSAC endorsed the changes in December 2017.

RESERVES CROSSWALK

CATEGORY	PREVIOUS NAME	NEW NAME
EXPENDITURES		
Contingencies	ALS Operational Reserve	ALS Contingencies (limited access for RSS)
RESERVES		
Expenditure Reserve	ALS Capacity Reserve	Placeholder for Additional ALS Capacity
	ALS Capacity Reserve	Facility Renovation/Relocation
	ALS Equipment Reserve	ALS Equipment
	Regional CMT Unit Reserve	CMT Reserve
	Cash Flow Reserves	Planned Future Years' Expenditures
	Designations - KCM1	KCM1 Equipment Reserves
	Designations - Program Balances	Program Balances
Rate Stabilization Reserve	KC required Fund Balance Reserve	Rate Stabilization Reserve
Rainy Day Reserve	ALS Capacity Reserve - Call Volume & Utilization/Disaster	ALS Call Volume Utilization/Disaster
	ALS Risk Abatement Reserves	ALS Risk Abatement Reserves

Within this new structure, ALS Contingencies continue to provide limited access for Regional Services' needs. The region took this opportunity to further clarify the financial policies and how reserves can be used to replenish each other. Any funds not needed for Expenditures Reserves will automatically fund the Rainy Day Reserve until it reaches 90 days of levy expenditures. Once the Rainy Day Reserve is fully funded, funds can be put into the Rate Stabilization Reserve. If Expenditure Reserves are used and/or ending fund balance reduced (for example, if revenues were less than planned), Rate Stabilization or Rainy Day Reserves would be reduced. Rainy Day Reserves can replenish Expenditure Reserves.

2017-2019 RESERVE LEVEL

RESERVE NAME	2017	2018	2019
Regional CMT Units	1,519,484	1,519,484	-
ALS Capacity	1,067,700	400,000	400,000
ALS Equipment	488,900	488,900	488,900
Planned Future Years Expenditures	9,402,152	6,347,689	-
KCM1 Equipment*	1,772,380	1,234,029	1,234,029
Program Balances (ALS & RSS)*	11,874,941	12,770,017	12,674,942
Rainy Day Reserves	18,219,800	19,257,433	21,062,526
Rate Stabilization Reserves	-	1,659,272	1,468,738
TOTAL RESERVES	44,345,357	43,676,824	37,329,135

**Previously considered designations*

USE OF RESERVES

The use of reserves is subject to review and recommendation by both the EMSAC Financial Subcommittee and EMSAC. The following table shows actual reserve usage through the end of 2018. Regional Services uses existing program balances to cover a portion of the amount eligible for reserves.

USE OF RESERVES AND DESIGNATIONS

	2014	2015	2016	2017	2018	TOTAL
OPERATING RESERVES						
Excess Paid Time Off (PTO)	214,000	25,689	243,741	-	-	483,430
Paramedic Students	271,648	407,012	414,645	290,950	297,932	1,682,187
Dispatch Costs	133,893	169,629	157,683	-	-	461,205
ALS Mid-levy Allocation Adjustment	-	-	1,989,324	2,049,288	2,124,702	6,163,314
Regional Services	306,261	925,922	579,148	-	-	1,811,331
ALS EQUIPMENT RESERVE						
Power Load Systems	-	434,562	174,333	188,990	-	797,885
ALS CAPACITY RESERVE	-	-	-	300,517	59,483	360,000
ALS RISK ABATEMENT RESERVE	-	649,672	161,885	45,000	80,000	936,557
RESERVES SUB-TOTAL	925,802	2,612,486	3,720,759	2,874,745	\$2,562,118	12,695,909
DESIGNATIONS						
Supplement BLS	219,144	-	-	11,698	-	230,842
TOTAL RESERVES & DESIGNATIONS	1,144,946	2,612,486	3,720,759	2,886,443	\$2,562,117	12,926,751

EMS Funding and 2019 Financial Plan

EMS 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 2018 actuals and a 2019 forecast. In alignment with King County's strategic goal of financial stewardship, this Plan is regularly reviewed by EMS stakeholders to ensure sound financial management.

EMS FUND 1190 FINANCIAL PLAN

	2018 ACTUALS	2019 FORECAST
BEGINNING FUND BALANCE (A)	44,345,357	43,676,824
REVENUES		
Property Taxes	76,185,694	77,888,458
Grants	307,091	340,482
Charges for Services	565,528	411,817
Interest Earnings/Miscellaneous Revenue	1,113,311	1,142,200
Other Financing Sources	22,973	-
TOTAL REVENUES (B)	78,194,597	79,782,957
EXPENDITURES		
Advanced Life Support Services	47,997,154	51,498,425
Basic Life Support Services	17,671,236	18,489,414
Regional Services	9,098,884	10,857,229
Strategic Initiatives	1,639,115	2,351,508
Regional CMT Units	1,093,750	1,473,667
BLS Core Services Support	599,033	750,000
Grants, Entrepreneurial & Donations	828,204	710,403
TOTAL EXPENDITURES (C)	78,927,376	86,130,646
TOTAL REVENUES LESS TOTAL EXPENDITURES (D)	(732,779)	(6,347,689)
Other Fund Transactions (E)	64,246	-
ENDING FUND BALANCE (A+D+E=F)	43,676,824	37,329,135
RESERVES AND DESIGNATIONS		
Designations (including Program Balances)	(14,004,046)	(13,908,971)
Reserves*	(29,672,778)	(23,420,164)
TOTAL RESERVES AND DESIGNATIONS (G)	(43,676,824)	(37,329,135)
ENDING UNDESIGNATED FUND BALANCE	-	-

*Refer to page 54 for additional details on reserves

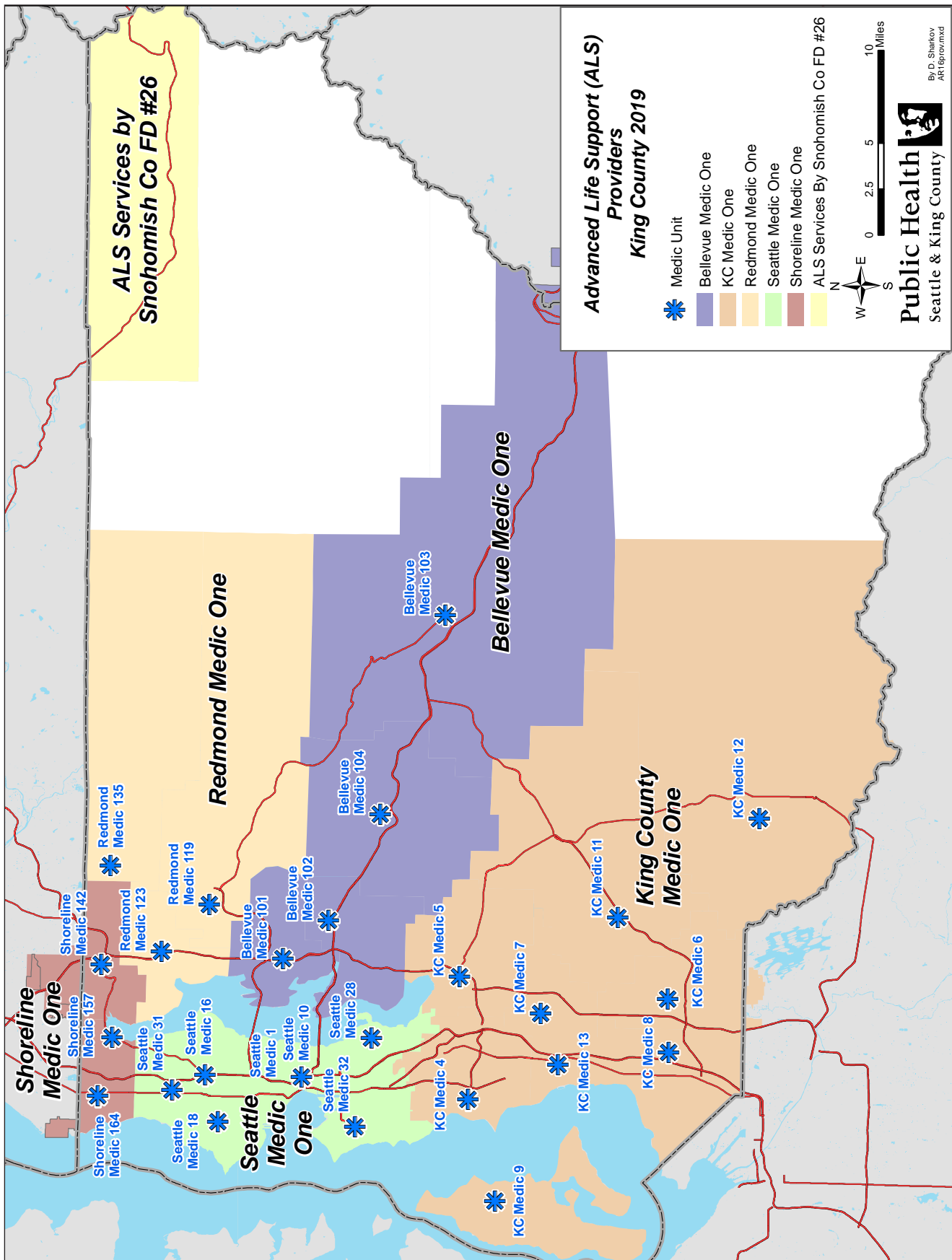
CONCLUSION

Over the 2014-2019 levy span, expenses continued to increase at a rate greater than originally anticipated. As such, ALS and Regional Services programs have accessed reserves to help address these additional costs, and BLS agencies received support from the BLS Core Services program. This trend is expected to continue for the remaining year of the levy.

Similarly, revenues are higher than anticipated in the original plan, due to new construction and higher assessed values, indicating strong economic growth and development throughout King County. The region is collaboratively managing system expenses and overseeing the use of reserves to ensure the overall health of the EMS Fund. Due to the strong economy as reflected in new construction, revenues have increased to cover these expenses and also fund Rainy Day Reserve.

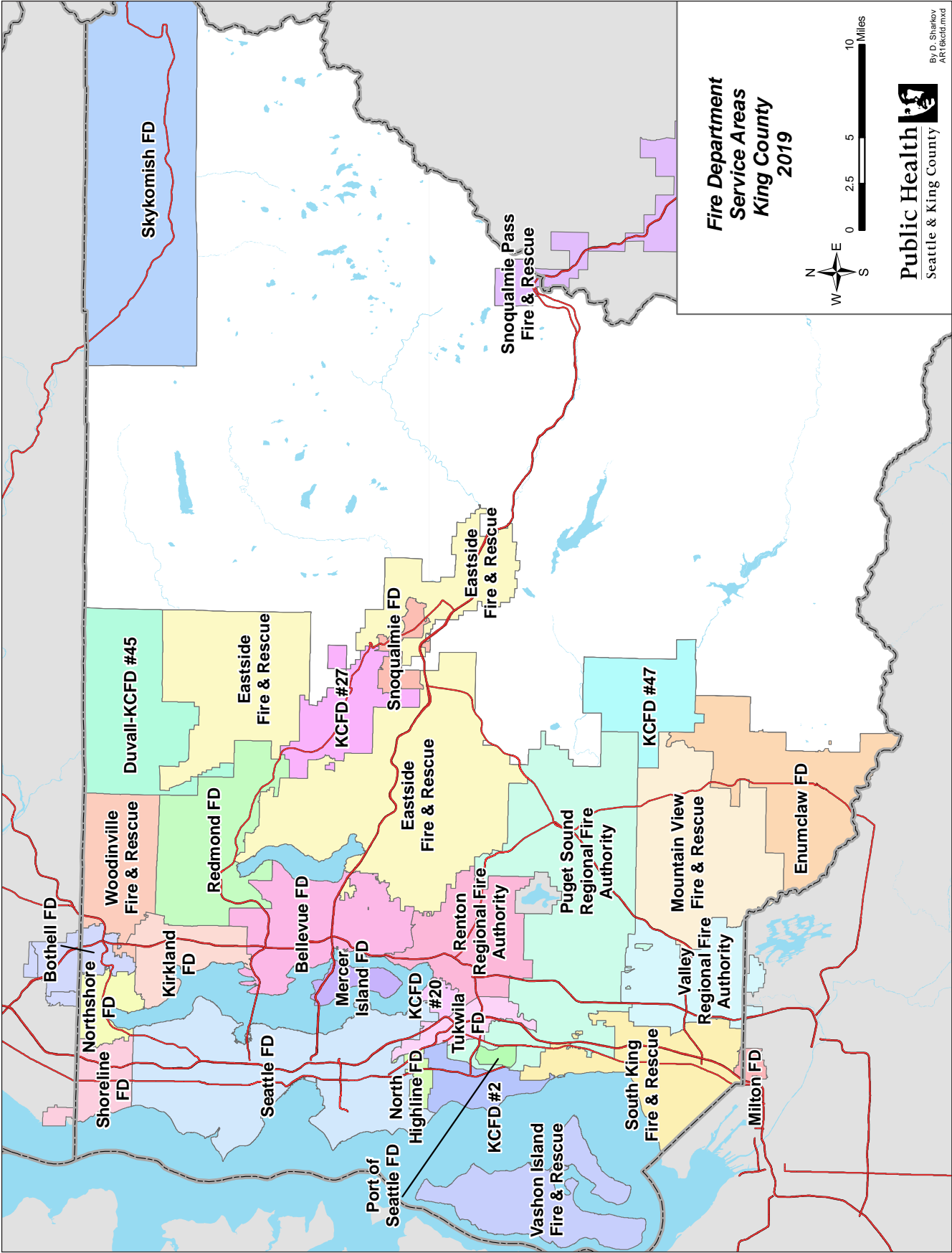
Appendix A: Regional Maps

ALS Provider Areas



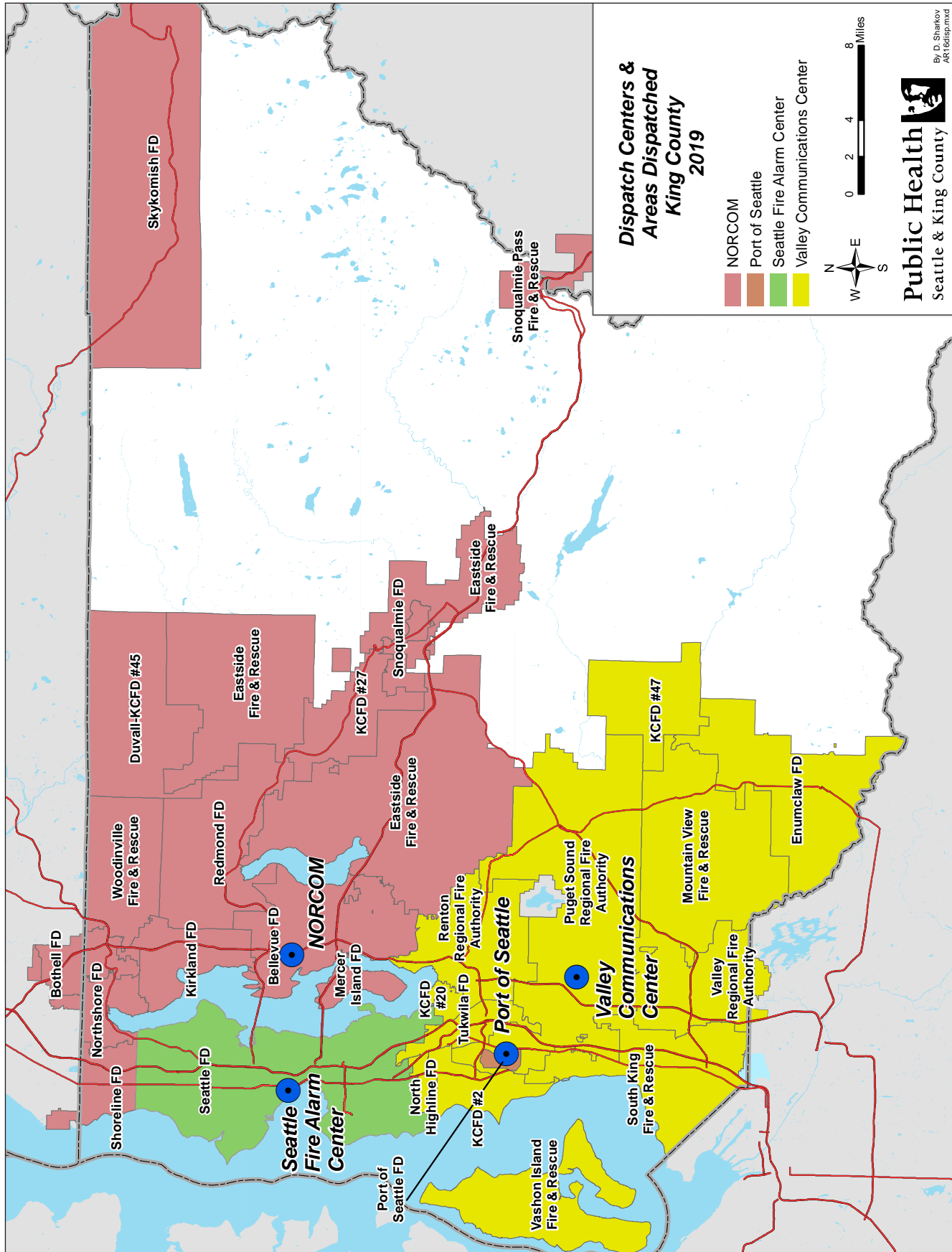
Appendix A: Regional Maps

BLS Provider Areas

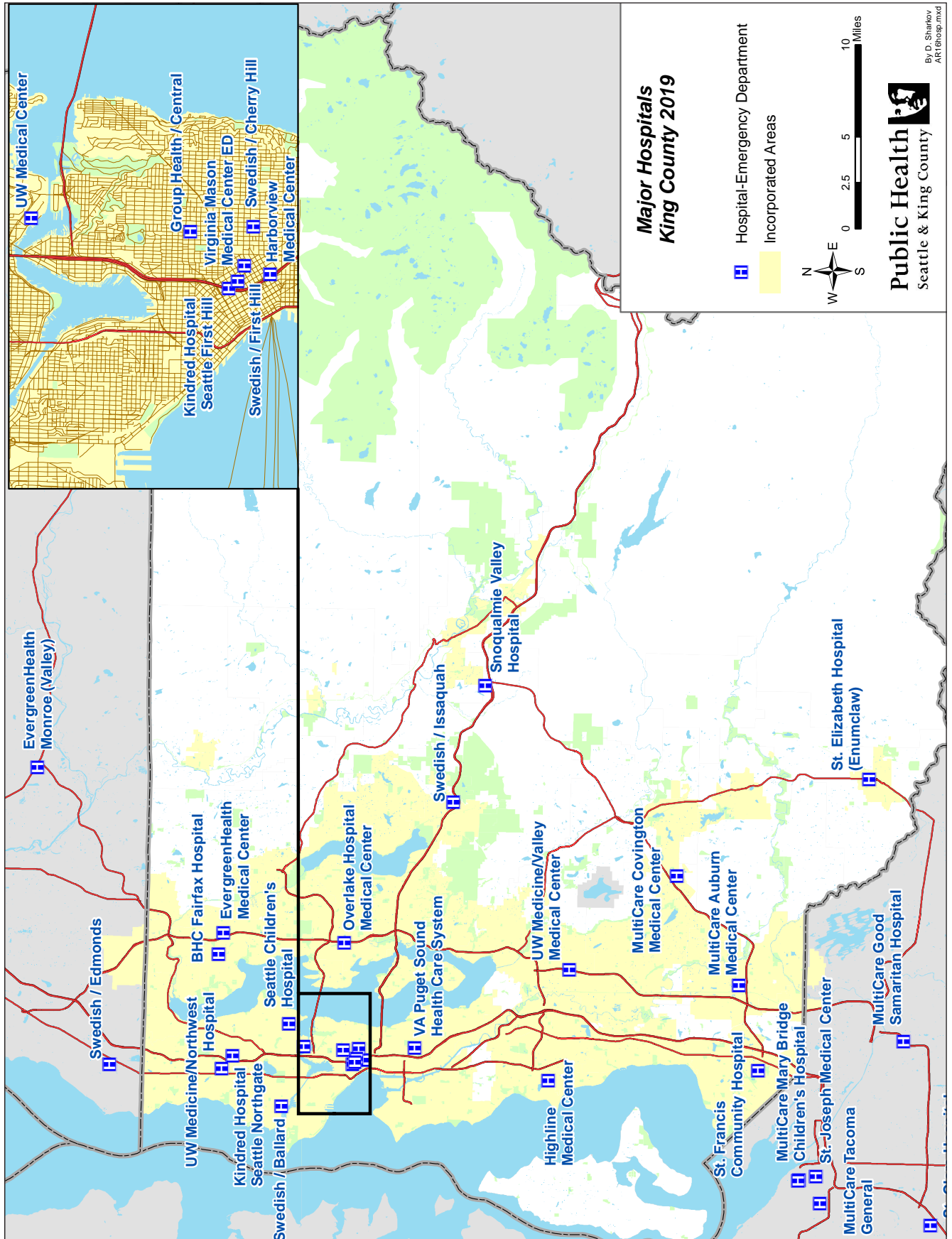


Appendix A: Regional Maps

Dispatch Center Service Areas



Appendix A: Regional Maps EMS Hospitals



Appendix B: EMS Advisory Committee (EMSAC)

Member Name	Representation	Title/Organization
Michele Plorde (Chair)	Emergency Medical Services Division	Director, EMS Division
Patty Hayes	Public Health - Seattle & King County (PHSKC)	Director, PHSKC
Jay Hagen	ALS Providers - Bellevue	Chief, Bellevue Fire Department
Keith Keller	ALS Providers - KC Medic One (KCM1)	Medical Services Administrator, KCM1
Tommy Smith	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
Jeff Clark	BLS in Cities > 50,000 - Sammamish	Chief, Eastside Fire & Rescue
Mike Marrs	BLS in Cities > 50,000 - Burien	Chief, Fire District #2
Joe Sanford	BLS in Cities > 50,000 - Kirkland	Chief, Kirkland Fire Department
Matthew Morris	BLS in Cities > 50,000 - Kent	Chief, Puget Sound Regional Fire Authority
Rick Marshall	BLS in Cities > 50,000 - Renton	Chief, Renton Regional Fire Authority
Al Church	BLS in Cities > 50,000 - Federal Way	Chief, South King Fire & Rescue
Brent Swearingen	BLS in Cities > 50,000 - Auburn	Chief, Valley Regional Fire Authority
Dr. Tom Rea	King County Medical Program Director, Medical Directors' Committee Chair	Medical Program Director, King County
Dr. Peter Kudenchuk	KCM1 Program Medical Director	Medical Director, KCM1
Dr. Michael Sayre	Seattle Medical Program Director	Medical Program Director, Seattle
Larry Rude	KC Fire Commissioners' Association - Rural	Fire Commissioner, Eastside Fire & Rescue
John Rickert	KC Fire Commissioners' Association - Urban	Fire Commissioner, South King Fire & Rescue
Ryan Simonds	Labor - BLS	Renton Regional Fire Authority
Eric Timm	Labor - ALS	Medical Services Administrator, Redmond Fire Department
Lora Ueland	Dispatch	Director, Valley Communications Center
Brandt Butte	Ambulance	American Medical Response (AMR)
Vacant	Health Care System	
Ed Plumlee	Citizen Representative	

Appendix C: Publications

The EMS Division collaborates with medical program directors, EMS providers, and University Of Washington faculty and other guest researchers to conduct research and analyses. In 2018, King County EMS disseminated research findings to wider national and international audiences through the following publications in peer-reviewed scientific and trade journals:

1. Kudenchuk PJ. Shocking insights on double defibrillation: How, when and why not?. *Resuscitation*. 2019 Jul;140:209-210. doi: 10.1016/j.resuscitation.2019.05.022. Epub 2019 May 25. PubMed PMID: 31136807.
2. Coult J, Blackwood J, Rea TD, Kudenchuk PJ, Kwok H. A Method to Detect Presence of Chest Compressions during Resuscitation using Transthoracic Impedance. *IEEE J Biomed Health Inform*. 2019 May 24;. doi: 10.1109/JBHI.2019.2918790. [Epub ahead of print] PubMed PMID: 31144648.
3. Cappola AR, Desai AS, Medici M, Cooper LS, Egan D, Sopko G, Fishman GI, Goldman S, Cooper DS, Mora S, Kudenchuk PJ, Hollenberg AN, McDonald CL, Ladenson PW. Thyroid and Cardiovascular Disease Research Agenda for Enhancing Knowledge, Prevention, and Treatment. *Circulation*. 2019 May 13;. doi: 10.1161/CIRCULATIONAHA.118.036859. [Epub ahead of print] PubMed PMID: 31081673.
4. Murphy DL, Rea TD, McCoy AM, Sayre MR, Fahrenbruch CE, Yin L, Tonelli BA, Joffe AM, Mitchell SH. Inclined position is associated with improved first pass success and laryngoscopic view in prehospital endotracheal intubations. *Am J Emerg Med*. 2019 May;37(5):937-941. doi: 10.1016/j.ajem.2019.02.038. Epub 2019 Feb 25. PubMed PMID: 30826211.
5. Pollack RA, Brown SP, May S, Rea T, Kudenchuk PJ, Weisfeldt ML. Bystander automated external defibrillator application in non-shockable out-of-hospital cardiac arrest. *Resuscitation*. 2019 Apr;137:168-174. doi: 10.1016/j.resuscitation.2019.02.007. Epub 2019 Feb 18. PubMed PMID: 30790694.]
6. Dumas F, Coult J, Blackwood J, Kudenchuk P, Cariou A, Rea TD. The association of chronic health status and survival following ventricular fibrillation cardiac arrest: Investigation of a primary myocardial mechanism. *Resuscitation*. 2019 Apr;137:190-196. doi: 10.1016/j.resuscitation.2019.02.018. Epub 2019 Feb 19. PubMed PMID: 30794830.
7. Yannopoulos D, Bartos JA, Aufderheide TP, Callaway CW, Deo R, Garcia S, Halperin HR, Kern KB, Kudenchuk PJ, Neumar RW, Raveendran G. The Evolving Role of the Cardiac Catheterization Laboratory in the Management of Patients With Out-of-Hospital Cardiac Arrest: A Scientific Statement From the American Heart Association. *Circulation*. 2019 Mar 19;139(12):e530-e552. doi: 10.1161/CIR.0000000000000630. PubMed PMID: 30760026.
8. Dougherty CM, Thompson EA, Kudenchuk PJ. Patient plus partner trial: A randomized controlled trial of 2 interventions to improve outcomes after an initial implantable cardioverter-defibrillator. *Heart Rhythm*. 2019 Mar;16(3):453-459. doi: 10.1016/j.hrthm.2018.10.011. Epub 2018 Oct 16. PubMed PMID: 30340060; PubMed Central PMCID: PMC6399067
9. Petek BJ, Erley CL, Kudenchuk PJ, Carlom D, Strote J, Gatewood MO, Shuman WP, Hira RS, Gunn ML, Maynard C, Branch KR. Diagnostic yield of non-invasive imaging in patients following non-traumatic out-of-hospital sudden cardiac arrest: A systematic review. *Resuscitation*. 2019 Feb;135:183-190. doi: 10.1016/j.resuscitation.2018.09.004. Epub 2018 Sep 7. Review. PubMed PMID: 30201536.

Appendix C: Publications

10. Mody P, Brown SP, Kudenchuk PJ, Chan PS, Khera R, Ayers C, Pandey A, Kern KB, de Lemos JA, Link MS, Idris AH. Intraosseous versus intravenous access in patients with out-of-hospital cardiac arrest: Insights from the resuscitation outcomes consortium continuous chest compression trial. *Resuscitation*. 2019 Jan;134:69-75. doi: 10.1016/j.resuscitation.2018.10.031. Epub 2018 Nov 1. PubMed PMID: 30391366.
11. Coult J, Blackwood J, Sherman L, Rea TD, Kudenchuk PJ, Kwok H. Ventricular Fibrillation Waveform Analysis During Chest Compressions to Predict Survival From Cardiac Arrest. *Circ Arrhythm Electrophysiol*. 2019 Jan;12(1):e006924. doi: 10.1161/CIRCEP.118.006924. PubMed PMID: 30626208; PubMed Central PMCID: PMC6532650.
12. Panchal AR, Berg KM, Kudenchuk PJ, Del Rios M, Hirsch KG, Link MS, Kurz MC, Chan PS, Cabañas JG, Morley PT, Hazinski MF, Donnino MW. 2018 American Heart Association Focused Update on Advanced Cardiovascular Life Support Use of Antiarrhythmic Drugs During and Immediately After Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2018 Dec 4;138(23):e740-e749. doi: 10.1161/CIR.0000000000000613. PubMed PMID: 30571262.
13. Kearney KE, Maynard C, Smith B, Rea TD, Beatty A, McCabe JM. Performance of coronary angiography and intervention after out of hospital cardiac arrest. *Resuscitation*. 2018 Dec;133:141-146. doi: 10.1016/j.resuscitation.2018.10.007. Epub 2018 Oct 11. PubMed PMID: 30316950.
14. Peltan ID, Mitchell KH, Rudd KE, Mann BA, Carlbohm DJ, Rea TD, Butler AM, Hough CL, Brown SM. Pre-hospital Care and Emergency Department Door-to-Antibiotic Time in Sepsis. *Ann Am Thorac Soc*. 2018 Dec;15(12):1443-1450. doi: 10.1513/AnnalsATS.201803-199OC. PubMed PMID: 30153044; PubMed Central PMCID: PMC6322022.
15. Blackwood J, Eisenberg M, Jorgenson D, Nania J, Howard B, Collins B, Connell P, Day T, Rohrbach C, Rea T. Strategy to Address Private Location Cardiac Arrest: A Public Safety Survey. *Prehosp Emerg Care*. 2018 Nov-Dec;22(6):784-787. doi: 10.1080/10903127.2018.1462419. Epub 2018 May 16. PubMed PMID: 29768077.
16. Okubo M, Schmicker RH, Wallace DJ, Idris AH, Nichol G, Austin MA, Grunau B, Wittwer LK, Richmond N, Morrison LJ, Kurz MC, Cheskes S, Kudenchuk PJ, Zive DM, Aufderheide TP, Wang HE, Herren H, Vaillancourt C, Davis DP, Vilke GM, Scheuermeyer FX, Weisfeldt ML, Elmer J, Colella R, Callaway CW. Variation in Survival After Out-of-Hospital Cardiac Arrest Between Emergency Medical Services Agencies. *JAMA Cardiol*. 2018 Oct 1;3(10):989-999. doi: 10.1001/jamacardio.2018.3037. PubMed PMID: 30267053; PubMed Central PMCID: PMC6233822.
17. Malta Hansen C, Kragholm K, Dupre ME, Pearson DA, Tyson C, Monk L, Rea TD, Starks MA, Nelson D, Jollis JG, McNally B, Corbett CM, Granger CB. Association of Bystander and First-Responder Efforts and Outcomes According to Sex: Results From the North Carolina HeartRescue Statewide Quality Improvement Initiative. *J Am Heart Assoc*. 2018 Sep 18;7(18):e009873. doi: 10.1161/JAHA.118.009873. PubMed PMID: 30371210; PubMed Central PMCID: PMC6222952.
18. Newgard CD, Fu R, Malveau S, Rea T, Griffiths DE, Bulger E, Klotz P, Tirrell A, Zive D. Out-of-Hospital Research in the Era of Electronic Health Records. *Prehosp Emerg Care*. 2018 Sep-Oct;22(5):539-550. doi: 10.1080/10903127.2018.1430875. Epub 2018 Mar 1. PubMed PMID: 29494774.

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19. Blewer AL, McGovern SK, Schmicker RH, May S, Morrison LJ, Aufderheide TP, Daya M, Idris AH, Callaway CW, Kudenchuk PJ, Vilke GM, Abella BS. Gender Disparities Among Adult Recipients of Bystander Cardiopulmonary Resuscitation in the Public. *Circ Cardiovasc Qual Outcomes*. 2018 Aug;11(8):e004710. doi: 10.1161/CIRCOUTCOMES.118.004710. PubMed PMID: 30354377; PubMed Central PMCID: PMC6209113.
 20. Rea T. Paradigm shift: changing public access to all-access defibrillation. *Heart*. 2018 Aug;104(16):1311-1312. doi: 10.1136/heartjnl-2018-313298. Epub 2018 May 17. PubMed PMID: 29773656.
 21. Harris AW, Kudenchuk PJ. Cardiopulmonary resuscitation: the science behind the hands. *Heart*. 2018 Jul;104(13):1056-1061. doi: 10.1136/heartjnl-2017-312696. Epub 2018 Jan 20. Review. PubMed PMID: 29353251.
 22. Sundberg M, Perron CO, Kimia A, Landschaft A, Nigrovic LE, Nelson KA, Fine AM, Eisenberg M, Baskin MN, Neuman MI, Stack AM. A method to identify pediatric high-risk diagnoses missed in the emergency department. *Diagnosis (Berl)*. 2018 Jun 27;5(2):63-69. doi: 10.1515/dx-2018-0005. PubMed PMID: 29858901.
 23. Sharma A, Al-Khatib SM, Ezekowitz JA, Cooper LB, Fordyce CB, Michael Felker G, Bardy GH, Poole JE, Thomas Bigger J, Buxton AE, Moss AJ, Friedman DJ, Lee KL, Steinman R, Dorian P, Cappato R, Kadish AH, Kudenchuk PJ, Mark DB, Peterson ED, Inoue LYT, Sanders GD. Implantable cardioverter-defibrillators in heart failure patients with reduced ejection fraction and diabetes. *Eur J Heart Fail*. 2018 Jun;20(6):1031-1038. doi: 10.1002/ehf.1192. Epub 2018 May 15. PubMed PMID: 29761861.
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 25. Pollack RA, Brown SP, Rea T, Aufderheide T, Barbic D, Buick JE, Christenson J, Idris AH, Jasti J, Kampp M, Kudenchuk P, May S, Muhr M, Nichol G, Ornato JP, Sopko G, Vaillancourt C, Morrison L, Weisfeldt M. Impact of Bystander Automated External Defibrillator Use on Survival and Functional Outcomes in Shockable Observed Public Cardiac Arrests. *Circulation*. 2018 May 15;137(20):2104-2113. doi: 10.1161/CIRCULATION-AHA.117.030700. Epub 2018 Feb 26. PubMed PMID: 29483086; PubMed Central PMCID: PMC5953778.
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 27. Latimer AJ, Husain S, Nolan J, Doreswamy V, Rea TD, Sayre MR, Eisenberg MS. Syringe Administration of Epinephrine by Emergency Medical Technicians for Anaphylaxis. *Prehosp Emerg Care*. 2018 May-Jun;22(3):319-325. doi: 10.1080/10903127.2017.1392667. Epub 2018 Jan 15. PubMed PMID: 29333893.
 28. Simeone S, Platone N, Perrone M, Marras V, Pucciarelli G, Benedetti M, Dell'Angelo G, Rea T, Guillari A, Da Valle P, Gargiulo G, Botti S, Artioli G, Comentale G, Ferrigno S, Palma G, Baratta S. The lived experience of parents whose children discharged to home after cardiac surgery for congenital heart disease. *Acta Biomed*. 2018 Apr 4;89(4-S):71-77. doi: 10.23750/abm.v89i4-S.7223. PubMed PMID: 29644992; PubMed Central PMCID: PMC6357628.

Appendix C: Publications

29. Bhandari S, Doan J, Blackwood J, Coult J, Kudenchuk P, Sherman L, Rea T, Kwok H. Rhythm profiles and survival after out-of-hospital ventricular fibrillation cardiac arrest. *Resuscitation*. 2018 Apr;125:22-27. doi: 10.1016/j.resuscitation.2018.01.037. Epub 2018 Feb 6. PubMed PMID: 29408303.
30. Myat A, Song KJ, Rea T. Out-of-hospital cardiac arrest: current concepts. *Lancet*. 2018 Mar 10;391(10124):970-979. doi: 10.1016/S0140-6736(18)30472-0. Review. PubMed PMID: 29536861.
31. Jollis JG, Al-Khalidi HR, Roettig ML, Berger PB, Corbett CC, Doerfler SM, Fordyce CB, Henry TD, Hollowell L, Magdon-Ismael Z, Kochar A, McCarthy JJ, Monk L, O'Brien P, Rea TD, Shavadia J, Tamis-Holland J, Wilson BH, Ziada KM, Granger CB. Impact of Regionalization of ST-Segment-Elevation Myocardial Infarction Care on Treatment Times and Outcomes for Emergency Medical Services-Transported Patients Presenting to Hospitals With Percutaneous Coronary Intervention: Mission: Lifeline Accelerator-2. *Circulation*. 2018 Jan 23;137(4):376-387. doi: 10.1161/CIRCULATIONAHA.117.032446. Epub 2017 Nov 14. PubMed PMID: 29138292.
32. Kleinman ME, Goldberger ZD, Rea T, Swor RA, Bobrow BJ, Brennan EE, Terry M, Hemphill R, Gazmuri RJ, Hazinski MF, Travers AH. 2017 American Heart Association Focused Update on Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2018 Jan 2;137(1):e7-e13. doi: 10.1161/CIR.0000000000000539. Epub 2017 Nov 6. Review. PubMed PMID: 29114008.
33. Coult J, Kwok H, Sherman L, Blackwood J, Kudenchuk PJ, Rea TD. Ventricular fibrillation waveform measures combined with prior shock outcome predict defibrillation success during cardiopulmonary resuscitation. *J Electrocardiol*. 2018 Jan - Feb;51(1):99-106. doi: 10.1016/j.jelectrocard.2017.07.016. Epub 2017 Aug 1. PubMed PMID: 28893389; PubMed Central PMCID: PMC5776045.

Appendix D: EMS Performance Measures

RESOURCE CATEGORY	PERFORMANCE MEASURE	DEFINITION	2018 RESULTS
SYSTEMWIDE	Rate of cardiac arrest survival	% discharge from hospital for all witnessed cardiac arrests due to cardiac etiology in VF/VT. Includes only circulatory arrests of non-traumatic etiology receiving ALS care in patients > 2 years old	56%
BYSTANDER	Rate of bystander CPR in cases of cardiac arrest	% of bystander CPR provided for all cases of cardiac arrest. Includes only circulatory arrests of non-traumatic etiology that received ALS care in patients age > 2 years old	67%
DISPATCH	Rate of correctly identified cardiac arrest by telecommunicator	% of confirmed cardiac arrest cases that were correctly identified by dispatcher when provided opportunity to assess	96%
	Rate of correctly identified resource used by telecommunicator	% of total number of reviewed calls that received correct EMS resource	86%
	Rate of correctly transferred T-IDC calls	% of T-IDC calls that were sent to the Nurseline vs. received a BLS response	70%
BASIC LIFE SUPPORT	% that response time standards are met for emergency BLS calls	Urban response areas: 10 minutes or less, 80% of the time; Suburban response areas: 20 minutes or less, 80% of the time; Rural response areas: 45 minutes or less, 80% of the time; Wilderness response areas: As soon as possible	Urban: 5.1 Suburban 5.5 Rural 6.5 Wilderness: ---
	Rate of EMTs documenting FAST and glucometry in stroke patients	% of hospital- and pre-hospital-diagnosed stroke patients for whom FAST exam and glucometry were documented by EMTs on MIRFs	97%
	Rate that "on scene time" standards are met	% of suspected CVA and suspected TIA patients with < 15-minute BLS scene time	44%
	Rate of taxi transported patients	% of taxi transports of all BLS transports	% Not available (447 vouchers issued in 2018)
	Compression fraction during resuscitation attempts	% of time that compressions are actively applied to the chest during the first 20 minutes of the case, until efforts are ceased, or until sustained ROSC is achieved (whichever event comes earliest)	87%
ADVANCED LIFE SUPPORT (PARAMEDICS)	% that response time standards are met	Respond on average <= 10 minutes, and <= 14 minutes 80% of the time	<=10 = 77.8% <=14 = 93.8% MEAN = 8.0 min.
	Rate of paramedics documenting a 12-lead ECG for STEMI patients	% of suspected STEMI cases where paramedics documented the use of a 12-lead ECG	70%
	Rate that "on scene time" standards are met	% of suspected STEMI patients with < 15 minute on scene time	34%
	Rate of paramedics documenting Glasgow Coma Scale for trauma patients	% of trauma patients transported to HMC by paramedics where GCS was documented	96%
	Rate of scene time for trauma patients	% of trauma patients taken to Harborview Medical Center by paramedics with < 15 min. ALS scene time	53%
REGIONAL	Rate of successful first attempt intubations	% of successful first attempt intubations	82.5%
	Rate of cancelled enroute ALS calls	% cancelled enroute ALS calls to all ALS calls	18.2%
	% of calls where no upgrade or downgrade was needed	% of calls where ALS was not cancelled and not requested from scene	64.8%
	Rate of ALS requests from scene	% of BLS request for ALS from scene of all ALS calls	13.0%
	# of paramedic hours above planned 2 paramedic staff per unit	# of paramedic hours above planned two (2) paramedic unit staffing	843 hours
	Rate of satisfied customers	% of satisfied or very satisfied with service as reflected in survey results	Not available

Appendix E: EMS Division Contact Information

King County Medic One 20811 84th Avenue S., Suite 102 Kent, WA 98032 Phone: (206) 296-8550 Fax: (206) 296-0515	
Emergency Medical Services Division Public Health - Seattle & King County 401 Fifth Avenue, Suite 1200 Phone: (206)296-4693 Fax: (206) 296-4866 Website: http://www.kingcounty.gov/health/ems.aspx	
Administration Section Contracts Finance Strategic Planning	(206) 263-8549
Community Programs Section BLS Efficiencies Communities of Care Program CPR/AED Training Programs Emergency Medical Dispatch (EMD) Injury Prevention and Public Education Programs (Fall Prevention, Child Passenger Seat, Exercise/Shape Up for Seniors, Fire Department Small Grant Program)	(206) 263-1457 (206) 263-1542 (206) 477-8664 (206) 263-8636 (206) 263-8544
Training & Education Section EMS Online Basic and Advanced Life Support Training	(206) 263-8054
Regional Quality Improvement Section Center for the Evaluation of EMS (CEEMS) Regional Medical Control and Quality Improvement Regional Data Collection and Analysis	(206) 263-8057

