

Public Health
Seattle & King County



Division of Emergency Medical Services



2018 Annual Report

to the King County Council
September 2018

Medic One/Emergency Medical Services (EMS) serves more than 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 2017, Emergency Medical Technicians (EMTs) responded to approximately 200,000 calls regionwide.

Paramedics responded to over 40,000 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, 251 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 2018 Annual Report to the King County Council.

This report provides an in-depth look at the wide range of day-to-day regional activities that, in their totality, allow the EMS program to deliver world-class, life-saving care. While it is difficult to choose just a few to mention, the following milestones are significant and worthy of highlighting.

First, this year marked the initiation of the extensive regional levy planning process (page 12). Undertaken every six years, this all-inclusive process brought together regional leaders, decision-makers and stakeholders to collaboratively develop programmatic and financial recommendations regarding EMS services for 2020 and beyond. The recommendations, once vetted and finalized, will form the core of the 2020-2025 EMS Strategic Plan and levy that will go to King County voters for renewal in 2019.

We also completed an evaluation of the Community Medical Technician (CMT) pilot (page 11). The region has piloted over the past three levy periods different methods to address lower acuity calls, and meet the needs of vulnerable and marginalized community members. What started as a hopeful idea has blossomed into a more integrated regional approach to better connect callers to appropriate services, now aligned under the umbrella term of "Mobile Integrated Healthcare." Extending these services into every community in King County was identified as a priority by our EMS partners during the levy planning process, and there is strong support for continuing this program into the next levy span.

In addition, we celebrated the region's transition to using one records management system, ESO Solutions. This is the culmination of years of effort to bring our patient care records into the digital age, allowing for a more regional systems approach to data collection and analysis. An initiative to further bolster the region's quality improvement efforts received strong support during the levy planning process, and has been included in the draft recommendations for 2020-2025 Strategic Plan.

Finally, in conjunction with the City of Seattle, we launched the region's first Future Women in Fire and EMS Academy this past Spring. This is just one piece of the Division's multi-faceted approach to increase EMT, paramedic and EMS Division workforce diversity. Throughout the two-day immersive training, students received hands-on experience for real-world scenarios, not only exposing them to the vast opportunities within this field but empowering them to seriously consider a career in EMS.

In rolling out these multi-layered and complex efforts, we've relied deeply on our EMS partners for support, vision and commitment to excellence. Our EMS system has a long and vibrant legacy of regional collaboration in King County, and this report reflects these deep roots that are the foundation of our success. We offer our sincerest gratitude to each of you for your continued support that makes it possible for our system to achieve such impressive and sustained accomplishments for our community.



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



Michele Plorde, EMS
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

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We would like to thank all of the individuals who contributed to the EMS 2018 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

In 1998, our regional EMS system was introduced to the concept of strategic initiatives. Borne out of the need to better align funds with service delivery, the first strategic initiatives package included a combination of cost-control strategies and demand management proposals. EMS agencies across the region collaboratively rolled out these early programs, producing numerous positive impacts and promoting efficient use of public funding.

Fast forward 20 years, and strategic initiatives have now become an integral part of our system's structure and identity. They offer a way to explore concepts, measure impacts and adjust approaches over a greater period of time. The 2018 report showcases many ways that the system has collectively incorporated these efficiencies into its everyday practices.

Efficiencies extend through all EMS program areas, and benefit the entire regional system - its providers and users. Our EMS Online platform and the recent addition of EMT training options give agencies flexibility to meet workforce needs, while still ensuring consistency and continued excellence in training across the county. The region's measured transition toward a single records management system, ESO Solutions, results in enhanced data quality, which is vital to measuring and improving EMS care. The BLS Training and Quality Improvement initiative responds to the region's collective pledge to improve patient outcomes by better synchronizing and expanding data analyses and training across all agencies in the system.

Pilots to enhance systems of care have been front and center throughout this levy span. Our partners have embraced programs like Communities of Care and the Vulnerable Populations initiative that educate both community organizations and 9-1-1 callers about EMS services through outreach and training activities. The third Community Medical Technician pilot and its two similar pilots connect callers to the right resources, providing a meaningful intervention and truly impacting the patient's well-being. It is these types of collaborations where potential users learn about when, why and how to use 9-1-1, and EMS providers increase their understanding about meeting the needs in their communities, that has paved the way to a more efficient EMS system.

This report highlights the many ways in which our region comes together to collectively carry out the EMS Strategic Plan and ensure the continued success of the EMS system.

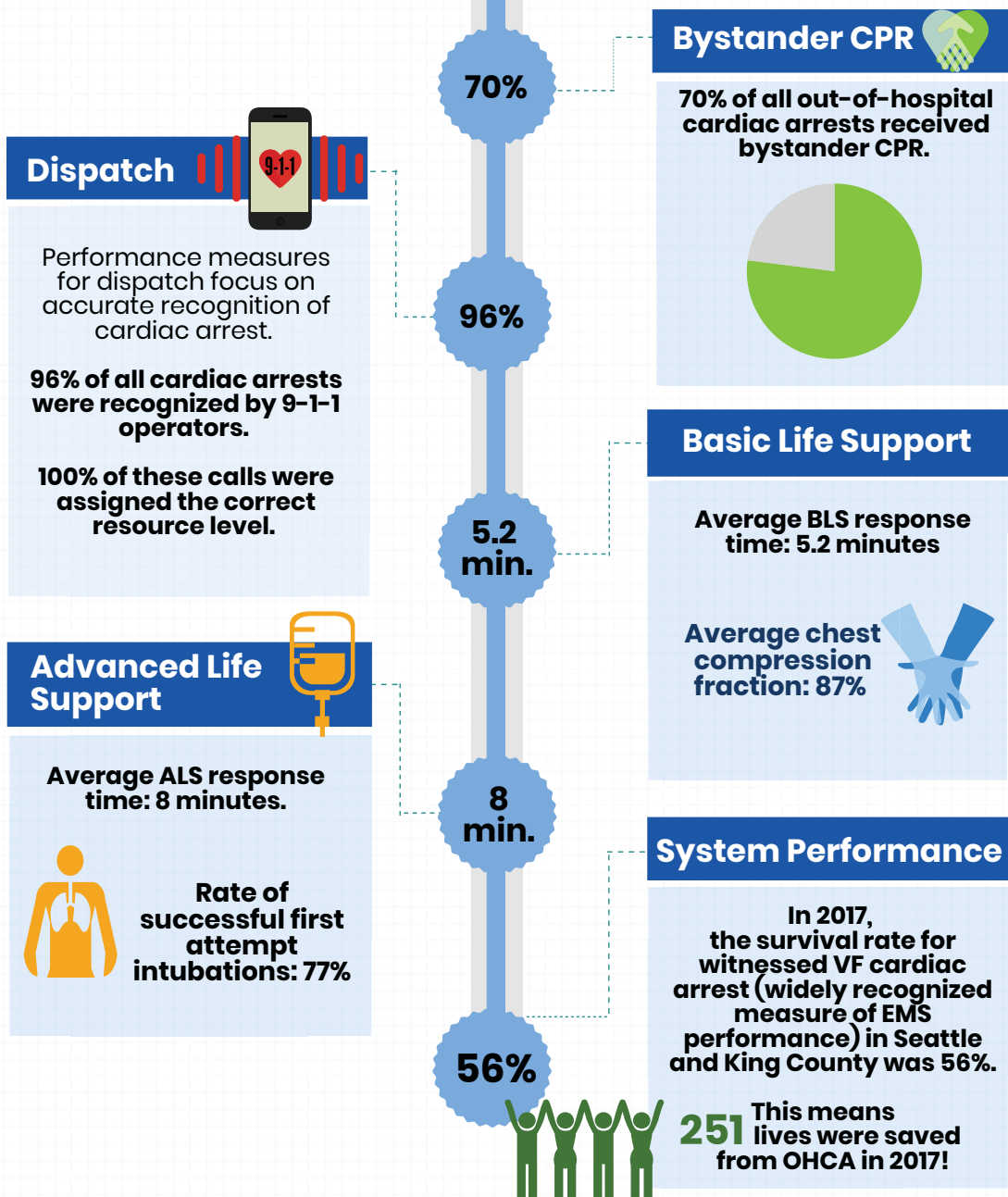


Improving patient care -- and the bottom line -- for all King County residents

Developed in response to the skyrocketing costs of EpiPens®, the Check and Inject program has EMTs returning to the more traditional -- and much more cost effective -- method of administering epinephrine via needle and syringe. Praised for its success in saving lives while also saving money, the program was awarded the 2017 EMS World Innovation Award in Las Vegas, NV last year.

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 has a number of performance measures designed for continuous quality improvement. Selected 2017 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 over two million. 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 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 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. Gary Somers 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 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 4,300 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 5.2 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 25% 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.

2018 EMS Division Highlight

Community Medical Technician Pilot Program Update

Managing the rate of call growth in the EMS system is a regional priority, and has been an ongoing focus throughout the past three levy periods. Unmanaged growth can negatively impact fire department response times, performance standard achievement, and the quality of patient care. The EMS Division has been identifying and testing strategies for serving non-emergency patients and callers to provide alternatives to dispatching a BLS unit.

FROM COMMUNITY MEDICAL TECHNICIAN TO MOBILE INTEGRATED HEALTH: CONNECTING CALLERS TO THE RIGHT RESOURCES

As highlighted in our 2017 Annual Report, regional EMS partners have been testing methods to better manage low-acuity calls from individuals who use 9-1-1 inefficiently or ineffectively. These strategies center on identifying the callers' root causes of need, and help them get the most appropriate care (i.e. physical/mental/behavioral health care visits, other services). This assistance is provided outside of a "lights and sirens" response setting, allowing the responder to spend more time with the caller. Often times, this approach uses health and well-being providers, such as nurses and social workers, to serve as a bridge between prehospital and traditional healthcare. Developing and maintaining these bridges is becoming increasingly crucial in order to best assist the individuals calling 9-1-1 get the care they need.

To improve the effectiveness and efficiency of the EMS system and meet the needs of vulnerable and marginalized community members, King County EMS and several King County fire departments launched the third version of the **Community Medical Technician (CMT)** program in the 2014-2019 Medic One/EMS levy span. Early CMT programs piloted innovative service models focusing on improving care for individuals that call 9-1-1 with low-acuity conditions, individuals that generate a high volume of 9-1-1 calls, and individuals with complex care needs. In 2017, this third CMT pilot had three units operating in various parts of King County simultaneously, the largest pilot of the CMT concept to date.

An evaluation of the CMT pilot completed in early 2018 illustrated three main points. First, the CMT units were capable of impacting call demand on the BLS level of service, acting to mitigate the peak mid-day calls for BLS service and instead shifting these calls to the CMT units. Second, the CMT units were able to maintain a high level of patient satisfaction. Third, the first responders participating in the pilot expressed generally positive experiences in a follow-up survey. (The full CMT Pilot III Evaluation Report is available on the King County EMS webpage: <https://www.kingcounty.gov/depts/health/emergency-medical-services.aspx>.)

In addition to the CMT units, several other King County EMS agencies simultaneously explored other alternative methods to engage similar targeted populations frequently seen by the CMT units. As these programs have gained increasing support with community members and community stakeholders alike, they have grown throughout the region and are now referred to the nationally recognized terminology of Mobile Integrated Healthcare (MIH).

In late 2017 and early 2018, an MIH advisory group in King County was commissioned to provide a framework for a county-wide MIH network that achieves the following goals:

1. Connect our community members to the most appropriate health and social services
2. Optimize availability of emergency services
3. Position EMS as an integrated and interconnected link in the broader health and social service systems

The MIH advisory group presented a framework for a coordinated MIH network operating in King County to the 2020-2025 Medic One/EMS levy planning subcommittees and gained support for MIH as a priority focus area in the future. Please refer to page 12 for more information on the recent levy reauthorization process.

2018 EMS Division Highlight

Levy Planning for the 2020-2025 Medic One Reauthorization

The Administration Section provides leadership and support to internal and external customers to ensure the integrity and transparency of the EMS system. The section actively engages with regional partners to implement the EMS Strategic Plan; undertakes long-term programmatic and financial planning; prepares the annual budget, monthly monitoring, and projections, and is responsible for the continuity of business in collaboration with EMS stakeholders. Administration also provides essential support to all EMS Division sections that direct a multitude of regional programs by assisting with contract management, and support for personnel-related activities, budget preparation, and day-to-day operational activities.

REGIONAL LEADERSHIP: MEDIC ONE LEVY REAUTHORIZATION 2020-2025

The Medic One/EMS system serving Seattle and King County is primarily funded with a countywide, voter-approved EMS levy. Mandated by state law to be exclusively used to support emergency medical services, the levy is a reliable and secure source for funding our world-renowned system.

The current six-year levy expires December 31, 2019. To ensure continued emergency medical services in 2020 and beyond, **the region started an extensive planning process to collaboratively develop a Strategic Plan and financing plan (levy)** for King County voters to renew in 2019. This all-inclusive process brought together regional leaders, decision-makers and Stakeholders to assess the needs of the system and develop recommendations to direct the system into the future.

EMS ADVISORY TASK FORCE

Overseeing the development and vetting of the Medic One/EMS levy is the *EMS Advisory Task Force*. This 20-body group consists of elected officials from the county, cities, and fire districts, and is charged with reviewing and endorsing Medic One/EMS program recommendations and a supporting levy rate. Representing those who administer, authorize and are served by the system, the *Task Force* will be invaluable in determining the right proposal, and the financial implications it may have, for their jurisdictions.

The *EMS Advisory Task Force* convened on January 18, 2018, officially kicking off the start of the 2020-2025 Medic One/EMS levy planning process. The meeting introduced *Task Force* members not just to the key components that contribute to the Medic One/EMS system's success, but also to nearly 50 EMS partners whose commitment to excellence make it possible for the system to excel.

SUBCOMMITTEES

The *Task Force* formed four (4) subcommittees to conduct the bulk of the program and cost analyses that will become the basis for the next Strategic Plan and levy. The subcommittees concentrated on the different program areas of Advanced Life Support (ALS), Basic Life Support (BLS), Regional Services, and Finance. Each subcommittee, chaired by an *EMS Advisory Task Force* member and comprised of subject matter experts from all aspects of the Medic One/EMS system, met regularly to determine how the programs would ensure the region can continue to provide its world-class emergency medical services. Subcommittees reported back to the *Task Force* every two or three months. In addition, subcommittees involved both the ALS and BLS Working Groups, seeking their review and insight regarding some of the more complex issues.

After months of meetings, numerous refinements and much discussion, the subcommittees finalized their draft Recommendations and Financial Plan in July 2018. The recommendations are slated for *Task Force* review and possible endorsement in mid-September of this year. Should further modifications be required, the amended recommendations will need to be presented to the *Task Force* for final approval no later than October 2018. Look for a full account of the process and finalized recommendations in the 2019 Annual Report.

DRAFT PROGRAMMATIC RECOMMENDATIONS

ADVANCED LIFE SUPPORT (ALS)



- Continue using the unit allocation to fund ALS, but with slight revisions to better ensure full funding.
- Establish a "place holder" in the Financial Plan to protect the system, should new units need to be added over the span of the 2020-2025 levy.
- Explore options to address paramedic workforce needs and increase operational efficiencies through regional collaboration.

BASIC LIFE SUPPORT (BLS)



- Consolidate all BLS funding awards into a single allocation and contract to streamline and minimize the time, effort, and expense of administering BLS funding; earmark use for specific activities in the contract.
- Distribute the total allocation in the first year of the levy (2020) using a methodology that will more accurately reflect agencies' current assessed valuation and service levels.
- Add funding to ensure that agencies are not negatively impacted by this first year distribution, and allocate new funds on top of the previous year's combined BLS "base" allocation.
- Declare Mobile Integrated Healthcare (MIH) a regional priority and fund MIH from the regional EMS levy.

REGIONAL SERVICES & STRATEGIC INITIATIVES



- Continue delivering programs that provide essential support to the system. Such programs and services are the foundation of the direct services provided by EMS personnel, ensuring consistency and standardization throughout the system.
- Maintain regional focus on creating additional efficiencies and system effectiveness to improve patient care and outcomes.

FINANCE



- Support financial policies that provide stability to the system.
- Incorporate sufficient reserves in the Financial Plan to mitigate unforeseen financial risk.
- Pursue a six-year EMS levy length that ensures sufficient funding

This levy planning process has been an exercise in practicality: principles guiding decision-making included stability, consistency and equity; great consideration was given as to how programs and processes could be streamlined to be more effective and useful to all parts of the regional system; and partners collectively focused on what the system needed, as opposed to what they individually wanted, when developing the system's programmatic recommendations.

2018 EMS Division Highlight

KC Medic One Celebrates 40 Years of Service Excellence

King County Medic One (KCM1) is one of the five (5) 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 2017, KCM1 responded to approximately 18,000 calls for advanced care, including cardiac emergencies, pediatric patients, mass casualty, and motor vehicle crashes.

MEDIC ONE: EARLY PIONEERS AND LEADERS IN PRE-HOSPITAL EMERGENCY MEDICAL CARE

Forty years ago, the Seattle Fire Department, in cooperation with Harborview Medical Center and the University of Washington, trained its first class of firefighters to become paramedics. In 1978, the University of Washington and Harborview Medical Center physicians, Dr. Michael Copass and Dr. Leonard Cobb, and Seattle Fire Chief, Gordon Vickery, introduced the region to the radical idea of paramedics and the **King County Medic One** system. The Medic One system was based on equipping firefighters with medical skills for use in a person's home, or on the street at the scene of an accident.

Prehospital emergency medical care pioneered in Seattle is world renowned, and the Medic One programs throughout King County are considered models both nationally and internationally. In addition to King County Medic One, other Medic One programs in King County include: Seattle Fire Medic One, Redmond Medic One, Bellevue Fire Medic One, and Shoreline Fire Medic One.



KING COUNTY MEDIC ONE: CELEBRATING 40 YEARS OF SERVICE EXCELLENCE

King County Medic One celebrated its 40th anniversary of providing service to the citizens of south King County on March 30, 2018. Originally founded in 1976 and placed into service in 1977, the Medic One in Seattle & King County has grown, and continues to provide the highest quality paramedic service, arguably, in the United States and in the world. This program started with a few provider groups selling baked goods to buy supplies and gas and has evolved into a very sophisticated program answering 18,000 ALS calls and serving 725,000 people living in south King County. Its success is in no small part due to the cooperation of the many local fire departments and EMTs who provide initial care until paramedic arrival.

Over 150 guests attended the 40th anniversary banquet, including retired and active paramedics, firefighters, EMS employees and their spouses. The International Association of Fire Fighters Local 2595 proudly co-sponsored the banquet with the Department of Public Health - Seattle & King County. Patty Hayes, Director of Public Health-Seattle King County and Michele Plorde, Director of Emergency Medical Services attended the event. The evening included unique awards including the Dr. Copass award given to Jim Sandlin, a paramedic with King County since 1980, for exemplifying the highest standard of care. A lifesaving award was given to Shawn Merritt who donated her kidney to save her son's life just this last November. The highlight of the evening was meeting a survivor and her husband, now both great supporters of the program, tell her story about how Medic One saved her life.



2018 EMS Division Highlight Promoting Equity & Social Justice in EMS



FUTURE WOMEN IN FIRE & EMS ACADEMY



CREATING PATHWAYS TO CAREERS IN FIRE & EMS

In Spring 2018, King County and Seattle hosted its first **Future Women in Fire and EMS Academy**. Academy participants included 20 women ranging from ages 20 to 24. Aimed to encourage women to join the fire and EMS service as a career, this two-day immersive experience served as a smaller scale of Camp Blaze, featured in our 2017 Annual Report. In addition to interactive panels, hands-on stations, lectures, and real-life demonstrations, the curriculum provided participants opportunities to engage, network and interact with women currently employed in fire and EMS agencies across King County and Seattle, including female ranking officers, paramedics, and firefighters.

LEARNING OPPORTUNITIES

The Academy covered topics relevant to both fire and EMS and real-world scenarios to expose the attendees to the vast variation that the career encounters. Attendees rotated through a number of stations to learn and practice critical skills that included, but were not limited to: stroke, backboard, patient assessment, wound care, mass casualty incidents, ladder, forcible entry, personal protective equipment, CPR/first aid, hoses, and low angle. The goal of this academy was to engage women interested in pursuing a career in fire and EMS to empower them to take the next steps. Special thank you to the volunteer staff that supported the academy, comprised mostly of females from nine (9) different fire departments in the region.

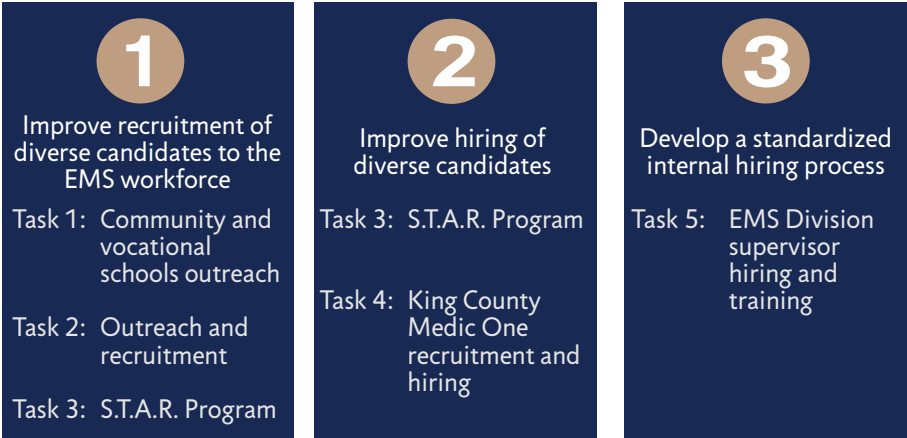
The goal is to host the **Future Women in Fire and EMS Academy** at least twice a year, with academy locations alternating between the north and south ends of the region to fully engage all fire departments and to establish pipelines for future women in EMS. For more information about the EMS Division's Equity and Social Justice efforts, refer to page 16.

EMS Division Update

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, with 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 technician (EMT) and paramedic workforce, and within the EMS Division.

EMS/ESJ Initiative Objectives and Supporting Tasks



Strategies for improving the recruitment and hiring of a diverse pool of EMTs and paramedics include increasing collaboration with ESJ communities, engaging diverse candidates, and evaluating and improving internal EMS Division hiring practices. These strategies were then further refined by: gathering and analyzing new data; researching best practices; refining efforts related to the EMS S.T.A.R. program and the Vulnerable Populations Strategic Initiative; working with private ambulance companies and fire departments to identify barriers in hiring; meeting with hiring managers, and encouraging ESJ facilitated discussions and/or training of EMS employees. Specific metrics were developed to measure impacts for each of the specific strategies supplemented these efforts.

Partners and stakeholders in the initiative are plentiful, and include hiring managers from the EMS Division and King County Medic One, researchers from the University of Washington (UW), the EMS/ESJ Core Team, fire departments, and private ambulance companies. Hiring managers assisted with developing a work plan for the division and with the effort to increase diversifying the workforce and integrating ESJ themes within the division. UW researchers will help evaluate programs and develop metrics to measure impact.

TASK #1: COMMUNITY AND VOCATIONAL SCHOOLS OUTREACH

The EMS Division’s ESJ Core Team has committed to attending various educational and community outreach opportunities, such as school career days, community fairs, community festivals, vocational schools, and community college career fairs, in an effort to provide resources to improve potential candidates’ qualifications.

TASK #2: OUTREACH AND RECRUITMENT

The ESJ Core Team reached out to events to expose under-represented groups to the EMS workforce. Potential opportunities to establish partnerships and create a pipeline to careers in EMS were explored. In addition to the Future Women in Fire and EMS Academy featured on page 15, EMS sponsored three campers for Camp Blaze, 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. Campers learned essential firefighting skills such as live fire training, search and rescue, interviewing techniques, rappelling, and team-building. Campers were strongly encouraged to apply to the S.T.A.R. program after completion of the camp.

TASK #3: S.T.A.R. PROGRAM (formerly “the Scholarship Program”)

Increasing the diversity of the EMS workforce by raising awareness and providing training opportunities for traditionally under-represented students are two goals of the Strategic Training And Research (S.T.A.R.) program. Students selected for the S.T.A.R. 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. Direct feedback obtained from students and instructors through each iteration continuously improves on the structure of the class and selection process for the program. In 2016, the program was evaluated by Zachary Williams, a University of Washington graduate student (at the time), to learn of the program and possible recommendations for improvement. The findings can be found on the EMS Division website: <http://kingcounty.gov/depts/health/emergency-medical-services/~media/depts/health/emergency-medical-services/documents/vulnerable-populations/EMT-scholarship-program-evaluation.ashx>.



Since the evaluation, the application and selection process has been refined for selecting 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 S.T.A.R students who have successfully completed the course and continued on to their desired career paths in both the public and private EMT industry.

TASK #4: KING COUNTY MEDIC ONE RECRUITMENT AND HIRING

Improving the recruitment and hiring of diverse candidates for King County Medic One remains a high priority. The EMS/ESJ Core Team analyzed recruitment, testing, and hiring data for King County Medic One to identify under-represented groups in the areas served by KCM1. This involved analyzing the demographics of those populations served by KCM1 across the South King County region. Initiatives included coordinating outreach initiatives to increase recruitment and hiring of workforce members representative of under-represented groups of the areas served.



TASK #5: EMS DIVISION SUPERVISOR HIRING AND TRAINING

Raising awareness of equity and social justice across EMS, in addition to building the knowledge, skills, and behaviors necessary, seeks to foster an organizational culture that promotes fairness and opportunity. In 2016, the EMS/ESJ Core Team worked collaboratively with Public Health ESJ trainers and EMS leadership in developing standard and consistent hiring practices and training for the Division. As an example, supervisors and managers that facilitate the hiring process will consistently require application reviewers and interview panel members to watch, then discuss, a training video that focuses on raising awareness of “implicit bias.” “Implicit bias” refers to the process of associating stereotypes or attitudes toward categories of people without conscious awareness. King County EMS will continue to offer this standard practice to ensure that participants in the hiring process understand the concept of implicit bias and begin to identify and mitigate individual bias during the hiring process.

Training & Education

The EMS Division renamed its “Professional Standards” Section to the “Training and Education” Section. The Section provides initial training, continuing education, instructor education and oversight of the recertification process for more than 4,300 Emergency Medical Technicians (EMTs) throughout King County. Through communication and coordination among EMS stakeholders, this section develops the curricula that ensure the training and education programs meet agencies’ needs and Washington state and national requirements. As the liaison between the Washington State Department of Health and the 30 EMS/fire agencies in King County, Training & Education relays continuing education, certification, and regulatory and policy changes to EMS agencies.

BLS INITIAL TRAINING & ONGOING EDUCATION

Through its initial EMT training classes, the EMS Division sets the foundation for EMTs to succeed within King County’s dynamic, efficient and responsive EMS system. Consisting of 132 hours of classroom and practical instruction and 10 hours of hospital observation time, initial EMT training is offered twice a year. Classes are held on evening and weekends over the span of 14 weeks. Courses are based on the latest data and research so that EMTs are knowledgeable about current medical practices and measures.



A number of agencies experience frequent and overlapping retirements, and needed more options for training their workforce. While the 14-week program offered by EMS is comprehensive, its timing and length was not meeting fire departments’ schedules and needs. To address this, agencies began providing their own intensive five-week and one-week EMT courses using the County’s curriculum and materials. Other agencies were also interested in making these course opportunities available to their personnel, but were hindered by the cost.

In an effort to provide flexibility the agencies wanted, yet still ensure continued excellence in training EMTs across the county, the EMS Division and its partners initiated a pilot project this past year to **regionalize initial EMT training options**. Under this approach, the EMS Division supports and directs five-week Initial EMT Training sessions, and a one-week “bridge” session. The five-week class covers the EMT certification basic skills and King County-specific guidelines, while the one-week session provides experienced EMTs with training on King County skills and directives. These courses are offered in addition to the current 14-week option and are available to all EMTs in the region. King County EMS coordinates and provides the standardize curriculum used in the training, giving departments the ability to schedule classes based on hiring demands and to select which training option best fits their new recruits. The EMS Division and fire agencies will collectively assess the skills of those EMTs that completed the various training options to evaluate the success of this new program.

BLS INITIAL TRAINING ACCREDITATION

The EMS Division is in its second year of accreditation from the Commission on Accreditation for Prehospital Continuing Education (CAPCE) for EMS Online (<https://emsonline.net>). EMS Online is a website that allows emergency medical providers to access, complete, and get credit for continuing education courses online. CAPCE is recognized as a leader in continuing education for Emergency Medical Services. Earning the CAPCE accreditation demonstrates the Division’s commitment to excellence in EMS Continuing Education (CE) and leadership in the EMS arena by putting EMS CE on an equal footing with that of physicians and nurses.



Each King County ALS and BLS provider registered for the EMS Online CAPCE accreditation receives a “Certificate of Completion” listing the number of Continuing Education Hours (CEH) obtained for each accredited course and exam they successfully pass on EMS Online. The CAPCE accredited CEH earned on EMS Online is approved by the state of Washington and is now eligible to meet the distributive education requirements for the National Registry of Emergency Medical Technicians (NREMT).

Career Pathways to Become an EMT



14-week training

Biannual 14-week EMT training classes. Classes held twice a week.

Provides 132 hours of classroom and practical instruction and an additional 10 hours in-hospital instruction.



5-week training

Multiple 5-week fire-based EMT trainings. May meet up to 6 days a week.

Offers flexibility for new fire department hires. Reduces cost.



1-week training

Annual 1-week "bridge classes" focused on Seattle and King County patient care guidelines.

Reduces hold time to deployment in the field for previously trained EMTs.

Ongoing EMT Education



300

Competency-Based Trainers (CBT)
Train-the-Trainers



5,000

EMTs trained yearly

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.

BACKGROUND

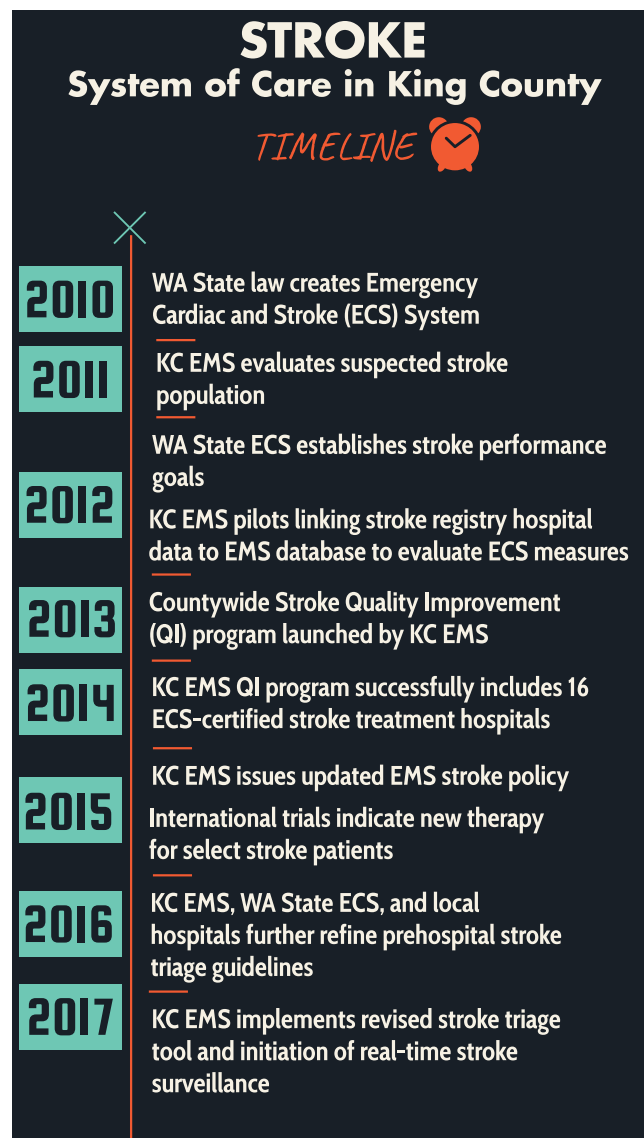
As highlighted in our 2017 Annual Report, stroke is a medical emergency caused by an acute disruption of blood flow to the brain due to a blockage (ischemic) or bleeding (hemorrhage). Unless stroke is treated promptly, patients can face permanent neurological disability or even death. Stroke remains a leading cause of death and disability in King County, and thus continues to be a priority focus for EMS medical quality improvement activities.

PARTNERSHIPS TO IMPROVE QUALITY OF CARE FOR STROKE

In a stroke emergency, time delay is brain lost. There is a short period of time after the symptoms start, when serious damage can be prevented or treated. Some hospital-based treatments may only be available within a few hours from when the patient was last known to be 'normal' or symptom-free. Ensuring an efficient and effective stroke system of care--from onset of symptoms to definitive treatment--relies on seamless coordination between 9-1-1 dispatch centers, EMS agencies, and hospitals. The figure to the right presents a timeline of major events in building a regional collaboration to improve the system of care in King County using guidance from the Washington (WA) State Department of Health (DOH).

KING COUNTY STROKE QUALITY INITIATIVE: IMPROVING TREATMENT FOR STROKE

In stroke medicine, the right patient must be matched with the right treatment. Medical advancement in the treatment of large vessel occlusion (LVO) ischemic strokes prompted the King County EMS to implement a new method for assessing stroke severity when performing prehospital triage. Started in early 2017, EMTs and paramedics now go beyond their F-A-S-T assessment protocol to identify severe cases, which facilitates transporting patients directly to hospitals capable of providing the new interventional therapies. For patients with confirmed LVO stroke, emergency treatment with a catheter-based intervention called "thrombectomy" can remove the clot that blocks the brain's blood vessel and restore blood flow, ultimately enabling the patient to regain most or full function. The challenge is to identify such patients early on and deliver this relatively small subset of stroke patients to specialty hospitals. Thus, EMS has implemented a physical exam stroke severity tool in 2017 designed to identify potential LVO stroke in the field.



Since the triage tool was implemented, King County EMS and the region's hospitals have collaborated to monitor each phase of care to understand where the process works well and where it can be refined. For the evaluation period (January 15, 2017 to January 14, 2018), 185 patients were identified by EMS as potentially high-risk for suspected LVO stroke and triaged to the specialty hospital for evaluation to determine if they were eligible for emergency thrombectomy. Median age was 70 years, and 48% were female. Among these cases, 91% had a hospital diagnosis of stroke, with the remaining 9% being stroke mimics. Of the 127 with ischemic stroke, 64% (n=81) had a confirmed LVO. Of those found to have LVO stroke, 73% (n=59) received thrombectomy. This data is preliminary and quality assessments are ongoing. Collaboration with regional and state partners continues to be essential to provide a comprehensive assessment so that we can understand how our prehospital-hospital stroke system may continue to improve.

CHARACTERISTICS OF EMS RESPONSES FOR SUSPECTED STROKE

Early recognition and rapid treatment are essential to optimizing a patient's recovery from stroke. In 2017, Seattle & King County EMS responded to approximately 3,000 suspected strokes. Among those, patient median age was 75 years, and just over half were women. Currently, King County EMS uses the F-A-S-T assessment tool to help identify a potential stroke based on the patient's presenting signs and symptoms. Among patients able to comply with EMS assessments, 24% demonstrated facial droop, 41% had arm drift, and 55% had speech difficulty. Approximately 45% of EMS-suspected stroke patients activated 9-1-1 within the optimal first hour of onset of symptoms or when the patient was last seen normal. Overall, about 62% of patients arrived to the hospital within 3.5 hours of last seen normal time, which is the available time window for certain hospital-based treatments. In those instances, EMS was able to call ahead to the hospital's emergency department so staff can activate their stroke response team and prepare for the patient's arrival.

CHARACTERISTICS OF EMS RESPONSES FOR CONFIRMED STROKE

A definitive stroke diagnosis can be challenging. The diagnosis relies on both presence of signs and symptoms of stroke as well as special brain imaging (e.g., computed tomography (CT) scan) available only at a hospital. Hospitals confirmed EMS suspicion of stroke in about two-thirds of cases. Other neurological emergencies such as seizure accounted for another 18% of hospital diagnoses. Importantly, EMS personnel can influence the time patients arrive at the hospital until CT completion (i.e., "Door to CT" time) by calling ahead to the hospital to notify of an incoming suspected stroke patient. Among hospital-confirmed stroke patients assessed by EMS personnel during years 2016-2017*, the "Door to CT" time goal of 25 minutes or less was achieved in approximately 75% of cases a marked improvement compared to the historical performance of 62% in 25 minutes or less (2014 EMS Annual Report). Review of CT results indicated approximately 77% of EMS patients had an ischemic stroke, and 23% had a hemorrhagic stroke. Treatment for ischemic stroke, in particular, has evolved over the last few years, prompting King County EMS to revise the prehospital approach to stroke identification and triage.

COMMUNITY EDUCATION FOR STROKE

About 1 in 3 stroke patients do not call 9-1-1 to activate EMS services. When persons do not use EMS, their care can be delayed such that they do not receive full benefit of time sensitive treatments. Studies show that by activating EMS via 9-1-1, stroke patients are more likely to reach the hospital faster, receive necessary drug therapies, and generally get treated more quickly. Thus, an important part of the solution to improve stroke care is to educate the public about stroke symptoms and emergency actions. There are multiple ongoing public education programs. One example is the collaboration between the King County EMS Division and the University of Washington School of Public Health students in a project to connect with key community stakeholder groups and residents of King County to educate them about heart disease and stroke, and how to respond in the case of a medical emergency. For more details, refer to page 30 of this report.

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, the EMS Division's Regional Quality Improvement Section's CEEMS program managers conduct studies aimed at improving the delivery of prehospital emergency services and advancing evidenced-based care and treatment.

CEEMS PATENT REVENUE FUND: REAL-TIME COMPRESSION DETECTION AND RHYTHM IDENTIFICATION

Current defibrillator technology requires users to stop chest compressions in order to analyze heart rhythms in the case of sudden cardiac arrest (SCA). However, multiple peer-reviewed publications have shown that SCA outcomes improve when pauses in chest compressions are minimized.



Beginning as a two-year **Life Sciences Discovery Fund (LSDF)** matching grant in 2015, researchers at King County EMS, in collaboration with the University of Washington's Bioengineering Department, have been working 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, allowing for continued "hands-on" CPR support. Ongoing work has resulted in refinements, bringing the region much closer to using this new and improved technology in the field.

HEART RESCUE PROJECT, MEDTRONIC FOUNDATION

King County is one of the leaders of the **Heart Rescue Project**, which is a collaborative effort to increase 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 is focused on systemically expanding SCA systems of care to regional and statewide levels.



This is the sixth year that Washington State has participated in this data-driven approach to assist in developing action plans for improving survival across the nation. With the creation of Cardiac Arrest Registry to Enhance Survival (CARES), communities have access to data to measure and report on their EMS system performance. King County has been involved in CARES since 2011 when it was invited to help initiate Washington State's data collection effort. What began as a simple statewide endeavor has now expanded to include the states of Alaska, Oregon, and Montana, creating a Pacific Northwest group that is coordinated by King County, and aimed at increasing survival throughout the larger region.



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 teaches EMS professionals from around the world about 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, which extends this opportunity to us year after year. For more information about their efforts, please visit <http://www.heartrescueproject.com>.

BRAIN OXIMETRY DURING CARDIAC ARREST: PROJECT UPDATE

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 emphasizes just how important cerebral oxygenation (getting oxygen to the brain) is during CPR.



Recent advances in technology have enabled the real-time measurement of cerebral oxygenation during CPR. The King County EMS Division is using such technology to conduct the **Brain Oximetry During Cardiac Arrest** study to help optimize brain recovery during resuscitation. Using a regional oximetry sensor by Nonin to evaluate cerebral oximetry profile during cardiac arrest resuscitation, the Division specifically aims to:

1. Measure cerebral oximetry over the course of resuscitation in human cardiac arrest and determine the relationship between cerebral oximetry and oximetry of the forearm;
2. Evaluate the relationship between cerebral oximetry and specific therapies including CPR, medication administration, and endotracheal intubation; and
3. Evaluate the relationship between cerebral oximetry and clinical outcomes including heart resuscitation (return of spontaneous circulation) and brain resuscitation (survival with favorable functional status).

This study makes King County the first agency in the United States to study brain oximetry levels in prehospital cardiac arrest. The results of the study may be used to enhance the capabilities of medical instruments used by EMS providers for out-of-hospital cardiac arrest care.

AED LIFESAVER EARLY RESPONDER TRIAL (ALERT) STUDY

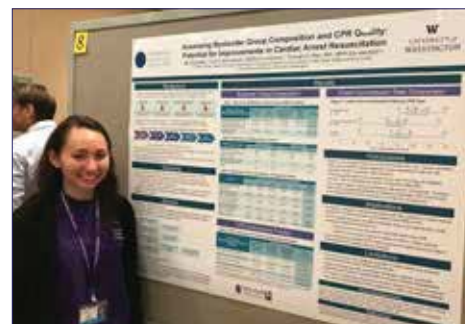
Resuscitation of SCA relies on early CPR and early defibrillation. Even in communities with a mature emergency response system, only about half of cardiac arrest victims receive CPR prior to EMS arrival, and less than 5% receive defibrillation prior to EMS arrival. Survival could be improved substantially if these formidable gaps in resuscitation care were addressed. The **AED Lifesaver Early Responder Trial (ALERT study)** enlists volunteer off-duty EMS professionals equipped with an AED to respond to nearby cardiac arrests **anywhere and at any time**, using the PulsePoint phone app. This is a new take on a previous program where responses were limited to just public areas. The ability to respond to all areas is extremely significant, since approximately 80% of cardiac arrests occur in private residences, and has the potential to dramatically decrease time from collapse to chest compressions and/or defibrillation.

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 2.1 million residents. The collaborative evaluation of the program will help determine if and how this innovative program could be targeted or expanded to additional communities.

MENTORSHIP

Each year, affiliate clinicians and researchers, such as medical students, physicians and EMS professionals, are provided 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 SCA and improving outcomes.

In 2018, the King County EMS Division hosted University of Washington students from the Harborview Injury and Prevention Research Center (HIPRC) INSIGHT Research Program to work alongside EMS Division staff. This unique opportunity introduces students to public health research and lets them put that research into practice. Pictured above is UW HIPRC INSIGHT student, Mia Richards.



Community Programs: CPR & Public Access Defibrillation

Every year, over 300,000 Americans die from sudden cardiac arrest (SCA), a condition in which the heart unexpectedly stops beating. It can happen anywhere, to anyone, at any time - even to those with optimal heart health. When it occurs, seconds count. Numerous clinical studies have demonstrated that patients who receive early cardiopulmonary resuscitation (CPR) and early defibrillation have a significantly improved chance of survival from cardiac arrest. Research has also demonstrated that rapid defibrillation after cardiac arrest is the most critical factor for improving survival.

First introduced in the 1960s, but greatly enhanced and streamlined since then, AEDs administer an electrical shock to a SCA victim's failing heart to restore a normal heart beat. Studies have shown a 70-80% chance of survival if an AED is used within minutes on a victim of sudden cardiac arrest. For many, a shock from an AED is the only chance for survival.

PATHWAY TO EXPANDING PAD PROGRAMS IN OUR COMMUNITIES

One reason our region ranks highly for witnessed out-of-hospital SCA survival rates is because a large number of our residents are trained in, and willing to perform, CPR. In order for the public to be successful in this role, education, training, support and recognition are all needed.

Public Access Defibrillation (PAD) programs help organizations create policies for responding to SCA, and lead to improve education and training of the public. In the past year, the Division has recognized multiple members of the public who initiated early CPR and applied a AED to save a life.

AEDs placed in high incident/high risk locations provide a greater opportunity for citizens to provide CPR and defibrillation prior to the arrival of EMS. Support from King County EMS has allowed for AEDs to be placed in community centers, parks, pools, and law enforcement vehicles. As a result of increased placement of AEDs in communities, AEDs are now applied in over 10% of cardiac arrests. This is largely due to the exceptional efforts of numerous community and law enforcement groups working in conjunction with dispatch centers and EMS agencies. The commitment of public agencies, corporations, and small business owners to participate in a PAD program has increased the capacity of the public's role in increasing survival from sudden cardiac arrest. The EMS Division will continue to work with County municipalities to provide CPR training and identify strategic locations to place AEDs in their communities.

A STORY OF SURVIVAL THROUGH BYSTANDER CPR & AED USE

In April 2018, employees at Hexcel Corporation quickly jumped into action, administering and using an AED on a co-worker who suffered sudden cardiac arrest. This life-saving event was made possible due to Hexcel Corporation's commitment to implementing a life-saving PAD program, developed with the help of the King County EMS Division. PAD programs provide employees with training in CPR and using an AED. Early recognition, early CPR, and early defibrillation saved their co-worker's life, illustrating the value of having defibrillators in the community. While this story is one of many that happen every year in King County, we attribute its happy ending to Hexcel Corporation's participation in the King County PAD program. Pictured to the right are the Hexcel Corporation employees who initiated the first links in the Chain of Survival.

AEDs don't work if you
can't find them

KING COUNTY AED REGISTRY PROGRAM

1

Registering an AED helps 9-1-1 dispatch centers direct callers to the nearest AED.

2

It takes less than 5 minutes to register an AED with King County, but when seconds can mean life or death, early access to an AED can improve the chance of survival for a victim of sudden cardiac arrest.

3

The EMS Division currently maintains an AED registry of over 3,000 devices in King County.



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 continual Chain of Survival. Trained by the EMS Division in Criteria Based Dispatch, dispatchers “triage” calls using specific medical criteria that are based on the signs and symptoms of the patient, to send the proper level of care 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.

COMMUNITIES OF CARE PROGRAM: TEACHING COMMUNITIES WHEN TO CALL 9-1-1

The **Communities of Care Program** continues to deliver positive results for facilities with trained care staff serving their residents or patients, such as Assisted Living Facilities (ALFs), Adult Family Homes, Skilled Nursing Facilities, and medical clinics. Because of the services they provide, these facilities are highly likely to access the EMS system on a regular basis. Calling for emergency services can be stressful, and the pressure of the situation can cause delays for 9-1-1 in getting critical information from the caller. The training provided by Communities of Care focuses explicitly on the 9-1-1 call and EMS response processes – the “what” that is needed, and the “why.” Preparing employees to answer the critical medical questions telecommunicators ask, and to be led through pre-arrival instructions, if necessary, improves the efficiency of the 9-1-1 call and with EMS patient contact.

Positive results of the Communities of Care program include:

- Appropriate use of the EMS system
- Improved communication on the chief medical concern
- Appropriate resources responding to low-acuity events
- Better information provided to dispatchers (knowing the address, identifying if the caller is with the patient)

PATHWAY TO CONTINUOUS IMPROVEMENT WITH OUR REGIONAL PARTNERS

Among the greatest benefits to come from this program are the solid working relationships. This program has strengthened the relationships among service providers, fire departments, and communication centers who are all working toward the shared goal of delivering quality patient care to residents. In early 2018, leaders from ALFs, King County EMS Fire Department representatives and ALF advocate groups – LeadingAge and Washington Healthcare Association – convened to discuss opportunities to improve collaboration between ALFs and EMS providers. This workgroup enabled ALFs and EMS to gain a better understanding between each industry’s expectations and protocols, allowing for a more collaborative approach to treating patients.

Community Programs: Injury Prevention

Injury is the leading cause of death for those under 45 years of age. The EMS Division has built long-term relationships with fire departments, community agencies and organizations to work toward the common goals of reducing injury and death through public awareness campaigns and direct intervention programs.

CHILD SAFETY SEAT CHECK-UP PROGRAM

Placing children in car seats that are size and age appropriate can reduce serious and fatal injuries, but only if properly installed and used. Through the **Child Safety Seat Check-Up Program**, Community Health Workers trained as certified car seat technicians teach you the best way to install and correctly use your child safety seat. Over the past year, the program conducted close to 400 car seat check-ups, donated 89 car seats, and provided a monthly car seat installation class at the Auburn Public Health Clinic.

Child safety seat check-ups take approximately 30 minutes per car seat. Appointments are recommended, but not required. These child safety seat check-up events are one of several ongoing events in the Puget Sound area. For additional information about car seat check-up events, check the [Safety Restraint Coalition](http://www.800buckleup.org) website (<http://www.800buckleup.org>) for locations and schedules in the State of Washington.



CAR SEAT FACTS

- ★ 1-in-4 car seats are installed correctly.
- ★ Correctly used child safety seats can reduce the risk of fatal injuries by 71%.
- ★ The safest seating location is generally the center-rear seat, unless the child restraint is too wide for the location, or a pronounced hump or abutment compromises the fit of the child restraint. Check the vehicle owner's manual for further instruction.

TIPS FROM OUR CERTIFIED CAR SEAT SPECIALISTS:

- ✓ Keep the child rear-facing as long as possible to the height and weight limits of the car seat -- recommended to at least 2 years of age.
- ✓ A child must be in a booster seat until 8 years old or 4'9". Washington law requires children under 13 years to ride in the back seat.
- ✓ The chest clip must be located at the armpit level and tightness of the shoulder strap must be so you can't pinch any extra webbing at the collar bone area.



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:

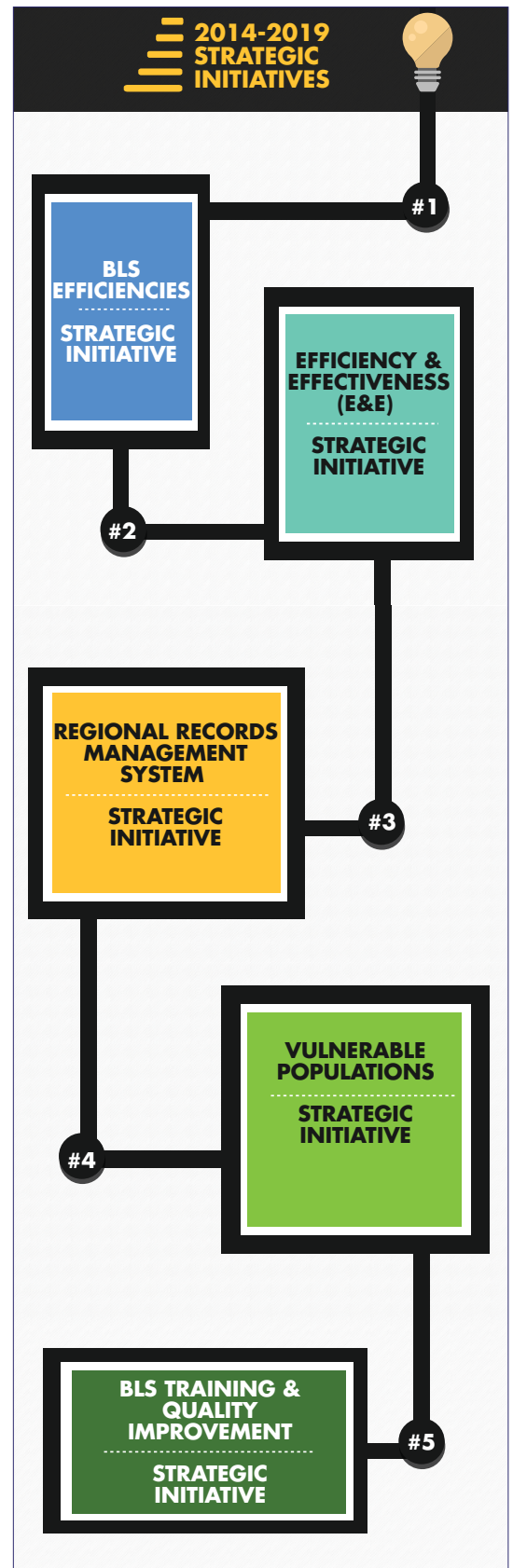
- Evaluating and reducing unnecessary EMT requests for medics from the scene;
- Evaluating and minimizing unnecessary BLS transports;
- Studying potential to expand EMT scope of practice to accommodate emerging community needs; and
- Providing EMTs with more training and skills to make more effective,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

REGIONAL APPROACH TO INITIAL EMT TRAINING

Over the past year, the EMS Division and EMS agencies in King County implemented a regional approach to initial EMT training by standardizing and expanding training options available. 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 18 and 19 for more information.

SUPPORT FOR OTHER 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 Community Medical Technicians Program update.



2014-2019 Strategic Initiatives

EFFICIENCY & EFFECTIVENESS STRATEGIC INITIATIVE

The **Efficiency and Effectiveness (E&E) Strategic Initiative (SI)** funds allow the EMS Division - and its numerous partners - to explore opportunities to improve EMS, system-wide. The initiative supports a wide range of continuous improvement projects that aim to improve the quality of care, first by testing in small or limited areas, then looking to expand its benefits by taking the idea to a larger area or across the region. Each project receiving funds through the E&E initiative adheres to a strong evaluation component in order to focus on performance measures, system outcomes, standards and other metrics.

The following three projects were awarded E&E SI funding to:

1. Add a Master of Social Work (MSW) care coordinator within the overall structure of South King Fire and Rescue and evaluate the overall effectiveness of this resource;
2. Explore and develop a Mobile Integrated Healthcare Program (MIH) through visiting and learning from national and local efforts, identify key performance measures, determine the scope and budget needed for MIH. (Refer to page 11 for more information about MIH and the CMT pilot program); and
3. Incorporate a resource vehicle staffed by two MSW resources in the Bellevue Fire Department.

PROJECT UPDATES

SOUTH KING FIRE AND RESCUE (SKFR): PROJECT UPDATE

In its second year of implementation, SKFR's E&E project continues to connect patients with an MSW care coordinator in the fire and EMS system. SKFR works in conjunction with St. Francis Hospital in Federal Way. This project identifies and engages with individuals in the community who suffer from chronic disease and have high utilization of both the EMS system and the hospital and emergency department.



REDMOND FIRE DEPARTMENT: PROJECT UPDATE

Redmond Fire Department and the Redmond Medic One provider group were also awarded an E&E grant to explore and develop a MIH program; the planning efforts include visiting and learning from national and local efforts, data review, scope and budget development.



BELLEVUE FIRE DEPARTMENT: PROJECT OVERVIEW

In 2017, the Bellevue Fire Department added a resource vehicle staffed by two professional social workers. Available as an additional resource to be dispatched to the scene of emergency medical 9-1-1 service calls, this resource may augment both ALS and BLS calls where appropriate. This project is slated to continue through 2019, during which time key performance measures across all dispatch codes, the number of responses to incidents, and the overall impact of the resource for the customers it serves will be thoroughly evaluated.



REGIONAL RECORDS MANAGEMENT SYSTEM (RMS) STRATEGIC INITIATIVE

During the Medic One/EMS 2014-2019 levy planning process, the region committed to supporting programs that specifically reduce BLS costs and improve overall EMS system effectiveness. One such project is the **Regional Records Management System (RMS) Strategic Initiative**, which reduces BLS agency costs by transferring the administrative and financial responsibility of the patient care record software to the EMS Division. This milestone was completed in late 2015 following the identification of a single software solution and the establishment of a contract (ESO Solutions) that enables all EMS agencies access to the software.

By the end of 2018, all King County and Seattle EMS agencies will have transitioned to the use of ESO records. Currently, a project is underway to implement ESO at Snoqualmie Pass Fire and Rescue -- the last remaining King County EMS agency to transition to the new regional RMS system.

The regional RMS initiative is an important penultimate step in the larger Systemwide Enhanced Network Design (SEND) effort to move EMS agencies from paper to electronic patient care records in the field and connecting to hospitals over electronic interfaces. Tangible progress has been made over the past few years, and the final step is to complete additional interfaces with local hospitals and garner a greater percentage of patient outcomes (currently about 15% of all transported patients are received electronically). This initiative benefits our partners and patients with more complete and better access to data, increased system oversight, and ultimately, improved medical care.

VULNERABLE POPULATIONS STRATEGIC INITIATIVE

The **Vulnerable Populations Strategic Initiative (VPSI)** is a collaboration between the EMS Division, Public Health – Seattle & King County, fire departments, community-based organizations, and the University of Washington (UW). The goal of VPSI is to conduct programmatic, scientific, and case-based evaluations to ensure that the interface between EMS and vulnerable populations is of the highest quality.

Since the last 2017 Annual Report, VPSI activities included:

1. Conducting education and outreach activities on 9-1-1 and emergency response in vulnerable communities with limited English proficiency (LEP) and seniors.
2. Conducting pilot studies on alternative EMS care delivery to vulnerable populations.
3. Assessing mental wellness needs among 9-1-1 personnel in King County.
4. Developing strong collaborative relationships between VPSI activities and the UW by connecting students to the practice community via capstone, thesis, and practicum opportunities related to VPSI.
5. Building a sustained approach to career paths in EMS for under-served, vulnerable populations.



2014-2019 Strategic Initiatives

VPSI IMPACTS

In partnership with a variety of community-based organizations in King County, including the Chinese Information Service Center, Somali Health Board, Tukwila School District, Seattle Office of Emergency Management, EMS agencies in King County, and the University of Washington School of Public Health undergraduate and graduate programs:

- Provided 9-1-1 and CPR education to over 12,000 limited English proficiency (LEP) residents from diverse language communities.
- Delivered 9-1-1, CPR, and stroke education to 750 senior citizens.
- Developed and implemented four (4) fire department-based pilot projects, which were evaluated by UW graduate students resulting in a set of recommendations for implementation of alternative care delivery strategies for vulnerable populations (i.e. patients with mental health disorders, vulnerable adults, and substance use disorder patients).
- Conducted a countywide mental wellness needs assessment, identifying gaps in availability and access to mental wellness resources such as leadership training, easily accessible and standardized peer support programs (for current and retired personnel), and awareness campaigns of available wellness resources.
- Sponsored and led several programs to increase EMS workforce diversity, including the S.T.A.R. Program EMT Training Program and Future Women in EMS/Fire Academy.
- Engaged 121 undergraduate public health students who contributed a total of 6,050 service-learning hours to the VPSI outreach and education program as of March 2018 as part of their undergraduate public health capstone class. In addition, 14 undergraduate students contributed an estimated 2,000 volunteer hours during the 2015 and 2016 10-week VPSI summer internships. Activities conducted by undergraduate students included conducting needs assessments, materials development and pre-testing, and outreach and education.
- Completed over 2,000 service hours across eight (8) graduate students who developed and evaluated the fire department-based VPSI projects.



UW undergraduate students visit residents to share stroke educational materials

WORK PLAN 2018-2019

VPSI will continue its outreach program to vulnerable communities in partnership with academic and practice partners. In addition, VPSI will continue collaborative pilot projects with EMS agencies on how to ensure the highest quality prehospital care delivery for vulnerable populations. The initiative will also continue its support of workforce diversity.

PATHWAY TO THE 2020-2025 LEVY PERIOD

The EMS Division proposed the continuation of VPSI outreach programs and collaborative pilot projects in the recent 2020-2025 EMS levy planning process. Programmatic recommendations also included sustaining support of Equity and Social Justice (ESJ) efforts related to workforce diversity (such as sponsoring and evaluating the S.T.A.R. program and Future Women in Fire and EMS Academy), as well as supporting coordinated efforts related to improving mental wellness among our EMS personnel is included in the body of work. For more information on VPSI, please visit our website: <https://www.kingcounty.gov/depts/health/emergency-medical-services/vulnerable-populations.aspx>.

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. Consistently conducted paramedic "run reviews"

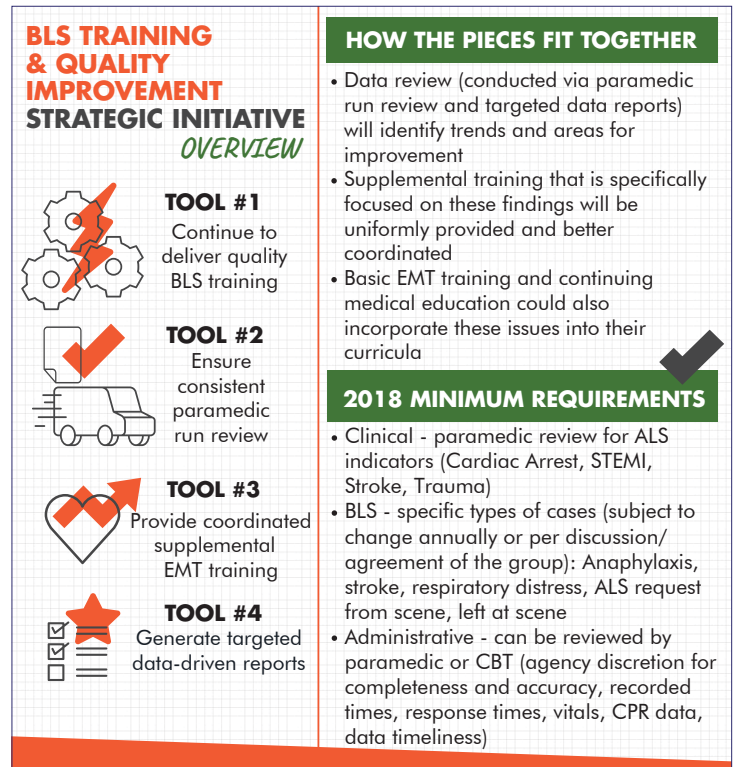
"Run reviews" are critical to improving EMT performance by examining medical performance, decision making and EMT understanding of current education concepts. This initiative develops a consistent run review program so that the level of review, including the types of calls reviewed, is the same across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

3. Coordinated supplemental EMT training

This initiative will provide 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

In 2018, the region officially implemented 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. 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.

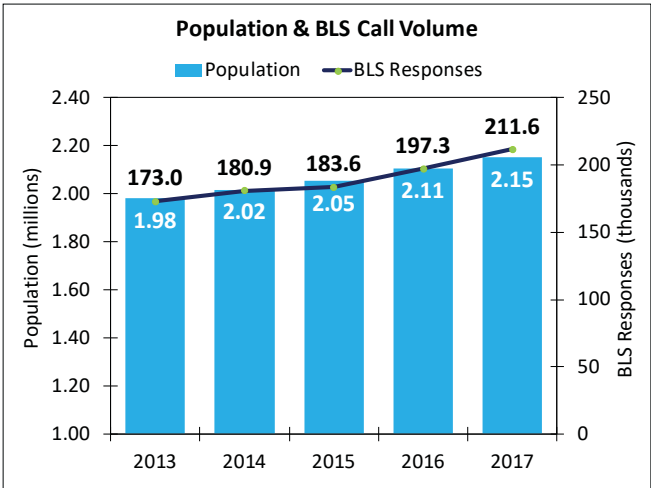
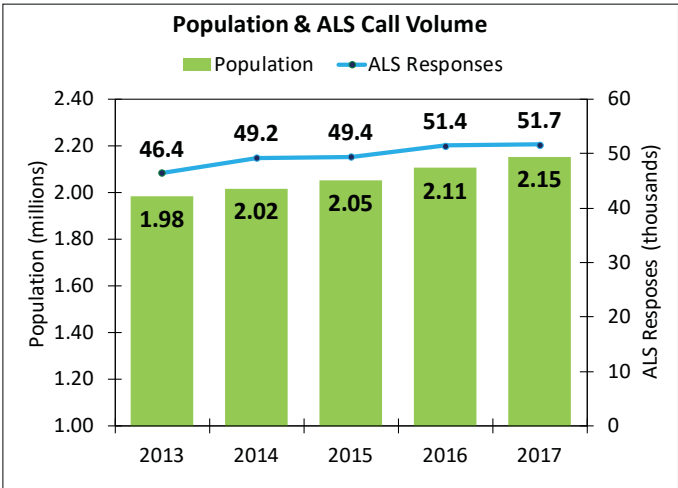
EMS Statistics: Seattle & King County - 2017 Overview

POPULATION

Population increases have historically been closely correlated to the increased utilization of EMS and the number of responses to emergency medical calls. The rate of population growth in King County continues to recover from the recessional decline as indicated in the table shown to the right.

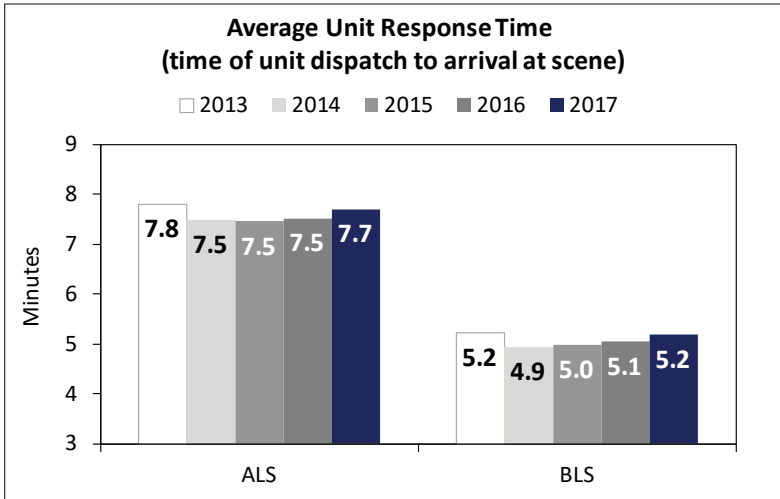
Year	Seattle & King County Population	% Growth (Annualized)
1980	1,269,898	
1990	1,507,305	1.87%
2000	1,737,034	1.52%
2010	1,931,249	1.12%
2017	2,105,100	1.65%

The two graphs below depict population growth relative to both ALS and BLS call volume trend across the five-year period and reflect call volumes correlated with the increases in population. Note there are differences in the scales used for ALS and BLS call volumes.



EMS SYSTEM KEY PERFORMANCE INDICATORS

Response times (RT) represent a key performance indicator of the EMS system. The “total response time” is calculated as the time of the call received at a 9-1-1 dispatch center to the time of the EMS unit arrival at the scene. Whereas, the “unit response time” is calculated as the time of the unit dispatch time to the unit’s arrival at the scene. The figure below depicts the average unit response time across a five-year period (2013-2017).

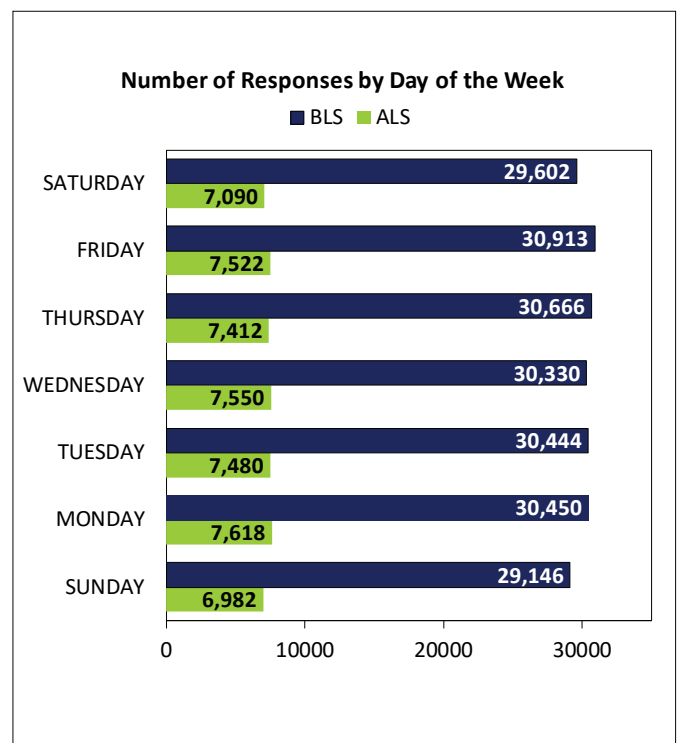
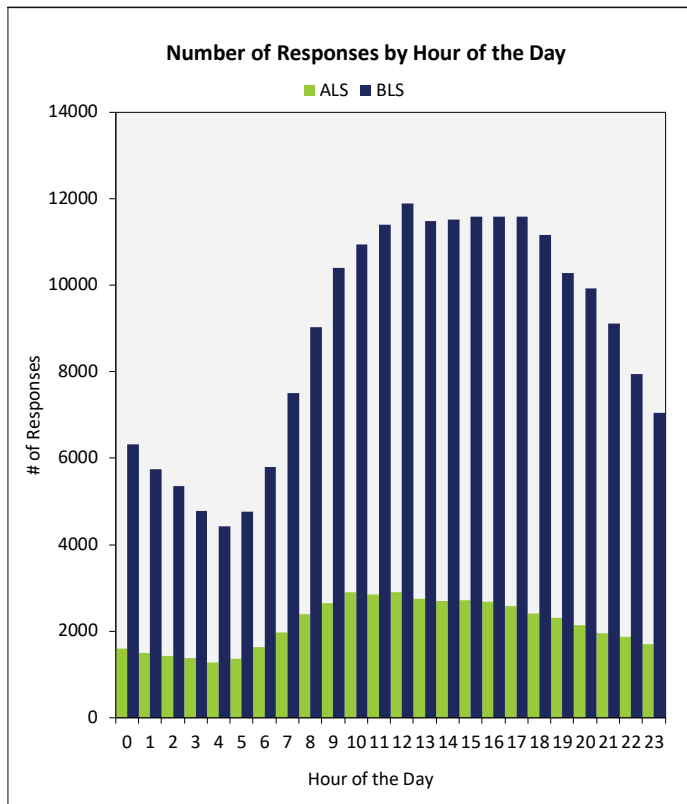
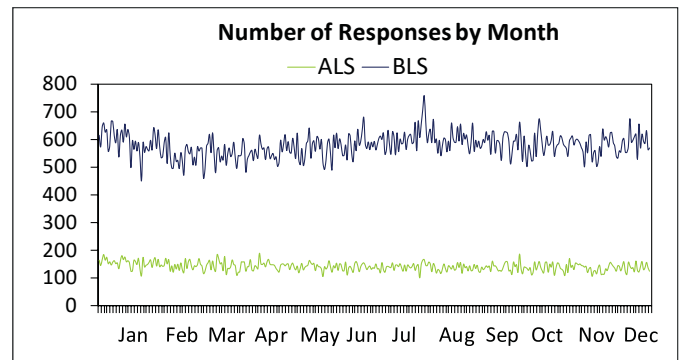


Characteristics of Responses

OPERATIONS

METRIC	ALS		BLS	
Number of Responses	51,654		211,551	
	Total RT	Unit RT	Total RT	Unit RT
Average Response Time (RT) (minutes)	11.8	7.7	6.4	5.2
Median Response Time (minutes)	9.6	7.0	5.5	4.6
6 minutes or less	N/A	N/A	58.7%	73.0%
8 minutes or less	35.5%	61.8%	N/A	N/A
10 minutes or less	53.0%	79.9%	N/A	N/A
12 minutes or less	65.7%	89.9%	N/A	N/A
14 minutes or less	74.0%	94.5%	N/A	N/A
Cancelled Enroute Calls	9,395 (18.2%)		7,066 (3.4%)	

The average unit response time for BLS and ALS has remained stable over time. The following graphs reflect the patterns of ALS and BLS responses by month during the year, day of the week, and hour of the day throughout the year. As indicated in the Number of Responses by Day of the Week graph, there is a notable difference in range of BLS responses per day over time (~450-760 calls) in comparison to ALS responses (~100-200 calls).

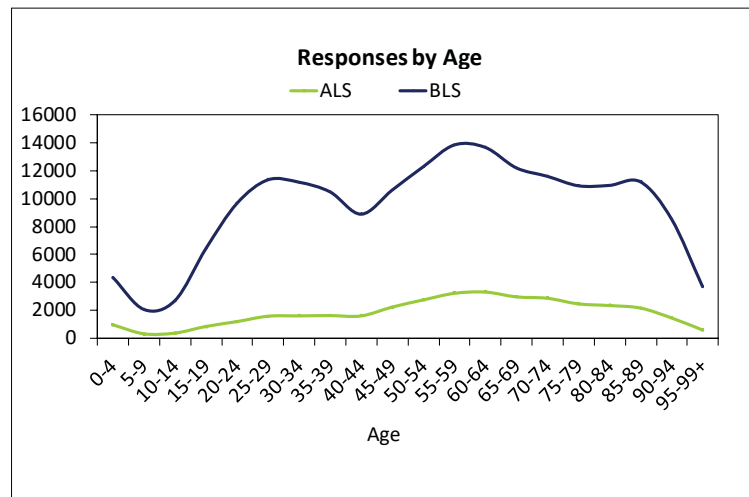


Characteristics of Responses

The following information reflects a variety of statistics that characterize the types of BLS and ALS calls, including a comparison of age groups, types of medical complaints, where incidents occur, and patient transport information. Paramedics providing advanced life support are more likely to attend to patients that are 65 years or older for more life-threatening conditions, while emergency medical technicians commonly respond to incidents involving trauma in young adults. BLS responses are closely aligned and correlated with population increases.

RESPONSES BY AGE GROUP

AGE GROUP	ALS	BLS
0-4 years	964 (2.6%)	4,354 (2.3%)
5-9 years	317 (0.9%)	2,049 (1.1%)
10-17 years	793 (2.2%)	5,903 (3.2%)
18-24 years	1,627 (4.4%)	12,920 (6.9%)
25-44 years	6,442 (17.6%)	41,971 (22.4%)
45-64 years	11,580 (31.6%)	50,528 (27.0%)
65-84 years	10,704 (29.2%)	45,764 (24.5%)
85+ years	4,230 (11.5%)	23,465 (12.6%)
TOTAL	36,657	186,954

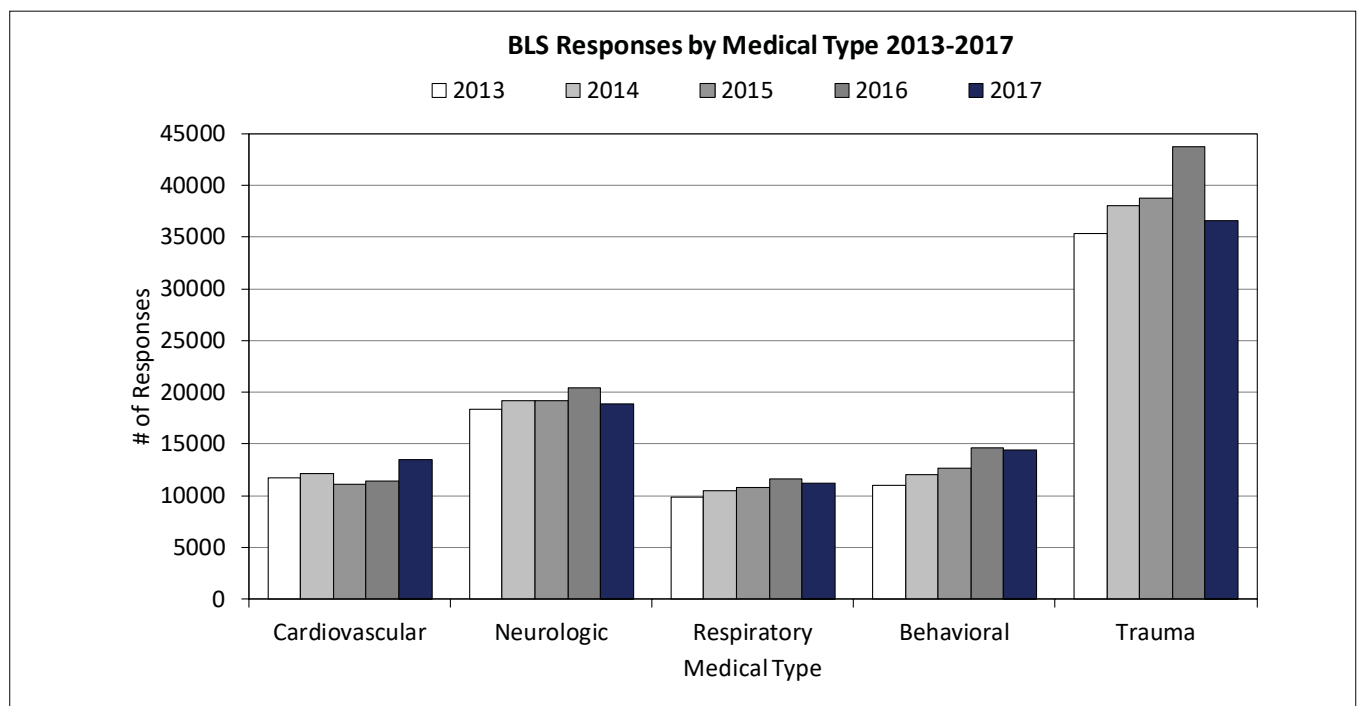
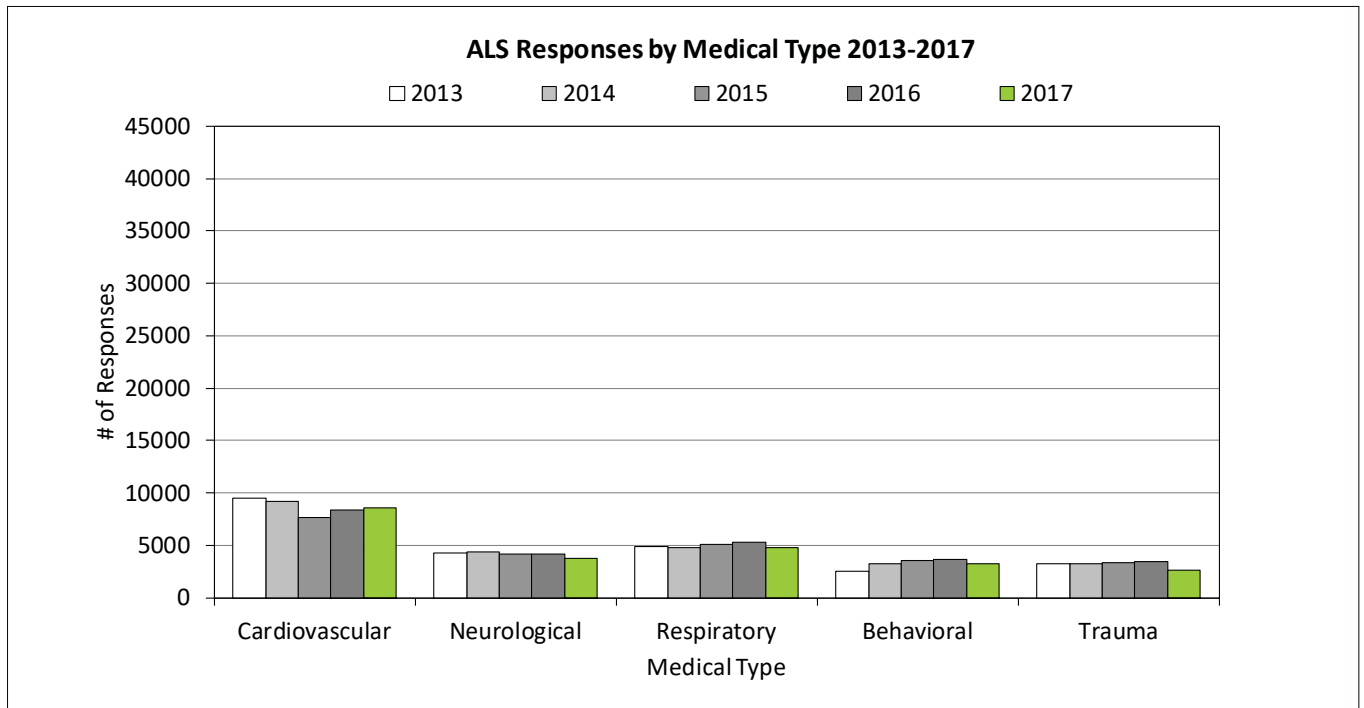


RESPONSES BY MEDICAL TYPE

Although ALS and BLS personnel each respond more frequently to particular types of calls (i.e. cardiac calls for ALS and trauma for BLS), the EMS community serves a wide variety of medical emergencies. This requires not only an in-depth knowledge of specific invasive medical procedures, but it also requires a considerable breadth of knowledge and skills for diagnosis and management.

Medical Type	ALS		BLS	
	# of Responses	% of Total	# of Responses	% of Total
Cardiovascular	8,626	23.8%	13,439	7.6%
Respiratory	4,759	13.1%	11,153	6.3%
Neurological	3,817	10.6%	18,910	10.6%
Behavioral/Psychological	3,263	9.0%	14,421	8.1%
Trauma	2,639	7.3%	36,551	20.5%
Alcohol/Drug	2,087	5.8%	13,236	7.4%
Abdominal/Genito-Urinary	1,638	4.5%	12,408	7.0%
Endocrine/Metabolic	1,048	2.9%	3,164	1.8%
Allergy/Anaphylaxis	716	2.0%	1,676	0.9%
Infection	663	1.8%	4,465	2.5%
Obstetric/Gynecological	336	0.9%	1,075	0.6%
Obvious Death	144	0.4%	1,629	0.9%
Environmental Exposure	75	0.2%	421	0.2%
Other Medical	6,405	17.7%	45,507	25.6%
Total	36,216	100.0%	178,055	100.0%

With the transition to a regionally used electronic health record system, medical type categories now include responses to behavioral-related incidents. An important component of providing EMS care is appropriate triage. EMS personnel use their skills and knowledge to match the clinical need of the patient with the most appropriate transport and destination plan. For example, in 2017, ALS transported 97% of its patients to a hospital. Other transport destinations include emergency room facilities or clinics.



Cardiac Arrest Statistics

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, EMS personnel (fire fighter/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 Seattle and greater 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 (2) 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 2013 through 2017 for Seattle and King County. The report presents 2017 results and 5-year cumulative results. The 5-year cumulative results provide the best general gauge of system performance as there can be year-to-year variability caused by circumstances outside the emergency 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	2013	2014	2015	2016	2017
Cardiac arrests	1,135	1,246	1,114	1,228	1,215

- 2017 Highlight: Overall survival to hospital discharge based on arrest before or after arrival of EMS personnel and initially monitored cardiac arrest rhythm:

Initial Cardiac Arrest Rhythm	Patients Treated	Patients Survived To Hospital Discharge	Percent Survived
Arrest Before Arrival of EMS	1,084	210	19%
Ventricular Fibrillation/ Tachycardia (VF/VT)	302	146	48%
Asystole	463	11	2%
PEA	268	47	18%
Not Shockable, but unknown if PEA or asystole	43	4	9%
Unknown	8	2	25%
Arrest After Arrival of EMS	131	41	31%
Ventricular Fibrillation/Tachycardia (VF/VT)	28	18	64%
Asystole	22	4	18%
PEA	73	17	23%
Not Shockable, but unknown if PEA or asystole	4	2	50%
Unknown	2	0	0%
Total	1,215	251	21%

- Utstein Group: Survival to hospital discharge for arrests due to heart disease, witnessed by bystanders (excludes EMS-witnessed arrests), with an initial heart rhythm of VF or VT:

Year	2017	2013-2017
Survival Rate	115/205 (56%)	525/962 (55%)

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

Year	2013	2014	2015	2016	2017
Bystander CPR	657/998 (66%)	734/1,093 (67%)	666/985 (68%)	791/1,086 (73%)	763/1,084 (70%)

SUMMARY OF KEY POINTS FOR 2018:

- The EMS system successfully **resuscitated 21% of EMS-treated cardiac arrest victims** in Seattle and King County -- a success rate of two to three times higher than most communities.
- This 21% represents **251 lives saved** by the EMS system, most of whom return home to resume normal lives with loved ones, friends, and colleagues.
- 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 70%**, one of the highest ever reported in the nation. Refer to page 38 for a special feature on bystander CPR.
- This resuscitation success is a tribute to the **immense dedication and efforts by all the stakeholders** involved in the EMS system, a system that continues to strive to do more regardless of the challenge.

Cardiac Arrest Highlight: Bystander CPR

The Integral Role of Emergency Medical Dispatch

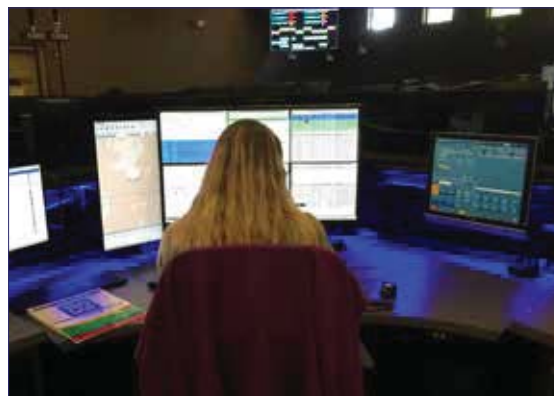
Every year, King County EMS responders treat over 1,200 patients for out-of-hospital cardiac arrest. Cardiac arrest occurs when the heart stops suddenly so that blood no longer circulates to the brain and other vital organs. Cardiac arrest is the most time-critical medical emergency. The patient becomes unresponsive and will stop breathing. Death is certain within minutes without quick initiation of lifesaving measures. Termed the “chain of survival,” a community-wide coordinated system of lifesaving measures includes early recognition of cardiac arrest; early activation of the 9-1-1 emergency medical communications center; rapid initiation of CPR; rapid application of a defibrillator; expert treatment by basic and advanced life support EMS responders; and expert hospital care.

CPR is a key link in the “chain of survival.” In recent years, the technique for bystander CPR has emphasized providing continuous chest compressions, often referred to as “hands-only CPR,” as opposed to alternating chest compressions and rescue breaths. Scientific evidence indicates that laypersons should push hard and fast – at a rate of 100-120 compressions per minute – to help blood circulate to vital organs including the heart and brain. Hands-only CPR provides the cardiac arrest victim critical support while EMS race to the scene, ultimately improving the patient’s chance to survive the cardiac arrest.

Long-standing efforts to engage the public in CPR have been crucial to improving patient outcomes in our community. CPR training programs involve workplace organizations, school-based training, and a range of civic groups and individual initiatives. The community’s commitment to CPR training distinguishes King County, and has helped provide an important foundation to improve cardiac arrest survival.

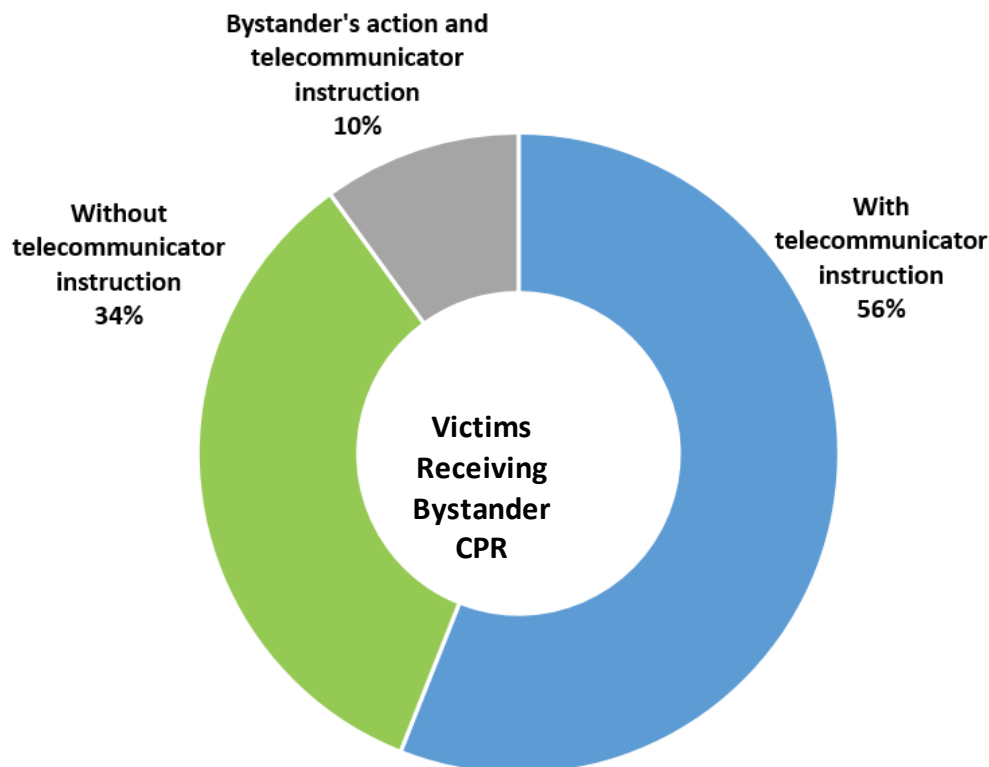
TELEPHONE CPR

A complementary strategy to boost early layperson CPR is the systematic effort by the emergency medical telecommunicators. These professionals answer the 9-1-1 call for help using a structured approach with the goal of efficiently identifying cardiac arrest and instructing the caller in CPR. The telecommunicator engages with the caller who is often uncertain of the arrest or lacks confidence to act. In these circumstances, the telecommunicator partners with the caller to coach CPR in a just-in-time fashion. The telecommunicator CPR program -- started in King County over 30 years ago -- has been an integral reason why layperson CPR rates in King County now approach 70%. As reference, this high rate of bystander CPR is 2 to 3 times higher than what occurs in most US communities.



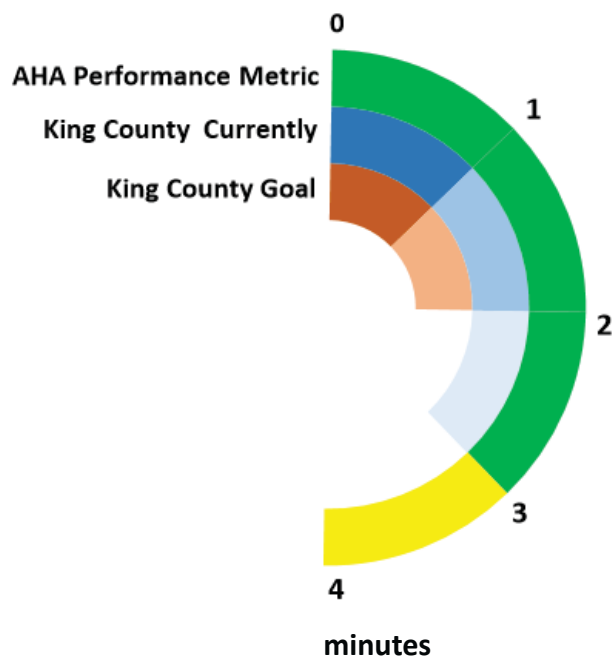
As part of quality improvement, each cardiac arrest call is reviewed to better understand the challenges of recognition and CPR coaching. This review is provided back to the emergency communication centers as a basis for how to improve. The information provides important insight to how King County achieves such a high bystander CPR rate. For 2017, we evaluated not only whether patients received bystander CPR, but reviewed the mechanism by which this lifesaving intervention was performed. Specifically, cases were reviewed to understand whether bystander CPR was started because the layperson acted on their own or because the telecommunicator directed the caller through arrest recognition and CPR coaching.

The results of these efforts highlight the important and lifesaving role of the telecommunicator. Among cardiac arrest patients who receive bystander CPR prior to the arrival of EMS professionals, 56% were primarily due to telecommunicator instruction and coaching.



PATHWAY TO EXCEPTIONAL EMERGENCY COMMUNICATIONS

These efforts by the telecommunicators have set the example for other communities. Specifically, the American Heart Association has recently released goals for performance by emergency communication centers related to rapid cardiac arrest recognition and actual hands-on CPR performance. The goal for telecommunicators is to start chest compression within 3 minutes from the 9-1-1 call pick-up. During that time interval, the telecommunicator must work with the caller to acquire the address, identify that the patient has a high likelihood of cardiac arrest, position the patient, and instruct and coach the start of chest compressions. In 2017, the median interval from 9-1-1 call pick-up to initial start of chest compressions was 2 minutes and 58 seconds. The aspirational ideal interval is 2 minutes, a goal that King County communication centers will strive for as they continue to set the standard for exceptional emergency communications as a critical link in the chain of survival.



EMS Funding and 2018 Financial Plan

EMS LEVY STRUCTURE OVERVIEW

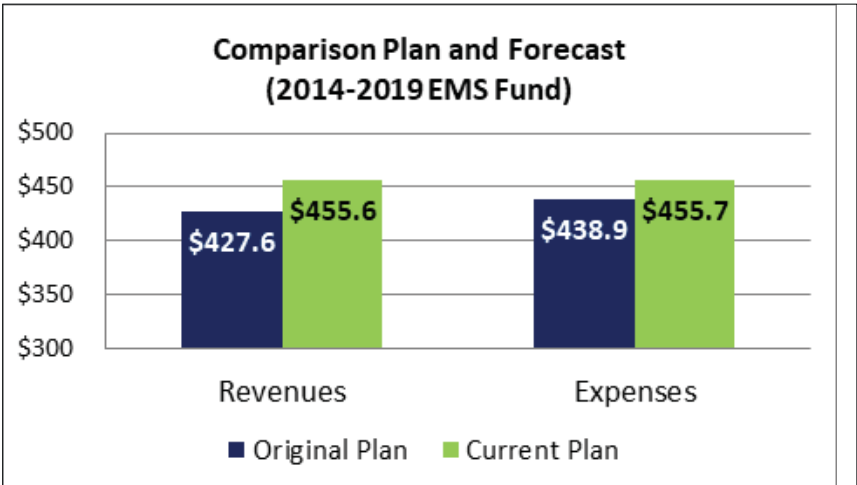
The Medic One/EMS system is funded by a regular property tax levy, subject to the limitations contained in Chapter 84.55.010 Revised Code of Washington (RCW). Levy funds are restricted by RCW and can only be spent on EMS-related activities. The annual levy growth is limited to a 1% increase for existing properties, plus assessment on new construction.

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 Annual Report, excluding the City of Seattle, pertains only to the EMS fund within the remainder of King County (referred to as the KC EMS Fund). The 2018 and 2019 financial information in this report is based on a financial forecast completed in May 2018 and reported to the EMS Advisory Council in June 2018.

SUMMARY

Five years into the current levy, revenues and expenditures are both forecasted to be higher than anticipated in the original plan - revenues are up by \$28 million, and expenditures by \$16.8 million. Both 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 reduce both the ALS and Regional Support Services (RSS) allocations. Because these reduced allocations have left little room for programs to adapt to expenditure challenges, both programs have needed to access reserves to cover costs.



Although authorized at 33.5 cents per \$1,000 Assessed Valuation (AV), the levy rate for 2018 is 23.9 cents per \$1,000 AV - down from 26.3 cents per \$1,000 AV in 2017.

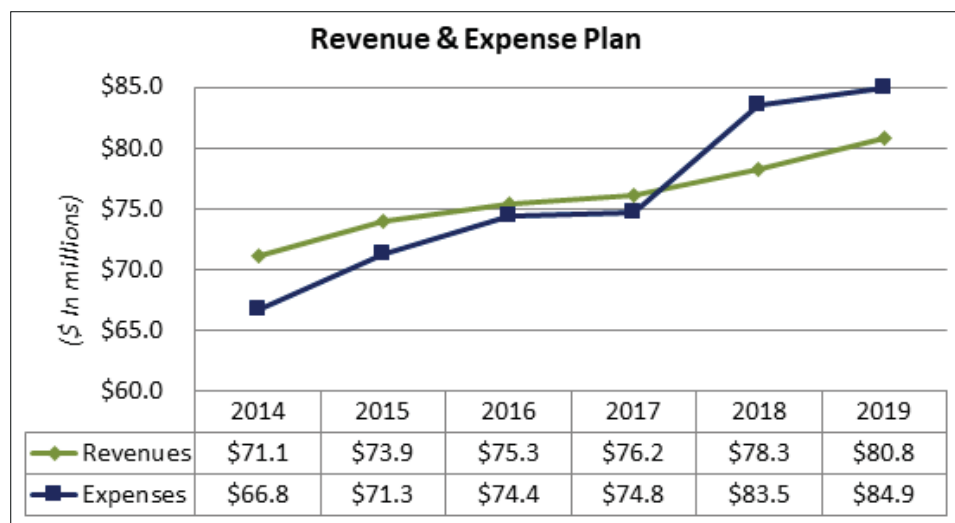
REVENUES

Approximately 98% of revenue for the EMS levy comes from taxes and income related to property taxes based on assessed valuations. The levy is structured so that property taxes collected early in the levy period are planned to cover expenditures in the later years of the levy as shown in the Revenue & Expense Plan shown in the figure below.

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. Per 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 the total amount allowed (1% + new construction).

The decrease in levy rate shown on the following table are proportionate to the increase in assessed valuation. Since AV is projected to increase at a rate higher than the limit factor of 1% throughout the levy period, the levy rate is projected to decrease from 33.5 cents/\$1,000 AV to 22.3 cents/\$1,000 AV in 2019.

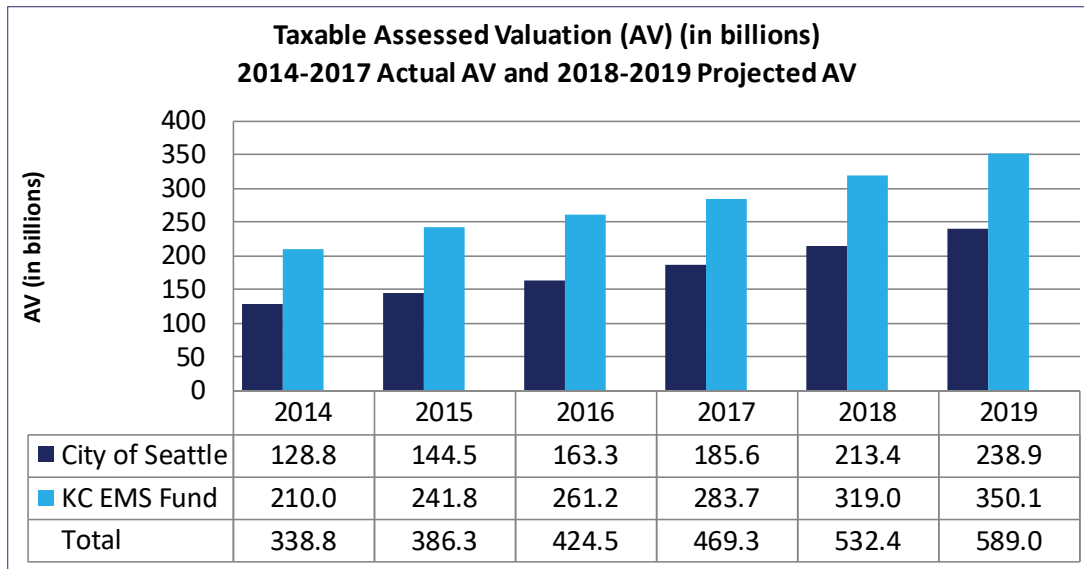


Revenues	2014	2015	2016	2017	2018	2019	Total
Property Taxes	\$70.30	\$72.89	\$73.38	\$74.32	\$76.38	\$78.79	\$446.06
Interest/Other Income	\$0.59	\$0.55	\$0.66	\$0.78	\$0.53	\$0.60	\$3.71
Charges for Services	\$0.25	\$0.50	\$0.70	\$0.67	\$0.79	\$0.80	\$3.71
Grants	\$0.0	\$0.0	\$0.60	\$0.40	\$0.57	\$0.59	\$2.16
Total	\$71.14	\$73.94	\$75.34	\$76.17	\$78.27	\$80.78	\$455.64

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

EMS Funding and 2018 Financial Plan

As the region transitions from the previous economic downturn, AV has continued to grow with 2018 AV 13.4% higher than that in 2017. The percentage of the levy to the King County EMS Fund (based on AV outside the City of Seattle) decreased in 2017 and is projected to continue to decrease in 2018 and 2019 as AV in Seattle has increased at a higher rate than the rest of the county. King County AV outside of the City of Seattle is projected to increase at a slow rate through the remainder of the levy period – from 59.9% in 2018 to 59.4% in 2019.



Taxable Assessed Valuation						
	2014	2015	2016	2017	2018	2019
% KC EMS Fund	62.0%	62.6%	61.5%	60.4%	59.9%	59.4%
% City of Seattle	38.0%	37.4%	38.5%	39.6%	40.1%	40.6%

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

EXPENDITURES*

EMS levy revenues support EMS activities that are 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 increased by a compound inflator that considers the different inflators for labor, pharmaceuticals, equipment and benefits
- Eligible for use of reserves

Basic Life Support (BLS) Services (EMTs):

- Distributed to individual agencies based on an allocation that includes the assessed valuation of the district and demand for services (call volume)
- Allocation increased by consumer price index (CPI) inflator
- Includes the addition of the BLS Core Services program beginning in 2015

Regional Support Programs:

- Supports eight major areas - Training and Education (formerly Professional Standards), Community Programs, Emergency Medical Dispatch, Operations, Regional Medical Control/QI, Management & Finance, Infrastructure, and Overhead and Indirect costs
- Allocation increased by CPI inflator
- Eligible for use of reserves

Strategic Initiatives:

- Funded with lifetime budgets (budgeted amount by year is adjusted to reflect changing cashflows based on project needs)
- Includes carryover of the Systemwide Enhanced Network Design (SEND) Strategic Initiative and Emergency Medical Dispatch Strategic Initiative from the 2008-2013 levy period

In addition to these four main areas above, other important line items include:

Community Medical Technician (CMT) Units:

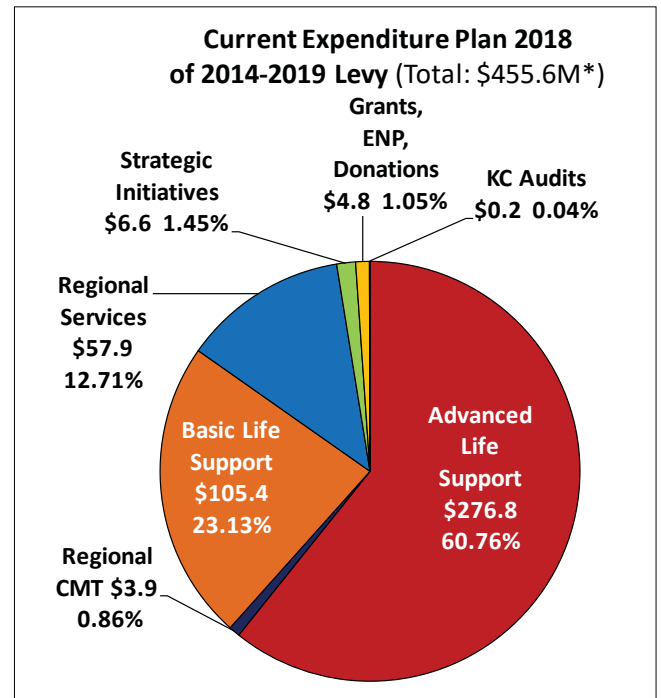
- New for the 2014-2019 levy period

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:

- Grants supporting the Center for Evaluation of EMS (CEEMS) projects (moved from Public Health Fund to EMS Fund)
- Entrepreneurial programs sharing EMS products with other agencies
- Donations



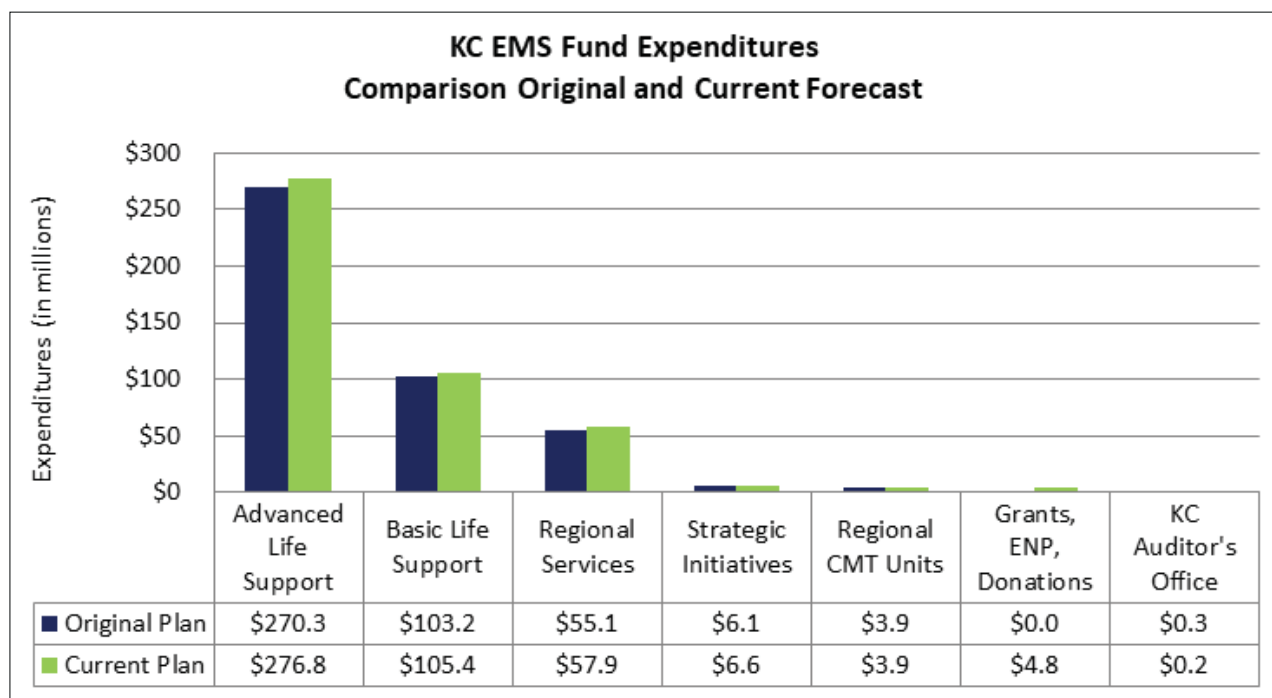
*Expenditures do not include \$4M of the forecasted Use of Reserves, Designations, and Program Balances, which are included as Forecasted Expenses on the chart on page 44. Please refer to page 46 for more information about Reserves and Designations.

EMS Funding and 2018 Financial Plan

EXPENDITURE TRENDS

Major expenditure trends from the original Financial Plan now include:

- Baseline ALS and BLS allocations decreased due to economic indices, such as CPI, being less than projected. These indices are used to calculate yearly increases in allocations.
- Reduced allocations and increased costs led ALS providers to access reserve funding in order to cover costs above the allocation. Areas requiring the use of reserves include paid time off above planned, additional paramedic student costs and additional costs related to power stretchers (see Use of Reserves table for more detailed information). In 2017, the EMS Advisory Committee recommended implementing a mid-levy allocation adjustment, which is estimated to provide ALS providers approximately \$8.4 million through the end of the 2014-2019 levy.
- The BLS allocation was supplemented in 2014 by \$219,144 so that the 2014 allocations were not less than those in 2013. The BLS Core Services Program was added to help agencies with unanticipated costs (funded at \$3.7 million for 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).
- Strategic Initiatives supporting the Systemwide Enhanced Network Design (SEND) project and Emergency Medical Dispatch were carried over from the 2008-2013 levy to the current levy.



STRATEGIC INITIATIVES

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

In order to implement the Regionalization of Initial EMT Training Strategic Initiative (see page 27), \$450,000 was moved from the Efficiency & Effectiveness (E&E) Initiative into the BLS Efficiencies Initiative. Over one million dollars remains available for spending in the E&E initiative.

STRATEGIC INITIATIVES	2014 Actuals	2015 Actuals	2016 Actuals	2017 Actuals	2018 Forecast	2019 Forecast	2014-2019 Forecast
2014-2019							
Regional Records Management System	33,750	162,719	203,445	107,971	162,756	184,070	854,711
BLS Training and Quality Improvement	-	-	-	160,255	825,245	495,378	1,480,878
Vulnerable Populations Strategic Initiative (VPSI)	80,148	188,956	220,383	310,222	352,434	381,506	1,533,649
BLS Efficiencies	8,389	17,521	29,359	271,453	280,000	265,342	872,064
Efficiency and Evaluation	42,472	99,115	180,277	143,011	428,036	440,000	1,332,911
TOTAL 2014-2019 SIs	164,759	468,311	633,464	992,912	2,048,471	1,766,296	6,074,213
2008-2013							
Emergency Medical Dispatch (EMD)	77,523	(111,249)	18,804	28,402	251,985	129,868	395,333
Systemwide Enhanced Network Design (SEND)	68,960	30,183	8,943	37,400	24,374	-	169,860
TOTAL 2008-2013 SIs	146,483	(81,066)	27,747	65,802	276,359	129,868	565,193
TOTAL STRATEGIC INITIATIVES	311,242	387,245	661,211	1,058,714	2,324,830	1,896,164	6,639,406

EMS Funding and 2018 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. The plan also created the Community Medical Technician (CMT) Reserve and KC Required Fund Balance Reserve, and specifies that Regional Services may access the ALS Operational Reserve to cover specific expenses which may be higher than anticipated.

In 2014, the EMS Advisory Committee recommended the development of a Rate Stabilization reserve, similar to the millage reduction reserve in the 2008-2013 levy. To achieve consistency with King County Reserve Policies, EMS converted the Fund Balance Reserve to the Cash Flow Reserve.

In 2017, EMS formally transitioned the reserves established in the 2014-2019 Strategic Plan 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.

CATEGORY	PREVIOUS NAME	NEW NAME
EXPENDITURES		
Contingencies	ALS Operational Reserve	ALS Contingencies (limited access for RSS)
RESERVES		
Expenditure Reserves	Reserves for adding Regional CMT Units	Reserves for adding Regional CMT Units
	ALS Capacity Reserve	Placeholder for Additional ALS Capacity
	ALS Capacity Reserve	Facility Renovation/Relocation
	ALS Equipment Reserve	ALS Equipment
	Cash Flow Reserves	Planned Future Years Expenditures
	Designations-KCM1	KCM1 Equipment Reserves
	Designations - Program Balances	Program Balances (ALS & Regional Support Services)
Rainy Day Reserves	ALS Call Volume Utilization/Disaster	ALS Call Volume Utilization/Disaster
	Amount Over Risk Pool	ALS Risk Abatement Reserves
Rate Stabilization	Rate Stabilization Reserve (previously Millage)	Rate Stabilization Reserve

ALS Contingencies continue to provide limited access for Regional Services needs. King County policies require levy funds to have 90 days of funding at the end of the levy. King County acknowledges that not all funds have this ability within their current levies and work with each fund on moving towards that goal. The crosswalk was reviewed by and recommended to EMS Advisory Committee (EMSAC) by the EMSAC Financial Subcommittee. EMSAC reviewed and recommended adoption of this new structure in December 2017.

Financial policies further clarified how reserves are used to replenish each other. Any funds not needed for Expenditure 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.

In addition to funds being appropriated by the King County Council, all use of reserves are reviewed and recommended by the EMSAC Financial Subcommittee and EMS Advisory Committee.

2017-2019 RESERVES

RESERVE NAME	2017	2018	2019
Regional CMT Units	1,519,484	1,519,484	1,519,484
ALS Capacity	1,067,700	3,358,700	3,358,700
ALS Equipment	488,900	488,900	488,900
Planned Future Years Expenditures	9,402,152	4,134,270	-
KCM1 Equipment*	1,772,380	1,371,892	1,371,892
Program Balances (ALS & RSS)*	11,874,941	10,185,919	8,741,175
Rainy Day Reserves	18,219,800	18,018,308	19,463,052
Rate Stabilization Reserves			
TOTAL RESERVES	44,345,357	39,077,473	34,943,203

**Previously considered designations*

USE OF RESERVES

Several uses of reserves have been approved to date. The following table shows actual amounts used through the end of 2017. Additional use of reserves has been approved with “not-to-exceed” amounts for power stretchers and risk abatement, and ongoing support for paramedic services and regional services. Regional Services is using existing program balances to cover a portion of the amount eligible for use of reserves. ALS Capacity Reserve use in 2017 covers temporary service in the Sammamish Plateau area related to multiple construction projects.

USE OF RESERVES & DESIGNATIONS	2014	2015	2016	2017	Total
ALS OPERATING RESERVES:					
Excess Paid Time Off (PTO)	214,000	25,689	243,741	-	483,430
Regional Services	306,261	925,922	579,148	-	1,811,331
Paramedic Students	271,648	407,012	414,645	290,950	1,384,255
Dispatch Costs	133,893	169,629	157,683	-	461,205
ALS Mid-Levy Allocation Adjustment	-	-	1,989,324	2,049,288	4,038,612
ALS EQUIPMENT RESERVE:					
Power Load Systems	-	434,562	174,333	188,990	797,885
ALS CAPACITY RESERVE	-	-	-	300,517	300,517
ALS RISK ABATEMENT RESERVE	-	649,672	161,885	45,000	856,557
RESERVES SUB-TOTAL	925,802	2,612,486	3,720,759	2,874,745	10,133,792
DESIGNATIONS:					
Supplement BLS Allocation	219,144	-	-	11,698	230,842
TOTAL	1,144,946	2,612,486	3,720,759	2,886,443	10,364,634

CONCLUSIONS

Expenses continue to increase at a rate greater than anticipated at the time the region developed the Financial Plan. ALS and Regional Services programs have accessed reserves to help address these additional costs, and the BLS agencies have received limited support from the BLS Core Services program. This trend is anticipated to continue for the remaining years of the levy. Revenues (primarily property taxes due to new construction) are higher than anticipated in the original plan. 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 the Rainy Day Reserve.

EMS Funding and 2018 Financial Plan

EMS FUND 1190 FINANCIAL PLAN	2017 ACTUALS	2018 ESTIMATE	2019 ESTIMATE
BEGINNING FUND BALANCE (A)	43,064,555	44,345,357	39,077,473
REVENUES			
Property Taxes	74,315,167	76,380,591	78,788,476
Grants	399,573	572,227	588,997
Charges for Services	670,985	790,731	802,235
Interest Earnings/Miscellaneous Revenue	762,068	515,200	592,200
Other Financing Sources	18,884	12,000	12,000
TOTAL REVENUES (B)	76,166,677	78,270,749	80,783,908
EXPENDITURES			
Advanced Life Support Services	44,730,708	50,030,863	51,441,807
Basic Life Support Services	16,986,671	17,671,236	18,489,414
Regional Services	8,654,987	10,545,507	11,033,764
Strategic Initiatives	1,058,714	2,324,830	1,896,164
Regional CMT Units	1,477,626	1,085,002	-
BLS Core Services Support	899,201	600,799	750,000
Grants, Entrepreneurial & Donations	946,312	1,280,396	1,307,029
TOTAL EXPENDITURES (C)	74,754,219	83,538,633	84,918,178
TOTAL REVENUES LESS TOTAL EXPENDITURES (D)	1,412,458	(5,267,884)	(4,134,270)
Other Fund Transactions (E)	(131,656)	-	-
ENDING FUND BALANCE (A+D+E=F)	44,345,357	39,077,473	34,943,203
RESERVES AND DESIGNATIONS			
Designations (including Program Balances)	(13,647,321)	(11,557,811)	(10,113,067)
Reserves*	(30,698,036)	(27,519,662)	(24,830,136)
TOTAL RESERVES AND DESIGNATIONS (G)	(44,345,357)	(39,077,473)	(34,943,203)
ENDING UNDESIGNATED FUND BALANCE	-	-	-

*Refer to page 46 EMS Funding and 2018 Financial Plan for additional details on reserves.

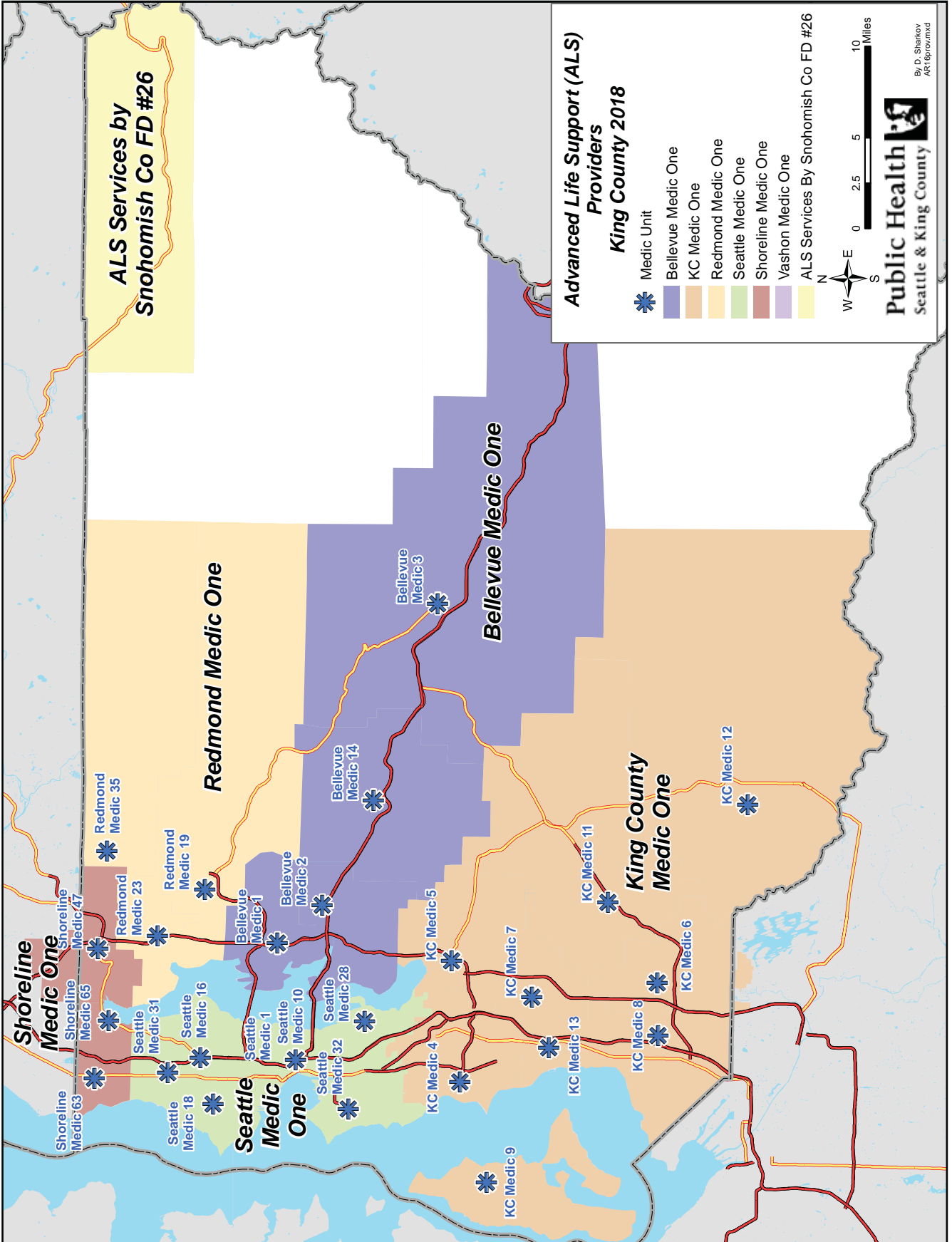
DONATIONS

King County Medic One and the EMS Division accept gifts, bequests, and donations in accordance with King County Ordinance 18254 in support of the EMS mission to provide high quality prehospital emergency care. The table below identifies the donations recieved from 2014-2017.

	2014	2015	2016	2017
BEGINNING BALANCE (A)	52,835	94,713	143,008	143,588
Donations (B)	41,878	50,407	4,853	(2,723)
Expenditures (C)	-	2,112	4,273	-
ENDING BALANCE (A+B-C)	94,713	143,008	143,588	140,865

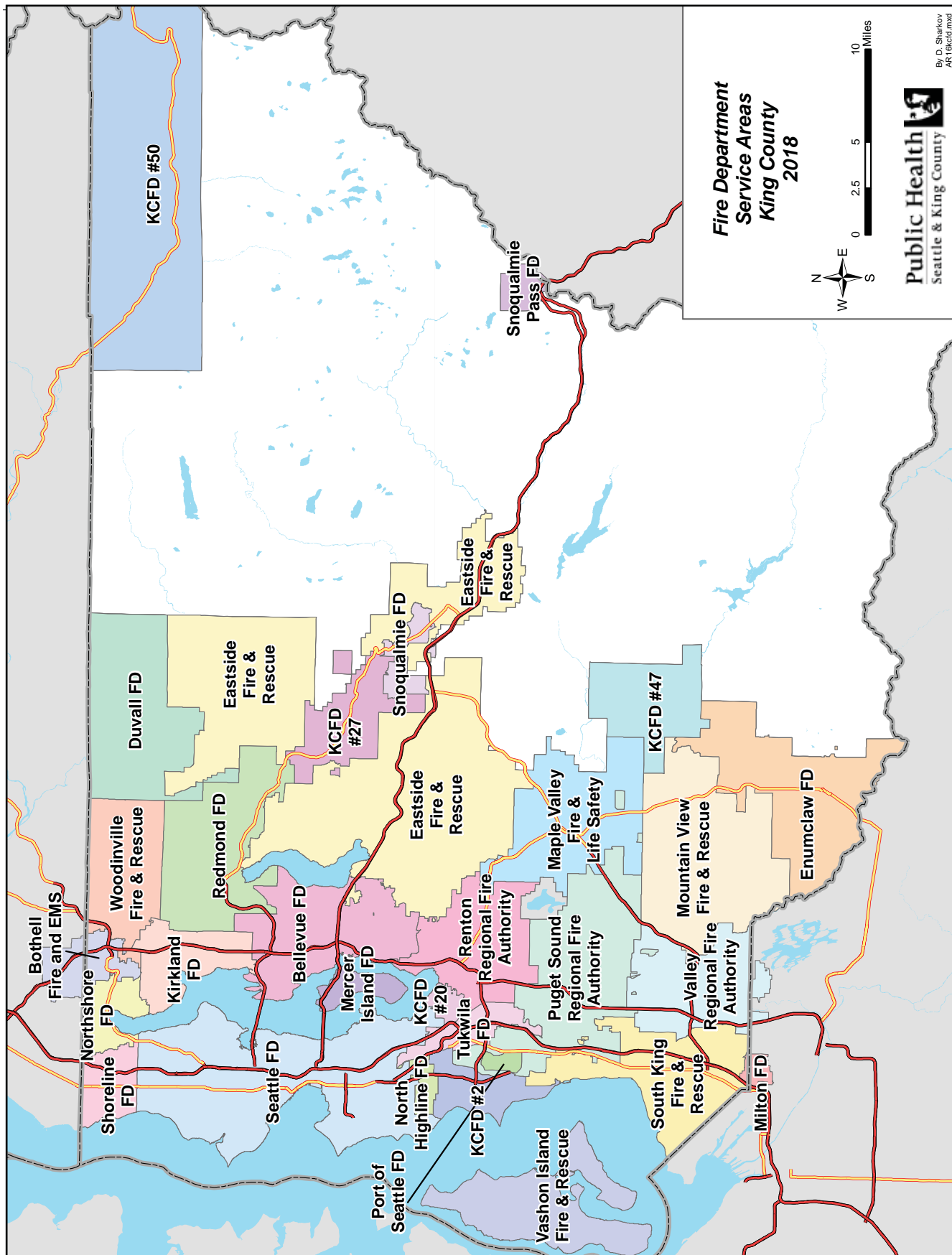
Appendix A: Regional Maps

ALS Provider Areas



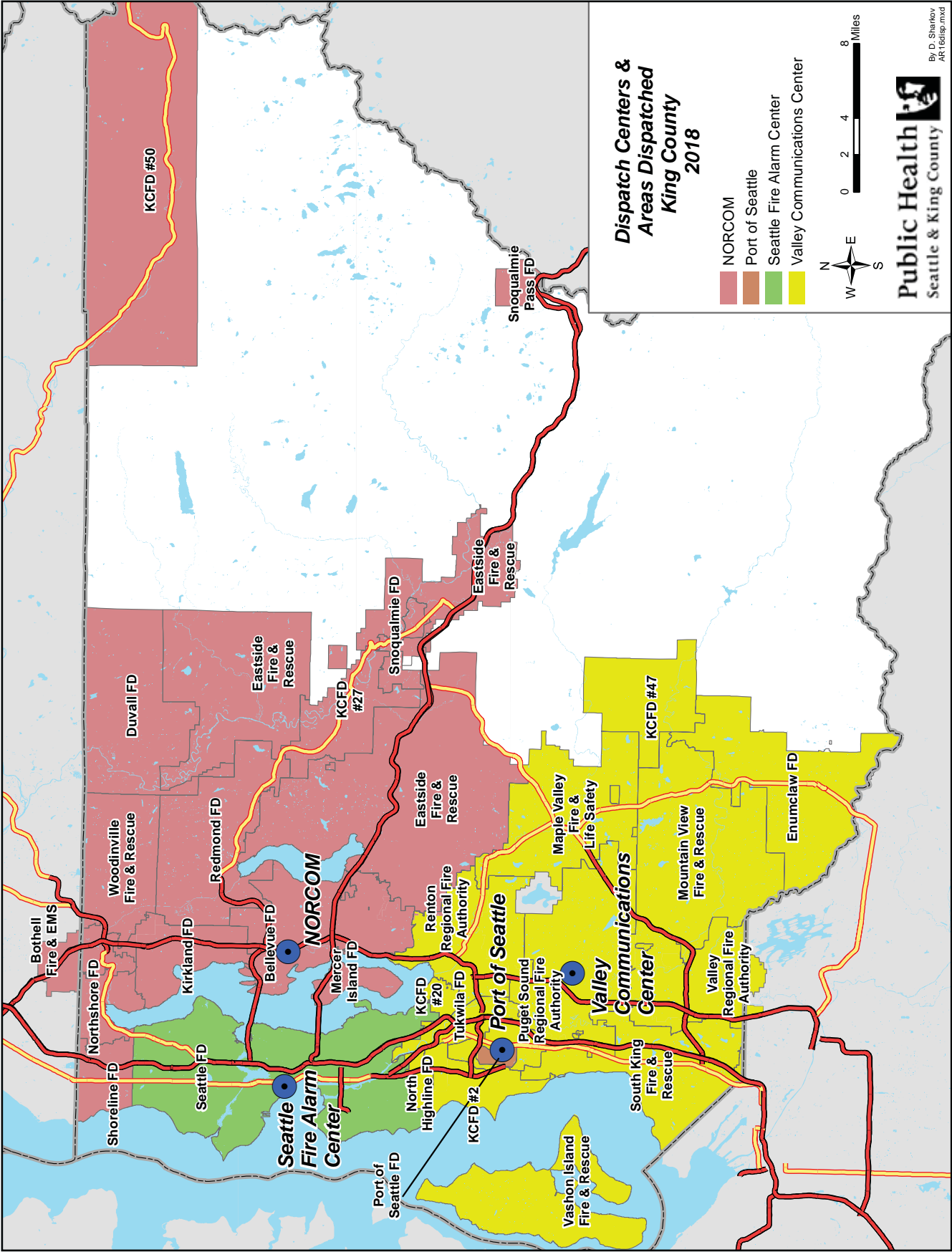
Appendix A: Regional Maps

BLS Provider Areas



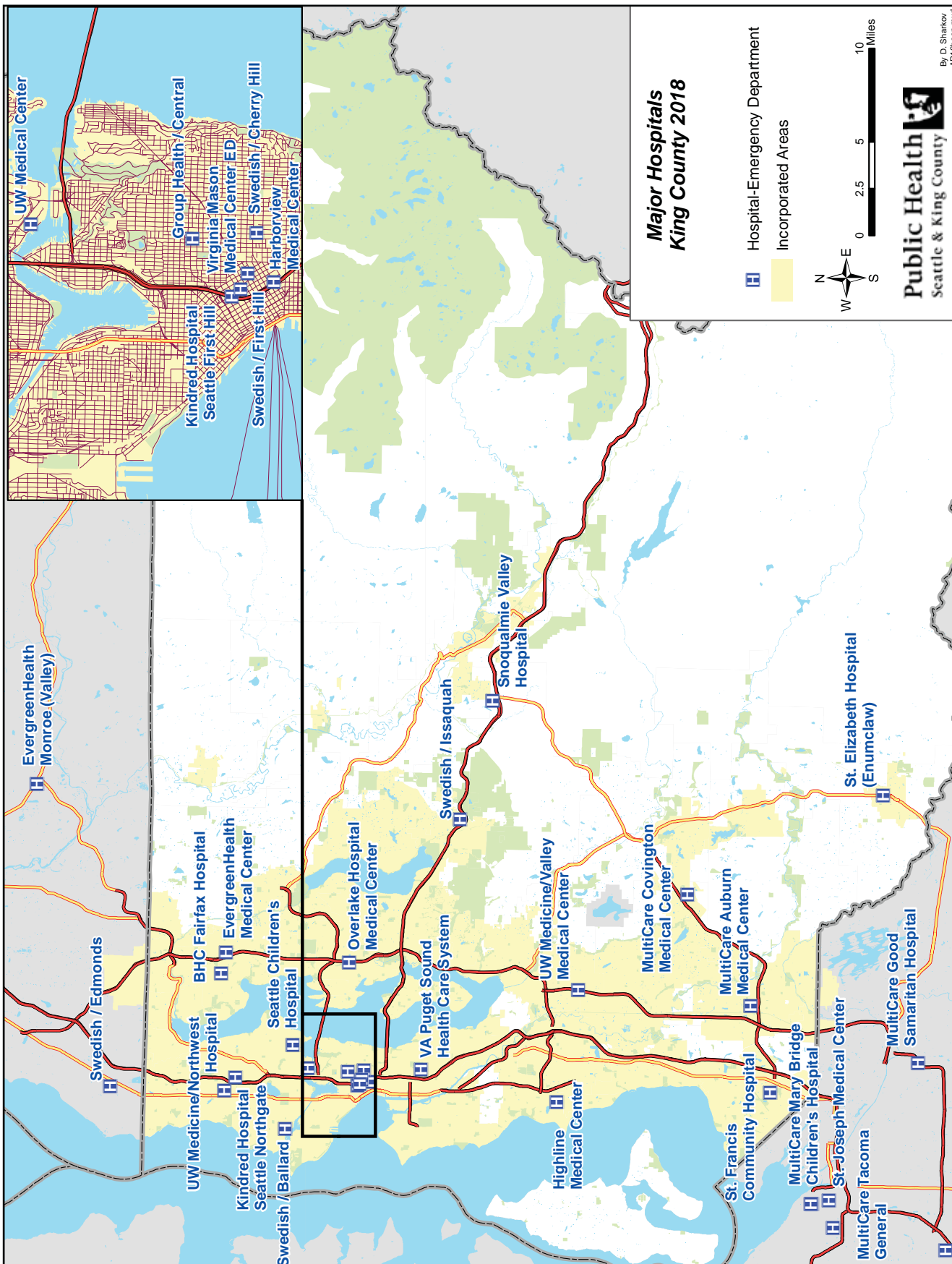
Appendix A: Regional Maps

Dispatch Center Service Areas



Appendix A: Regional Maps

EMS Hospitals



Appendix B: EMS Advisory Committee (EMSAC)

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)	Deputy Chief, Valley Regional Fire Authority
Dr. Tom Rea	King County Medical Program Director	Medical Program Director, King County
Dr. Peter Kudenchuk	Chair, Medical Directors' Committee	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	Paramedic, KCM1
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's Regional Quality Improvement (QI) Section collaborates with our Medical Program Directors, EMS providers, and University of Washington faculty and guest researchers to conduct research and analyses. In the past year, King County EMS disseminated research findings to wider national and international audiences through the following publications in peer-reviewed scientific and trade journals:

1. Badolamenti S, Fida R, Biagioli V, Caruso R, Zaghini F, Sili A, Rea T. Modified Moral Distress Scale (MDS-11): Validation Study Among Italian Nurses. *Prof Inferm*. 2017 Oct-Dec;70(4):238-248.
2. 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.
3. Blewer AL, Ibrahim SA, Leary M, Dutwin D, McNally B, Anderson ML, Morrison LJ, Aufderheide TP, Daya M, Idris AH, Callaway CW, Kudenchuk PJ, Vilke GM, Abella BS. Cardiopulmonary Resuscitation Training Disparities in the United States. *J Am Heart Assoc*. 2017 May 17;6(5). pii: e006124.
4. Cheskes S, Schmicker RH, Rea T, Morrison LJ, Grunau B, Drennan IR, Leroux B, Vaillancourt C, Schmidt TA, Koller AC, Kudenchuk P, Aufderheide TP, Herren H, Flickinger KH, Charleston M, Straight R, Christenson J; ROC investigators.. The association between AHA CPR quality guideline compliance and clinical outcomes from out-of-hospital cardiac arrest. *Resuscitation*. 2017 Jul;116:39-45.
5. 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.
6. DeRuyter NP, Husain S, Yin L, Olsufka M, McCoy AM, Maynard C, Cobb LA, Rea TD, Sayre MR. The impact of first responder turnout and curb-to-care intervals on survival from out-of-hospital cardiac arrest. *Resuscitation*. 2017 Apr;113:51-55.
7. Dumas F, Blackwood J, White L, Fahrenbruch C, Jouven X, Cariou A, Rea T. The relationship between chronic health conditions and outcome following out-of-hospital ventricular fibrillation cardiac arrest. *Resuscitation*. 2017 Nov;120:71-76.
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9. Feinstein BA, Stubbs BA, Rea T, Kudenchuk PJ. Authors' reply. *Resuscitation*. 2018 Jun;127:e2.
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11. Feinstein BA, Stubbs BA, Rea T, Kudenchuk PJ. Intraosseous compared to intravenous drug resuscitation in out-of-hospital cardiac arrest. *Resuscitation*. 2017 Aug;117:91-96.
12. Friedman DJ, Al-Khatib SM, Zeitler EP, Han J, Bardy GH, Poole JE, Bigger JT, Buxton AE, Moss AJ, Lee KL, Steinman R, Dorian P, Cappato R, Kadish AH, Kudenchuk PJ, Mark DB, Inoue LYT, Sanders GD. New York Heart Association class and the survival benefit from primary prevention implantable cardioverter defibrillators: A pooled analysis of 4 randomized controlled trials. *Am Heart J*. 2017 Sep;191:21-29.

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13. Gargiulo G, Sansone V, Rea T, Artioli G, Botti S, Continisio GI, Ferri P, Masi D, Risitano AM, Simeone S, La Sala R. Narrative Based Medicine as a tool for needs assessment of patients undergoing hematopoietic stem cell transplantation. *Acta Biomed.* 2017 Mar 14;88(15):18-24
 14. Fleischman RJ, Mann NC, Dai M, Holmes JF, Wang NE, Haukoos J, Hsia RY, Rea T, Newgard CD. Validating the Use of ICD-9 Code Mapping to Generate Injury Severity Scores. *J Trauma Nurs.* 2017 Jan/Feb;24(1):4-14.
 15. Geri G, Fahrenbruch C, Meischke H, Painter I, White L, Rea TD, Weaver MR. Effects of bystander CPR following out-of-hospital cardiac arrest on hospital costs and long-term survival. *Resuscitation.* 2017 Jun;115:129-134.
 16. Hansen M, Schmicker RH, Newgard CD, Grunau B, Scheuermeyer F, Cheskes S, Vithalani V, Alnaji F, Rea T, Idris AH, Herren H, Hutchison J, Austin M, Egan D, Daya M; Resuscitation Outcomes Consortium Investigators.. Time to Epinephrine Administration and Survival From Nonshockable Out-of-Hospital Cardiac Arrest Among Children and Adults. *Circulation.* 2018 May 8;137(19):2032-2040.
 17. Harris AW, Kudenchuk PJ. Cardiopulmonary resuscitation: the science behind the hands. *Heart.* 2018 Jul;104(13):1056-1061.
 18. Jollis JG, Al-Khalidi HR, Roettig ML, Berger PB, Corbett CC, Doerfler SM, Fordyce CB, Henry TD, Hollowell L, Magdon-Ismail 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.
 19. 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.
 20. Kudenchuk PJ, Leroux BG, Daya M, Rea T, Vaillancourt C, Morrison LJ, Callaway CW, Christenson J, Ornato JP, Dunford JV, Wittwer L, Weisfeldt ML, Aufderheide TP, Vilke GM, Idris AH, Stiell IG, Colella MR, Kaye T, Egan D, Desvigne-Nickens P, Gray P, Gray R, Straight R, Dorian P; Resuscitation Outcomes Consortium Investigators.. Antiarrhythmic Drugs for Nonshockable-Turned-Shockable Out-of-Hospital Cardiac Arrest: The ALPS Study (Amiodarone, Lidocaine, or Placebo). *Circulation.* 2017 Nov 28;136(22):2119-2131.
 21. Kudenchuk PJ. No, No, GO! A call to arms (and hands) for cardiac arrest. *Heart Rhythm.* 2017 Nov;14(11):1735-1736.
 22. 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.
 23. Mehta P, Horton DK, Kasarskis EJ, Tessaro E, Eisenberg MS, Laird S, Iskander J. CDC Grand Rounds: National Amyotrophic Lateral Sclerosis (ALS) Registry Impact, Challenges, and Future Directions. *MMWR Morb Mortal Wkly Rep.* 2017 Dec 22;66(50):1379-1382.
 24. Myat A, Song KJ, Rea T. Out-of-hospital cardiac arrest: current concepts. *Lancet.* 2018 Mar 10;391(10124):970-979.
 25. Newgard CD, Fu R, Lerner EB, Daya M, Wright D, Jui J, Mann NC, Bulger E, Hedges J, Wittwer L, Lehrfeld D, Rea T. Deaths and high-risk trauma patients missed by standard trauma data sources. *J Trauma Acute Care Surg.* 2017 Sep;83(3):427-437.

Appendix C: Publications

26. 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 Mar 1:1-12.
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Appendix D: EMS Performance Measures

RESOURCE CATEGORY	PERFORMANCE MEASURE	DEFINITION	2017 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	70%
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	97%
	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	73%
	Rate that "on scene time" standards are met	% of suspected CVA and suspected TIA patients with < 15-minute BLS scene time	54%
	Rate of taxi transported patients	% of taxi transports of all BLS transports	% not available (474 vouchers issued in 2017)
	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%
	Rate of successful first attempt intubations	% of successful first attempt intubations	77.2%
REGIONAL	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	73.3%
	Rate of ALS requests from scene	% of BLS request for ALS from scene of all ALS calls	16.2%
	# of paramedic hours above planned 2 paramedic staff per unit	# of paramedic hours above planned two (2) paramedic unit staffing	291 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

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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

