Hamilton

HAMILTON PARAMEDIC SERVICE MASTER PLAN 2022 2031

October 2021

CONTENT

MESSAGE FROM THE CHIEF 4

EXECUTIVE SUMMARY 5

1.0 INTRODUCTION 8

1.1 City of Hamilton Strategic Plan (2016-2025) 10
1.2 Current Climate 12
1.3 Purpose, Vision, Priorities, Scope 14
1.4 Methodology 16
1.5 Master Plan Outline 18

2.0 CITY OF HAMILTON PROFILE 20

2.1 Geography 21
2.2 Population 21
2.3 Social Determinants of Health 23
2.4 Growth and Development 32
2.5 Transportation Network 33
2.6 Educational Institutions 34
2.7 Arts and Culture 34
2.8 Economy 35

3.0 HAMILTON PARAMEDIC SERVICE PROFILE 36

3.1 Historical Context 37
3.2 Overview of HPS 37
3.3 HPS User Profile 52
3.4 Service Demands 53

4.0 SYSTEM DRIVERS 58

4.1 Current Demand 59
4.2 Projected Demand 66

5.0 SYSTEM OPTIMIZATION 72

5.1 Dispatch 72
5.2 Deployment 75
5.3 Off-load Delay Mitigation Initiatives 87
5.4 Mobile Integrated Health 96
5.5 Clinical Practice 105
5.6 Specialized Services 112
5.7 Contingency Response Planning 123
5.8 Logistics and Planning 126
5.9 Information Technology and Data Management 135
5.10 Reliability Management System 145

6.0 FACILITIES 148

7.0 PEOPLE PLANNING 158

8.0 OBJECTIVES AND ACTIONS 166

9.0 FINANCIAL PROJECTION 172

10.0 APPENDICES 176

Appendix A: Survey Results 176
Appendix B: Hamilton Paramedic Service User Profile 196
Appendix C: Service Demand 207
Appendix D: Addendum - 2021 Service Metrics 230

MESSAGE FROM THE CHIEF

The Hamilton Paramedic Service (HPS) is proud to serve Hamilton's residents and those who come to our city to work and visit. The people of HPS are dedicated to the profession and to ensuring that Hamilton is a healthy and safe community.

To assist us in our endeavour to continue to provide timely, effective quality care in an ever-changing environment that meets the complex and diverse needs of all the people we serve, we need to set a course that is transformative.

This Master Plan lays the groundwork to transform Hamilton's land ambulance service over the next ten years. Through technology advancements, innovation and optimizing resources and processes, this Master Plan seeks to alter the way HPS delivers service to better meet the needs of the community, now and into the future.

The Hamilton Paramedic Service Master Plan (2022-2031) analyzes the current state of service delivery in Hamilton including response data and the unique characteristics of the city's profile that impact land ambulance services. This Master Plan also forecasts the future state of service delivery based on predicted increases in demand on services and the growing and changing needs of the community. Barriers to the delivery of services currently experienced by HPS and challenges expected in the coming years are reported. In addition, ways to optimize and transform systems to enhance service delivery and improve patient outcomes are discussed. The Master Plan serves as a map with which to navigate challenges and capitalize on opportunities we face currently as well as in the years ahead.

The community and city leaders trust and depend on HPS. We do not take that for granted and sincerely appreciate their ongoing support. This Master Plan will help us continue to provide the quality of care and level of service the community has come to expect and deserves. It is a plan that puts the needs of people in Hamilton at the forefront. Despite the changes and challenges we face we will persist in doing what is right for the health and well-being of those in our community. We are fortunate to be in a city with some of the best health care and social services in the province and we will continue to work with our community partners to enhance an integrated system of support. This Master Plan will ensure we do that in an efficient, fiscally responsible manner.

Michael Sanderson, Chief
Hamilton Paramedic Service

EXECUTIVE SUMMARY

This Master Plan provides direction for the Hamilton Paramedic Service (HPS) for the next ten years. It is a Plan that is transformational. Through technology advancements, innovation, resource allocation and optimization of operations, this Plan lays the groundwork for transforming how HPS conducts its business. The type of work HPS performs and how the work is carried out must evolve to meet the growing and diverse needs of the community. This Plan sets the course for more integrated services delivered by paramedics equipped with progressive technology and expanded skills to ensure the best outcomes for all people who depend on HPS for their health and well-being.

The HPS Master Plan is built on five overarching priorities:

- Operational Integration
- Infrastructure Progression
- Service Delivery Optimization
- Positive Work Culture Elevation
- Healthy and Safe Communities Protection and Promotion

A series of objectives are identified for each priority. These objectives are categorized as follows:

- Increase response resources
- Modernize dispatch
- Centralize logistics for City of Hamilton health care divisions
- Integrate patient records
- Enhance logistics and planning functioning
- Review and develop facilities
- Advance IT
- Enhance deployment
- Reduce offload delays
- Increase cultural competency
- Increase use of virtual platforms in patient care
- Advance a just and safe culture
- Develop a people-focused plan for personnel
- Expand, centralize, and sustain Mobile Integrated Health (MIH)
- Broaden the scope of clinical practice
- Add specialized services
- Plan for contingency response
- Reduce carbon footprint

HPS Master Plan Priorities and Categories of Objectives

HAMILTON PARAMEDIC SERVICE MASTER PLAN 2022 2031

Operational Integration	Infrastructure Progression	Service Delivery Optimization	Positive Work Culture Elevation	Healthy & Safe Communities Protection and Promotion
Modernized Dispatch	Adequate Response Resources	Enhanced Deployment	Just and Safe Culture	Expanded, Centralized and Sustained MIH
Centralized Logistics	Enhanced Logistics	Reduced Offload Delays	People-Focused Culture	Broadened Scope of Practice
Integrated Patient Records	Sufficient Facilities	Increased Cultural Compentency		Specialized Services
	Advanced IT	Increased Virtual Care		Contingency Response Preparedness
				Reduced Carbon Footprint

This Master Plan will transform HPS to ensure it is well-prepared to meet evolving community needs in increasingly complex times, but also to be a leader in delivering innovative, patient-centred quality care. It will provide the HPS workforce with a positive workplace culture and the tools required for optimal performance. HPS knows that paramedics who are cared for are better able to care for patients. This Master Plan will also focus on serving the community in an inclusive, environmentally conscious, and fiscally responsible manner.

THE HAMILTON PARAMEDIC SERVICE 10-YEAR MASTER PLAN LAYS THE GROUNDWORK FOR TRANSFORMATIONAL CHANGE.

THROUGH TECHNOLOGY ADVANCEMENTS, INNOVATION, RESOURCE ALLOCATION AND OPTIMIZATION OF OPERATIONS, THIS MASTER PLAN ADDRESSES THE GROWING AND DIVERSE NEEDS OF HAMILTON'S COMMUNITIES NOW AND INTO THE FUTURE.

1.0

INTRODUCTION

The Hamilton Paramedic Service (HPS) is the designated sole provider of paramedic services for the City of Hamilton since 2000, following the downloading of this responsibility from the provincial government to local municipalities.

HPS provides emergency response pre-hospital advanced medical and trauma care, in addition to transporting patients to appropriate health care facilities. HPS also undertakes demand mitigation activities including community paramedic activities, public education, health care and safety promotion and risk prevention activities in neighbourhoods and public facilities including provision and maintenance of public access defibrillators across the city. As well, with community partners, HPS responds to health care crises in the community such as the opioid crisis and the COVID-19 pandemic.

As mandated by the *Ambulance Act*, R.S.O. 1990, c. A.19, and overseen by the Ministry of Health (MOH), the City of Hamilton is responsible for "ensuring the proper provision of land ambulance services in the municipality in accordance with the needs of persons in the municipality." Specifically, the municipality is responsible to:

a) select persons to provide land ambulance services in the municipality in accordance with the Act;

b) enter into such agreements as are necessary to ensure the proper management, operation and use of land ambulance services by operators; and

c) ensure the supply of vehicles, equipment, services, information, and any other thing necessary for the proper provision of land ambulance services in the municipality in accordance with this Act and the regulations.

The *Ambulance Act* directs municipalities to select persons to operate the land ambulance services via a request for proposals issued by the municipality to provide land ambulance services directly.

The City of Hamilton has assumed direct delivery of land ambulance services for the city since January 1, 2000. Because this responsibility was downloaded, the provincial government provides 50% funding to the City of Hamilton for paramedic services, while the remaining 50% comes from the local tax levy.

In the 2017 Capital Budget Report, Hamilton's City Council approved the development of a plan to guide the delivery of paramedic services over the next ten years.

1.1 City of Hamilton Strategic Plan (2016-2025)

HPS is driven by the City of Hamilton's Strategic Plan aimed at achieving the City's Vision "to be the best place to raise a child and age successfully." Specifically, HPS supports the following priorities within the City's Strategic Plan:

PRIORITY: Community Engagement and Participation

To enhance the wellness of the community, HPS has initiated a variety of engagement opportunities including fundraising events such as toy drives, food drives, clothing drives and supporting local businesses in raising funds for their charities; awareness-raising campaigns for health issues including autism, cystic fibrosis, breast and prostate cancers and mental health; educational events consisting of school visits, participating in parades, fairs and festivals as well as being active on social medial. Furthermore, HPS continually seeks feedback about services provided through a range of satisfaction surveys available to patients and residents.

PRIORITY: Economic Prosperity and Growth

HPS contributes to a prosperous local economy as paramedic services are a key component of the health care system enhancing quality of care including emergency medical care and in-home care through community paramedicine. A community that has access to robust health care services has a population that is healthier and more economically productive. Moreover, quality health care attracts and retains people, their skills, entrepreneurship and earning potential to contribute to the economic growth of the city. In addition to ensuring quality of care is provided to all residents who require paramedics services, the Master Plan seeks to develop a proactive approach to generating revenue through contractual services such as supporting the film and sports industries.

PRIORITY: Culture and Diversity

HPS values equity, diversity, and inclusivity as critical for enriching experiences, enhancing innovation, and promoting quality of life. Through various outreach and home-based programs HPS works to ensure vulnerable residents receive the same quality of care provided to all populations in the city. HPS staff has undergone mandatory training to better understand and value the diversity that makes up the community and the workforce. Furthermore, HPS recruitment activities have sought to increase diversity within the service as HPS strives to establish a workforce that reflects the community it serves. This Master Plan sets out transformational objectives to achieve this goal such as building relationships with diverse communities to expand recruitment activities and developing a college paramedic recruitment program to support students of diverse backgrounds in securing employment with HPS.

PRIORITY: Healthy and Safe Communities

In addition to providing on-scene emergency medical response, HPS provides a variety of home-based programs that provide clinical support to vulnerable populations and help improve their quality of life while avoiding hospital visits. Mobile Integrated Health (MIH) provides programs and services such as free clinics in buildings where seniors reside, monitoring client's health in their homes through remote technology, conducting home visits and offering at-home care for those awaiting placement in long-term care homes. MIH also provides and maintains Automated External Defibrillators (AEDs) for residents to access in public facilities throughout the city. The need to strengthen these essential programs over the coming years is discussed in this Master Plan.

PRIORITY: Clean and Green

HPS supports the urgent need to reduce greenhouse gas emissions to help reverse the negative impact of climate change on the environment. All new ambulances have anti-idling technology which automatically turns the engine off and on which reduces carbon emissions, saves fuel, and extends the life of the vehicle's charging system components. HPS has also recently added hybrid ambulances to its fleet. These are designed to reduce carbon emissions and save fuel. This Master Plan will propose the development of a comprehensive plan to further reduce the carbon footprint of HPS.

PRIORITY: Our People and Performance

Paramedics in Ontario are governed by the regulations and standards issued pursuant to the *Ambulance Act*. Hamilton's paramedics are certified annually by a physician to conduct delegated controlled medical acts as per the *College of Physicians and Surgeons of Ontario*. All of these requirements are supported by HPS's comprehensive continuing medical education and rigorous quality assurance and improvement program that seeks to strengthen performance to ensure high quality services are delivered to Hamilton's residents. HPS realizes that a service is only as good as the people who deliver the service. To that end, HPS will continue to focus on and enhance access to the tools and information staff require to do their jobs effectively. Furthermore, paramedics require additional supports to ensure their health and well-being so they can continue to deliver quality care despite the pressures of their jobs. This Master Plan will outline a 'people plan' to ensure staff can successfully and safely carry out their roles in a positive and supportive work environment.

The City's Strategic Plan also defines the corporate culture which reflects the City's values and the how employees interact with each other and the people they serve. The culture revolves around five pillars:

The development of the HPS Master Plan is guided by the priorities and values of the City's Strategic Plan.

1.2 Current Climate

A number of compelling events have occurred during the time this Master Plan was in development. These realities were taken into consideration and helped to inform many of the transformational objectives set out in this Plan.

Provincial Health Care Changes

As this Master Plan was being developed, the Ontario government presented their 2019 budget, *Protecting What Matters Most Act*. The budget includes modernizing the health care system to create a seamless, patient-centred system. The budget declares the need for urgent action to ensure the system of health care is sustainable and accessible to all patients and their families. A component of this modernization is the potential for restructuring of land ambulance service. The budget describes the intention to consolidate services across the province and better integrate them with provincial dispatch centres:

> The government will streamline the way land ambulance dispatch services are delivered by better integrating Ontario's 59 emergency health services operators and 22 dispatch centres. The government will continue to support first responders by providing the right tools to ensure the right responders get to the right place with the right information at the right time, and by integrating emergency health services into Ontario's health care system.[1]

Similarly, the budget proposed merging 35 public health units to 10. Consequently, the MOH introduced the *Connecting Care Act*, 2019 which authorizes the MOH to create Ontario Health. Ontario Health has a broad mandate to integrate the health system. Ontario Health Teams (OHT) are being established at the local level to promote more integrated services for patients.[2] In November 2019, Hamilton established one of the first Health Teams in Ontario. The intention is that all publicly funded health service providers will be a part of these teams and operate within a single accountability agreement with the MOH. At the time of writing this Plan, details about the changes to ambulances services have not been released and therefore the impact to HPS specifically is not known. For this reason, the objectives in this Master Plan do not address any potential changes that may occur to the structure of the ambulance service in Ontario in the future. The HPS Master Plan objectives for service delivery over the next decade are based on local needs and the need to strive for better service integration. The Hamilton Paramedic Chief's participation on the Greater Hamilton Health Network ensures that the strengths and challenges of HPS will inform the restructuring of Ontario's health care system.

1 2019 Ontario Budget, *Protecting What Matters Most Act*
2 *Ontario Health Teams: Guidance for Healthcare Providers and Organizations*, April 2019

Global Health Crisis

In March 2020, Hamilton identified its first case of the COVID-19 virus, midway through the development of this Master Plan. HPS had to promptly respond to this constantly evolving public health crisis which resulted in many operational changes. From implementing a program to manage critical supply of inventory and equipment, securing a system to monitor and distribute personal protective equipment, instituting decontamination processes for all vehicles and equipment, ensuring vehicles were fully staffed when paramedics were quarantined, training paramedics to assist with COVID-19 testing, vaccinations and vaccine aftercare, establishing an infectious disease paramedic team, participating in a COVID-19 simulation event with hospital partners, conducting mass evacuations of congregate settings experiencing COVID-19 outbreaks, assisting with inter-regional hospital transfers for COVID-19 patients, as well as ensuring the safety and well-being of frontline paramedics to adjusting to working remotely with most of the HPS support staff. Focus on overcoming the challenges brought about by the pandemic disrupted some of the everyday business including the completion of this Plan. However, it also highlighted opportunities for change and innovative ways to improve the delivery of paramedic services which have been incorporated into this plan.

Social Justice Movements

In addition to the global pandemic, much of the world also experienced a swell in activism over racism and social injustices. Hamilton, along with other major cities around the world, dealt with incidents of hate and injustice, protests, demonstrations and calls for leaders to make changes that would ensure equity and justice for those who are marginalized. Most recently, the discovery of unmarked graves of residential school children has again brought to light the need to respect and celebrate the cultures, experiences, and contributions of diverse populations. The City of Hamilton has recently formed an Equity Diversity and Inclusion Steering (EDI) Committee whose mandate it is to develop a roadmap for advancing EDI within the organization and when serving the community. This Master Plan recommends that the roadmap is adopted by HPS to strengthen EDI within the service. In addition, HPS will establish a plan for building relationships with diverse communities to understand how they can be served in more culturally appropriate ways.

1.3 Purpose, Vision, Priorities, Scope

PURPOSE

The purpose of this Master Plan is to provide guidance with respect to the delivery of paramedic services in Hamilton over the next ten years. This 10-year plan, the first of its kind for HPS, considers the diverse and dynamic needs of people in Hamilton and sets objectives that will equip HPS with the tools necessary to successfully meet those needs now and into the future.

VISION

The vision for the Master Plan is to establish the groundwork to achieve a service that is transformative. Through technology advancements, innovative thinking, resource allocation and the optimization of operations, this Master Plan seeks to alter the way HPS delivers services that better serves a complex and ever-changing community.

PRIORITIES

The HPS Master Plan is built on five priorities that led to a number a of objectives to action. The priorities are as follows:

Operational Integration – A system of health care services that is well-coordinated and integrated enhances access to services, provides seamless comprehensive patient care and reduces duplication of services and costs. HPS is committed to operating in a more integrated fashion both within the organization and the health care system.

Infrastructure Progression – To achieve optimal performance, sufficient infrastructure needs to be in place. This includes adequate facilities, availability of resources and advanced information technology systems to ensure HPS operates effectively and efficiently.

Service Delivery Optimization – By enhancing current activities HPS can maximize how services are delivered. By ensuring resources are available to respond when needed and paramedics are equipped to serve diverse needs HPS can improve service in a cost-effective manner.

Positive Work Culture Elevation – A workplace that is safe, just and engages employees increases morality, performance, and retention. HPS is committed to strengthening the workplace culture by developing its people and keeping them healthy and satisfied in an inclusive environment.

Healthy and Safe Communities Protection and Promotion – Having equal access to services and supports required to be healthy and well in a community in which people feel safe from harm is the focus of HPS operations. HPS is dedicated to enhancing efforts to promote and protect the health of the community through proactive and responsive activities.

SCOPE

The HPS Master Plan sets out to describe the current level of service delivery, through a review of resources including facilities, vehicles and staffing as well as an analysis of operational data including response times, call volume, events, and deployment model. An overview of Hamilton's demography, population growth and social determinants of health is also provided for a fulsome understanding of the current state in which paramedic services are delivered. Where appropriate, comparisons will be made to the performance data from similar services in the province.

Furthermore, the forecasted state of service delivery is also described through an analysis of systemic trends, trends relating to population growth and demographics, as well as predicted call volume.

Challenges related to operating paramedic services in Hamilton are also described with corresponding objectives. Objectives focus on making transformational changes in the way HPS conducts business and optimizing service delivery through developing people, technology advancements and resource alignment. Implementing these objectives will not only ensure HPS is prepared to deliver optimal service in a complex and evolving environment over the next ten years but also that HPS is a leader of innovation among land ambulance services.

1.4 Methodology

The process to develop the HPS Master Plan included the collection, analysis, and review of various key components:

- Provincial Documentation – A number of reports and legislative requirements from the province must be considered in delivery ambulance services in Ontario:
  - *Patients First: Action Plan for Healthcare*
  - *Ambulance Act* R.S.O. 1990, c. A.19
  - *2019 Ontario Budget, Protecting What Matters Most Act*
  - *Coroner's Act*, R.S.O. 1990, c. C.37
  - *Mental Health Act*, R.S.O. 1990, c. M.7
  - *Healthcare Consent Act*, 1996
  - *Controlled Drugs and Substance Act*, S.C. 1996, c. 19
  - *Personal Health Information Protection Act*, 2004
  - *Municipal Freedom of Information and Protection of Privacy Act*, R.S.O. 1990
  - *Employment Standards Act*, 2000
  - *Occupational Health and Safety Act*, R.S.O. 1990
  - *Criminal Code*, R.S.C., 1985, c. C-46
  - *Child, Youth and Family Services Act*, 2017
  - *Highway Traffic Act*, R.S.O. 1990, c. H.8
- Strategic Alignment – City of Hamilton Strategic Plan 2016-2025

- Surveys – Various surveys were conducted by the City of Hamilton and the HPS that have informed the development of this Master Plan:
  - *Our City Survey (2019)* – level of resident satisfaction with City of Hamilton services
  - *Our People Survey (2017)* – level of engagement of City of Hamilton employees
  - *HPS Citizen Survey (2018)* – residents' expectations and satisfaction levels regarding services delivered by the HPS
  - HPS Website – feedback from patients and patients' families
  - Mobile Integrated Health Client Surveys – clients' level of satisfaction with the @Clinic, @Home and Flu Clinic programs
- Consultations – Engagement of both internal and external partners was critical to the planning process, including:
  - Stakeholder Consultations – key partners provided their perspective of potential areas of focus for the HPS over the next decade
  - HPS Leadership Team – leaders provided their input and feedback into the future direction of HPS
  - HPS Employee Feedback – paramedics identified areas for improvement in the work environment
- Internal Review – an internal review of operations including facilities, vehicles and deployment and an analysis of data including current and historical call demand and performance data
- External Review – a review of similar-sized services was undertaken to be able to draw comparisons
- Predictive Analysis – a customized digital tool based on HPS response data provides a spatial forecast of call volumes and a prediction of response times in tune to the practices of the HPS

1.5 Master Plan Outline

The HPS Master Plan is a compilation of consultations results, survey responses, a comprehensive analysis of operational data and predictive data. Also taken into account are the characteristics of the city that influence the services delivered by HPS. Combined, this information forms a blueprint for service delivery over the coming decade.

Following the current Section 1.0 that introduces the Master Plan,

SECTION 2.0 profiles the City of Hamilton including its unique geography, demographics, the growing and aging population, and the health of its residents as related to the social determinants of health. The city's growth and development, and transportation network are also described.

SECTION 3.0 provides a detailed description of HPS, its organizational structure, workforce, scope of practice and other key elements that contribute to its operations. It includes performance metrics and a profile of those who utilize HPS services. This section also outlines the results of various surveys of residents' expectations of HPS and their level of satisfaction with programs and services. Results of consultations with key partners and feedback from Hamilton's paramedics are also summarized to provide a fulsome picture of HPS through varying perspectives.

SECTION 4.0 describes the system drivers, these are the leading factors that affect the performance of HPS including staffing, call volume, demand by time of day and days of the week, time on task and staffed vehicles. This section also forecasts the service demand over the course of this Master Plan. Challenges to performing optimally are described and solutions to overcome them are recommended.

SECTION 5.0 Ways to transform and optimize service delivery are presented in Section 5.0, such as reforming dispatch, enhancing deployment activities, mitigating off-load delay, expanding Mobile Integrated Health and creating a clinical hub, enhancing the clinical practice of paramedics, implementing specialty programs, preparing for disruptive events, modernizing logistics and centralizing some activities for the City of Hamilton, advancing technology to provide personnel with the tools they need to deliver quality services and achieving a safe and fair workplace culture.

SECTION 6.0 discusses HPS facilities and the current and long-term needs to accommodate a growing and evolving service.

SECTION 7.0 outlines a 'People Plan' to ensure a workforce that is healthy, engaged and has opportunities to develop in a positive, inclusive, and safe workplace environment that supports optimal performance.

SECTION 8.0 – 10.0 summarizes the objectives set out in the previous sections including a proposed timeline for implementation. Objectives are organized according to the five priority areas. Section 9.0 offers a summary of the projected financial impact of the objectives with known or anticipated costs presented in three alternative models. Finally, Section 10.0 contains the appendices: resident and employee survey results, the HPS User Profile complied by Public Health Services and HPS service demand statistics.

2.0

CITY OF HAMILTON PROFILE

2.1 Geography

Hamilton is a city with a land area of 1,117 square kilometres[3] divided into 15 Wards. It is the fifth largest municipality in Ontario and the tenth largest in Canada. Hamilton is a port city that wraps around the westernmost part of Lake Ontario. The city's northern limit is marked by the Hamilton Harbour. The Niagara Escarpment runs through the middle of the entire city dividing the cityscape into lower and upper portions. Hamilton's escarpment is characterized by its hiking and biking trails such as the Bruce Trail, forests, cliffs, over 150 waterfalls[4] and a variety of ecosystems.

Hamilton is at the centre of the Golden Horseshoe which is surrounded by the Greenbelt, permanently protected agricultural and natural areas. The Greenbelt, which includes the Niagara Escarpment, covers a large portion of the city's total land mass.[5]

Hamilton has a number of bodies of water both within and on its borders. These include Lake Ontario, Hamilton Harbour, Cootes Paradise and many small lakes, ponds, and creeks within conservation areas and throughout the city.

Recently, there has been an increase in the number of people exploring Hamilton's natural treasures. The bodies of water, waterfalls and wooded trails along the escarpment have attracted more people in recent years which has led to more mishaps, such as rope rescues at waterfalls and other incidents requiring emergency medical attention is required.

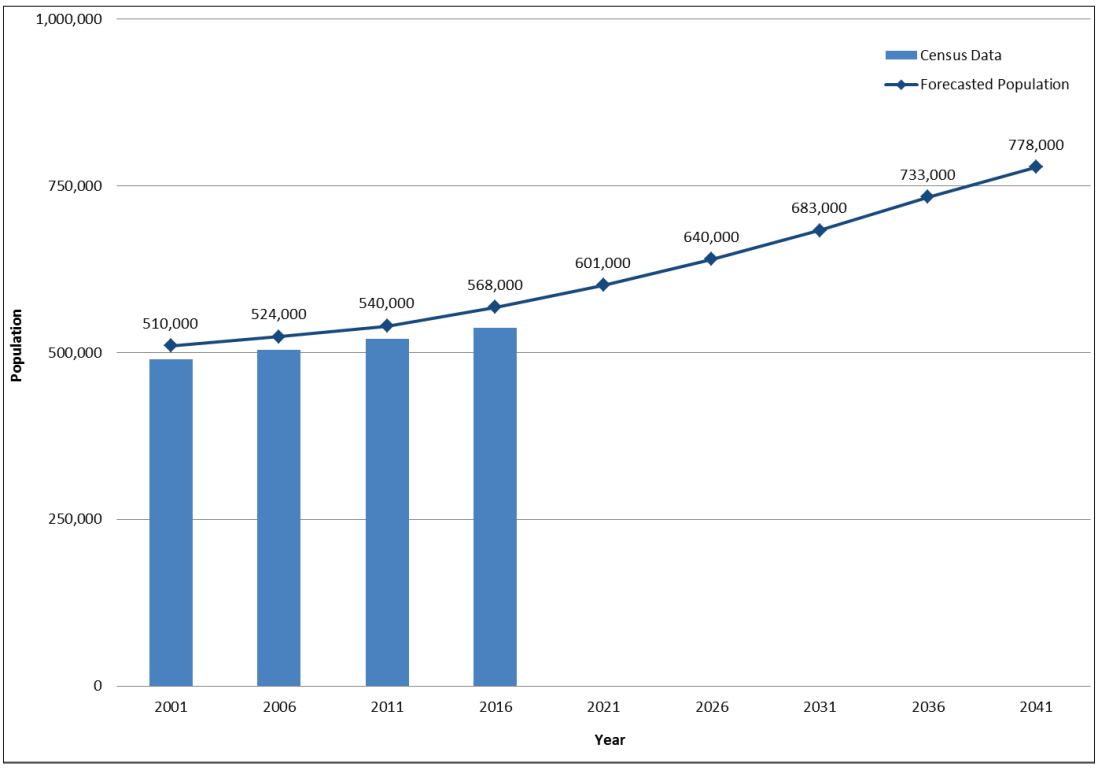
2.2 Population

HPS provides service to almost 537,000 residents living in the city of Hamilton with a population density is approximately 480.6 people per square kilometres. The median age of Hamilton's population in 2016 was 41.5 years. Hamilton's population is an aging one with just over 17% of residents, or about 93,000 people, aged 65 years or older.[6] Hamilton's senior population increased 23% from 2006, almost four times greater than Hamilton's overall growth. The number of seniors 85 years and older increased by 55% in 2016 from 2006. The highest number of seniors reside in Hamilton's east end below the escarpment (Ward 5). There are also higher than average numbers of seniors in the central mountain area (former Ward 7) and Dundas (Ward 13).[7]

3 Statistics Canada, Census 2016
4 Smithsonian.com *Just 50 Miles From Niagara Falls Lies the True Waterfall Capital of the World* by Jennifer Nalewicki (July 24, 2017)
5 City of Hamilton, Greenbelt Boundary Review Public Consultation Presentation 2015
https://d3fpllf1m7bbt3.cloudfront.net/sites/default/files/media/browser/2015-09-10%2008%3A56/greenbelt-boundary-pic-panels.pdf
6 https://projects.thespec.io/census/
7 https://www.hamiltoncommunityfoundation.ca/vital-signs/seniors-in-hamilton

Children aged 14 years and under account for approximately 16% of the city's population. For the first time in Hamilton, seniors outnumber children.[8]

City of Hamilton Population Forecast, 2021 to 2041



Sources: Statistics Canada, Census 2001, Census 2006, Census 2011 and Census 2016
Hemson Consulting Ltd (2012). Greater Golden Horseshow Growth Forecasts to 2041, Technical Report

Over the course of this ten-year plan, Hamilton's population is projected to increase to approximately 680,000 by 2031[9] with seniors being the fastest growing segment of the population.[10] By 2031, almost 22% of Hamilton's population will be 65 years old or older.[11]

Hamilton's population is forecasted to grow to approximately 780,000 by 2041.[12] This forecasted increase in the senior population will significantly increase the demand on services provided by HPS over the next ten years and beyond.

8 Statistics Canada, Census 2016
9 GRIDS2: Growth Summary 2006-2016
10 GRIDS May 2006
11 Hemson Consulting Ltd (2012). Greater Golden Horseshoe Growth Forecasts to 2041, Technical Report
12 https://www.hamiltoncommunityfoundation.ca/vital-signs/seniors-in-hamilton

2.3 Social Determinants of Health

In addition to considering the Hamilton's aging population, HPS must consider the social determinants of health of Hamilton's residents when planning for service delivery. These are the social and economic factors that impact the health and well-being of people either positively or negatively. They relate to a person's income, education, and employment as well as experiences of discrimination and the distribution of resources and power.

Understanding the social determinants of health and how they impact the residents of Hamilton can help HPS plan the delivery of services needed to support health equity and increase opportunities for better health for all members of the community.

Income and Social Status

Income and social status are key determinants of health. The higher on the income and social hierarchy means more resources for quality housing and food.

The average total household income in Hamilton in 2015 was just under $88,000. However, almost 81,000 residents were living with low income using the Low Income Measure after tax (LIM-AT) or just over 15% of the total population.[13] Hamilton's average is slightly higher than the provincial average of approximately 14%.[14] Furthermore, in 2015 almost 23% of children (up to 5 years old) in Hamilton lived in low income families (using the LIM-AT) higher than the provincial average of about 18%.[15]

The average price of a house in Hamilton has increased significantly in the last few years. In 2017, the average sale price was just over $500,0000[16] compared to 2021 with the average cost being closer to $800,000.[17] Hamilton has had some of the fastest rising home prices in Canada. Hamilton's cost of rent is also increasing at a fast pace. In 2018, the average market rent was just over $1,000 per month, up 23.9% from 2014. This increase is outpacing the inflation rate and the modest growth in household income.[18] The city-wide vacancy rate for the most affordable units was 2.1% in 2017.[19] As of December 31, 2020, there were 6,647 households on the Access-to-Housing Wait List for social housing in Hamilton, up from 6,231 in 2019.[20]

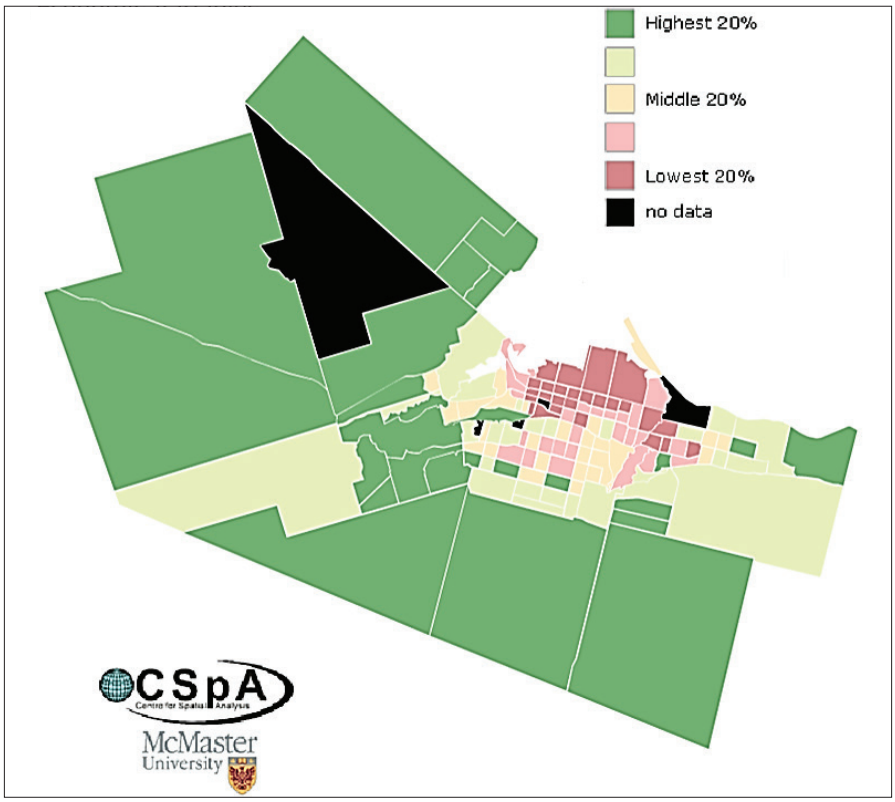
As a result of social, economic and health inequities which have escalated during the pandemic, there has been a rise in the establishment of encampments in Hamilton. Encampments are set up in unsheltered locations by those experiencing homelessness. This has increased calls for paramedics for medical response as well as outreach activities to assess and provide necessary supports for people living in encampments. In response, a paramedic has been added to the Social Navigator Program (SNP) team to work with encampment residents.

13 City of Hamilton, Hamilton Profile – Our Community
14 Statistics Canada, Census 2016
15 Ibid
16 https://www.hamiltoncommunityfoundation.ca/vital-signs/housing-2018
17 https://www.rahb.ca/rahb-market-area-saw-slight-decrease-in-sales-activity-and-average-price-in-may-compared-to-the-previous-month
18 Hamilton Profile – Our City https://www.arcgis.com/apps/MapSeries/index.html?appid=8d7d72677d844bdd8a7acb641e3acd8a
19 https://www.hamiltoncommunityfoundation.ca/vital-signs/housing-2018
20 City of Hamilton, Performance and Evaluation Specialist, email correspondence September 2, 2021

Food insecurity results from the inability to consistently access adequate food for a healthy diet due to financial constraints. In 2016, 14.8% of Hamiltonians, or over 76,000 people experienced some food insecurity.[21] In 2019, food banks in Hamilton were visited 233, 747 times.[22] The reliance on food banks has risen sharply during the COVID-19 pandemic while donations have decreased.

In a 2010 news article series entitled Code Red, the Hamilton Spectator explored the impacts social determinants of health have on people living in Hamilton. Specifically, the series highlighted how poverty has affected the health of the community. The gap in health outcomes between the affluent and the low-income neighbourhoods in the city was documented. For example, in impoverished neighbourhoods the rates of emergency room visits are higher, more people are without a family physician, there are more respiratory-related problems, more cardiovascular incidents, more psychiatric emergencies and higher rates of low birth weight babies as compared to the wealthier neighbourhoods. Most notably, the Code Red series showed a variation in average life expectancy of 21 years between the richest and poorest neighbourhoods in Hamilton.[23]

Overall Rankings Based on Cumulative Scores for 24 Health, Social and Economic Variables

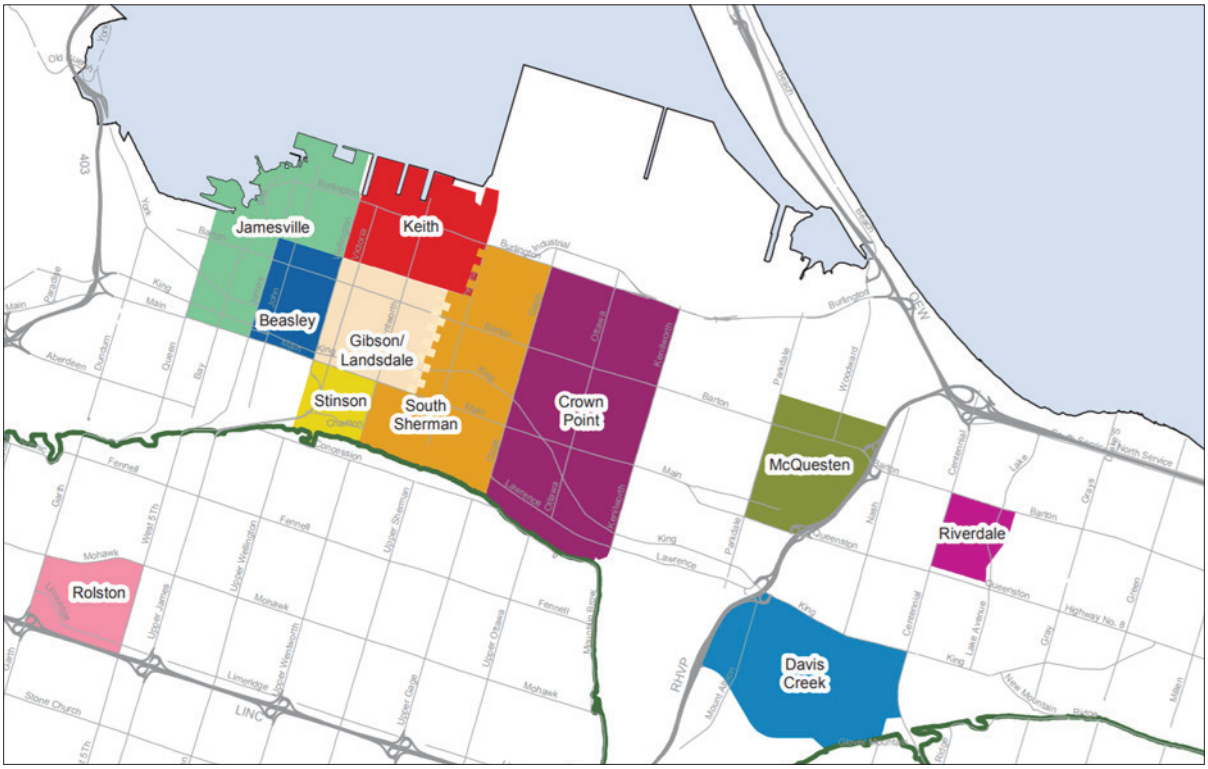


Source: http://media.metroland.com/thespec.com/statistics_flash

21 https://www.hamiltoncommunityfoundation.ca/vital-signs/low-income-2018
22 http://map.feedontario.ca
23 http://thespec-codered.com

In response to these findings, the City of Hamilton identified 11 neighbourhoods, mostly in the lower inner city, as priority neighbourhoods (see map below). The health and wealth disparities in these areas prompted the City to create a new Division dedicated to working with neighbourhood residents to address the inequities. In 2019, almost ten years later, the Spectator revisited the Code Red project only to find that the health outcomes in these neighbourhoods worsened. The only two areas with significant improvements were the rate of low birth weight and access to family physicians.[24]

Hamilton's Neighbourhood Action Strategy Boundaries



Source: Social Planning and Research Council of Hamilton (SPRC) 2013

HPS understands the challenges facing these neighbourhoods and is supporting residents through its recently expanded Community Paramedicine Program, now called Mobile Integrated Health (MIH). A variety of home-based health care programs and services are provided to vulnerable individuals. This enables people to received health care in their own residences to help them to live well and improve their quality of life. This also helps to reduce the pressures on the health care system by avoiding hospital visits.

24 https://projects.thespec.io/codered10

Employment and Working Conditions

Employment in safe conditions with minimal stress-related demands that provides a steady and sufficient income contributes to overall good health.

By the end of 2019, Hamilton had an unemployment rate of 4.3% lower than the provincial rate of 5.6%. Since 2017, Hamilton's labour market saw significant growth though not all employment during this growth period was stable. A study from McMaster University revealed that precarious work such as contractual or temporary positions and self-employment is a growing area of employment. In 2013, nearly 60% of Hamilton's millennials (born 1981 to 1997) had precarious employment which is shown to have an affect on people's mental health and their overall health.[25]

With the onset of the pandemic, Hamilton's economy has been negatively impacted. In 2020, the unemployment rate rose to 8.8% with over 38,000 people unemployed. However, Hamilton's diverse economy that includes health care, public administration, manufacturing, and construction has seen some growth during the pandemic. With the availability of the vaccine economists are predicting a strong economic rebound in late 2021.[26]

The labour force participation rate measures the number of people either employed or actively looking for employment. In 2016, Hamilton's overall participation rate was just over 63%.[27] However, the rate varies greatly among the city's neighbourhoods ranging from 45% to 75%.[28]

Excluding the impact of the pandemic, on average, 20,000 residents in Hamilton are unemployed at any given time. Based on an analysis of persons using employment services in Hamilton, the trends in unemployment include persons with disabilities, newcomers and visible minorities, people aged of 15 to 24 years old, people who have been unemployed for a long period of time and those with low levels of education.[29]

Education and Literacy

Education increases opportunities for employment, a stable income and job satisfaction, all of which contribute to good health. Education also increases the ability to understand and access information about achieving and maintaining health.

In 2016, 25% of Hamilton's population aged 25 to 64 years were university educated at the bachelor level or above. Over 27% had a college diploma or the equivalent and just over 26% had secondary school as their highest level of education. Just over 12% of Hamilton's adult population had not obtained a high school certificate[30] which was higher than the provincial average of around 10%.[31]

The top three major fields of study in 2016 were architecture, engineering, and related technologies (12.5%); business, management, and public administration (11.5%); and health and related fields (10.7%).[32]

25 McMaster University and United Way Toronto. 2015. *The Precarity Penalty*. https://www.economics.mcmaster.ca/pepso/documents/precarity-penalty.pdf
26 Workforce Planning Hamilton, Trends in Hamilton's Labour Market: Local Labour Market Plan Update 2020
27 City of Hamilton, Hamilton Profile – Our Community
28 https://www.hamiltoncommunityfoundation.ca/vital-signs/economy-2018
29 Workforce Planning Hamilton. *Trends in Hamilton's Labour Market: Local Labour Market Plan 2018*
30 City of Hamilton, Hamilton Profile – Our Community https://www.arcgis.com/apps/MapSeries/index.html?appid=8d7d72677d844bdd8a7acb641e3acd8a
31 Statistic Canada, Census 2016
32 City of Hamilton, Hamilton Profile – Our community

Childhood Experiences

Children's experiences early in life shape their development and impacts their health later in life. A child's development is affected by socioeconomic status, support network, a safe nurturing environment, healthy habits, and genetic makeup.

In 2015, children ages 0 to 17 years had the highest rate of low income in Hamilton.[33] As reported by the original Code Red series, child poverty is concentrated, with some neighbourhoods in the city experiencing rates of over 55% while others have no child poverty.[34]

According to Code Red: Ten Years Later, there has been a significant increase in hospital stays from 2010 to 2017 for children and teens who have been treated for anxiety, mood disorders and substance use. In 2017, young people under the age of 20 visited the Emergency Department 296 times or almost six times per week. This increase is rooted in poverty.[35]

Mental illness in young people leads to mental illness in adulthood. Mental health problems can disrupt education and employment and can lead to chronic health problems, substance use and social isolation. One of the reported impacts of the pandemic is a deterioration of mental health in a large majority of children and youth due to the stress from social isolation.[36] As rates of mental illness in young people increase, the impact to the community and the demand on HPS resources will continue to increase.[37]

Among Hamilton's senior kindergarten classes, almost 31% of children are vulnerable in at least one domain of development which includes physical, social, emotional, cognitive development and communication skills.[38] In some areas of the city, the vulnerability rate is almost 47%.[39]

Physical Environments

The physical environment such as air, water, food, and soil have an impact on health. Toxins in the environment can cause a range of illnesses and lead to premature death.

Hamilton has had challenges dealing with poor air quality due to the city's unique topography which affects how pollutants are dispersed in the lower city in addition to the pollution from industry and transportation.[40] While air quality has significantly improved over the past two decades with a reduction in cancer-causing pollutants and smog advisories, a local study shows disparities in air quality at the neighbourhood level. While overall, Hamilton residents have a 4% increased risk of premature death from air pollution, in certain parts of the city that number nearly doubles.[41]

33 Ibid.
34 http://thespec-codered.com
35 https://projects.thespec.io/codered10
36 Cost, K., Crosbie, J., Anagnostou, E., et al., (2021). Mostly worse, occasionally better: impact of COVID-19 pandemic on the mental health of Canadian children and adolescents. European Child & Adolescent Psychiatry. https://link.springer.com/article/10.1007/s00787-021-01744-3
37 https://projects.thespec.io/codered10
38 https://www.hamilton.ca/government-information/trust-and-confidence-report/early-years-system-management-profile
39 https://projects.thespec.io/census
40 https://globalnews.ca/news/4158298/hamilton-air-quality-improving-report
41 https://www.thespec.com/news-story/8902503-dramatic-air-quality-improvements-in-hamilton-with-a-caveat

Social Supports and Coping Skills

The support of social networks such as family, friends and the community and the ability to cope with problems contribute to making decisions that promote health. Being socially disconnected makes it more difficult for people to access information, transportation and emotional support and can lead to negative health effects such as stress, depression, malnutrition, and even premature death in seniors.[42]

According to the results of a recent Angus Reid survey, Canadians more likely to be socially isolated and lonely are visible minorities, Indigenous peoples, LGBTQ2 individuals and those with mobility challenges.[43] The onset of the pandemic has exacerbated social isolation for these groups who are disproportionately affected. People who are less likely to experience social isolation and loneliness are married, have children, higher incomes and involved in faith-based activities.[44]

In 2016, 19% of Hamilton's population identified as visible minorities and 2.3% identified as Aboriginal. Almost 36% of Hamilton's population reported having activity limitations, higher than the provincial average of about 32%.[45] Over 55% of the population (age 15 and older) were married (46.9%) or in a common-law relationship (8.7%) and just over 63% of all families in the city had children.

Pandemic aside, social isolation has been a growing problem, particularly among seniors, especially those with low income and living in rural areas.[46] In 2015, approximately 12,000 seniors in Hamilton were living in isolation. With an increase in the aging population in Hamilton, the health-risks related to socially isolated seniors are a challenge that must be addressed by HPS. In 2018, seniors age 65 years and older made up 45% of HPS's total call volume.

Healthy Behaviours

A person's beliefs and actions to promote self-care and prevent diseases affect their health or mortality. Examples of behaviours that risk health include smoking, heavy drinking, diet, and physical activity.

The percentage of smokers in Hamilton Wards ranges from 18% to 40% for males and 14% to 33% for females. Males who consume higher levels of alcohol are consistently between 10% and 12% and between 6% and 8% for females. The proportion of population in Hamilton Wards who do not consume enough fruits and vegetables (less than five times per day) ranges from 56% to 70% for females and is consistently between 72% and 78% for males. The percent of people who are physically active in Hamilton's Wards is consistently between 20% and 27% of females and for males it is between 28% and 37%.[47]

HPS has been working with Hamilton Public Health Services to support a smoking cessation program. HPS provides clients of MIH with nicotine replacement products and educational materials. Clients are then referred to Public Health's smoking treatment program which offers sessions to help people quit smoking along with counselling support. The program prioritizes pregnant women, young families, individuals living in poverty, individuals living with a mental illness and people without a family doctor.

42 Hamilton Seniors Isolation Impact Plan, Info Sheet 5: How Does Social Isolation Affect Health?
43 http://angusreid.org/social-isolation-loneliness-canada
44 Ibid.
45 Canadian Council on Social Development's Community Data Program (email correspondence July 17, 2019)
46 https://socialisolation.ca
47 City of Hamilton, Ward Profiles

Access to Health Services

Having health services available and readily accessible can contribute to maintaining and restoring health and preventing disease.

In 2015-2016, 94% of Hamilton's population reported having access to a family doctor. This exceeds the provincial average of approximately 90% and is one of the best rates in the province. [48]

Hamilton is home to a number of hospitals including a mental health and addictions hospital, cancer centre, children's hospital, and a chronic care hospital for older adults. In addition, there are two urgent care centres in Hamilton. The McMaster University Medical Centre is located in Hamilton and offers a range of adult specialty clinics, day surgery and labour and delivery programs.[49]

Hamilton Health Sciences

- Hamilton General Hospital
- Juravinski Hospital and Cancer Centre
- McMaster Children's Hospital
- St. Peter's Hospital – chronic care for older adults
- Hamilton Health Sciences Main Street West Urgent Care Centre

St. Joseph's Healthcare Hamilton

- St. Joseph's Healthcare Hamilton Charlton Campus
- St. Joseph's Healthcare Hamilton West 5th Campus (mental health and addictions services)
- St. Joseph's Healthcare Hamilton King Campus – urgent care centre

In 2000-2014, the rate of hospitalizations per 1,000 Hamiltonians was approximately 81 people. In 2017, the rate of Emergency Department visits in Hamilton was over 486 people per 1,000 people with almost 23 of these people accessing Emergency Departments four or more times a year.[50] In 2019, 53,248 patients were transported by HPS to hospitals, an average of 146 a day. Slightly fewer patients, 48,412 or 132 per day, were transported in 2020, due to a decrease in 911 calls during the early days of the pandemic.

Hamilton has four community health centres funded by the Local Health Integration Network (LHIN) including a francophone centre and an aboriginal health centre. Community health centres provide clinical care from doctors, nurse practitioners, nurses, dietitians, social workers, and other clinical health providers.

In addition, Hamilton has a wide range of community support services and programs to support residents in achieving and maintaining their physical and mental health. With expanding services including public education, providing care in the community and at residents' homes and ambulance transports, HPS has become a critical component of Hamilton's system of health care.

48 https://www.hamiltoncommunityfoundation.ca/vital-signs/health-and-well-being-2018
49 https://www.hamiltonhealthsciences.ca/about-us/our-organization/our-locations/mcmaster-university-medical-centre
50 City of Hamilton, Hamilton Profile – Our Community

Biology and Genetic Endowment

The organic make-up of the human body and inherited attributes are a fundamental determinant of health.

Some chronic diseases such as diabetes, heart disease, cancer and high blood pressure are caused by mutations in genes combined with environmental factors. Chronic diseases are the leading cause of illness, disability, death, and overall poor quality of life. In 2016, rates of diabetes (7.2%), heart disease (3.7%) and cancer (1.2%) in residents of Hamilton aged 12 years and older were similar to the provincial rates. However, Hamilton had a higher rate of high blood pressure with just over 20% as compared to the province with approximately 18%.[51]

Diabetes, heart disease and high blood pressure increase risk for stroke. To help detect and enhance responsiveness to the needs of a person having a stroke, HPS partnered with the Heart and Stroke Foundation and added the F.A.S.T. decal on ambulances. The acronym helps raise awareness about the signs of a stroke: Facial drooping, Arm weakness, Speech difficulties and Time to call emergency services. HPS also collaborates with Hamilton General Hospital's Heart Investigation Unit (HIU) to enable paramedics to transport heart attack patients directly to the HIU rather than to the Emergency Department where there may be a delay. An HIU medical team is alerted to prepare to receive and treat the patient immediately upon arrival. In 2020, HPS had 951 responses for strokes and 134 ST-Elevation Myocardial Infarction (STEMI) responses, a serious form of heart attack.

Gender

Inequities based on gender not only affect employment, income and housing but also access to health services. As a result, gender influences health outcomes.

In 2016, Hamilton's population comprised of just over 51% female and approximately 49% male. For residents aged 75 years and over, about 59% were females and almost 41% were males. The difference between the proportion of females and males becomes increasingly greater among older age groups. For those 100 years and older, 80% were females and only 20% males.[52]

Fewer females than males were looking for work in Hamilton in 2016 as the labour force participation for females was 63% versus 67% for males. The unemployment rate for females in 2016 was just slightly lower than males (7% versus 7.5% respectively).[53] However, the pandemic has disproportionately impacted females as they experienced more job loss than males since they tend to work in the sectors hardest hit by the pandemic such as retail, hospitality and food. [54]

In 2015, the average income for females in Hamilton was $36,815, below the city average of $43,099 and less than the average for males of $48,918. Females also had higher rates (15.2%) of poverty (using LIM-AT) compared to the city (14.5%) and to males (13.7%) aged 18 to 64 years of age.[55] The difference in poverty rates between females (13.8%) and males (9.1%) increases among older Hamiltonians aged 65 and above.

51 https://www.hamiltoncommunityfoundation.ca/vital-signs/health-and-well-being-2018
52 City of Hamilton, Hamilton Profile – Our Community
53 Statistics Canada, Census 2016
54 Statistics Canada, Economic impacts and recovery related to the pandemic https://www150.statcan.gc.ca/n1/pub/11-631-x/2020004/s5-eng.htm
55 Statistics Canada, Census 2016

The nationally coordinated Point-in-Time Count of homelessness conducted by the City of Hamilton in 2016 showed that more men (72%) than women (28%) are impacted by homelessness. However, more women (66%) become homeless due to trauma than do men (37%).[56]

The economic and labour market disruptions that occurred during the pandemic disproportionately affected the service sector which is predominantly occupied by women. Women were one of the groups hardest hit by job loss in Hamilton experiencing an 18% decrease in employment.[57] A recent report in Hamilton revealed because of the pandemic women's finances have been negatively impacted, they face challenges re-entering the job market and are struggling to balance working and caregiving.[58]

Culture, Race/Racism

The cultural values, customs and beliefs of a person or community and one's race can have an impact on their health. Those whose practices differ than the dominant cultural values and those who are of a race distinct from the dominant group may face marginalization and stigmatization. Losing cultural traditions, language and access to culturally appropriate health care can adversely affect mental and physical health. Furthermore, inequitable treatment of marginalized groups from providers of housing, health care, social services and employment can negatively impact health. Recent events have highlighted the inequitable treatment of minorities and racialized people. The incidents that led to a resurgence in the Black Lives Matter movement, the discovery of remains of hundreds of Indigenous children on former residential school grounds, the rise in hate crimes against Asians and Muslims, have made it clear that not all people receive fair and equitable treatment which can have a devastating impact on health and well-being.

About 25% of the population of Hamilton is immigrants.[59] At least 23% of Hamilton residents have a non-official language as their mother tongue and almost 2% have no knowledge of English or French.[60] Over 100 languages other than English are spoken in Hamilton households.[61] Hamilton is home to more than 80 ethnicities with 19% of Hamiltonians identifying as visible minorities.[62]

The pandemic has brought to light inequitable access to essential services including health care experienced by people of minority and racialized groups who have also experienced more job loss than other groups.[63] HPS must ensure that anyone who requires the service of a paramedic will be treated with dignity and be given the best possible care for a positive health outcome. Moreover, HPS must continue to work to expand programs aimed at supporting the most vulnerable in the community to ensure they are provided and can readily access quality health care. This Master Plan identifies objectives to strengthen the delivery of services for the best possible outcome for every person served.

56 https://www.hamiltoncommunityfoundation.ca/vital-signs/housing-2018
57 SPRC *Employment Impacts of COVID-19 in the Hamilton* CMA http://www.sprc.hamilton.on.ca/wp-content/uploads/2020/08/SPRC-Hamilton-Social-Landscape-Employment-impacts-of-COVID-19-August-2020.pdf
58 *Women out of Work Report: Assessing Hamilton's Employment Disparities During COVID-19* https://bluetoad.com/publication/?m=66690&i=717346&p=6&ver=html5
59 Statistics Canada, Census 2016
60 City of Hamilton, Hamilton Profile – Our Community https://www.arcgis.com/apps/MapSeries/index.html?appid=8d7d72677d844bdd8a7acb641e3acd8a
61 https://infogram.com/copy_2016_home_languages_in_hamilton?utm_source=SPRC+Newsletter&utm_
62 http://www.cbc.ca/news/canada/hamilton/hamilton-2016-census-visible-minorities-doubled-1.4383573
63 RBC, COVID Further Clouded the Outlook for Canadian Women at Risk of Disruption (2021) https://thoughtleadership.rbc.com/covid-further-clouded-the-outlook-for-canadian-women-at-risk-of-disruption/?utm_medium=referral&utm_source=media&utm_campaign=special+report

2.4 Growth and Development

As one of Ontario's fastest growing metropolitan areas, Hamilton is the ninth largest in Canada and the third largest in Ontario.[64] Major growth and development in Hamilton is occurring in former neighbouring municipalities which were amalgamated to form the 'new' City of Hamilton in 2001. Binbrook, Upper Stoney Creek, Waterdown and Winona are all in the suburban/rural areas of Hamilton currently undergoing development or plans for development to accommodate the increasing population.

Hamilton's downtown core is undergoing a revitalization leading to growth in high rise developments and a project to develop Hamilton's west harbour is on the horizon. The expected population forecast for these growth areas are as follows:

Growth Area	2031 Population Forecast	Increase from 2016	Growth %
Binbrook	16,011	5,985	60%
Waterdown	32,067	11,804	58%
Upper Stoney Creek	20,427	15,442	310%
Winona	13,297	9,671	267%
Downtown Hamilton	25,206	12,480	98%
West Harbour	8,419	2,791	50%
Ancaster	26,327	7,305	38%
TOTAL	**141,754**	**65,478**	

Source: City of Hamilton, Planning and Economic Development Community Planning-GIS Section, January 7, 2019

By 2031, Hamilton's population is expected to grow to 680,000, or by almost 20%.[65]

Hamilton will also see development in the Airport Business Park located in the southern portion of the city, on the escarpment east of the Hamilton International Airports. The Airport Employment Growth District is an area designated for employment lands which will help meet the City's needs identified in its growth strategy (GRIDS) to the year 2031.[66] Hamilton's employment is expected to grow from 252,000 jobs in 2016 to 350,000 in 2031. [67]

Growth in Hamilton is also gauged by the amount of construction in the city. In the first half of 2021, Hamilton issued one billion dollars in building permits. This milestone is unprecedented within only six months and marks growth in the residential, commercial, and industrial sectors. Despite the pandemic, investments in Hamilton continue to increase aiding economic recovery.[68]

64 City of Hamilton, Planning and Economic Development Dept. Elfrida Growth Area Study Existing Conditions Report
65 GRIDS2 Growth Summary 2006-2016
66 http://www.investinhamilton.ca/locate-expand/business-parks
67 Ibid.
68 https://bayobserver.ca/2021/07/13/hamilton-hits-1-billion-building-permit-mark-with-half-a-year-to-go

The Hamilton Street Railway (HSR) provides bus service within the city while GO Transit provides inter-regional bus and rail services. However, the City of Hamilton and the provincial and federal governments currently have an agreement in place to build a Light Rail Transit (LRT) system to carry passengers between the west and east ends of the city (B-Line). This would eliminate the need for buses along this line. Construction for this project will have an impact on emergency response times since it will occur along central corridors through the lower city which is a main artery used by HPS. It will run through the downtown core, an area with the highest call demand. Furthermore, once construction is complete paramedics will have to learn the right-of-way rules and how to navigate the tracks during an emergency response.

2.5 Transportation Network

As Hamilton is situated roughly midway between Toronto and Niagara Falls it has a strategic position within Ontario's transportation network. Hamilton has two major provincial freeways, Highway 403, Queen Elizabeth Way (QEW) and two municipal expressways, the Lincoln Alexander Parkway, and the Redhill Valley Expressway.

The location of the city enables easy access through a network of highways, international trucking and rail lines, the John C. Munroe International Airport and the Port of Hamilton, the busiest of all Canadian Great Lakes ports.[69] As such, Hamilton is a primary gateway in North America for global goods movement which is paramount to the local economy.[70] Its location and highway network also makes commuting to a job outside of the city more accessible. In 2016, almost 33% of employed residents travelled outside of Hamilton for work[71] higher than the 20% provincial average.[72]

In 2016, 83% of the Hamilton's employed labour force travelled to work by motor vehicle (either as the driver or a passenger)[73] as compared to the provincial average of 79%[74]. Over 10% of the employed population take public transit to their jobs and just under 1% cycle to work.[75] Hamilton currently has 115 kilometres of designated bike lanes on its streets and 150 kilometres of multi-use trails for cyclists and pedestrians.[76]

With a growing population, increasing density, residents working outside of the city, construction, narrower streets and bike lanes, the city has experienced heightened traffic volume and congestion. This can impede the travel time for the HPS in responding to emergencies. Increased traffic also increases the occurrence of transportation-related incidents on the city streets, highways, bridges, water or on the rail lines that may require emergency response from HPS.

69 https://www.hamiltonport.ca/port-facts/history
70 https://investinhamilton.ca/industries/goods-movement
71 City of Hamilton, Hamilton Profile – Our Community https://www.arcgis.com/apps/MapSeries/index.html?appid=8d7d72677d844bdd8a7ac-b641e3acd8a
72 https://www.hamiltoncommunityfoundation.ca/vital-signs/getting-around-2018
73 City of Hamilton, Hamilton Profile – Our Community
74 https://www.hamiltoncommunityfoundation.ca/vital-signs/getting-around-2018
75 City of Hamilton, Hamilton Profile – Our Community
76 https://www.hamilton.ca/streets-transportation/biking-cyclists/cycling-infrastructure

2.6 Educational Institutions

Hamilton is home to a number of post-secondary institutions including McMaster University, Mohawk College, Redeemer University College, Brock University satellite campus and Collège Boréal, the only French-language college in Southwestern Ontario.

In addition, Hamilton is home to Columbia International College a university preparatory school and the country's largest boarding school with 1,800 students from over 70 countries.[77]

The existence of various educational institutions in the city presents opportunities for HPS to collaborate in conducting local research. For example, HPS partnered with McMaster University Department of Family Medicine to study the impacts of the MIH's @Clinic Program. HPS has also collaborated with McMaster University students of CityLab to developed solutions to reduce unnecessary 911 calls through effective communication.

The number of post-secondary institutions in Hamilton creates an influx of students during the school term. For example, McMaster University has approximately 30,000[78] students, of which almost two-thirds come from outside the immediate Hamilton region.[79] Such an influx of people to the city, combined with events and celebrations held by students has the potential to increase the demand on paramedic services.

2.7 Arts and Culture

Hamilton's arts and culture scene has flourished in recent years. The city has a range of entertainment venues including a 17,500-seat enclosed arena that is home to an OHL hockey club (Hamilton Bulldogs) and national basketball team (Hamilton Honey Badgers) and hosts concerts year-round; a state-of-the-art concert hall with a capacity for over 2,100 people; a 750-seat professional theatre as well as many small community theatres. Hamilton has an outdoor stadium that holds up to 24,000 persons which is home to Hamilton's national sports teams (Hamilton Tiger Cats and Forge FC), and also utilized for concerts and films. There are also numerous smaller venues and clubs that feature live shows.

In addition to the Art Gallery of Hamilton, Hamilton boasts smaller galleries and studios displaying local and international art. Many of these are located in the downtown core along James Street North and are showcased during "Art Crawl" a monthly event when galleries, studios, boutiques, stores, and restaurants stay open late for hundreds of visitors. In addition, "Supercrawl" is the annual festival for which the street is closed to vehicle traffic so hundreds of thousands of people can enjoy the shops and studios in addition to street performers, artisans, and a variety of musical acts.[80]

Hamilton has received media attention for its cultural revival and as such has attracted thousands of visitors to the city and its venues, both indoor and outdoor. The ten-year Master Plan must consider the influx of visitors and mass gatherings that could pose health risks for which HPS needs to be equipped to respond with adequate resources.

77 https://www.cic-totalcare.com/discover-columbia
78 City of Hamilton, Invest in Hamilton http://www.investinhamilton.ca/why-hamilton/universities-colleges
79 https://en.wikipedia.org/wiki/Hamilton,_Ontario
80 http://supercrawl.ca/news/84-volunteer-for-supercrawl-2018

2.8 Economy

In recent decades Hamilton's economy has become significantly diversified. Moving away from being seen as the steel-producing city, Hamilton is now recognized for its life sciences research, health care, education, and service sectors in addition to advanced manufacturing.

In addition to the thriving arts and culture industry, Hamilton's film industry has also been contributing to the local economy. In 2019, 141 productions were filmed in Hamilton with a self-reported direct spend of $59.7 million in the city's economy.[81] While the number of films dropped in 2020 due to the pandemic, in the first three months of 2021, 126 filming permits were issued compared to 117 in the first quarter of 2019.[82]

The movement of goods is paramount to the local economy. The location of the city enables easy access through a network of highways, rail lines, the International Airport, and the Port of Hamilton. Because of an increasing integration of the economy and transportation system between the Greater Toronto Area (GTA) and the City of Hamilton, Hamilton is now considered part of larger GTA region called the GTHA (Greater Toronto and Hamilton Area).

Hamilton's International Airport has seen significant growth in passenger traffic in the last few years. In 2019, the airport served over 955,373 passengers. The airport is Canada's largest overnight express cargo airport with a 21% increase in air cargo distribution since 2016. The airport has recently been recognized as North America's fastest growing airport. The airport is a strong economic driver for the city with over 3,400 people employed either directly or indirectly with the airport and $1.2 billion of economic output.[83]

The Port of Hamilton is home to 130 companies that store, process and export diversified cargo such as steel, agricultural and liquids. The Port of Hamilton receives approximately 650 vessel calls per year. Approximately $3 billion worth of cargo flows through the Port of Hamilton each year. The Port of Hamilton is the largest port in Ontario and the busiest of all Canadian Great Lakes ports. It employs 2,100 people and is one of the City's largest taxpayers.[84]

With Hamilton's unique geography, increasing and aging population, growth and development, social determinants of health, complex transportation network and influx of students and visitors throughout the year, HPS must plan for a growing demand for an increasingly wide range of paramedic services over the coming decade.

81 Email correspondence Kimberley Adrovez, Film Operations Specialist, City of Hamilton, May 26, 2020
https://www.thespec.com/entertainment/local/2021/03/26/hamilton-filming-2021-tv-productions.html
82 https://www.thespec.com/entertainment/local/2021/03/26/hamilton-filming-2021-tv-productions.html
83 https://cdn.flyhamilton.ca/wp-content/uploads/2020/04/HIA-Year-in-Review_Final.pdf
84 https://www.hopaports.ca/port-facts/cargo-statistics

3.0

HAMILTON PARAMEDIC SERVICE PROFILE

3.1 Historical Context

In the years since the City of Hamilton has had responsibility for the land ambulance services, the service has transitioned from Emergency Medical Services located in the City Manager's Office to the Hamilton Paramedic Service located in the Healthy and Safe Communities Department.

From 2000 to 2010, a number of reviews of HPS have been undertaken by both internal and external parties that highlighted the need to address the growing demand on paramedic services. A series of recommendations were made that were only partially acted upon due to the contingencies and pressures at the time. With increasing call volume and a developing code zero issue, where there is one or no ambulances available for response, HPS faced challenges in meeting service demands.

From 2014 to 2020, excluding 2015, additional resources each year have enabled HPS to keep up with increasing 911 calls. However, the initial deficit identified through the earlier reviews of HPS has not been fully addressed. As a result, HPS continues to be challenged by limited resources that do not adequately address the needs of the community. The details of call demand and response performance are described in Section 4.0 of this Master Plan.

3.2 Overview of HPS

HPS is an integral part of the health care system in Hamilton and contributes to the public safety of the community. HPS helps to promote the health and safety of Hamilton's residents and visitors through prevention, response, and follow-up activities.

Regulations and Standards

HPS must operate in accordance with the regulations and standards set by the MOH through the *Ambulance Act*. Regulations and standards supported by the *Ambulance Act* include:

- Regulations 257/00: General, 129/99: Costs Associated with the Provision of Land Ambulance Services, and 497/07: Land Ambulance Services – Designation
- Land Ambulance Response Time Standard
- Advance Life Support Patient Care Standards
- Ambulance Service Communicable Disease Standard
- Basic Life Support Patient Care Standards
- Provincial Equipment Standards for Ontario Ambulance Services
- Provincial Land Ambulance and Emergency Response Vehicle Standard
- Ontario Ambulance Documentation Standards
- Patient Care and Transportation Standard
- Land Ambulance Certification Standards

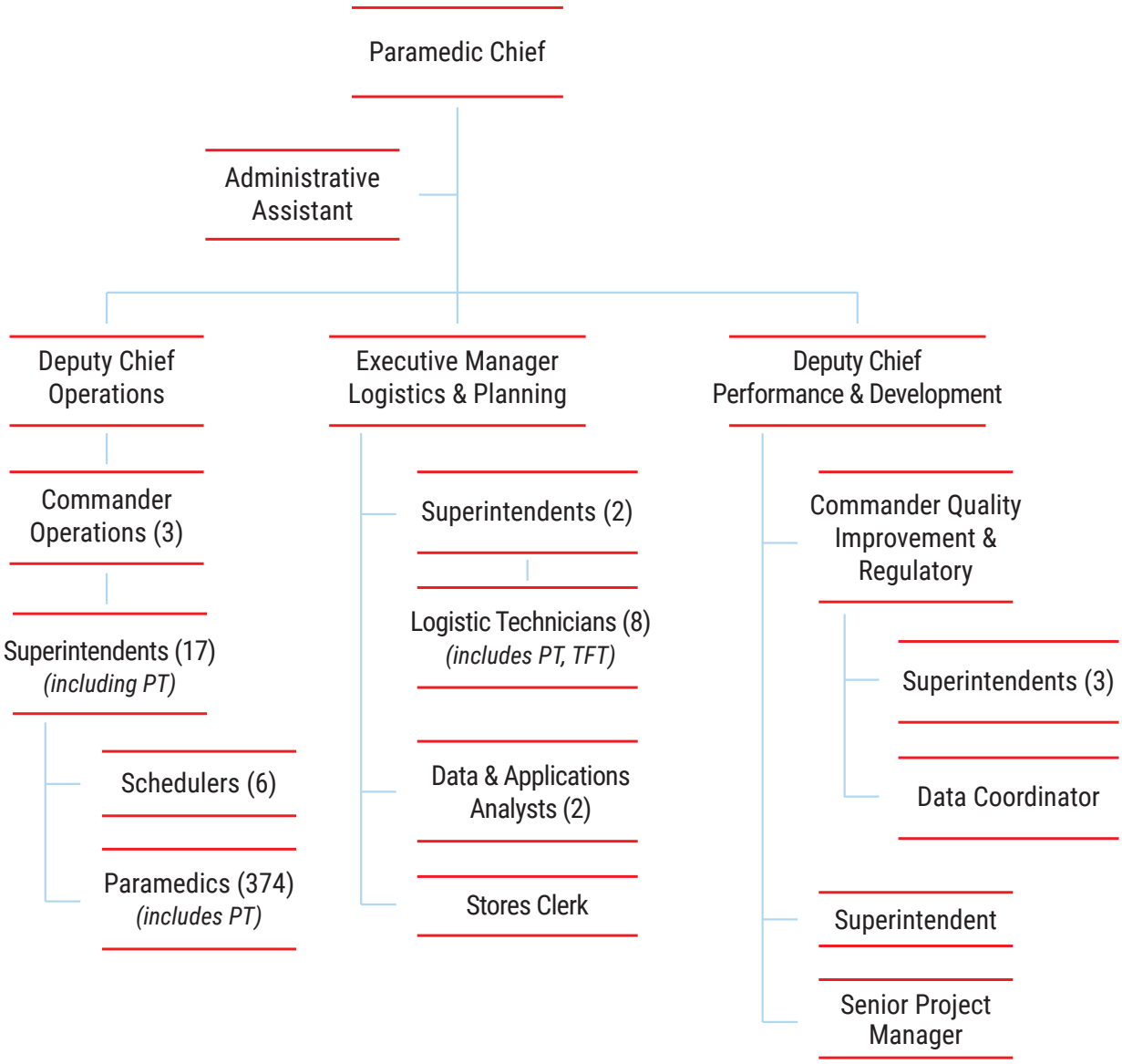
Organizational Structure

As noted earlier, HPS is situated within the Healthy and Safe Communities Department of the City of Hamilton which enables for collaboration with other divisions focused on similar outcomes for the community.

The Paramedic Chief reports to the General Manager of the Healthy and Safe Communities Department and is responsible to lead the planning and operationalization of HPS which is comprised of the following sections:

- Office of the Chief
  - Responsible for strategic vision, direction, and planning
- Operations Section
  - Responsible for providing oversight on matters of deployment and resource utilization
- Logistics and Planning Section
  - Responsible for providing support to all sections through procurement and asset management
- Performance and Development Section
  - Responsible for ensuring regulatory compliance, quality improvement and continuing education and training

The HPS organizational structure is as follows:



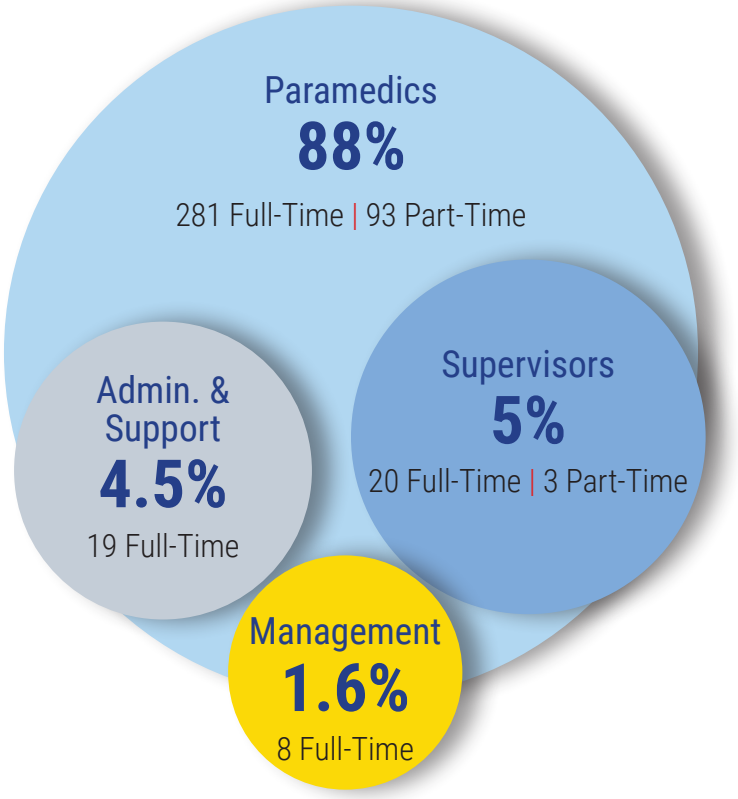
PT= Part-time

TFT= Temporary Full-time

Workforce

HPS employs a total of 424 staff including both full and part time. The HPS workforce is represented by three unions: The Ontario Public Service Employees Union (OPSEU) Local 256 representing paramedics, the Canadian Union of Public Employees (CUPE) Local 1041 representing supervisors and CUPE Local 5167 representing some HPS support staff.

Approximately 88% or 374 staff are paramedics with about 17% of those Advanced Care Paramedics. While paramedics provide direct frontline services to residents and visitors, the supervisors, management, and administration staff provide a variety of supportive and regulatory functions to meet MOH mandates. The workforce breaks down as follows:



Position	Full-time	Part-time
Primary Care Paramedics	226	83
Advanced Care Paramedics	55	10

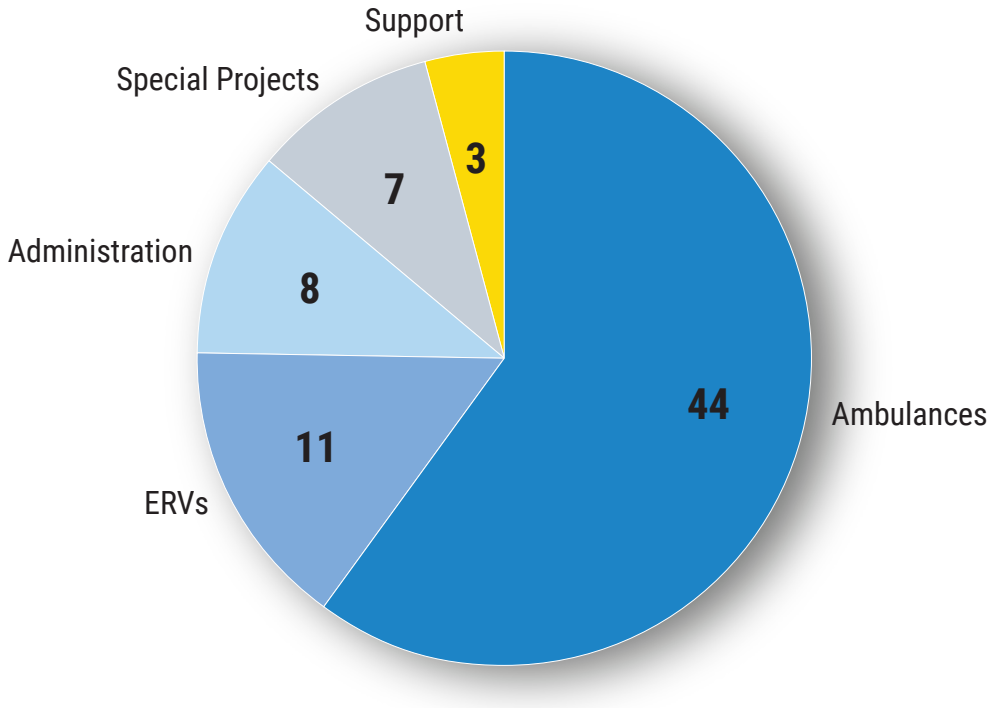
HPS has a considerable portion of its workforce eligible to retire over the course of this Master Plan. As of 2020, approximately 11% of the HPS workforce is qualified for retirement within the next two years. By the end of this ten-year Master Plan in 2030, almost half (46%) of the 2020 workforce will be 51 years and older with many eligible to retire. The loss of seasoned employees means a loss of key experience and skills. Planning for the departure of experienced employees is essential to ensure continuity of operations. HPS must develop a strategy to develop future leaders and prepare employees for advancement. Succession planning is critical for long-term success of HPS.

Infrastructure

HPS operates out of 18 paramedic response stations across the city in both urban and rural areas. All stations are shared with the Hamilton Fire Department (HFD) with the exception of two that are exclusive HPS operations.

HPS has a fleet of 73 vehicles comprised of 44 ambulances, which includes a bariatric unit and a Neonatal Intensive Care Unit transport ambulance that is annually contracted. The fleet also consists of 11 Emergency Response Vehicles (ERVs), four of which are for frontline response with the remainder as spares; three support units including an Emergency Support Unit (ESU), operations trailer and logistics vehicle; eight administrative vehicles and seven special project vehicles utilized by Mobile Integrated Health. During the pandemic, HPS also decommissioned two ambulances to be used temporarily for COVID-19 testing in the community. The breakdown of the fleet is as follows:

Hamilton Paramedic Service Fleet



Recently, HPS has acquired two ambulances outfitted with hybrid regenerative braking technology. With travelling around two million kilometres per year, this technology will reduce greenhouse gas emissions and improve gas mileage of these vehicles. This Master Plan will recommend the development of a plan to further reduce HPS's carbon footprint.

Budget

For 2021, HPS has an overall budget of $61,040,630. However, as noted earlier, the province provides funding for 50% of these costs. As well, there are some specific programs such as the offload nurse program, the NICU transport ambulance and community paramedicine (know in Hamilton as MIH) that are funded 100% by the MOH. The allocation of funds per each cost category and the percentage of the overall budget is as follows:

Cost Category	$	%
Employee-related	50,290,900	82
Municipal Recoveries (Exclude Shop Labour)	4,724,750	8
Material and Supply	2,891,020	5
Contractual/Consulting/Financial	1,758,230	3
Vehicle Expenses	1,026,710	2
Building and Ground	349,020	1
TOTAL	**61,040,630**	**100**

Note: Percentages rounded to the nearest whole number

HPS achieves cost effectiveness in operating vehicles through partnerships within the City of Hamilton. With corporate fuel purchasing arrangements and utilizing the Hamilton Fire Department vehicle maintenance services, HPS realizes cost efficiencies without jeopardizing quality service. The costs per response in 2020 was as follows:

Response Category 2020	Total
Kilometres Travelled	1,887,557
Cost per Response	$688.69
Cost of Materials and Supplies per Response	$28.36
Vehicle Cost per kilometre	$0.66

Scope of Practice

HPS employs two levels of paramedics, Primary Care Paramedics (PCPs) and Advance Care Paramedics (ACPs). PCPs are graduates of an accredited one- or two-year paramedic program. ACPs have PCP level of training and experience as well as an additional year in a community college post-diploma program. Over 83% of paramedics with HPS are PCPs (including part time).

PCPs are authorized by a physician to perform controlled medical acts that when combined with other medical assessments they can effectively treat the majority of patients' illnesses or injuries. Based on call information provided to the MOH dispatch centre or at the request of a PCP, ACPs respond to perform additional practices to treat more complex medical or traumatic injuries. An outline of the scope of practice for PCPs and ACPs is as follows:

HPS Paramedic Scope of Practice	
Primary Care Paramedic (PCP)	**Advanced Care Paramedic (ACP)**
Medications: ▪ Acetaminophen (↓ mild pain) ▪ Aspirin (↓ mortality during heart attack) ▪ Epinephrine (↓ histamine in severe allergic reaction) ▪ Glucagon (↑ blood sugar levels) ▪ Ibuprofen (↓ mild pain) ▪ Ketorolac (↓ moderate pain) ▪ Naloxone (reverse opioid overdose) ▪ Nitroglycerine (↑ blood flow during angina) ▪ Oxygen ▪ Salbutamol (relax muscles in lungs)	**In addition to PCP medications:** ▪ Adenosine (↓ heart rate) ▪ Atropine (↑ heart rate) ▪ Calcium Gluconate (↓ blood potassium levels) ▪ Dextrose 50% (↑ blood sugar levels) ▪ Dimenhydrinate (↓ nausea/vomiting) ▪ Diphenhydramine (↓ moderate allergic reaction) ▪ Dopamine (↑ heart rate and blood pressure) ▪ Epinephrine (↑ blood flow during sudden cardiac arrest) ▪ Lidocaine (↓ irregular heartbeats and "numbing" of tissues) ▪ Midazolam (sedation and ↓ seizure activity) ▪ Morphine (↓ severe pain) ▪ Normal Saline Bolus (↑ blood pressure) ▪ Sodium Bicarbonate (↓ acidosis in blood) ▪ Phenylephrine (↓ blood flow to tissue)
Procedures: ▪ 12 Lead Electrocardiogram (diagnose heart attack) ▪ Supraglottic Airway (↑ ventilation/oxygenation) ▪ Airway Suctioning (↓ mucous/foreign bodies) ▪ Capnometry (evaluation of respiratory system) ▪ Continuous Positive Airway Pressure (↓ severe respiratory distress) ▪ Defibrillation (eliminate lethal irregular heartbeat) ▪ Peripheral Capillary Oxygen Saturation (evaluation of oxygen in blood) ▪ Glucometer (evaluate of blood sugar in blood) ▪ Emergency Dialysis Disconnect (removal of at home dialysis unit if transport required) ▪ Termination of Resuscitation (discontinue resuscitation if determined futile) ▪ On-Line Medical Direction (physician consult via phone)	**In addition to PCP procedures:** ▪ Endotracheal Intubation (↑ ventilation/ oxygenation) ▪ Tracheal Tube Introducer Device (assist with Endotracheal intubation) ▪ Foreign Body Airway Removal (remove object from airway) ▪ Central Venous Access Device (fluid or medication administration via arterial line) ▪ Intraosseous Therapy (fluid or medication administration via bone marrow) ▪ Intravenous Therapy (fluid or medication administration via vein) ▪ Needle Thoracotomy (↓ excessive air in lungs) ▪ Synchronized Cardioversion (↓ heart rate) ▪ Transcutaneous Pacing (↑ heart rate)

Given the additional procedures and medications that ACPs can administer, it would be optimal to have one ACP on every ambulance for every shift as well as expand the scope of practice of PCPs. This would increase capacity to reduce the severity of patient distress and potentially improve patient outcomes.

With the province's introduction of the "Patients First: Action Plan for Healthcare" in 2015, HPS collaborated with a variety of community and health partners to establish the Community Paramedicine Program now called Mobile Integrated Health (MIH). Community Paramedics who deliver these programs are certified PCPs or ACPs and possess additional training focused on chronic health and social determinants of health that may contribute to a resident having to use 911 on multiple occasions.

HPS Mobile Integrated Health Community Paramedics Additional Training	
Community Paramedic	**Social Navigator**
▪ Enhanced primary care assessment skills ▪ Chronic disease education and coaching ▪ Clinical rotations with local partners ▪ Senior citizen neglect and abuse assessment ▪ Falls risk and prevention techniques ▪ Community Health Assessment Program (CHAP) ▪ Aboriginal persons awareness and transition from acute care facilities ▪ Health Links awareness and orientation of Congestive Heart Failure (CHF) and Chronic Obstructive Pulmonary Disease (COPD) transitioning from acute care facilities	▪ Enhanced mental health and addictions assessment skills ▪ Forensic research ▪ Acceptance and Commitment Therapy ▪ Professional boundaries ▪ Give, Take, Care Learning ▪ Fetal Alcohol Spectrum Disorders (FASD) and the Law training ▪ Mental health first aid

Base Hospital

The MOH designated Hamilton Health Sciences (HHS) as the Base Hospital Program for the west region in Ontario which includes Hamilton. HHS Centre for Paramedic Education and Research (CPER) provides Hamilton paramedics with continuing medical education, medical advice relating to pre-hospital care and patient transportation and through the medical director gives paramedics the authority to perform controlled medical acts. As per the *Ambulance Act* the base hospital is also responsible to monitor the quality of care provided by ambulance services and provide quality assurance information and advice.

Paramedics are required to complete a specified number of hours of education and recertification exams annually to maintain their base hospital certification. Furthermore, patient care records are subject to review by the base hospital and HPS to assure appropriate care is provided to patients.

Education and Training

In addition to paramedics receiving mandatory continuing medical education from CPER, they also are required to attend HPS education and training sessions. HPS's Performance and Development Section organizes Professional Development Days sessions twice a year in which paramedics receive a range of instruction delivered by a variety of HPS partners.

During these sessions, paramedics learn about or review such topics as utilizing information systems, accurate record keeping, organizational policies, appropriate use of social media, mental health awareness, correct ergonomics to avoid injuries, proper use of equipment, CPR recertification, understanding and respecting gender diversity and maintaining a positive workplace culture.

The Performance and Development Section of HPS delivers over 10,000 hours of education and training to paramedics every year.

Ambulance Service Review (ASR)

HPS is required to be certified by the MOH to operate land ambulance service. To maintain certification the service must demonstrate compliance to legislation and related standards through a comprehensive review conducted by the MOH every three years. The MOH review team consists of ministry representatives as well as management and paramedic representatives from services throughout Ontario. The team evaluates vehicle, equipment maintenance and cleanliness, quality assurance programs, employee files and credentials, training records and patient care records. The team also conducts ride-outs with paramedics to assess patient care and other paramedic practices. In May 2019, HPS underwent a complete ASR and was found to meet the review certification criteria and legislated requirements for the renewal of certification to operate land ambulance service. Furthermore, the Ministry commended HPS for its efforts in the areas of preparing for the ASR, training, certification of vehicles and quality assurance and continuous quality improvement. HPS is currently beginning preparations for the 2022 ASR.

Dispatch

All ambulance movement in Hamilton is directed by the Central Ambulance Communications Centre (CACC), a service provided by the MOH. The CACC dispatches the closest ambulance available to a 911 medical call. This may mean an ambulance stationed across the city but travelling near the incident will be dispatched. It may also mean an HPS ambulance can be dispatched to a bordering municipality should it be closest to the incident. Similarly, an ambulance from a bordering city could be dispatched to an incident in Hamilton if it is closer or if there are no units available to respond. HPS develops and maintains a deployment plan that is provided to CACC. HPS does not directly control which ambulance is sent to a call or to deployment areas and relies on the CACC to deploy ambulances as per the HPS deployment plan.

Tiered Response Agreement

HPS established a Tiered Response Agreement (TRA) with the Hamilton Fire Department (HFD) in 2000. The agreement defines criteria for the HFD to respond to life-threatening (Code 4) medical calls. Responding to medical calls accounted for over 66% of HFD responses in 2019[85]. As such, the HFD's Service Delivery Plan (2019-2028) identifies the need to review the agreement to ensure that appropriate HFD resources are dispatched relative to patient needs.

However, before a review of the TRA had been completed, the onset of the COVID-19 pandemic in March 2020 resulted in immediate changes to tiered responses. In an effort to preserve personal protective equipment (PPE) and reduce contact, firefighters began responding to the most serious medical calls only, that is, motor vehicle collisions and vital signs absent calls. Other municipalities have also adjusted their TRAs in a similar fashion. This helps to ensure there is an adequate supply of PPE for paramedics and that firefighters are not exposed to potential COVID-19 positive patients unnecessarily.

These temporary changes to the TRA have provided insights into the impacts of a modified agreement. This Master Plan will recommend the TRA update be resumed and take into consideration the outcomes of a modified TRA during the pandemic.

Community Engagement

HPS recognizes the importance of obtaining input from residents and stakeholders to ensure the needs of the community are considered when planning and delivering services. To that end, HPS obtains feedback from the community in a variety of ways (see Appendix A for reports of survey findings).

85 City of Hamilton, Service Profiles, Hamilton Fire Department Profile https://spatialsolutions.maps.arcgis.com/apps/MapSeries/index.html?appid=434503288b19472e886ac9f2ac271f48

HPS Citizen Survey

In 2018, HPS conducted a survey to gain a better understanding of residents' expectations and satisfaction levels regarding the services provided by HPS (Appendix A-1). A total of 827 residents responded to the survey. Randomized telephone surveys, representative of Hamilton's population, collected 550 responses. To supplement the telephone data, an online version of the survey posted on the City of Hamilton website garnered 277 responses.

Based on either their experience with or knowledge of HPS, the majority (87%) of phone survey respondents rated services provided by HPS as excellent, very good or good. Approximately 29% of phone respondents called 911 for an ambulance in the past two years for either themselves or a family member.

Respondents' expectations of response time were very different for life-threatening emergencies and non-life-threatening situations. The majority (94%) of phone respondents expect a response time of less than ten minutes for life-threatening emergencies. For emergencies that are not life-threatening, the majority (61%) of phone respondents expect a response time of 11 minutes or more.

The majority (85%) of respondents by phone survey felt it was very important for the paramedic dispatcher to provide care instructions over the phone prior to paramedics' arrival. Moreover, 77% of phone respondents felt that they should be transported to a medical facility determined by paramedics to be most appropriate for their condition rather than to a hospital of their choice. While dispatchers can instruct callers to support administering first aid and CPR, currently dispatch does not employ a clinician to advise, treat or refer callers to practitioners and services. However, this Master Plan will recommend a clinician be installed at dispatch. Since this survey, legislation has been updated enabling paramedics to determine a destination alternate to a hospital and HPS is currently working with hospital partners on guidelines. Both of these practices can contribute to reducing the number of patients taken to the Emergency Department where paramedics are often held up in 'offload delay' until hospital staff assumes care of the patient.

When residents were asked if it would be acceptable for them to be left in the Emergency Department waiting room once paramedics had tended to them, the majority of phone respondents (91%) indicated that this practice was acceptable. The Fit-to-Sit program has been implemented by HPS in collaboration with the hospitals to address the persisting offload delay issue. This program allows paramedics to place some low acuity patients directly into the waiting room so they can return to the community promptly to respond to the next emergency. This program also helps to alleviate offload delay at hospitals experienced by paramedics. The details about offload delays will be examined later in this Plan.

HPS Stakeholder Consultations

To gain insight into the perspectives and needs of key community partners as well as to identify opportunities for further collaboration, HPS consulted with over 30 leaders of key organizations including the hospitals, base hospital, unions, long-term care facilities, Hamilton Public Health Services, MOH (including CACC), police, HFD, and CityHousing Hamilton.

Partners described having a strong, positive relationship with HPS. They identified areas for development or expansion over the coming decade such as:

- Proactive coordinated care (e.g., through MIH activities)
- Alternate care pathway
- Mental health and addiction
- Collaborative response
- Integrated systems (business processes, data, information technology)
- Joint training
- Community partnerships
- Public education
- Diversified paramedic role

Following these consultations, HPS has commenced a number of initiatives in collaboration with community partners such as the development of a profile of ambulance services users and the provision of flu shots through the @Clinic Program with Hamilton Public Health Services. Also, in partnership with long-term care homes, HPS created a new MIH Program in which paramedics treat residents with flu-like symptoms in the residence rather than transporting them to hospital. HPS also provided training to long-term care and Hamilton Public Health Services personnel in respiratory protection. In collaboration with Hamilton General Hospital's Heart Investigation Unit (HIU), paramedics now receive clinical feedback from the HIU on heart attack patients they have treated and transported to the HIU. This assists in enhancing the efficacy of paramedic responses. HPS provides training to Hamilton Police Service for the clinical and technical aspects of administering Naloxone to overdoes patients. Additionally, MIH has recently expanded to include a program in partnership with St. Joseph's Healthcare to support women and men with addictions which enables paramedics to take patients directly to addiction-related facilities rather than to Emergency Departments. Also underway in partnership with Hamilton Public Health Services are plans to deliver Naloxone kits to those in need in the community. This initiative is set to begin in the fall of 2021.

Mobile Integrated Health (MIH) Surveys

MIH, formerly known as the Community Paramedicine Program, delivers episodic and continuing community and home-based health care to vulnerable residents who utilize 911 and hospital services on multiple occasions due to chronic medical and/or social issues. Community Paramedics collaborate with community organizations to support clients where they live, thereby improving their quality of life while reducing the need for hospitalization.

As will be described in detail later, HPS delivers several MIH programs including @Home where a Community Paramedic visits clients in their homes, @Clinic where residents of select seniors' buildings can meet with the Community Paramedic during specified times, and Flu Clinics as part of the @Clinic Program during the flu season to provide influenza immunization to residents.

HPS conducts various surveys to garner feedback from clients of MIH to ensure their needs are fulfilled.

In a 2018 survey, clients of the @Home program who responded to the survey felt the program aided their overall health and well-being (87%) and increased their knowledge of how to maintain or improve their health (92%). All respondents felt better prepared to deal with health concerns in the future and gained information about the health and social services available to them.

The majority of respondents (88%) of the @Clinic program survey conducted in 2018 said they visit the clinic every time or almost every time the Community Paramedic was in their building. Ninety-two percent of respondents said the Community Paramedic taught them how to manage their condition and 4% said they would call 911 to deal with their health concern if the clinic was not in their building. Most of the clients surveyed rated the @Clinic program as excellent (83%).

In 2019 and 2020, pulse surveys of the programs were conducted. Results showed that 94% of respondents rated the @Home Program as excellent in 2020, up from 90% in 2019. Of the @Clinic clients who responded to the survey in 2019, 97% rated the program as excellent. Feedback on the Flu Clinic Program in 2019 showed a 98% satisfaction rate with this service. In 2020, 97% of the respondents highlighted the convenience of having flu shots in their buildings and 50% indicated they would not have been vaccinated had the clinic not been readily available. The vast majority (98%) reported that they would like the Flu Clinic Program to return again in 2021.

HPS Website

HPS routinely collects feedback from service users through the HPS webpage on the City of Hamilton website. The webpage includes a link to a survey where residents can provide input on their level of satisfaction with HPS services. The feedback helps HPS monitor performance and make improvements to customer service and patient experience.

The HPS webpage also includes a phone number and email address where people can provide feedback about the service they received from HPS. This feedback will often result in the creation of a file to be reviewed by the Commander of Quality Improvement and Regulatory Affairs. In 2020, HPS conducted a review of 60 files where there were concerns about service. Concerns were largely related to clinical practice and professional conduct. Each of these concerns resulted in a comprehensive review to determine ways to improve performance.

A file is also created when positive feedback is received so that the paramedics involved can be formally recognized. In 2020, there were 89 files created based on compliments about the paramedics' performance. 'Sensational Service' pins are delivered to paramedics with a letter from the Chief commending them on their extraordinary compassion, caring and kindness. Paramedics are recognized for not only the quality care they provide to their patients but also for ensuring that patients and their families feel comfortable, safe, and supported in their time of need.

City of Hamilton's Our City Survey

The City Manager's Office conducted a survey in 2019 called the "Our City Survey"[86] to gauge residents' level of satisfaction with city services (Appendix A-2). A representative sample of 5,771 respondents was contacted via telephone with an additional 3,374 people completing the survey on the City's website.

Results showed that a large majority of residents are satisfied with the services provided by HPS. In fact, results from the telephone survey showed HPS was one of the top ranked services for resident satisfaction with 91% of respondents indicating that the service is good, very good or excellent.

When asked to describe how Hamilton can achieve its vision of being the best place to raise a child and age successfully some residents indicated the need to invest in HPS to increase the number of ambulances and paramedics.

Over 89% of respondents from the phone survey perceived their health to be excellent, very good or good.

86 https://www.hamilton.ca/government-information/trust-and-confidence-report/our-city-survey

Employee Surveys

In the fall of 2017, the City of Hamilton conducted a survey of employees across all City Departments, called the Our People Survey (OPS). The OPS measured employee engagement. Employees' level of engagement affects organizational and work outcomes such as job performance and employee health.

Results for HPS were based on the responses of 141 HPS employees (Appendix A-3). Findings showed an overall engagement score of 55%, an improvement from the 2013 engagement score of 37% based on the results of a similar survey administered to HPS staff only.

During the Professional Development Days sessions in the spring of 2018, HPS staff were surveyed about the OPS results. They confirmed areas for improvement and suggested ways to make advancements. The results of their input informed the development of an action plan aimed at increasing employee engagement. The following are the focus areas of the OPS Action Plan:

- Career Advancement
- Workload/Staffing
- Recognition
- Morale

The City has just recently re-administered this employee survey in September 2021. Once the results have been shared in early 2022, the HPS Action Plan will be updated.

In addition to the City's survey and feedback at Professional Development Days sessions, there are suggestion boxes in stations that give staff the opportunity to provide input, suggestions, and ideas to management on an ongoing basis.

Peer Support Team

One of the ways HPS supports employee morale is through the Peer Support Team. The Peer Support Team, established in 2017, is currently comprised of 19 trained volunteer paramedic members and a mental health professional advisor.

The Peer Support Team responds to their colleagues' needs once they have identified a potential mental health issue. The objectives of the Peer Support Team are to:

- Provide a trained resource for peers to confide in, when faced with occupational and/or personal stressors that affect the person's mental health
- Bridge peers to an appropriate health care institution or health practitioner with the expertise to best assist with the person's challenges

In 2019, feedback about the Peer Support Team was obtained through a survey administered to paramedics. Results showed that all respondents were aware of the service and all respondents who utilized peer support indicated it was helpful. The majority (90%) of respondents reported they would contact the Peer Support Team again for assistance.

3.3 HPS User Profile

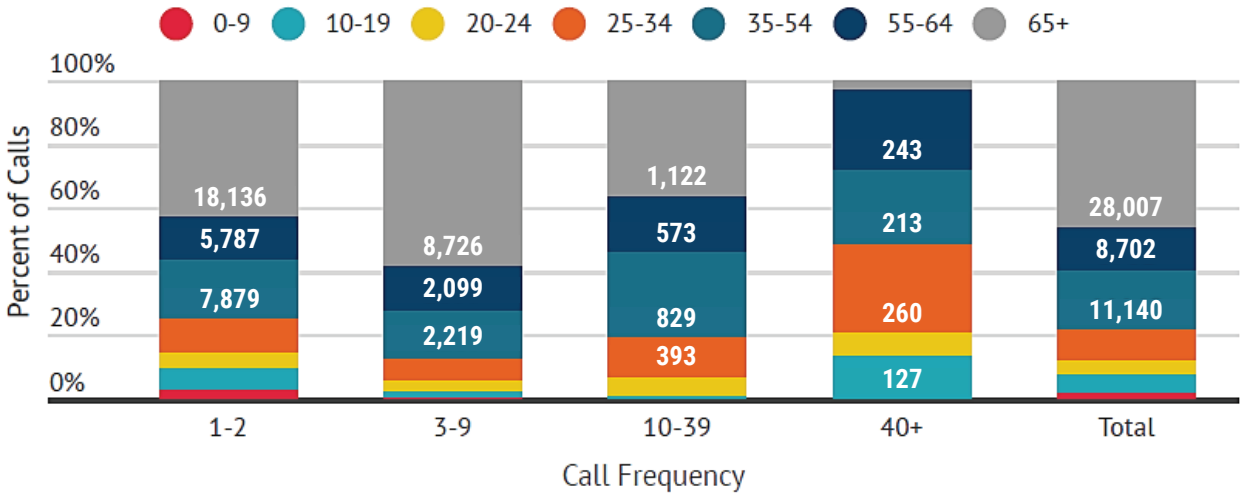
Hamilton Public Health Services conducted an analysis of 2018 patient call records to better understand the characteristics of people who access ambulance services multiple times (Appendix B).

A large portion (45%) of the 61,856 paramedic patients in 2018 were seniors age 65 years and older. Minor trauma was the most frequently reported concern for seniors, as it was for all age groups. Seniors also reported feeling unwell and respiratory problems, which were also common among the youngest patients (age 0 to 9 years).

While seniors made up the highest percentage (45%) of the total call volume in 2018, they made up the smallest portion (3%) of people who called for an ambulance 40 or more times. Seniors did, however, make up the highest portion of people who called between ten and 40 times in the year. Adults age 25 to 34 years were the largest portion (28%) of callers who called 40 times or more. Although youth age ten to 19 years represent only 5% of the call demand overall, they made up 14% of callers who called 40 or more times in 2018. Among the higher frequency callers, the most common issues were related to mental health and addiction. More high frequency callers are picked up by paramedics on the street, later in the day and transported to St. Joseph's hospital in downtown Hamilton.

However, most people (90%) called for an ambulance only one or two times in 2018. Nine percent of people who called 911 called between three and nine times during the year.

Patient Age Group by Call Frequency for All Logged Paramedic Calls with a Patient Interaction, City of Hamilton Paramedic Services 2018



Source: Hamilton Paramedic Service: A User Profile, Hamilton Public Health Services

Overall, the majority of calls (70%) to paramedic services have a return priority of moderate while 9% are very urgent. Fifteen percent of callers refuse to be transported by the ambulance to a hospital. There is a higher proportion of patient refusals among those who call more frequently, from ten to 39 times in the 2018. Common problems among people who refuse transport include 'no complaints,' that is, no obvious injuries were identified when paramedics arrived on scene and falls including lift assists. Mental health and addiction related issues also featured predominantly for higher frequency callers refusing transport.

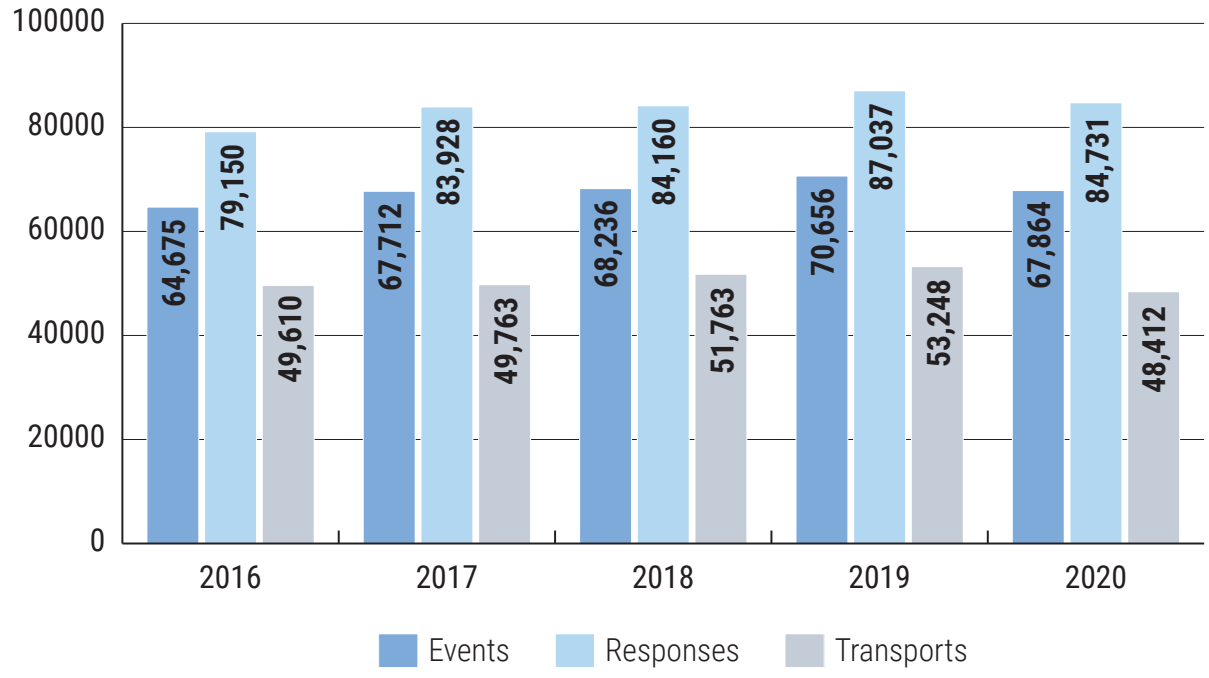
This Master Plan will recommend increasing the capacity to provide services through Mobile Integrated Health for those who most frequently call for an ambulance, particularly seniors and those struggling with substance use.

3.4 Service Demands

Servicing the fifth most populated city in Ontario means HPS is one of the busiest land ambulance services in the province. The demand on service can be demonstrated by the level of activity related to emergency responses. Prior to the pandemic HPS experienced an increase in service demands year-over-year. However, 2020 was a unique year for HPS service demands. It is the first time in many years HPS saw demand for service decrease, albeit marginally and temporarily. Since May 2020, there has been a steady significant increase and HPS is on track for an overall increase in service demand of 3.3% annually as previously forecasted.

The chart below illustrates the demand in service reported by number of events, responses, and transports from 2016 to 2020. Despite the decline in demand during the start of the pandemic, 2020 totals are only slightly below 2019.

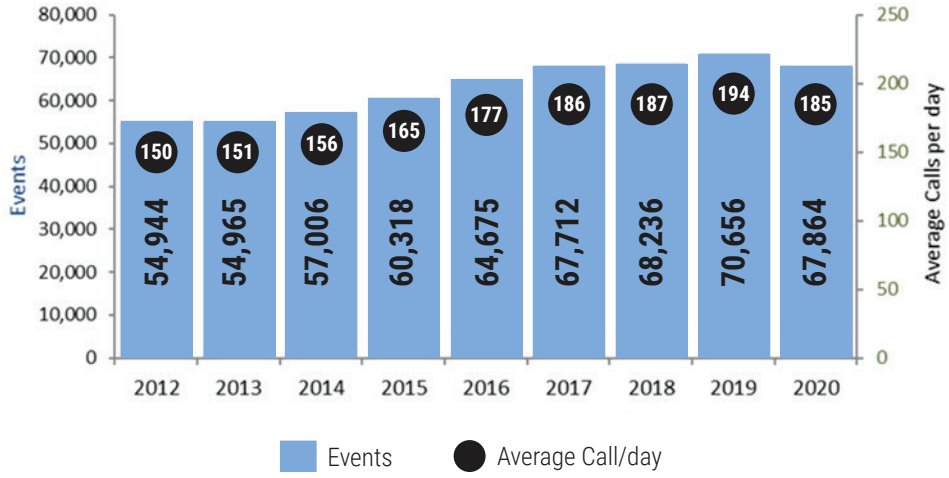
Hamilton Paramedic Service Events, Responses, Transports



Events

An event is generated every time a person calls 911 and requests the assistance of paramedics through CACC dispatch. HPS has seen an upward trend in events by an average of 3.6% each year from 2012 to 2019. In 2019, there was an average of 194 events per day. During the first three months of the pandemic in 2020, there was a daily average of 176 events. However, after May 22 and to the end of December 2020 events had escalated to an average of 222 per day, 14% higher than the 2019 daily average.

Hamilton Paramedic Service 9-1-1 Events



In 2020, HPS had a total of 67,864 events, an average of 185 per day. This is slightly lower than in 2019 due to the decline in demand for service during the onset of the pandemic as described above.

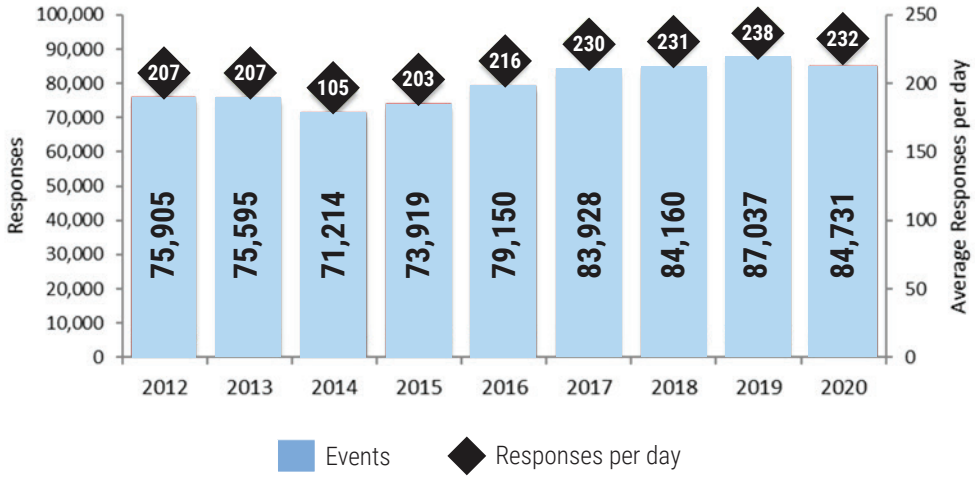
Responses

Responses are the number of paramedic vehicles that are sent to an event. This number is usually higher than the number of events as more than one vehicle is usually required to manage an emergency incident. For example, in the event of a motor vehicle collisions or a complex medical/traumatic emergency, multiple paramedic vehicles may be dispatched to respond.

Coinciding with a decline of 911 events at the beginning of the pandemic was a decline in responses in 2020. Responses decreased by 11% during the period of mid-March through May but rose to an average of 10% above the 2019 average in the latter part of the year.

In 2020, HPS dealt with a total of 84,731 responses with a daily average of 232 responses, slightly below the 2019 daily average of 238.

Hamilton Paramedic Service Responses



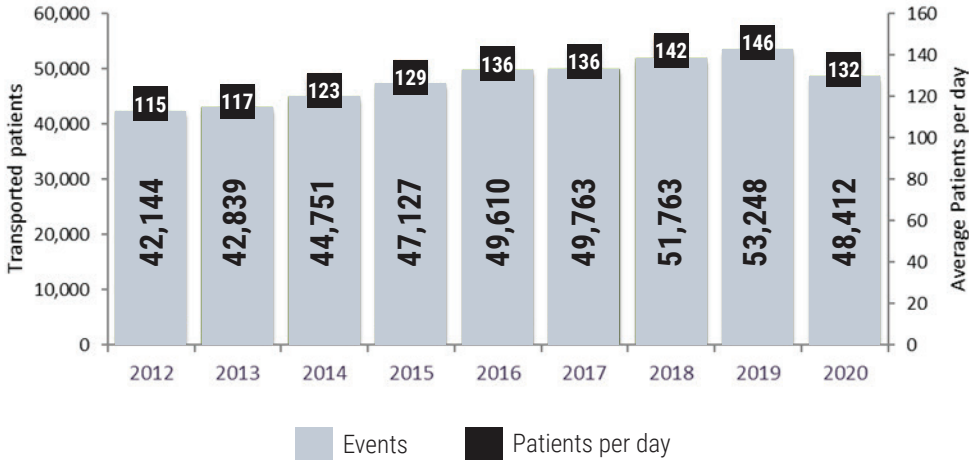
Transports

Transports refers to the number of times patients are transported to hospitals by ambulance. This number is typically lower than the number of events, as some patients decline transport to the hospital or are found not to require hospital services as determined through an assessment conducted by paramedics on scene.

Not surprisingly, the average number of transports to hospitals dipped to 20% below the 2019 average in the first three months of the pandemic. At the end of May 2020 when restrictions were relaxed, the number of transports increased but still remained below the 2019 average by 8%.

HPS carried out a total of 48,412 transports in 2020, with a daily average of 132 transports.

Hamilton Paramedic Service Transports



Response Time Compliance

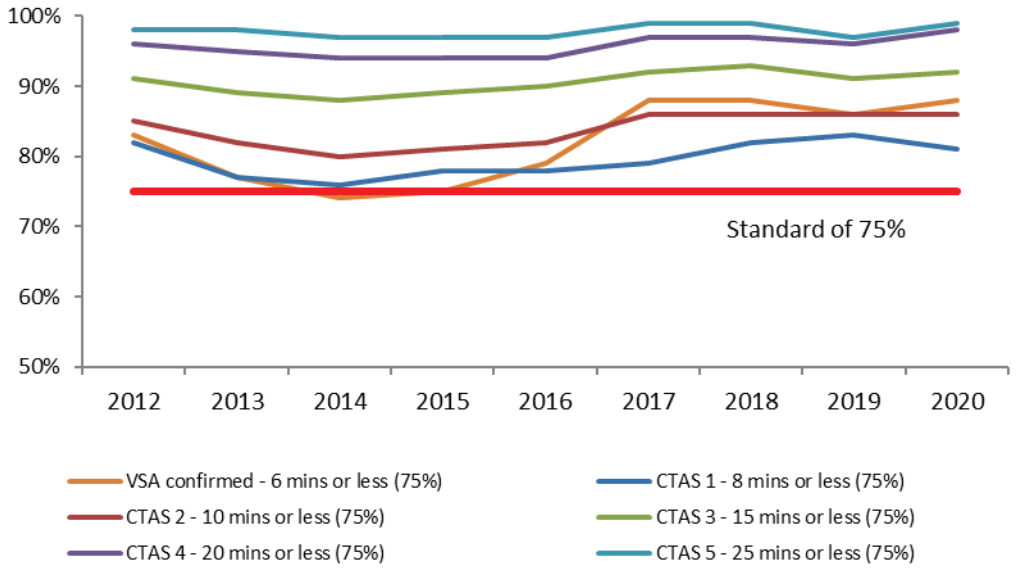
The *Ambulance Act of Ontario* requires that every paramedic operator in Ontario is responsible to establish and publicly report on response time performance. The City of Hamilton and MOH approved target response times based on the Canadian Triage and Acuity Scale (CTAS). CTAS is a triage system that prioritizes patient care by severity of the injury or illness. HPS is expected to achieve the target times in each CTAS category at least 75% of the time.

In 2020, HPS again surpassed the standard for achieving the target times for each CTAS category.

CTAS Category	Acuity Level	Target Time	Standard % of Time Target Time to be Achieved	% of Time HPS Achieved Target Time
Vital Signs Absent	VSA Confirmed	6 minutes	75	88
1	Resuscitation	8 minutes	75	81
2	Emergent	10 minutes	75	86
3	Urgent	15 minutes	75	92
4	Less Urgent	20 minutes	75	98
5	Non-Urgent	25 minutes	75	99

The graph below shows that as with previous years HPS met and exceeded the response time standards, as indicated by the red line, in each CTAS category again in 2020.

Hamilton Paramedic Service Response Time Performance



Despite the anomaly of a dip in service demand during the beginning of the pandemic in early 2020, the increase in calls since that time indicates a continuation of the upward trend HPS was experiencing pre-pandemic. With a growing population and an expected sharp increase in the senior population, it is anticipated that the demand for paramedic services will continue to rise over the coming years and decades. Through this Master Plan, HPS must ensure it has the capacity to meet these growing demands.

4.0

SYSTEM DRIVERS

OBJECTIVES

1. AN ADDITION OF FIVE 12-HOUR SHIFTS AT PEAK DEMAND HOURS, PROVIDING APPROXIMATELY 21,500 ADDITIONAL HOURS OF STAFFED AMBULANCE TIME ARE REQUIRED TO MEET EXISTING SERVICE DEMAND

2. AN ADDITION OF ONE AMBULANCE WITH TEN PARAMEDIC STAFF PER YEAR FOR THE NEXT TEN YEARS IS ANTICIPATED TO ADDRESS THE PROJECTED GROWTH IN SERVICE DEMAND

There are several factors that drive the HPS system of service delivery, key among them are people, service demand and service growth. Ensuring that there is an appropriate amount of staff to meet existing and future service demands is imperative for optimal performance.

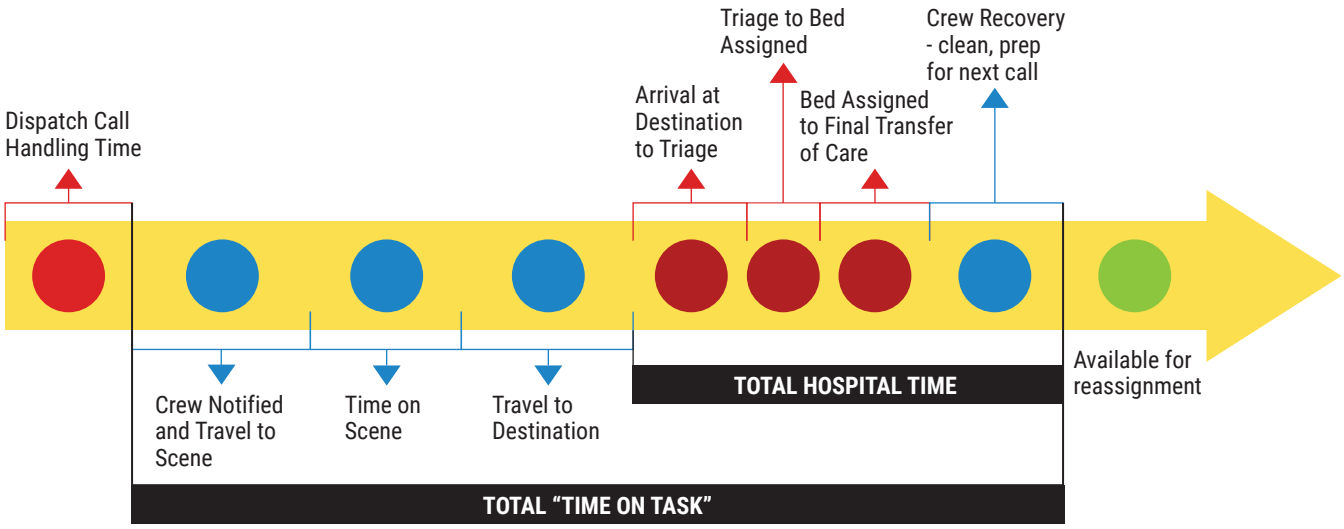
4.1 Current Demand

There are several basic principles that go into creating analysis of the staffing levels required to meet the demand for services. All of these need to be considered in combination with each other to adequately project the most appropriate staffing levels.

Aside from the very important people issues that arise from working in a stressful profession with unpredictable workload, there are two fundamental issues. Irrespective of resource placement issues, the primary variables involved in determining capacity requirements at a systems level are two-fold:

1. How many ambulance responses are required (demand); and
2. How long each response should take to complete (Time on Task, or ToT).

ToT is represented below and refers to the time when the paramedics are notified of a response, through to the time they are available for reassignment.



Principle 1: Demand multiplied by ToT = staffed ambulance hours required.

Modifying Principle 1, if there is a 12-hour shift, with exactly six responses required, each response taking exactly two hours, all of the responses equally spaced in time and only the total ToT matters rather than the individual time elements in the above figure, in theory one staffed ambulance for 12 hours could handle all of the responses in a timely manner. That is, as long as no one requires a meal, training, vehicle and equipment checks, vehicle and equipment cleaning, report writing, decompression from call activities and other non-response activity. The reality is that "non-response" activities are required and essential to delivering quality service.

Principle 2: Combined Time on Task for responses cannot consume the entire staffed shift as there are other non-response activities required.

Again, modifying Principle 1, ToT varies from call to call. Some calls will be cancelled prior to arrival at the scene. The distance, and therefore the travel time, to scene varies. Some calls are cancelled on scene and are therefore shorter. Some calls are longer on scene due to scene complexity and required procedures. Travel time to hospital varies dependent on which hospital the patient needs to be transported to and the variable distance to that hospital. The time required to transfer the care of the patient to hospital staff also varies. Additionally, the time to conduct an immediate readiness of equipment to respond to the next call prior to departing hospital varies dependent on what equipment was used and what immediate post-call cleaning is required.

Analysis of actual experienced ToT by hour of day, and day of week, demonstrates that it varies significantly across the hours of the day and the days of the week. For example, there were 1,248 discrete hour-long periods evaluated for 52 Mondays that occurred in 2019 (Appendix C-1). Analysis of the ToT by hour of day for the 12,006 responses performed shows significant variation across the hours of the day and the weeks of the year. While the average ToT across the 1,248 periods was 1.28 hours, the longest ToT during a single hour period was 4.22 hours occurring on the ninth Monday of the year between the hours of 2:00 and 3:00 a.m.

Similar time on task ToT analysis was performed by day of week and hour of day for all responses in 2018, 2019, and most recently the unique pandemic year of 2020. Including statistical analysis of the ToT to determine the average, the third quartile, the 90th percentile, and the 95th percentile by hour of day and day of week.

Principle 3: Time on Task predictably varies by hour of day and day of week, and that variance has to be included in the formula for calculating the required staffed ambulance hours to meet demand.

Heat mapping of the ToT by hour of day and day of week at the average, third quartile, and 90th percentile, demonstrates some predictability in the patterns. From a resource allocation perspective, ToT tends to be lower in the late evening and early morning hours and peaks significantly from mid-morning through early evening hours.

2019 Time On Task

	90% TOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	90% TOT	1.88	1.64	1.75	1.64	1.62	1.48	1.74	1.92	1.93	2.15	2.16	2.54	2.69	2.63	2.59	2.50	2.32	2.25	2.33	2.51	2.28	2.02	2.05	2.04
Tuesdays	90% TOT	1.89	1.69	1.74	1.73	1.62	1.60	1.69	1.94	1.94	2.24	2.63	3.19	3.31	3.46	3.32	3.19	3.32	2.87	2.57	2.99	2.65	2.37	2.49	2.18
Wednesdays	90% TOT	1.95	2.05	2.07	1.86	1.82	1.52	1.74	2.02	2.24	2.47	2.99	3.12	3.59	3.45	3.34	3.32	2.90	2.55	2.42	2.46	2.26	2.36	2.17	2.05
Thursdays	90% TOT	1.72	1.85	1.88	1.75	1.87	1.63	1.69	1.83	1.94	2.20	2.36	2.62	2.83	3.05	2.94	2.85	2.63	2.48	2.40	2.35	2.18	2.23	2.10	1.90
Fridays	90% TOT	1.74	1.81	1.70	1.62	1.75	1.54	1.70	1.95	1.99	2.32	2.48	2.70	2.80	3.09	3.14	2.92	2.65	2.68	2.53	2.77	2.45	2.35	2.19	2.12
Saturdays	90% TOT	1.93	1.65	1.84	1.70	1.74	1.61	1.67	1.82	1.86	2.10	2.57	2.74	2.80	2.94	3.09	2.93	2.69	2.49	2.36	2.59	2.31	2.27	2.14	2.06
Sundays	90% TOT	1.97	1.88	1.83	1.69	1.80	1.61	1.61	1.82	2.01	2.03	2.09	2.24	2.46	2.33	2.24	2.50	2.19	1.98	2.06	2.17	1.92	1.94	2.01	1.92

	3rd Quartile	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	3rd Quartile	1.41	1.37	1.32	1.36	1.31	1.21	1.33	1.51	1.59	1.62	1.60	1.71	1.75	1.82	1.88	1.83	1.76	1.60	1.62	1.62	1.57	1.44	1.42	1.46
Tuesdays	3rd Quartile	1.39	1.28	1.36	1.32	1.42	1.32	1.33	1.52	1.56	1.68	1.77	2.04	2.02	2.19	2.23	2.05	2.13	1.79	1.67	1.86	1.64	1.65	1.63	1.60
Wednesdays	3rd Quartile	1.47	1.47	1.49	1.43	1.43	1.22	1.37	1.53	1.66	1.69	1.93	2.01	2.23	2.17	2.18	2.14	1.98	1.74	1.71	1.77	1.60	1.55	1.54	1.48
Thursdays	3rd Quartile	1.34	1.45	1.47	1.35	1.46	1.30	1.31	1.50	1.58	1.64	1.68	1.79	1.92	2.00	1.95	1.95	1.99	1.67	1.66	1.61	1.57	1.54	1.57	1.44
Fridays	3rd Quartile	1.39	1.40	1.36	1.29	1.36	1.26	1.39	1.55	1.57	1.69	1.71	1.91	1.88	1.90	2.16	2.02	1.86	1.80	1.63	1.76	1.64	1.58	1.62	1.58
Saturdays	3rd Quartile	1.42	1.34	1.38	1.33	1.37	1.28	1.25	1.45	1.50	1.63	1.75	1.89	1.85	1.97	2.05	1.99	1.94	1.70	1.70	1.75	1.60	1.54	1.51	1.50
Sundays	3rd Quartile	1.52	1.41	1.33	1.34	1.51	1.29	1.26	1.45	1.51	1.62	1.57	1.64	1.63	1.74	1.73	1.73	1.67	1.55	1.51	1.61	1.48	1.48	1.52	1.46

	Average	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	Average	1.06	0.96	0.96	0.97	1.00	0.96	0.91	1.12	1.18	1.22	1.20	1.30	1.33	1.34	1.38	1.38	1.26	1.20	1.17	1.23	1.25	1.08	1.09	1.11
Tuesdays	Average	1.05	0.97	1.15	1.03	1.13	0.99	0.94	1.15	1.16	1.32	1.36	1.49	1.49	1.63	1.58	1.49	1.60	1.36	1.18	1.34	1.27	1.22	1.20	1.22
Wednesdays	Average	1.10	1.12	1.16	1.10	1.14	0.95	0.98	1.16	1.26	1.34	1.47	1.49	1.62	1.58	1.55	1.52	1.42	1.27	1.20	1.27	1.19	1.20	1.13	1.17
Thursdays	Average	0.98	1.08	1.09	1.03	1.13	1.03	0.95	1.04	1.19	1.31	1.27	1.31	1.40	1.46	1.42	1.40	1.39	1.24	1.22	1.18	1.19	1.18	1.16	1.07
Fridays	Average	1.04	1.09	1.09	1.01	1.04	0.98	0.94	1.16	1.13	1.26	1.32	1.38	1.44	1.45	1.56	1.45	1.37	1.33	1.19	1.32	1.23	1.20	1.23	1.13
Saturdays	Average	1.17	1.01	1.02	1.07	1.04	0.95	0.90	1.06	1.14	1.21	1.37	1.43	1.38	1.49	1.47	1.43	1.39	1.26	1.23	1.26	1.21	1.20	1.09	1.12
Sundays	Average	1.05	1.04	1.01	1.00	1.14	1.03	0.87	1.11	1.18	1.24	1.16	1.26	1.24	1.24	1.27	1.33	1.21	1.14	1.08	1.16	1.13	1.12	1.12	1.03

Principle 4: Use of a statistical measure of Time on Task matched to the experienced responses and expected growth and matched to shift patterns is required.

The Principle 1 formula includes two factors: ToT and responses. Analysis demonstrates that response volume varies from day to day, from hour to hour, and from week to week due to fluctuating demand. Some days have more motor vehicle accidents. Ice storms cause more falls. Heat waves cause more heat-related health problems. Events like the 2020 pandemic can cause less demand due to people's fear of going to hospital which occurred at the onset, or it can increase demand due to anxiety or delayed care which occurred in subsequent waves of the pandemic.

The number of responses performed was reviewed by hour of day and day of week for the calendar years 2013 through 2020. Appendix C-2 shows a representative sample of calls by hour of day for each day of the week for the 2019 fiscal year.

Analysis of actual experienced response volume by hour of day demonstrates that it varies significantly across the hours of the day and the days of the week. Using the same Mondays in 2019 time period example, there were 1,248 discrete hour periods evaluated for the 52 Mondays in 2019 (Appendix C-3).

For the 12,006 responses performed on Mondays in 2019 there was significant variation across the hours of the day and the weeks of the year. While the average number of responses across the entire 1.248 hours in the period was 9.6 per hour there were some hours with as few as one response and some hours with as many as 29. Similarly, while the average number of responses in a 24-hour period was 231, there were days with as few as 181 responses and days with as many as 282 responses.

Similar patterns and ranges of experienced response volumes are demonstrated for all of the years 2013 through 2020.

Principle 5: Responses predictably vary by hour of day and day of week, and that variance has to be included in the formula for calculating the required staffed ambulance hours to meet demand.

Heat mapping of responses by hour of day and day of week for 2019 demonstrates a pattern similar to the pattern shown for ToT. The maximum number of experienced responses per hour was lower during the late evening and early morning hours and higher through the later morning, afternoon, and evening hours.

Heat mapping of the maximum number of responses in 2019 for each hour period, by day of week, is provided below. Similar heat mapping for the years 2013 through 2020 is provided as Appendix C-4 with the same basic pattern demonstrated.

Maximum Responses by Hour of Day

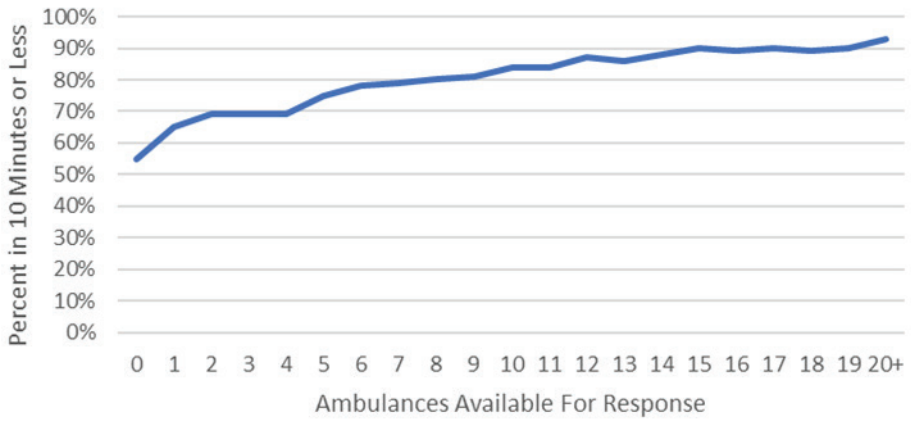
2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	16	11	15	14	9	10	19	18	22	22	25	22	29	27	30	23	23	22	26	26	29	20	22	15
Tuesdays	17	12	10	12	9	10	14	15	19	24	23	28	23	24	21	23	23	24	26	22	16	20	23	16
Wednesdays	16	12	12	14	10	16	14	16	21	22	28	25	24	27	27	28	24	22	18	27	20	16	18	17
Thursdays	14	11	13	10	10	10	14	19	24	24	20	22	21	25	23	24	25	32	22	22	23	19	20	18
Fridays	15	14	15	12	14	8	13	14	21	26	23	22	32	24	25	27	27	31	25	29	19	23	22	23
Saturdays	23	16	15	17	14	9	13	14	14	18	24	20	25	26	25	19	20	21	25	25	23	17	21	15
Sundays	16	18	16	14	10	9	17	15	17	19	25	19	25	22	23	18	24	23	33	18	19	25	21	19

Statistical measures were made for each day of the week including the number of responses at the 90th percentile and the 95th percentile. While use of a third quartile measure was considered it was rejected as it would result in very regular and predictable unavailability of ambulances for response.

Principle 6: Use of a statistical measure of Response Demand matched to the experienced responses and expected growth and matched to shift patterns is required.

Over the period 2013 through 2020 and carrying forward into 2021, HPS regularly experienced periods with few to no ambulances available to respond to demand. When this occurs, there is a demonstrable increase in response times to calls assessed by the dispatch as life-threatening or urgent. Utilizing diagnostic software developed by Darkhorse Analytics demonstrates that for the pre-pandemic year of 2019 when there were four or less ambulances available, the response times to calls assessed and dispatched as life-threatening emergencies were lengthened by more than three minutes and for less urgent calls for much longer time periods.

Response Time 10 minutes or less correlated to number of Ambulances available



Darkhorse Analytics has been used to evaluate not only the spatial and temporal aspects of call demand using the MOH provided ambulance dispatch data, but it has added an additional layer of complexity in being able to analyze system performance by time of day, day of week, call complexity as dispatched and as assessed by the responding paramedic, and by the number of ambulances available for response at the time of dispatch.

Sample extracts for 2018, 2019, and 2020 are attached at Appendix C-5 demonstrating the relationship between vehicle availability to emergency call response time with the additional parameters of time of day and day of week.

The chart below, using data for 2019 from Darkhorse Analytics summarizes the increased response time for Code 4 or life-threatening calls with a decrease in the number of available ambulances. In addition to the data for HPS ambulances the data also includes analysis of the response times for out of town ambulances assigned by the MOH CACC to emergency calls within the City of Hamilton which typically occurs during periods of narrowed resources.

First Arriving Ambulance (T2-T4)	Other Ambulance Service Response in Hamilton	Hamilton Paramedic Service Response – Code 4				
		All Code 4 Responses	0 to 4 Ambulances Available	5 to 9 Ambulances Available	10 to 14 Ambulances Available	15 or more Ambulances Available
90th % Time (Min-Sec)	13:50	11:15	13:44	11:56	10:51	10:01
% of all Code 4 Responses (n=48,749)	7.6%	92.4%	6.2%	24.5%	44.6%	17.1%

With existing staffing levels, HPS currently experiences a narrowing of resources causing risk of adverse events due to delayed responses. Choosing statistical measures for response demand and ToT to determine required staffing levels cannot result in less staffing hours than currently exist.

Principle 7: Required staffing calculations cannot result in levels of staffing that will result in levels of performance lower than those currently experienced.

Calculations of required staffed unit hours were performed for the various combinations of the statistical measures of both responses and ToT. Response measures of the average and third quartile of hourly responses were discounted as they would result in significant shortages of available ambulances given the actual experienced volumes.

2020 was a volatile year as a result of responding to the pandemic and changes performance. Thus, 2019 pre-pandemic experienced response volumes and ToT were utilized to avoid skewing longer term projections. A number of measures were used for calculation of required hours, which included:

a. The maximum experienced responses x the 90th percentile ToT

b. The maximum experienced responses x the third quartile ToT

c. The maximum experienced responses x the average ToT

d. The 95th percentile experienced responses x the 90th percentile ToT

e. The 95th percentile experienced responses x the third quartile ToT

f. The 95th percentile experienced responses x the average ToT

g. The 90th percentile experienced responses x the 90th percentile ToT

h. The 90th percentile experienced responses x the third quartile ToT

i. The 90th percentile experienced responses x the average ToT

Following Principle 7 that calculated levels of staffing cannot result in levels of performance lower than currently experienced, measures c, f, h, and i (highlighted in red) were discarded following evaluation results.

The ToT adjusted response volume for 2019 was created for each hour of the day and for each day of the week through multiplication of the actual experienced volume by the actual experienced ToT for that specific hour. The actual measures for the day of week and hour of day are reflected in Appendix C-6.

The resultant calculations for the measures listed above which do not result in staffing levels lower than are already in place are provided in Appendix C-7.

Performing retrospective evaluation of the potential model results the minimum recommended increase in staffing to meet hourly response demand as modified by the actual ToT. The resultant calculations for the response and ToT measures are reflected in Appendix C-8.

Recognizing there will be times during the year where response volume will be lower than average, average, or higher than average, and similarly the ToT will be lower than, at or above average, the ability to predict the exact matching is not precise. Experience, patterns, and retrospective application of the preferred staffing calculation conclusion to validate the choice is required.

Comparison of the results of the remaining statistical models with the experienced 2019 actual volumes and ToT and the 2020 approved staffing pattern (which is one 24-hour ambulance more than the 2019 staffing pattern) indicates that for the 2019 calendar year the minimum recommended level of staffed ambulance hours would be the model reflective of the 95th percentile of demand and the third quartile of ToT.

95th Percentile x3rd Quartile Time on Task																								
2019 Calendar	00.01	01.02	02.03	03.04	04.05	05.06	06.07	07.08	08.09	09.10	10.11	11.12	12.13	13.14	14.15	15.16	16.17	17.18	18.19	19.20	20.21	21.22	22.23	23.24
Mondays	18.5	13.9	14.3	15.1	10.2	10.8	19.9	20.8	26.0	33.9	36.2	34.1	41.7	39.5	40.1	40.5	33.5	32.7	36.7	32.4	33.3	26.7	25.6	19.5
Tuesdays	20.0	13.5	13.0	12.4	13.1	11.2	16.1	19.7	26.4	35.0	41.8	48.3	45.7	48.7	43.8	43.9	45.1	37.6	36.1	37.4	25.6	29.3	29.3	22.7
Wednesdays	17.6	16.4	15.9	13.1	12.1	12.8	16.7	21.0	28.8	32.2	43.3	45.2	52.3	45.4	52.3	52.3	40.7	36.2	30.7	37.7	27.2	23.5	23.4	21.7
Thursdays	16.7	14.9	15.5	12.0	12.8	11.5	15.3	23.1	29.9	35.8	31.8	37.8	40.0	43.8	40.2	44.6	40.5	38.5	34.9	31.9	30.2	27.2	26.0	21.3
Fridays	17.0	17.5	14.9	12.5	12.1	10.6	15.8	22.3	27.2	34.9	36.5	40.8	44.4	38.6	46.6	46.1	38.2	42.9	33.1	39.8	28.2	28.6	30.0	26.8
Saturdays	23.9	19.2	20.3	17.1	13.8	10.5	14.5	20.1	21.3	26.0	32.3	33.7	39.6	45.1	40.1	37.2	37.2	33.8	38.4	36.1	29.8	26.9	27.1	21.0
Sundays	23.4	20.0	18.9	17.2	15.2	11.1	18.4	19.7	22.4	27.6	30.9	29.8	36.1	37.1	37.3	31.4	29.5	31.0	37.0	28.0	27.2	29.0	26.0	19.7

Meeting the unit hours calculated by this model would require approximately 21,500 additional staffed ambulance hours, the equivalent of five 12-hour shifts, 7 days a week, 52 weeks of the year. Thus, it is the objective of this Master Plan that five additional 12-hour shifts, focused on peak demand hours and providing approximately 21,500 hours of additional staffed ambulance time, are required to meet existing demand. This will require 2.5 ambulances that can operate 24 hours a day plus an additional 25 paramedics to fill these shifts. While this is an immediate need, a staged-in approach will be explored in which an additional ambulance per year for three years is implemented.

The analysis and objective from statistical data is supported by the Darkhorse Analytics Diagnostics Analyzer and the Deployment Analyzer tools. Using information in these programs for the years 2018, 2019 and 2020 demonstrates that approximately 84% of all Code 4 calls are responded to within ten minutes which has been the Hamilton benchmark since the 2000 assumption of responsibility for land ambulance service delivery.

In addition to providing response time analysis at a macro level the tool further provides the ability to segment the data by geographical area including analysis at a Ward level. Not surprisingly there are variances by Ward (Appendix C-9) due to density, population, distances, and demographics and these can be summarized in the table below.

Overgoal Calls (>10 Minutes) - Number and Percent of Total Code 4

	2018			2019			2020		
	Overgoal	Total C4	Percent in Goal	Overgoal	Total C4	Percent in Goal	Overgoal	Total C4	Percent in Goal
Ward 1	512	3,164	83.8%	485	3,130	84.5%	446	2,849	84.3%
Ward 2	559	7,231	92.3%	578	7,277	92.1%	622	6,944	90.0%
Ward 3	582	6,814	91.5%	680	6,948	90.2%	571	6,857	91.7%
Ward 4	666	3,588	81.4%	717	3,652	80.4%	618	3,601	82.8%
Ward 5	713	4,103	82.6%	671	4,004	83.2%	629	3,828	83.6%
Ward 6	292	2,230	86.9%	238	2,433	90.2%	231	2,472	90.7%
Ward 7	434	4,018	89.2%	382	4,083	90.6%	339	3,676	90.8%
Ward 8	424	2,573	83.5%	388	2,676	85.5%	385	2,573	85.0%
Ward 9	427	1,427	70.1%	471	1,529	69.2%	505	1,551	67.4%
Ward 10	404	2,112	80.9%	420	2,200	80.9%	371	2,080	82.2%
Ward 11	329	1,166	71.8%	367	1,253	70.7%	382	1,226	68.8%
Ward 12	438	1,872	76.6%	560	2,103	73.4%	485	1,983	75.5%
Ward 13	674	2,348	71.3%	658	2,247	70.7%	658	2,276	71.1%
Ward 14	449	2,055	78.2%	450	2,175	79.3%	393	2,083	81.1%
Ward 15	261	1,117	76.6%	228	1,134	79.9%	249	1,082	77.0%
TOTAL	**7,164**	**45,818**	**84.4%**	**7,293**	**46,844**	**84.4%**	**6,884**	**45,081**	**84.7%**

Source: Darkhourse Performance Analyzer

While staffing and resource increases in 2018, 2019 and 2020 clearly maintained the system performance in the face of increasing call demands there were no overall system improvements demonstrated. To generate system improvements, additional resources allocated in the best locations are required. Over the 2018 to 2020 period 6,800 to 7,300 calls – an average of 18 to 20 per day – that were dispatched as life-threatening emergency calls had an ambulance response time greater than ten minutes.

Utilizing the Darkhorse Deployment Analyzer, with adjustment based on the actual improved performance experienced as result of dynamic deployment rather than the simple station based deployment possible in the Darkhorse tool, the addition of five ambulances (12-hour shifts) combined with redeployment of existing resources to areas with lesser performance should result in an overall improvement of 5% in system performance. This 5% improvement would bring the combined system performance for the city for having an ambulance resource on scene for calls dispatched as life-threatening emergencies to ten minutes 90% of the time (Appendix C-10).

At a more detailed level the modeling shows the most significant improvements can be expected in Wards 4, 5, 8, 9, 10, 11, 14, and 15.

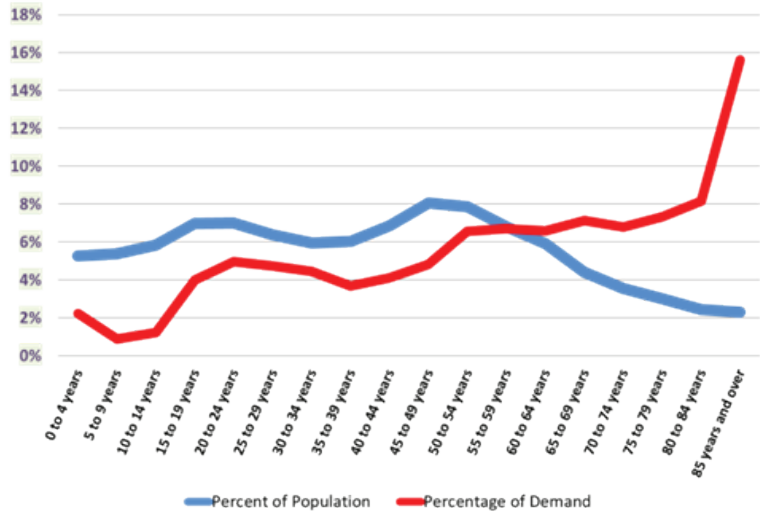
4.2 Projected Demand

Apart from the recommended staffing increases to appropriately meet existing demand there is a need to project demand increases as the served population increases and the demographics shift.

Utilization of, and reliance on, ambulance service is related to the age of the population. While the percent of Hamilton population above the age of 65 is just under 20%[87] that population accounted for 46% of all patients transported to hospital by ambulance in 2019.

Hamilton's population in general and the portion of Hamilton's population above the age of 65 are both projected to increase over the next 10 years.

Call Demand Distribution By Age Groups

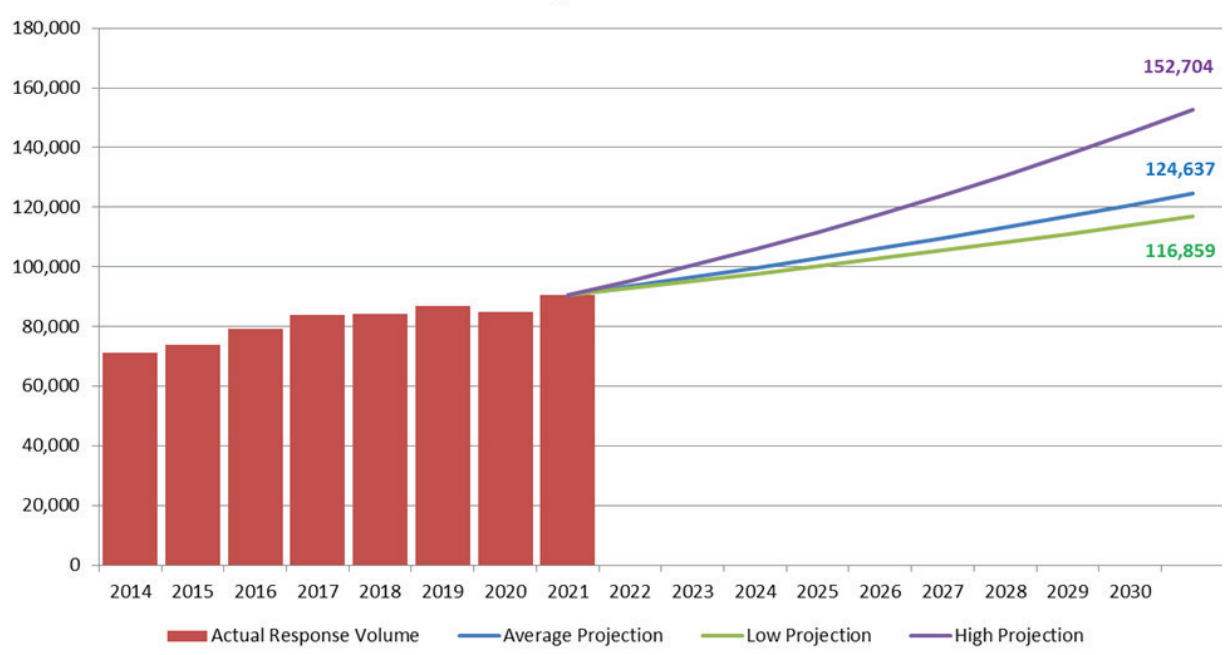


87 Statistics Canada https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3525005&Geo2=CD&Code2=3525&SearchText=hamilton&SearchType=Begins&SearchPR=01&B1=All&TABID=1&type=0

Response volume and demand for service has increased at an average rate of 3.3% per year over the period 2014 through the current 2021 year-end projection. While the 2020 pandemic year saw significant fluctuations through the year, including major declines in the months of March, April, May, and June the remaining months saw increases.

Actual response volume was projected forward over a 10-year period, utilizing the lowest average increase per year (2.6%), the average increase per year (3.3%), and the highest average increase per year (5.4%).

Actual Response Volume 2014 through 2021 with Average, Low, and High Projected Growth



Using the low, average, and high projections, an average annual response increase in the low range of 2,600 (average increase of 7 responses per day) and in the high range of 6,220 (an average increase of 17 response per day) can be anticipated.

To keep pace with the projected increases in response volume at the low to average projection levels, 24 hours of additional ambulance staffing each year for the next 10 years is required.

Darkhorse Analytics provides a similar view of the potential increases. In their analysis, and development of the projected Incident or Event volumes in 2031 they have linked currently planned development in the City of Hamilton, known planned road network changes, and the anticipated demographic shifts in the population.

This approach differs slightly from the HPS statistical analysis projected through to 2031 using the number of responses. This analysis is based on the understanding that there is often a need to respond with more than one ambulance to an event. Incidents involving more than one patient or where there is a significant complexity to the call require additional paramedic attendance. The ratio of responses to events over the last several years has been in the area of 1.2 responses per event. While the Darkhorse Analytics projection is for an increase in events of over 8% per year, the HPS review suggests continuing to plan for our annual statistical average increase with annual review.

In the Darkhorse Analytics projection, the growth in demand by geographic area, and the impact by ward, is clearly demonstrated in the maps attached as Appendix C-11. Significant increases in demand will be experienced in all Wards in the city, with the highest levels experienced in Wards 1, 9, 10, 11, and 15.

Incidents (Events)

	2018	2019	2020	2031 Projection	2020-2031 Change	
Ward 1	3,566	3,583	3,509	8,919	5,410	154%
Ward 2	8,595	8,722	8,422	14,115	5,692	68%
Ward 3	7,852	8,081	8,149	12,864	4,715	58%
Ward 4	4,856	4,914	4,919	7,398	2,479	50%
Ward 5	6,433	6,343	6,241	8,925	2,685	43%
Ward 6	2,912	3,264	3,351	4,928	1,577	47%
Ward 7	4,526	4,847	4,436	7,192	2,756	62%
Ward 8	3,380	3,490	3,363	5,143	1,779	53%
Ward 9	1,586	1,846	1,844	6,885	5,041	273%
Ward 10	2,544	2,733	2,653	6,328	3,675	139%
Ward 11	1,755	1,714	1,706	8,095	6,389	374%
Ward 12	2,351	2,521	2,392	4,162	1,770	74%
Ward 13	2,725	2,704	2,813	5,054	2,242	80%
Ward 14	2,446	2,636	2,482	4,058	1,576	63%
Ward 15	1,202	1,269	1,215	5,261	4,046	333%
TOTALS	**58,746**	**60,688**	**59,514**	**109,327**	**51,832**	**87%**

Source: Darkhourse Deployment Analyzer

With no additional staff over and above the 2020 Council approved staffing levels, the Darkhorse Analytics projections, based on the anticipated 2031 service demand levels, would see a decrease in levels of performance, as measured by the number of life-threatening calls with a paramedic resource on scene in 10 minutes or less.

Without additional resources to the 2020 staffing pattern, with the projected growth through to 2031, there would be more calls taking more than 10 minutes to get an ambulance on scene, an overall decrease in performance of 15%. As demonstrated in the tables below all Wards would be impacted with the most significant impacts being in Wards 1, 5, 9, 10, 11, and 15.

Overgoal Calls (>10 minutes)

	2018	2019	2020	2031 Projection	2020-2031 Change	
Ward 1	907	919	909	3,149	2,240	247%
Ward 2	1,003	1,029	949	2,389	1,441	152%
Ward 3	1,207	1,262	1,259	2,616	1,357	108%
Ward 4	1,745	1,784	1,720	3,532	1,813	105%
Ward 5	2,384	2,397	2,269	4,608	2,339	103%
Ward 6	660	770	755	1,733	978	129%
Ward 7	861	976	833	1,967	1,135	136%
Ward 8	942	1,012	942	1,769	826	88%
Ward 9	842	1,006	1,006	5,520	4,514	449%
Ward 10	1,173	1,251	1,195	4,417	3,222	270%
Ward 11	962	917	979	6,179	5,200	531%
Ward 12	1,132	1,259	1,138	2,376	1,238	109%
Ward 13	1,190	1,186	1,181	2,841	1,660	140%
Ward 14	863	954	855	1,885	1,030	120%
Ward 15	657	688	644	3,525	2,881	447%
TOTALS	**18,546**	**19,428**	**18,654**	**48,508**	**31,874**	**171%**

Source: Darkhourse Deployment Analyzer

Performance <10 minutes

	2018	2019	2020	2031 Projection	2020-2031 Change	
Ward 1	75%	74%	74%	65%	-9%	-13%
Ward 2	88%	88%	89%	83%	-6%	-6%
Ward 3	85%	84%	85%	80%	-5%	-6%
Ward 4	64%	64%	65%	52%	-13%	-20%
Ward 5	63%	62%	64%	48%	-15%	-24%
Ward 6	77%	76%	77%	65%	-13%	-16
Ward 7	81%	80%	81%	73%	-9%	-11%
Ward 8	72%	71%	72%	66%	-6%	-9%
Ward 9	47%	46%	45%	20%	-26%	-56%
Ward 10	54%	54%	55%	30%	-25%	-45%
Ward 11	45%	47%	43%	24%	-19%	-44%
Ward 12	52%	50%	52%	43%	-9%	-18%
Ward 13	56%	56%	58%	44%	-14%	-24%
Ward 14	65%	64%	66%	54%	-12%	-18%
Ward 15	45%	46%	47%	33%	-14%	-30%
TOTALS	**71%**	**70%**	**71%**	**56%**	**-15%**	**-22%**

Source: Darkhourse Deployment Analyzer

However, these projected demand increases may be reduced through the continued implementation of programs such as Community Paramedicine (now referred to as Mobile Integrated Health (MIH) in some services including Hamilton), which are designed to proactively look after clients or patients before exacerbation of illness requires a 911 response. Funding for transformational programs such as this is currently 100% provincial as a health care cost although funding is not permanent. Effective transformation and expansion of Community Paramedicine (or MIH) combined with dispatch reform and implementation of a central clinical hub (described later in this Master Plan) with well-developed clinical pathways, alternative response models and systems integration may reduce the anticipated demand growth curve.

As the impact of alternative programs is not assured and certainly will not be felt immediately, the addition of ambulance resources to meet growth in demand should be anticipated at an additional 24 hours of staffing per year but remain part of the annual budget process.

At the average growth level and the consequent anticipated need for additional annual staffing, there is potential for up to 10 additional ambulances (one per year) and 100 full-time equivalent paramedic staff (10 per year) over the 10-year period of this Master Plan. The growth in response demand can be anticipated to require an additional 8,760 hours of on-site ambulance staffing each year over the next 10 years. This Master Plan therefore recommends that the addition of one ambulance with 10 paramedic staff per year for the next years be anticipated to address the projected growth in service demand

This level of increased resourcing will also necessitate additional ambulance stations to provide space for crews and vehicles and additional logistics support to provide vehicle and equipment readiness, cleaning, and inventory management of supplies. Objectives related to facilities and logistics support are made later in this Master Plan in sections 6.0 and 5.7 respectively.

Annual staffing enhancements will also require additional supervisor time to achieve an ideal span of control that allows for better communication and support of paramedic staff. Furthermore, as the number of paramedic staff increases annually, the need for professional development staff to coordinate and conduct mandatory training will need to increase.

The need for additional supervisory and support staff such as professional development staff will be reviewed annually as part of the annual operating and capital budget process.

5.0

SYSTEM OPTIMIZATION

There are a number of ways that the HPS can optimize a system of service delivery to ensure the provision of timely, effective, and efficient high-quality services to people in Hamilton. This section will describe the ways in which the HPS can achieve optimal performance.

5.1 Dispatch

OBJECTIVE

3 PURSUE OPERATIONAL RESPONSIBILITY OF HAMILTON'S LAND AMBULANCE DISPATCH WITH CORE DISPATCH FUNDING REMAINING A PROVINCIAL RESPONSIBILITY

In March 1998, the MOH and the Red Tape Commission created the Land Ambulance Transition Taskforce (LATT) to address changes contemplated with the revisions to the *Ambulance Act* which were to take effect in the year 2000. The LATT developed a series of recommendations for a patient-focused ambulance system that is seamless, accessible, accountable, integrated, and responsive. While many of the LATT recommendations were addressed, one that remains outstanding is ambulance dispatch reform. The LATT identified the need to integrate the operation of the dispatch with the municipal paramedic service delivery.

In 2001, the IBI Group conducted a review of HPS operations and reported a number of challenges with Hamilton CACC:

- Serious shortage of personnel at all levels
- Inability to sustain minimum coverage
- Rapid turnover in staff attributed to high workload, stress, and relatively low wages
- Absence of experience at communicator level due to high staff turnover
- Communicator staffing falling short of the calculated model requirement
- CACC staffing model underestimates the true staffing requirements
- CACC would benefit from a well defined and active quality assurance program
- Management presence needs to be strengthened
- Communications protocols between fleet and CACC should be reviewed

The IBI report, while dated, outlined the differences between "level of effort" land ambulance provision as opposed to "performance based" land ambulance service. In this distinction the report clearly identified the need for accountability of the ambulance dispatch operations to municipal officials responsible to monitor the quality of their ambulance operation performance while attempting to control costs. A performance-based system is only made possible where the operation of the dispatch centre which controls both the assessment and prioritization of calls and the movement and activities of the ambulance resources is wholly aligned and responsive to the actual ambulance service operations.

Fully integrating and aligning the CACC operations with paramedic services requirements provides opportunities for innovation and improved service to the community. With a 90th percentile emergency dispatch call handling time of more than three minutes, the dispatch operations continue to consume a large portion of response time. Given that the CACC is under its own management, services are unable to effectively influence the operations of the CACC.

The success of this approach was demonstrated by Toronto Paramedic Services well before paramedic services were downloaded to municipalities. Toronto successfully took responsibility of land ambulance dispatch operations and implemented several types of innovative technology to support communicator decision-making and operational performance in combination with the MOH's Computer Aided Dispatch (CAD) software. Toronto also moved to the more precise Medical Priority Dispatch System (MPDS) triage tool and integrated other technology such as CADPortal, Headstart, smartphone digital paging. Progress by Niagara and more recently Ottawa has been similar to that experienced in Toronto.

A more effective and efficient system of dispatch is one in which the ambulance service that is impacted by the dispatch system develops the solutions to dispatch challenges. Assuming responsibility of dispatch would allow for innovative solutions including more timely technological advances. For example, including secondary clinical advice, screening and call diversion at dispatch to better triage calls can help improve hospital offload delay performance. Placing a clinician in dispatch is also discussed in relation to community paramedicine (see Section 5.3 on Mobile Integrated Health). Innovation could also take the form of placing a senior ACP in dispatch to provide advice on Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) incidents and other technical operations. Innovative solutions might also include an online booking system for inter-facility transfers and pre-populating and targeting the details of transfer requests to minimize the call-taking process that currently exists.

To better align and integrate the operations of dispatch with HPS and allow for innovation to improve service delivery, it is recommended in this Master Plan that HPS pursue and advocate dispatch operational responsibility be transferred to HPS. The MOH would continue to provide shared communications infrastructure, core funding and regulatory oversight.

5.2 Deployment

OBJECTIVES

4 INCREASE THE NUMBER OF ADVANCE CARE PARAMEDICS (ACPs) TO A LEVEL THAT ENABLES 90% OF CALLS REQUIRING ACP INTERVENTION TO HAVE AN ACP RESPONSE

5 REDEPLOY EMERGENCY RESPONSE VEHICLES (ERVs) TO IMPROVE RESPONSE TIME PERFORMANCE

6 UPDATE THE TIERED RESPONSE AGREEMENT (TRA) TO REDUCE UNNECESSARY USE OF HAMILTON FIRE DEPARTMENT RESOURCES ON MEDICAL CALLS TAKING INTO CONSIDERATION THE IMPACT OF THE MODIFIED TRA DURING THE PANDEMIC

Advance Care Paramedics

As described earlier, HPS employs two levels of paramedics, Primary Care Paramedics (PCPs) and Advance Care Paramedics (ACPs). PCPs perform controlled medical acts to effectively treat the majority of patients' illnesses or injuries. ACPs utilize more advance knowledge and skills to treat more complex medical or traumatic injuries. An outline of the scope of practice for PCPs and ACPs can be found in Section 3.2.

The severity of a patient's condition determines the level of medical intervention required by a paramedic. The Canadian Triage and Acuity Scale (CTAS) establishes the levels of severity of a patient's condition. CTAS levels are used by paramedics and hospitals to ensure consistency on how a patient is triaged.

Resuscitation

- Threats to life, limb or function
- Immediate aggressive intervention required

Emergent

- Potential threats to life, limb or function
- Rapid intervention required

Urgent

- Conditions that could progress to a serious problem
- Potential to require emergency intervention

Less Urgent

- Conditions related to age, distress, potential for deterioration or complications
- Intervention within 1-2 hour

Non-Urgent

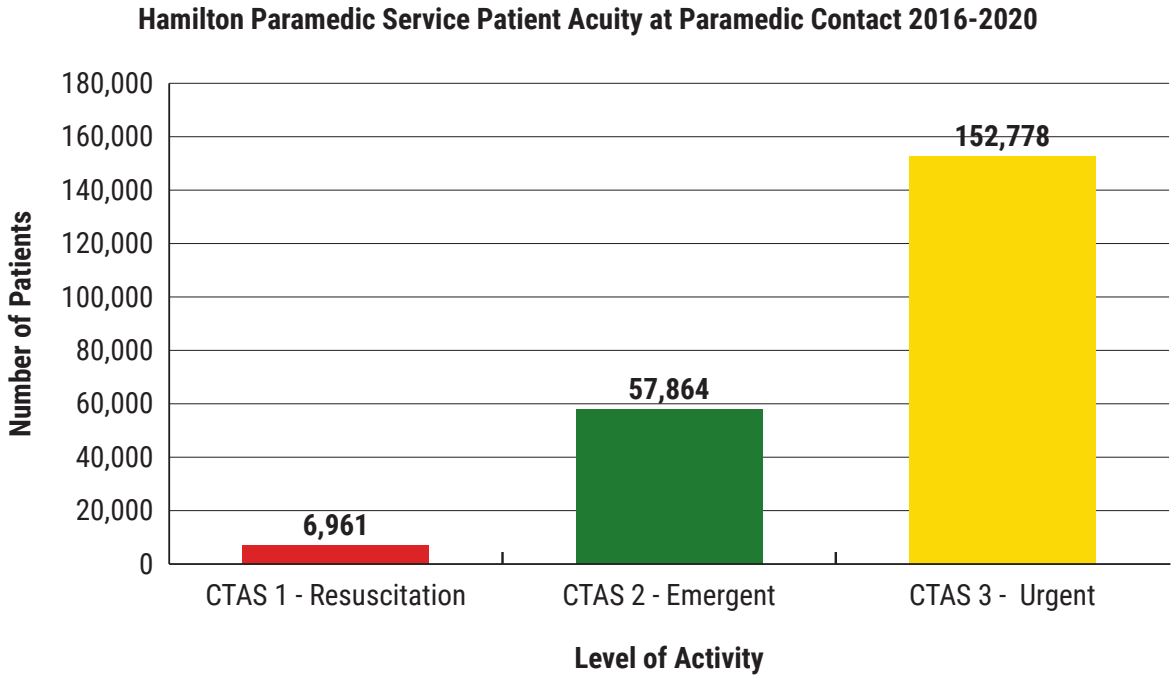
- Conditions that are acute but non-urgent, includes chronic problems with or without deterioration
- Intervention can be delayed or referred to other areas of health care system

CTAS levels 1 and 2 encompass critically ill or injured patients who require priority attention. Such conditions as cardiac arrest, respiratory arrest, severe respiratory distress, or unconsciousness are considered a CTAS 1. CTAS 2 includes moderate respiratory distress, vomiting blood, hypertension, altered levels of consciousness, severe fever, chest pains and major blunt trauma among other conditions. Conditions that are determined to be a level 1 and 2 on the CTAS scale require paramedics with advanced care training to provide life-saving interventions such as intravenous therapy, intubation, needle thoracostomy and administering more complex medications such as morphine, dopamine or adenosine.

CTAS 3 includes conditions such as shortness of breath, hypertension, and vomiting. Although CTAS 3 conditions are not as acute, they may require measures such pain control through medication and minor stabilization interventions such as intravenous therapy. As such, ACP assessment and skills may better support the needs of CTAS 3 level conditions.

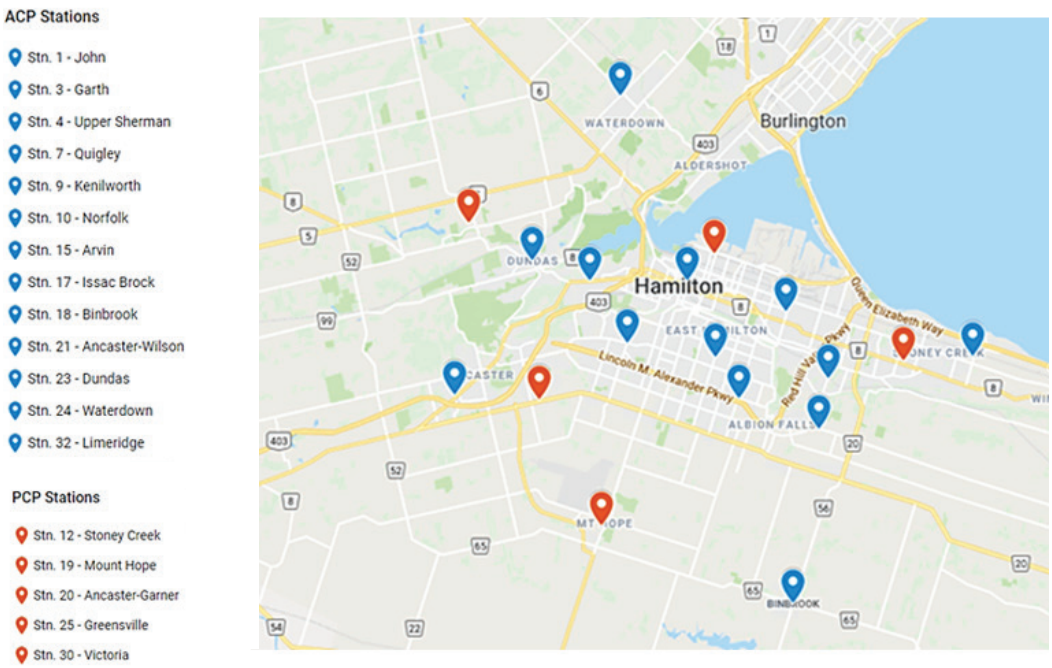
Patients identified at CTAS levels 4 and 5 have less severe conditions such as sunburns, minor cuts and minor bites caused by animals and insects. At these levels of acuity there is typically little to no medical intervention that requires ACP skills. However, their additional base knowledge is beneficial in assessing low acuity calls to determine whether transport to hospital is required or if the patient can safely be shifted to an alternative destination or referral rather than transporting to hospital.

The following chart shows the number of patients from 2016 to 2020 identified by Hamilton paramedics as scoring levels 1, 2 and 3 on the CTAS scale.



Over five years from 2016 to 2020, more than 217,000 patients were considered to have higher acuity conditions and therefore potentially required an ACP for medical intervention.

Currently, about 17% of paramedics are ACPs, including part time staff. They are deployed from various stations across the city as indicated by the blue marker in the map below:



Not all vehicles in these stations are staffed with an ACP. Currently, the HPS utilizes a dynamic staffing model in which the number of vehicles staffed matches call demand. Therefore, during peak hours more vehicles are added to handle the increase in calls. There are 13 vehicles designated as ACP resources with from six to 13 ACP staffed vehicles on duty each day.

In addition to having a limited number of ACP staffed vehicles, the current dispatch system requires the closest ambulance be assigned to emergency calls rather than the closest ambulance with the best matched skillset. This results in ACPs being assigned to calls for which their skills are not necessarily required. It further results in situations where an ACP ambulance has to be "layered" as a second vehicle responding to calls which require critical ACP interventions.

As previously described, the MOH oversees the dispatch centre, CACC. CACC is responsible for receiving 911 medical calls, triaging the patient's condition, and assigning appropriate paramedic service recourses to the call. Currently, CACC uses the Dispatch Priority Card Index II (DPCI II) to determine the priority of the call. However, this tool is not sensitive in the questions to be asked of the 911 caller. This lack of detail can lead to inadequate information causing the dispatcher to make a determination about the patient's condition that is different than the outcome of the assessment made by paramedics when they arrive on scene. Furthermore, the DPCI II utilizes just four priority levels, two for emergency response and two for non-emergency response. As such, it has a low level of sensitivity and specificity. Consequently, DPCI II tends to over-prioritize calls resulting in the use of lights and sirens, deploying multiple vehicles and/or ACPs when they are not required. Recognizing the issue of dispatching resources unnecessarily, the province has committed to replacing the DPCI II tool with the Medical Priority Dispatch System (MPDS). MPDS would enable high sensitivity and specificity allowing for more appropriate response levels when dispatching paramedics. While the original provincial plan would have seen MPDS implemented in late 2019 or early 2020, the actual implementation of this dispatch reform is not expected until at least 2023.

With limited ACP resources being utilized for calls that do not require that level of knowledge and skill, the number of ACPs available to attend CTAS 1 and 2 calls that require ACPs is diminished. In fact, from 2016 to 2018 an ACP attended a CTAS 1 call just over 53% of the time and a CTAS 2 call almost 39% of the time.

CTAS at Patient Contact	# of Patient Records	ACP Attended Events	% Compliance of ACP at Events
1	4,729	2,516	53.2%
2	35,793	13,773	38.5%

Source: Interdev iMedic database

In order to ensure ACPs are more readily available when required, this Master Plan recommends increasing the number of ACPs to a level that would enable at least 90% of the calls requiring ACP intervention to have an ACP response. The benefits of this approach include:

- Higher level of care to all patients no matter their condition or level of acuity
- Increase in available ACP resources for emergency calls (even if ACPs are also dispatched to non-emergency calls)
- Reduction in dual responses when PCPs arrive at a call first and determine they need to call in an ACP as well

HPS will increase the number of ACPs in its workforce through the annual recruitment process and through the City of Hamilton's tuition reimbursement program for existing PCPs who would like to obtain ACP certification.

Emergency Response Vehicles

An Emergency Response Vehicle (ERV) is a vehicle that responds to medical emergencies and is staffed by one paramedic to provide emergency medical services without the ability to transport patients. ERVs are used by paramedic services for the following purposes:

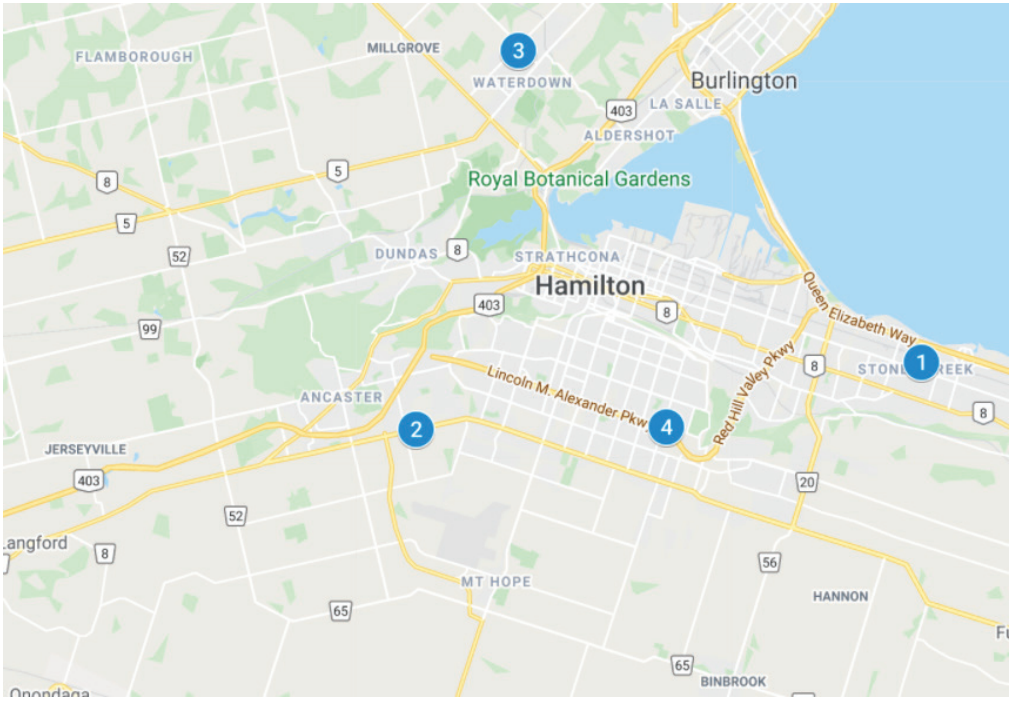
1. To provide a rapid response and initiate care by a trained paramedic when an ambulance is not immediately available
2. To provide enhanced clinical expertise by an ACP, when there are limited ACP resources on an ambulance
3. For critical medical or traumatic patient conditions, to augment ambulance response by providing a second trained paramedic, therefore effectively increasing the quality of care a patient receives

Unit hour utilization (UHU) is a proxy to determine the productivity of a paramedic service vehicle. When compared to HPS ambulances, ERVs' productivity ranged from three to nine times less than that of ambulances between 2015 and 2020. These units are available to serve outlying communities to ensure a paramedic response to an emergency is timely.

Since 2013, HPS has utilized its four frontline response ERVs to provide sustainable coverage in rural and suburban areas when ambulances are responding to emergencies in the urban area of the city.

Currently, ERVs are deployed from four stations as indicated in the map below:

1. Station 15 – Arvin Avenue, Stoney Creek
2. Station 20 – Garner Road, Ancaster
3. Station 24 – Parkside Drive, Waterdown
4. Station 32 – Limeridge Road E., Hamilton



The balance that must be achieved is to ensure appropriate paramedic response in areas outside of the city, while ERVs also contribute to decreasing response times for the city overall. To determine if a redeployment of ERVs can contribute to this goal of decreasing response times, three scenarios were analyzed using the Darkhorse Analytics tool to identify the performance metrics for:

a) the current deployment model of ERVs as a static resource from an assigned station,

b) areas of the city with less optimal response performance, and

c) redeployment of ERVs into areas of the city with less optimal response performance.

Current Deployment Model

Baseline metrics were established for how ERVs are currently deployed as a static resource from an assigned station. The areas reviewed included:

1. Drive time to an emergency by any vehicle (ambulance or ERV)
2. Overgoal calls, that is, calls that exceeded the City of Hamilton and MOH approved target response time of 10:03 minutes
3. Overall performance, which reflects the combination of 1 and 2

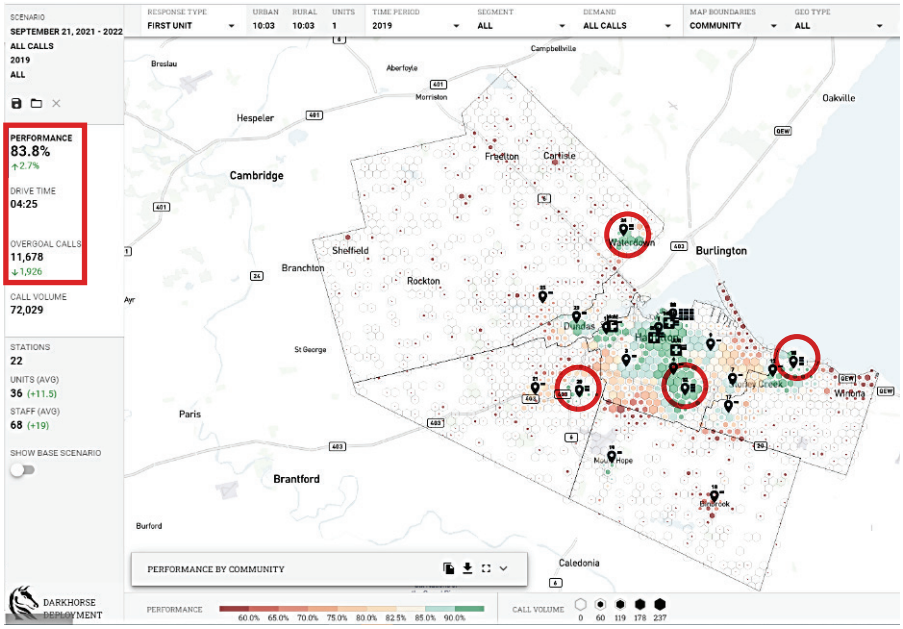
A summary of these baseline performance metrics for the current ERV deployment model are illustrated below and include:

04:25 min.
Drive time

11,678
Overgoal Calls

83.8%
Overall Performance

2019 Deployment Model - ERVs at Stations



Underperforming Areas

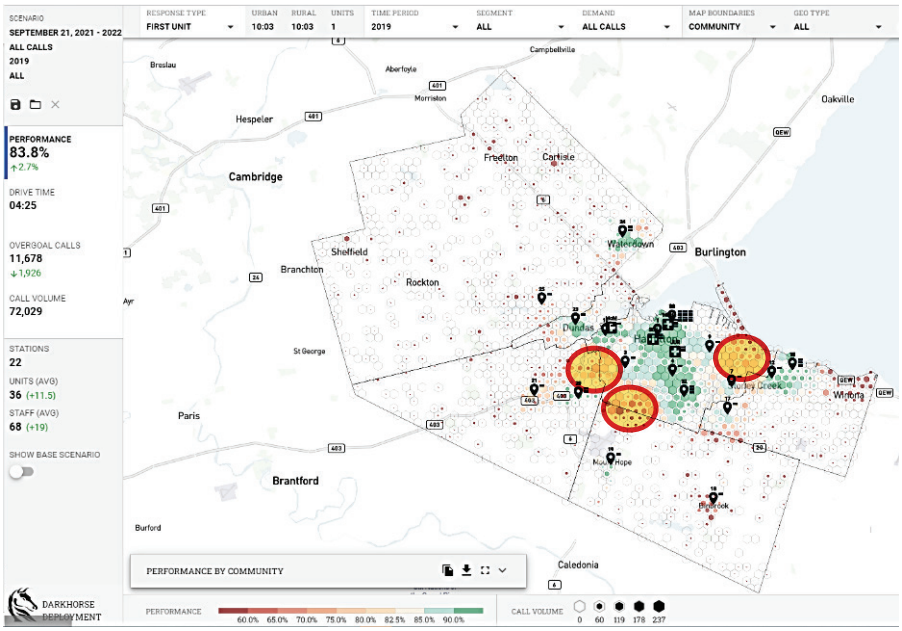
Areas of the city were compared to each other, to identify response areas that were not performing optimally. Criteria for this analysis included:

1. No ambulance station in the immediate area
2. Response performance was not optimal when compared to other areas
3. Number of calls

From this analysis, the following areas were identified as areas where there are opportunities to improve performance:

- Upper James Street and Rymal Road West (Ryckmans Corners)
- Golf Links Road and Hwy 403 (The Meadowlands)
- Barton Street East and Centennial Parkway area

2019 Deployment Model - Areas with Less Optimal Response Performance



Redeployment of ERVs

A variety of models were tested in an effort to improve performance in these underperforming areas. As a result of these analyses, the following three areas were identified as areas where ERV service would be the most beneficial for improving response time performance:

- One ERV redeployed to the area of Ryckmans Corner
- One ERV redeployed to the area of the Meadowlands
- One ERV redeployed to the area of Barton Street East and Centennial Parkway

The ERV at Station 24 in Waterdown was shown to be optimally placed for performance in that suburban area of the city and is therefore recommended to remain at Station 24.

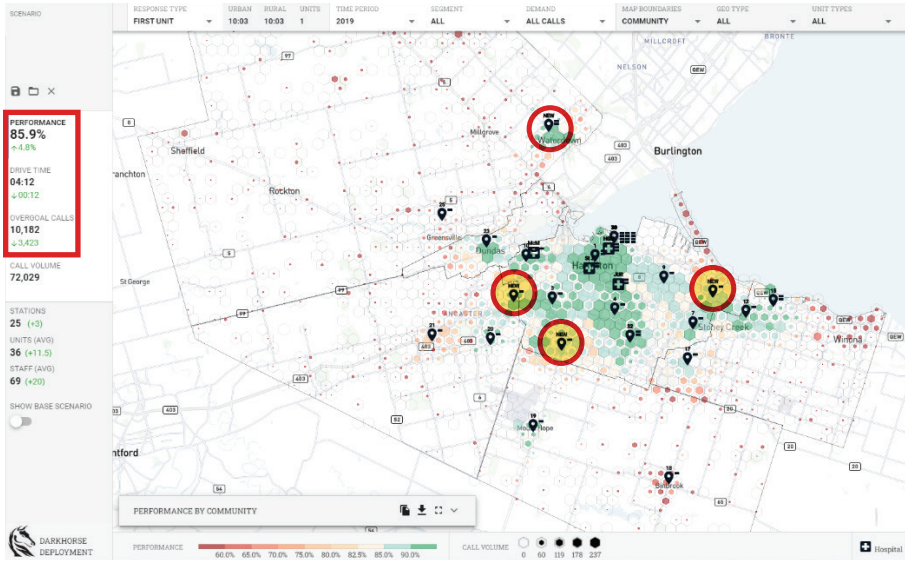
The performance metrics for ERV coverage of these areas of the city are illustrated in the map below and as follows:

04:12 min.
Drive time

10,182
Overgoal Calls

85.9%
Overall Performance

2019 Deployment Model - Redeployment of ERVs into Areas with Less Optimal Response



Redeploying the three ERVs from Stations 15 (Arvin Avenue., Stoney Creek), 20 (Garner Road., Ancaster) and 32 (Limeridge Road., Hamilton) to being mobilized in the areas identified above will improve response performance from the current static model. Drive time will be reduced by 13 seconds, overgoals or responses that do not meet the target time of 10:03 minutes will be reduced by 1,496 calls and overall performance would be improved by 2.1%.

It is therefore an objective of this Master Plan that ERVs be redeployed to improve response time performance to better serve all areas of the city.

Tiered Response Agreement

A Tiered Response Agreement (TRA) is a formal written document negotiated between two or more emergency service agencies. It outlines local criteria for a multi-agency response to a life-threatening or public safety incident. It is a voluntary program based on collaboration that recognizes when agencies work together, they are better equipped to meet the emergency needs of the community.

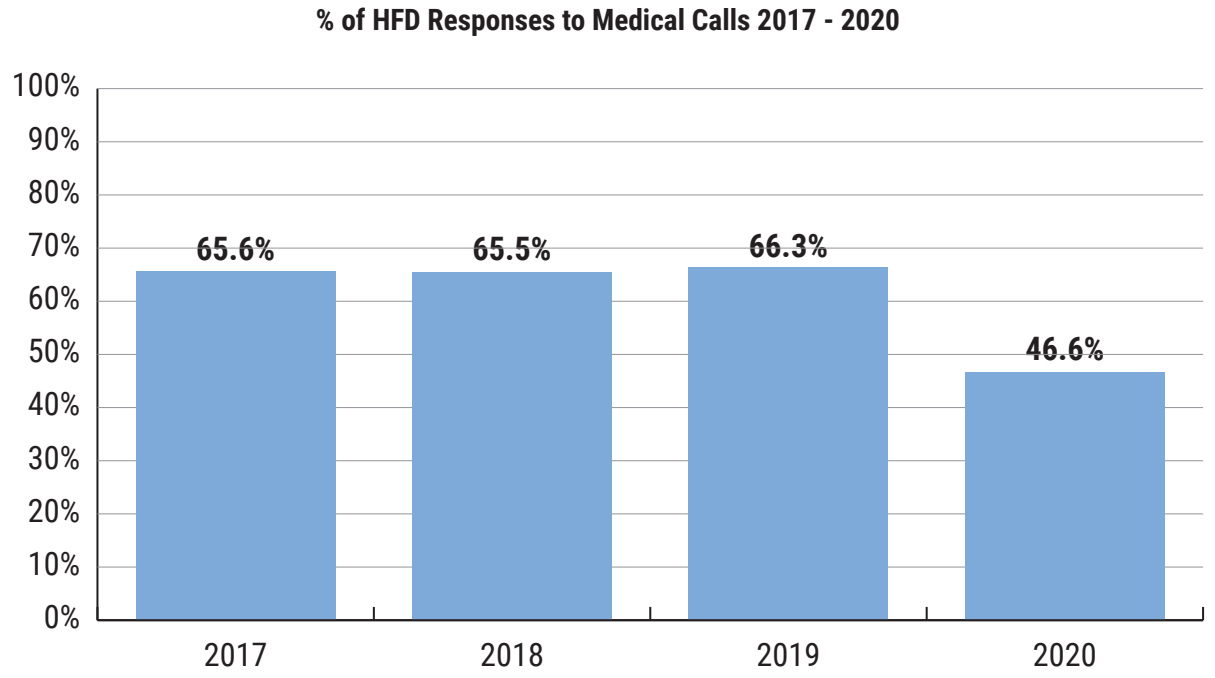
The purpose of a TRA is to ensure the timely availability of resources to mitigate medical emergencies. A rapid first response results in the best possible outcome for patients who are in a potentially life-threatening situation. Studies have shown that rapid response and early intervention prior to the arrival of advanced paramedic care can greatly reduce mortality and morbidity.

The TRA between the Hamilton Paramedic Service and the Hamilton Fire Department (HFD) is intended to allow for a fire service response time advantage in arriving at the scene of an emergency to begin critical medical intervention until paramedics arrive. It also provides the ability for additional fire resources to assist paramedics as required.

The existing TRA has been in place, essentially unchanged since the City of Hamilton assumed responsibility for the delivery of Land Ambulance Service in 2000. Over the years there have been changes in evidence-based medical practices, mandated response time standards and reporting, response capacity of both fire and paramedic services, paramedic scope of practice, firefighter first aid procedures and ambulance dispatch call assessment protocols. Despite evolving practices and procedures over the last two decades, a comprehensive review and update of the TRA had not been undertaken.

In 2019, the HFD identified the need to review the TRA in the Fire Service Delivery Plan (2019-2028) to ensure HFD resources were not being utilized unnecessarily. For example, firefighters were dispatched to some medical calls where paramedics arrived at the same time or shortly after firefighters who were then not needed. In some cases, calls were cancelled after firefighters were already dispatched as it was determined their assistance was not required. Such circumstance can put a strain on HFD resources.

The majority of HFD calls are for medical emergencies. Prior to 2020, when the TRA was modified, approximately 66% of the HFD's calls each year, or over 21,000, were medical.



Source: City of Hamilton, Service Profiles, Hamilton Fire Department Profile

A review of the TRA was required to ensure the appropriate fire services resources are being dispatched according to the medical needs of patients.

In late 2019, a project team was convened comprised of subject matter experts from HPS, HFD and CACC dispatch services as well as an emergency medical physician. The team sought to identify life-threatening calls that would benefit by a fire service time advantage where firefighters are first on scene and capable of performing critical medical interventions until paramedics arrived. To achieve this, the team undertook a review and analysis of the following:

1. Current tiered response data and current state of practice related to medical procedures and responses of the Hamilton Fire Department
2. Available medical literature regarding efficacy and impact of fire first response to medical calls
3. CACC's Dispatch Priority Card Index II (DPCI II) tool and paramedic response data to identify the potential for meaningful fire service first response intervention on medical calls

Through such a review and analysis of available evidence, the team uncovered some limitations including an imprecise dispatch tool that over prioritizes calls, a lack of clinical studies in the area of a fire response to medical calls and challenges in quantifying some response data due to the methods used to collect information. These limitations meant there was a lack of definitive evidence to support any significant modifications to the TRA. The team drafted recommendations aimed at improving response procedures, data collection methods, data sharing and integration processes and dispatch procedures. The team concluded that another review of the TRA was required once improvements were made and MOH implemented the more precise dispatch tool called Medical Priority Dispatch System or MPDS® (expected in 2023).

However, as the team's report was being finalized, the pandemic struck Hamilton which necessitated immediate modifications to the TRA. The calls on which the HFD were tiered were limited to the most serious medical calls, motor vehicle collisions and vital signs absent calls.

This change helped to reduce unnecessary exposure of firefighters to potentially COVID-19 positive patients. Additionally, it helped to ensure that PPE was not wasted as firefighters may have only required to use PPE for mere moments until paramedics took charge of the patient.

As a result of the modified TRA, the medical calls HFD responded to dropped by 20%. In 2020, 46% of HFD calls were for medical emergencies down from 66% in previous years.

Over a year and a half into the pandemic and as yet, HPS has not identified any negative impacts as a result of these temporary adjustments to the TRA. Despite the reduction in fire services' resources at life-threatening medical calls, no adverse events or issues have been reported. This will have to be more closely analyzed when an update of the TRA is resumed, as it indicates HFD resources are not required on some medical calls. This Master Plan recommends an updated TRA reduce the unnecessary use of HFD resources on medical calls to preserve HFD resources for fire calls based on evidence from a modified TRA during the pandemic.

5.3 Offload Delay Mitigation Initiatives

OBJECTIVE

7 CONTINUE TO IMPLEMENT AND IMPROVE INITIATIVES TO REDUCE OFFLOAD DELAY IN COLLABORATION WITH HEALTH CARE SYSTEM PARTNERS

Shortly after the health care reform introduced by the Ontario government in the late 1990s, ambulance services began to experience a phenomenon of an extended delay when transferring the care of patients from paramedics to hospital staff. The length of this delay would continue to increase, thereby increasing the length of time paramedics wait in Emergency Departments with their patients. The MOH-issued patient care standards definitively require paramedics to remain with the patient, and continue to care for the patient, until the hospital accepts responsibility for the patients care.

In a report submitted to the MOH in 2005 titled Improving Access to Emergency Services: A System Commitment[88] , it was recommended that:

> The time from ambulance arrival to patient placed on an Emergency Department stretcher should be 30 minutes, 90% of the time.

The report noted that an Offload Delay (OLD) occurs when the hospital does not accept responsibility for the care of a patient within 30 minutes of the ambulance arriving at hospital.

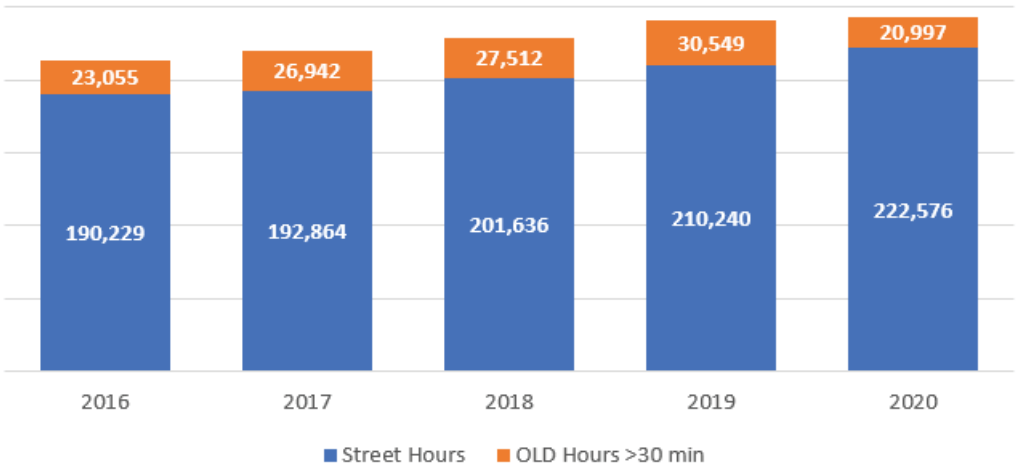
As a result of a variety of system pressures, hospitals in Hamilton continue to struggle to meet this target recommendation. OLD has become an increasingly complex issue, impacted by a variety of health care system issues, and leading to great reductions in the number of hours paramedics are available to respond to calls.

88 Improving Access to Emergency Services: A System of Commitment (Schwartz, 2005)

Between 2016 and 2020, HPS had a total of 1,017,545 hours in which paramedics were on calls. Of these total street staff hours 129,055 hours or approximately 13% of the paramedics' time was spent waiting at Emergency Departments for longer than 30 minutes until hospitals took responsibility for the care of the patient. Excluding the anomalous 2020 experience, where the annual OLD hours were lower due to the early pandemic influence on hospital performance, the annual cumulative hours of offload delays has continued to increase over time:

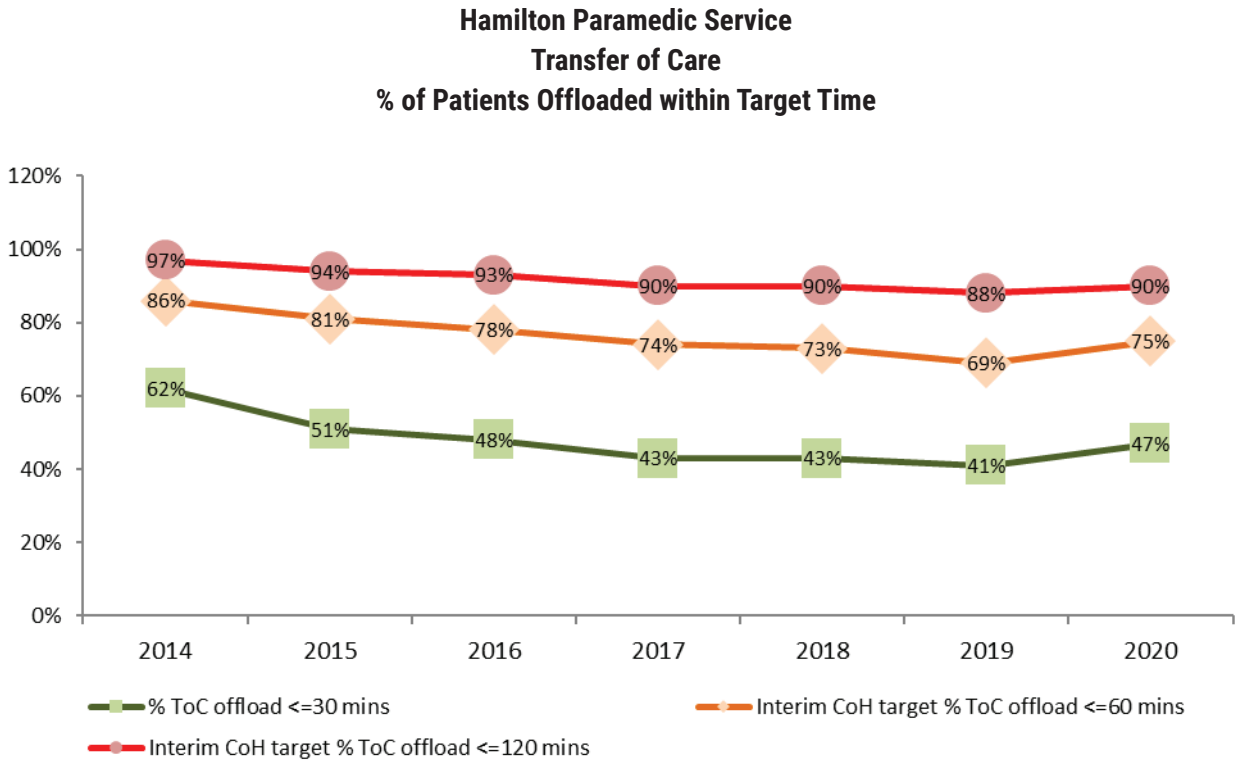
- 2016: The equivalent of 2.63 ambulances on OLD at hospital for the entire year
- 2017: The equivalent of 3.08 ambulances on OLD at hospital for the entire year
- 2018: The equivalent of 3.14 ambulances on OLD at hospital for the entire year
- 2019: The equivalent of 3.48 ambulances on OLD at hospital for the entire year

Hamilton Paramedic Service
Total Street Staff Hours and OLD Hours > 30 Minutes
2016 - 2020



In 2015, HPS and hospitals agreed to an interim target of 60 minutes to transfer care of patients, 90% of the time. A target of 60 minutes is more attainable and therefore more likely efforts will be made to ensure it is achieved. Achieving the transfer of care (TOC) within 60 minutes 90% of the time would help to alleviate OLD and free up paramedics to be able to respond to other emergencies in the community.

The chart below shows the percentage of time patients were transferred to the care of hospitals within 30, 60 and 120 minutes for each year since 2014.

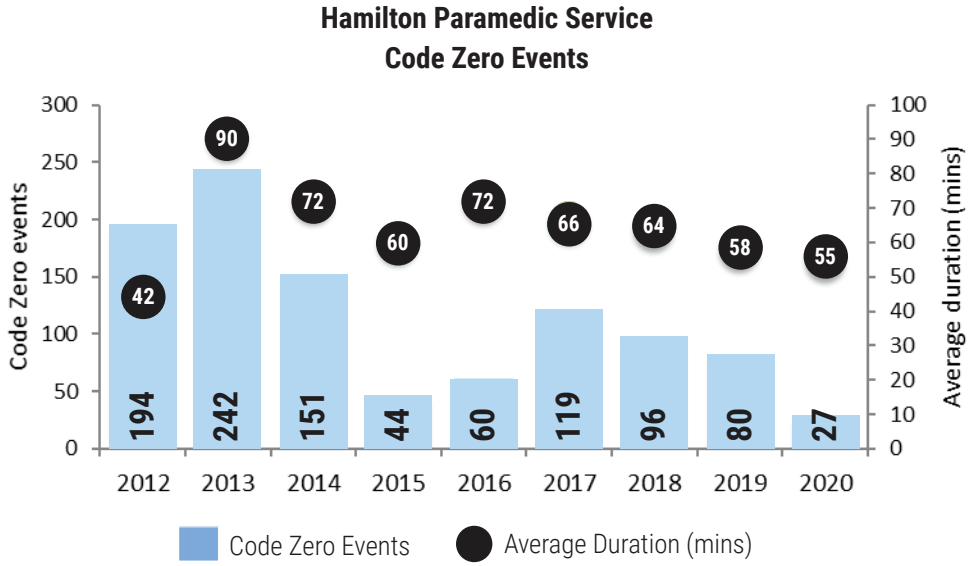


Code Zero Events

Long OLDs are strongly correlated with code zero events. A code zero event occurs when the number of ambulances available to respond to a call are limited to just one or none. When there are ten or more OLDs longer than two hours on any given day, a code zero is likely to occur. In the case of a code zero event, ambulances from neighboring municipalities are assigned to respond to emergency calls in Hamilton.

Code zero events continue to be a challenge for the HPS, hospitals, patients, and the community at large. In 2019, there were a total of 80 code zero events that lasted almost an hour on average. In 2020, that total number of code zero events greatly declined to a total of 27 that lasted almost an hour on average.

The graph below shows the number of code zero events from 2012 to 2020 and the average length of time in minutes a code zero event lasted that year.



The trend since 2015 has been an increase in code zero events with an emerging downward trend since 2017. The decline in code zero events in 2020 can be in part attributed to the pandemic which saw a reduction in calls during the first few months. In 2021, there has been a significant resurgence in hospital OLDs which coincides with an increase in code zero events and generally narrowed resources impacting response performance. HPS has been actively working with hospital partners to reduce OLD over the last several years, which has helped to curtail code zero events. Some of the initiatives undertaken with hospital partners are outlined in the next section.

Reducing OLD

Alternate Destination

In an effort to ease the burden of offloading times at hospitals, the MOH has amended the *Ambulance Act* requirement which directed paramedics to transport all patients to the Emergency Department. The amendment permits special care models which allow paramedics to transport patients to destinations other than hospitals, such as an urgent care facility and mental health and addictions facilities. Allowing transports to alternate destinations will divert some patients away from hospitals and alleviate OLD to free up paramedics' time. Furthermore, patients will receive more timely care at the most appropriate facility based on their condition. This patient-centred approach aligns with the province's vision for health care in Ontario.

A review of HPS electronic patient care records (ePCRs) between 2016 and 2020 shows that of the 415,730 ambulances dispatched on an emergency, 183,626 (44%) were transported to hospital with patients with minor to moderate injuries/illnesses (CTAS 3, 4 and 5). Approximately 44,016 (24%) of the minor to moderate injuries/illnesses (CTAS 4 and 5) would not likely have required hospital care and could have received appropriate treatment from another health care facility.

As noted earlier, a phone survey conducted by HPS of 550 Hamilton residents in 2018 indicated that 78% of respondents were aware of the OLD issue and 77% were comfortable allowing the paramedic to determine the most appropriate health care facility to which they could be transported for their minor health issues. These results indicate not only that the public has confidence in the paramedics' judgement for choice of facility but also that residents are confident they will receive appropriate health care in another facility other than the hospital.

Currently, HPS is working with Hamilton hospitals to develop Alternate Destination Guidelines (ADG) to ensure patients with a variety of less severe issues are taken to the appropriate facilities to receive the care that meets their needs.

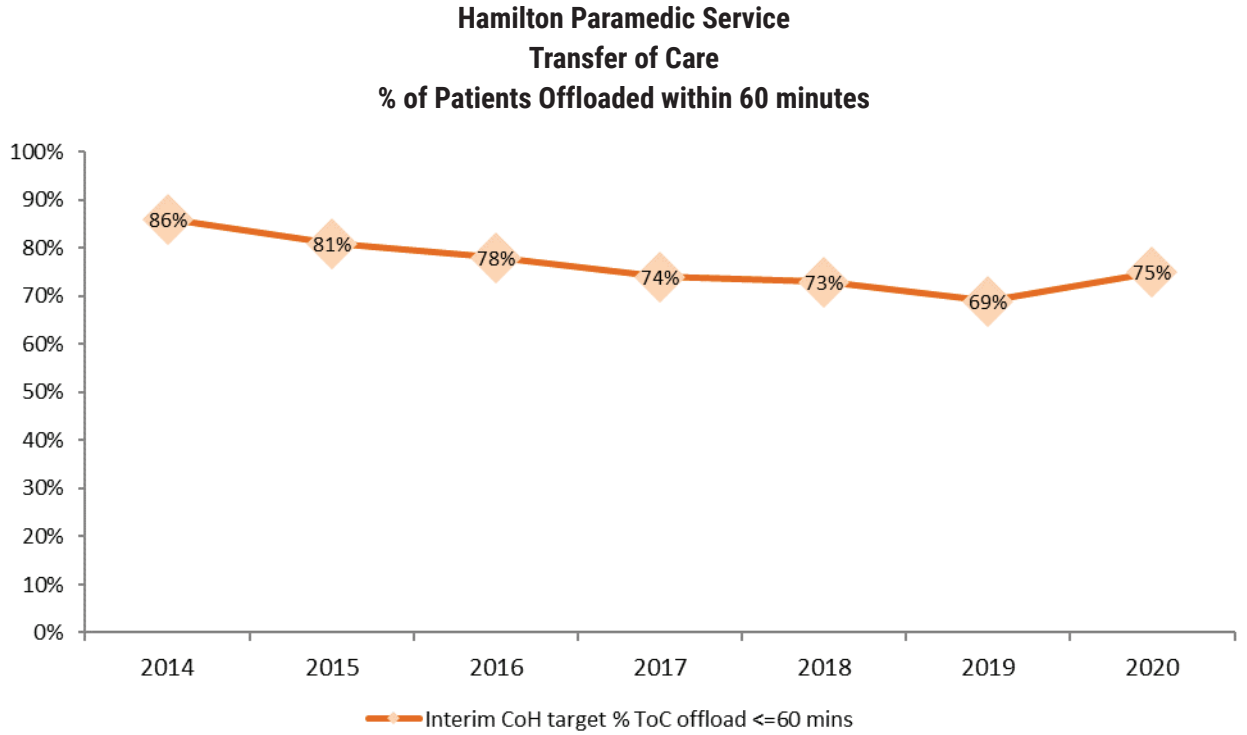
ADG is one of many initiatives aimed at reducing OLD currently being led by the HPS.

Mitigation Initiatives

In partnership with hospitals, HPS has implemented a range of quality improvement initiatives aimed at reducing OLD toward achieving the recommended TOC target time of 30 minutes or less. A summary of these initiatives is outlined in the table below:

OLD MITIGATION STRATEGIES			
Initiative	**Description**	**Status**	**Result**
Alternate Destination Guidelines	Ability for paramedics to take patients to a facility other than a hospital.	In Progress	Currently transporting patients with substance-related issues directly to appropriate facilities.
Response Analytics Dashboard	A "real time" dashboard used by the MOH dispatch centre to ensure even distribution of patients among hospitals.	Implemented 2018	Limited success, as the dashboard does not impact the volume.
Fit-to-Sit	Paramedics place low acuity patients into the Emergency Department waiting room so they can leave to response to another call.	Implemented 2018	Limited success, due to low participation rate.
OLD Supervisor	An HPS Supervisor facilitates TOC of patients.	Implemented 2016 Expanded 2019	Limited success, as the Supervisor has no authority over hospital operations.
Double Up of Patients	When paramedic resources are limited, one crew monitors two patients allowing the other crew to respond to another call.	Revised 2015 Implemented 2012	Limited success, as this initiative requires that there be an available stretcher in the Emergency Department.
Lean Initiatives	Quality improvement workshops with hospitals to work toward eliminating unnecessary OLD.	Implemented 2014 and on	Limited success as organizations must manage and mitigate risk associated with decreasing time on task.
OLD Escalation Process	When an OLD reaches specified length of time, notification is elevated to senior leaderships of the HPS and hospitals to assist.	Implemented 2014	Limited success, as HPS does not have authority to control hospital operations.
Mobile Integrated Health	A number of programs that serve patients where they live in their home or the community to prevent the need to call 911.	Implemented 2012 - 2014	Expansion of programs encompass all priority patient populations.
Designated OLD Nurse Funding	Funded by the MOH, a nurse dedicated to accepting the care of patients from paramedics upon their arrival at the hospital.	Implemented 2012	Limited success as designated beds are used for alternative purposes or quickly consumed due to HPS call volume or system issues in the hospital.
TOC Software	Computer software that is used to monitor and report on TOC times at area hospitals.	Implemented 2011	Limited success as this tool does not impact volume. This system is not well integrated into the full EMS and hospital systems.
Patient Priority System	Allows for distribution of patients to certain hospitals to ensure optimal care based on patient condition.	Revised Annually	Limited success as this system does not impact the call volume.

Despite the implementation of these initiatives over the past several years, there has not been a notable reduction in OLD times and TOCs greater than 60 minutes persist. Achieving a TOC within 60 minutes had been trending downward prior to 2020. In 2014, 86% of TOCs occurred within 60 minutes but by 2019 it had declined to 69%. The slight improvement in 2020 to 75% of TOCs within 60 minutes is likely a result of the temporary reduction in call volume at the beginning of the pandemic.



It appears from the above graph that the OLD mitigation initiatives are not having an impact on TOC time as TOC target times are not being achieved. However, taking into consideration the increase in demand for HPS services over the years, it becomes clear that the OLD mitigation strategies are helping to minimize the decline in the number of times TOC target times are not achieved. In fact, while the number of patients transported to the hospital by HPS has increased, achieving the TOC target time of 60 minutes has remained relatively stable.

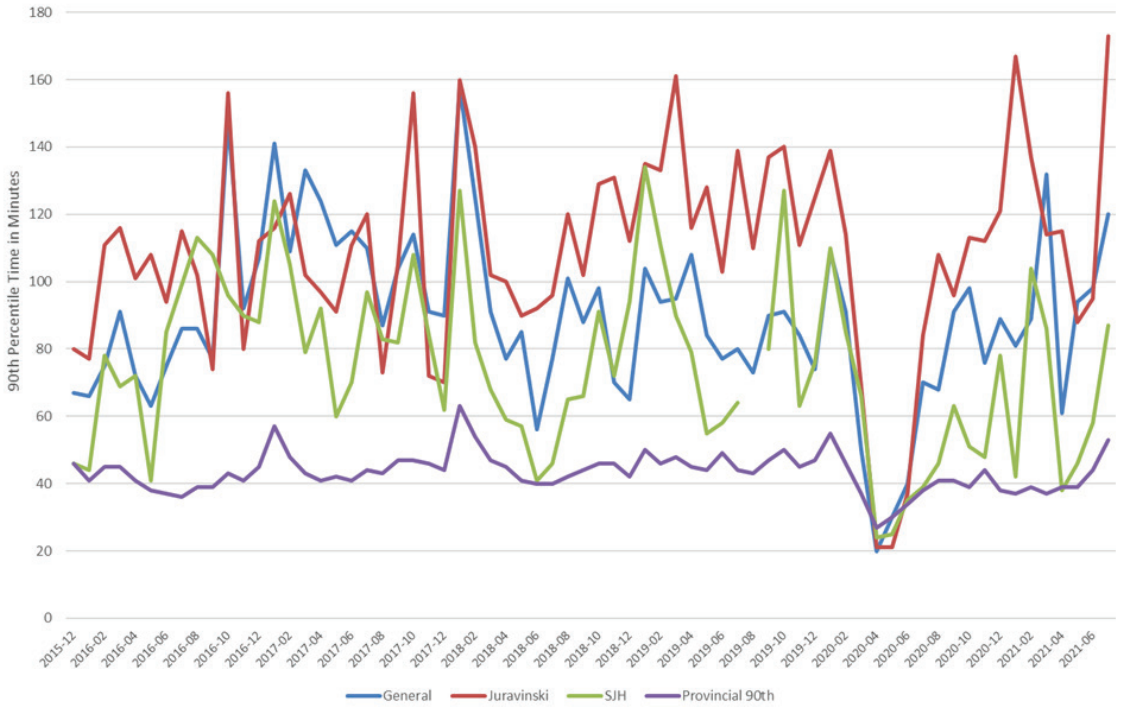
While the above data reflects information from both the HPS and the MOH dispatch center databases (see the chart below), the information provided directly by the hospitals' Cancer Care Ontario Access to Care (CCO-ATC) reporting system since 2015 regarding ambulance OLDs demonstrates that for Hamilton hospital sites the Ambulance Offload Times (AOT) are:

- Rarely within the agreed upon interim target of 60 minutes.
- Consistently higher than the provincial average at the 90th percentile
- Consistently amongst the highest reported for the province
- Consistently amongst the highest in the (former) HNHB LHIN area

Over the past 68 months that CCO-ATC has reported the hospital data the highest and the average reported monthly 90th percentile AOT were:

Dec 2015 to July 2021	Hamilton General	Juravinski	St. Joseph's
Highest Reported	2:38 (158 minutes)	2:53 (173 minutes)	2:20 (140 minutes)
Average Reported	1:30 (90 minutes)	1:49 (109 minutes	1:23 (83 minutes)

90th Percentile Ambulance Offload Time
2015 -12 to 2021-07



Despite the efforts of hospitals and the OLD mitigation activities undertaken including diverting patients away from Emergency Departments, without system and capacity changes at the hospitals, OLDs will continue to challenge HPS service delivery. This will result in extending the expected time on task through the ten-year planning period.

Leveraging Technology

HPS is in the process of implementing the technology of FirstWatch® to enable different data systems to communicate and promptly turn data into useful real-time information. This technology has the capability of monitoring the length of time it takes to transfer the care of a patient to the hospital as it occurs.

Technologies to monitor and report on TOC times, such as FirstWatch, require integration with hospital systems so data can be fed to HPS systems and to the CACC in real-time. This allows TOC activities to be proactively managed and problems mitigated as soon as they arise.

Capabilities to interface with dispatch systems, access hospital records and ePCRs are also possible through this advanced technology. Such coordination with health care partners and integration of information technology (IT) and systems provides progressive tools by which paramedics and health care providers can deliver the best care possible to patients. The development of an IT strategy to assist HPS in achieving operational efficiency and optimal patient outcomes is discussed further in Section 5.8.

Delays in the time it takes to transfer the care of a patient from the paramedics to the hospital continue to be a challenge for HPS. Paramedics' time spent in the Emergency Department with their patient waiting to transfer care means they are unavailable to respond to other emergencies in the community.

Through a variety of collaborative initiatives with the hospitals, the trend of not achieving TOC target times has been slowed despite the growing demand for service. Therefore, it is recommended that OLD mitigation initiatives in collaboration with health care system partners continue to be implemented, improved, and expanded where possible.

In addition to mitigation initiatives, HPS's Mobile Integrated Health programs have been effective in helping to prevent 911 calls and divert clients away from hospitals thereby avoiding transports to hospitals and alleviating OLD. The next section describes these programs and the successful outcomes.

5.4 Mobile Integrated Health

OBJECTIVE

8 INCREASE THE CAPACITY OF MOBILE INTEGRATED HEALTH (MIH) TO ADDRESS THE GROWING DEMANDS FOR COMMUNITY AND AT-HOME SUPPORTS:

- A) CREATE A FULL-TIME POSITION TO LEAD THE CARDIAC SAFE CITY PROGRAM
- B) ENSURE INTEGRATION, INVOLVMENT AND ENGAGEMENT OF FRONTLINE PARAMEDICS IN MIH ACTIVITIES
- C) ADVOCATE FOR ADDITIONAL COMMUNITY PARAMEDIC POSITIONS THROUGH THE MINISTRY OF HEALTH AND THE GREATER HAMILTON HEALTH NETWORK

9 ADVOCATE FOR THE SUSTAINED FUNDING OF MIH TO BECOME A PERMANENT COMPONENT OF PRIMARY CARE IN ONTARIO IN ACCORDANCE WITH THE COMMUNITY PARAMEDICINE POLICY FRAMEWORK DEVELOPED JOINTLY BY THE ASSOCIATION OF MUNICIPALITIES ONTARIO (AMO) AND THE ONTARIO ASSOCIATION OF PARAMEDIC CHIEFS (OAPC)

10 DEVELOP A PLAN IN COLLABORATION WITH STAKEHOLDERS TO ESTABLISH A CENTRAL CLINICAL HUB TO ACCESS MIH AND OTHER HEALTH SERVICES STARTING WITH INSTALLING A CLINICIAN AT DISPATCH

In late 2014, the provincial government provided funding to 20 land ambulance services in Ontario to trial community paramedicine initiatives. The goal was to mitigate unnecessary transports to hospital of patients with non-life-threatening issues. Through prevention activities, community paramedicine allows vulnerable residents to receive clinical support in their homes and reduces pressure on the health care system. Community paramedicine has become an integral part of health care in communities, yet despite the prevalence and significance of community paramedicine activities across municipalities, they remain pilot projects and lack permanent funding.

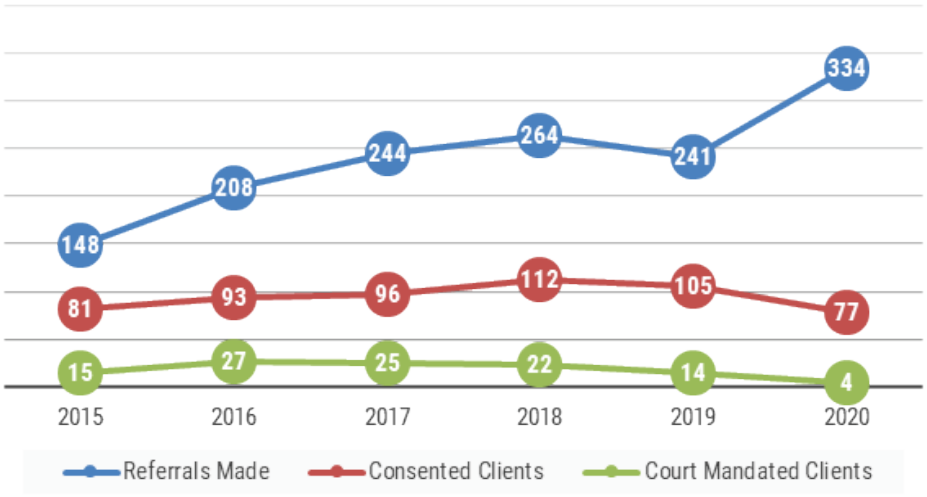
Hamilton's Community Paramedicine Program has evolved over the years to meet the growing and diverse needs of clients. In 2020, the program further expanded to become Mobile Integrated Health (MIH) with an increased capacity to reach more people in the community as well as the addition of pandemic response initiatives.

HPS has established several programs under the umbrella of the MIH that offer a variety of services to a range of clients. These programs and some of the outcomes are described below.

Social Navigator Program (SNP)

The SNP was implemented in 2011 as a collaboration between HPS and Hamilton Police Service. The program provides outreach services for clients with diverse and complex needs who have frequent contact with police and paramedics due to underlying mental health and addiction challenges. According to the profile of users of ambulance services described in Section 3.3, HPS responded to over 5,100 calls related to mental health and addiction in 2018. Through case management, the SNP provides support utilizing a referral process.

Since 2015, the SNP has seen an increase of over 125% in the number of referrals made to service providers to support SNP clients and from 2015 to 2019 there was a 30% increase in intensive case management clients (i.e. consented clients). Although there was a decrease of these clients in the program in 2020, the needs were greater and episodic assistance increased from 301 individuals in 2019 to 512 in 2020.



Evidence has shown the SNP has been successful in reducing the amount of times police were called for clients for adverse purposes. In 2020, SNP clients' negative interactions with police decreased by 55% after being in the program for three months.

Since the beginning of the pandemic, the city has seen a rise in the number residents experiencing unsheltered homelessness. Many of these people are living in encampments in tents on public or private property without running water or electricity. In response, the SNP has added another paramedic to the team to work with encampment residents.

@Clinic Program

As noted earlier, seniors (age 65 years and older) made up 45% of patients served by HPS in 2018. They are also the largest portion of repeat 911 callers which totalled 9,848 calls or 16% of the total call volume in 2018.

The @Clinic Program focuses on preventive activities by placing a Community Paramedic led clinic in select CityHousing Hamilton buildings where a high number of vulnerable seniors reside. Clinic interventions focus on health promotion, nicotine replacement, monitoring and prevention of high blood pressure, diabetes, cardiovascular disease, falls and social isolation.

Dr. Gina Agarwal at McMaster University's Department of Family Medicine studied the impact of the @Clinic program and found that in comparison to the CityHousing Hamilton buildings that did not offer the clinic, those with access to the clinic had 22% fewer emergency calls for an ambulance and more health risks were diagnosed among residents.[89]

Flu Clinics

In 2018, the @Clinic Program introduced the provision of influenza immunization. This additional service available during the flu season helps to minimize hospitalizations of seniors who are at higher risk of contracting the flu.

With the existence of the COVID-19 virus in 2020, it was more important than ever to be inoculated. In response, the Flu Clinic program expanded to include Mobile Flu Clinics across the city at the Hamilton Public Library's Central location, shelters, residential care facilities, retirement homes, long-term care facilities and the Neighbour-to-Neighbour Centre. In total, 1,840 flu shots were administered between October 19 and December 16, 2020.

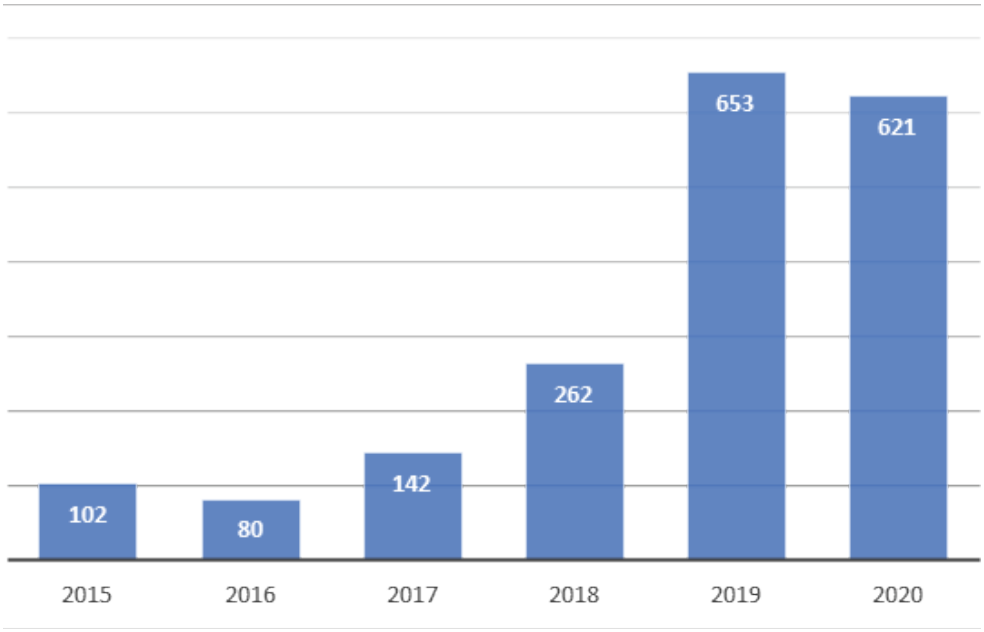
89 http://www.cmaj.ca/content/190/21/E638?ijkey=17e6bbadb0c104dcf543b02924d-683382d82445c&keytype 2=tf_ipsecsha#T6

@Home Program

The @Home Program provides support to clients in their homes after they have been identified as frequent users of ambulance services. A Community Paramedic visits the client where they live, conducts an in-depth assessment and can quickly connect the client to the resources they require related to a variety of issues such as congestive heart failure, diabetes, falls, mental health and addiction and palliative care. During the pandemic, the @Home Program also provided COVID-19 testing and vaccinations for homebound residents.

The demand for the @Home Program has increased significantly since it was established. As shown in the graph below, there has been an increase in the number of clients enrolled in the program each year since 2015, except for a slight decrease in 2020.

Total @Home Clients by Year



Remote Patient Monitoring (RPM)

RPM is a component of many MIH programs. RPM leverages technology to monitor clients with chronic conditions in their home. The patient-generated health data is transmitted wirelessly to a database and monitored by a Community Paramedic. Through this program, a client's condition is proactively managed before it requires an emergency 911 response and hospitalization.

In 2020, the RPM program was expanded to monitor patients at home after being hospitalized with COVID-19 enabling the early and safe discharge of patients from hospital and rapid identification should their condition deteriorate at home.

By 2020, at total of 115 clients were enrolled in the program with Community Paramedics receiving 3,473 alerts from their remote devices, yet only four transports to hospital were required.

Paramedic Palliative Outreach Support Team (PPOST)

The PPOST program consists of a specially trained team of Community Paramedics who provide support through a palliative crisis when a patient's palliative care team is unavailable. In 2020, the team supported eight patients in their homes preventing hospitalization. In April 2021, the Paramedics Providing Palliative Care (3PC) project was launched in which all paramedics were trained to provide palliative care to registered patients.

Emergency Department Diversion to Withdrawal Management (EDWIN)

The EDWIN program enables paramedics responding to a 911 call to transport adults and youth with addiction-related issues to a withdrawal management facility rather than to Emergency Departments. Over 110 clients have been supported through this program with only one requiring transport to hospital.

Public Access Defibrillation

MIH is responsible for the maintenance and tracking of Automated External Defibrillators (AEDs) throughout the city and advocate to increase in the number of AEDs in the community. Medical evidence shows that when an AED and CPR are administered immediately, often by a bystander, the chance of survival from sudden cardiac arrest is substantially improved by up to 75%.

In 2020, there were 443 AEDs in Hamilton with two uses. AEDs are located throughout the city in public buildings, such as City of Hamilton office buildings, schools, libraries, local event arenas, fitness centres, recreational facilities, hockey arenas and seniors' centres. In 2020, AEDs were also installed at Tim Hortons Field.

Currently, there is no dedicated resource assigned to the Public Access Defibrillation program which is managed by the MIH lead responsible for all MIH programs. Thus, this Master Plan recommends creating a full-time position to lead this program that supports the City of Hamilton's Cardiac Safe City program. The Cardiac Safe City program recognizes the best chances of surviving sudden cardiac arrest requires early CPR and the use of an AED. The program includes first aid, CPR and AED training for the public. This new position would be responsible for all aspects of the program including increasing the number of AEDs in public spaces, public education and reporting on program activities and outcomes.

This position would also oversee other programs such as the Stop the Bleed program and support the education and asset management for naloxone kit and epinephrine autoinjectors.

Community Paramedic Long-Term Care (CP-LTC)

Hospitals report a significant number of alternative level of care patients awaiting long-term care placement as one factor contributing to bed shortages. Through this program, Community Paramedics are able to support patients, both in person and virtually, who are waiting to be placed thereby helping them to stay in their homes.

Pandemic Response

MIH activities expanded in 2020 in response to the needs of the community as a result of the COVID-19 pandemic. In collaboration with Hamilton Public Health Services, MIH carried out the following activities:

- COVID-19 Swabbing – From April 2020 to the end of June 2021, a COVID-19 Swabbing Team conducted 21,599 tests at congregate settings and patients who are homebound
- Vaccine Aftercare – Paramedics supported Public Health Services by designing and providing aftercare at seniors' buildings to monitor those who received the shot
- Home-Bound Vaccinations – Paramedics administered 3,325 vaccines for homebound patients between the spring of 2021 and the end of July 2021

Summary

HPS provides a range of services offered through MIH. Evidence suggests these programs are helping to reduce 911 calls which in turn eases elevating OLD times. These programs support the provincial objectives to improve health care and end hallway medicine. MIH supports vulnerable populations and high users of 911 where they live by proactively providing clients with the services they require in the convenience of their own residence. Observable impacts of the program indicate an improvement to health care access and outcomes for those at-risk while decreasing dependence on the health care system.

The benefits of MIH programs have been recognized by community agencies that increasingly make referrals to the various programs. During consultations with stakeholders, as described in Section 3.2, community paramedicine was identified as a key approach to proactively handling the over-burdened health care system and helping people manage their own health in their own environments. Stakeholders recommended that a priority of the HPS Master Plan be to expand these programs to serve more people (e.g. @Clinic in more CityHousing Hamilton buildings), more vulnerable populations (such as youth) and address a wider range of issues (such as clinics for mental health and addictions and seniors' isolation, etc.).

Despite the wide range of programs provided through MIH, its resources are limited. For some programs, HPS must utilize frontline paramedics when they are not needed for emergency response or paramedics who are on modified duty. These options are not reliable as paramedics may be called away to respond to an emergency and modified duty is temporary.

To ensure that MIH can continue to provide essential health care services to the people most in need in the community now and in the future as demand grows, this Master Plan recommends that current resources be optimized by integrating MIH activities into frontline paramedic services and involving and engaging all frontline paramedics in MIH programs. HPS will achieve this through communication, education, and training so all paramedics are aware and capable of supporting programs related to palliative care (3PC) and mental health and addiction (EDWIN).

Furthermore, it is recommended that HPS advocate for additional full-time community paramedics through the MOH and Greater Hamilton Health Network to assist with the growing demands on MIH programs.

MIH programs are able to reach some of the most vulnerable in the community to help improve their access to health care and their quality of life. Pressures on the health care system are alleviated through these programs that prevent avoidable emergency rooms visits, provide early detection of health deterioration, and reduce length of stay when admitted to the hospital. They are innovative and agile, designed to meet the evolving needs of the community. In collaboration with partners, they have filled the gaps in health care services such as responding to the pandemic and seasonal surges of influenza.

Despite its benefits, MIH has yet to receive permanent provincial funding. Being permanent would help to address inherent health equity issues by enabling sustained access to health care for vulnerable populations in the community. Permanent MIH programs would enable them to be delivered in a more integrated, coordinated, and effective way and ensure there is no duplication of services or additional work for providers. As MIH becomes an integral part of the health care system, this Master Plan recommends that HPS follow the Community Paramedicine Policy Framework (June 28, 2021)[90] developed jointly by the Association of Municipalities Ontario (AMO) and the Ontario Association of Paramedic Chiefs (OAPC) to advocate for MIH programs to be funded as a permanent component of primary care in Ontario.

Clinical Hub

Given the significance of MIH programs and the growing demands for community and at-home supports, it is evident that HPS provides more than emergency response and transports to hospitals. In addition to the MIH programs that deliver care at home, in long-term care facilities, and in the community, paramedics provide clinical advice and deliver public education. For this reason, paramedic services are well-positioned to manage a central coordinating hub for the provision of mobile health care and clinical advice. Such a transformation would mean delivering more treatment in the home and clinical advice over the phone or virtually. It would require integrated service delivery in which paramedics work closely with other health care and social services professionals to provide coordinated patient care.

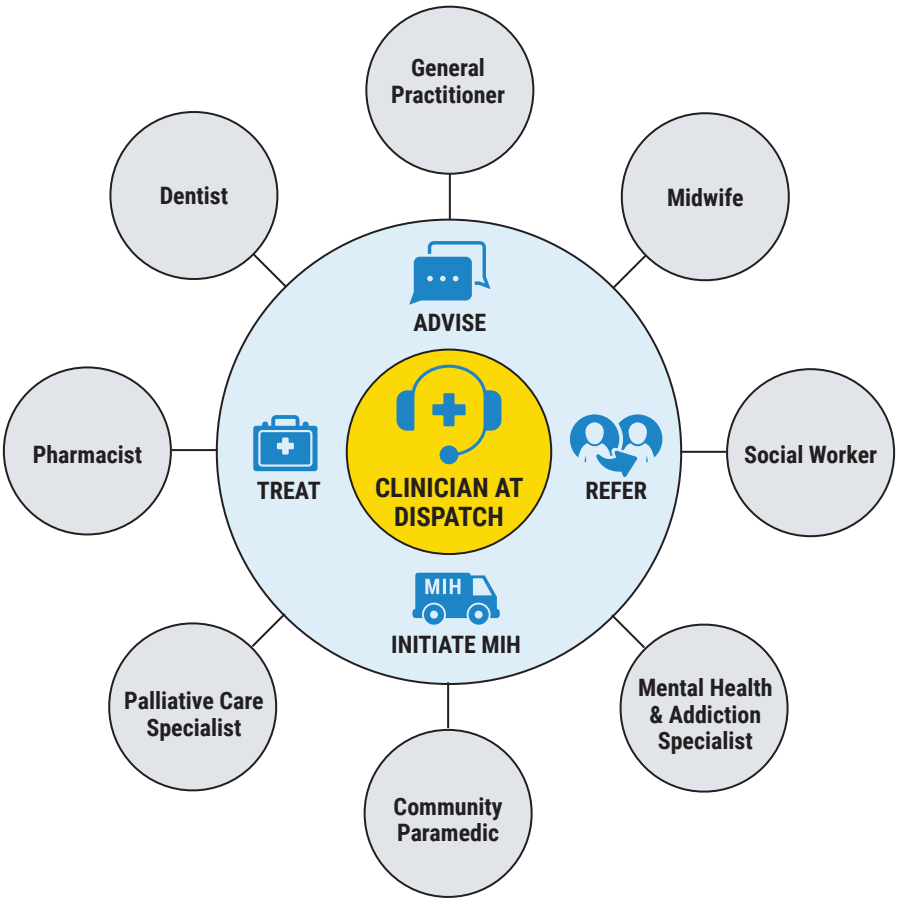
A central clinical hub would operate out of what is currently the dispatch centre. Health and social services would be accessed through the hub including paramedics, dentists, general practitioners, palliative care specialists, mental health and addiction practitioners, pharmacists, social workers, and midwives. Such a model would improve experiences and outcomes of patients who can access the support they need quickly. It would shift the burden of care away from emergency departments and hospitals as more treatment would be provided in-home by paramedics. From patients' homes, paramedics could access other health care professionals virtually. Patients would be monitored in their homes by paramedics remotely. Clinical advice and referrals would be given in-person, virtually or by telephone.

90 https://www.amo.on.ca/sites/default/files/assets/DOCUMENTS/Reports/2021/MOH-LTCLTRAMO-OAPCCommunityParamedicinePolicy%20Frameworkwjoint%20paper2021-06-28.pdf

A clinical hub also means fewer ambulances would be dispatched for non-urgent purposes. Currently, when 911 is called an ambulance is dispatched no matter the severity of the injury or illness. The highest priority calls, indicating risk of losing life or limb, generate an urgent response from an ambulance. Ambulances are also dispatched to low priority calls that are non-life threatening such as back pain, albeit without the urgency of a high priority call. A clinical hub model would offer more options for a 911 caller than just an ambulance response. Callers with less urgent issues as determined by dispatchers would be transferred to a clinician for secondary assessment. The clinician would then be able to advise the caller about next steps, recommend treatment, refer the caller to the appropriate health care practitioner, arrange for a Community Paramedic to visit the caller's home or send an ambulance if warranted.

This Master Plan recommends that a plan be developed in collaboration with the Greater Hamilton Health Network, community and provincial stakeholders that takes a phased approach toward establishing a central clinical hub in Hamilton. The first step in moving toward a clinical hub is to have a clinician assigned to dispatch. A clinician will perform secondary assessment of 911 calls and provide callers with advice, treatment, referrals, or access to MIH services to ensure they receive right care at the right time from the right practitioner. The transformation to a clinical hub model will change the manner in which services are organized and delivered to address growing community needs for in-home care while alleviating the pressures from the hospital system.

Clinical Hub Model



5.5 Clinical Practice

OBJECTIVES

11 PURSUE PRIMARY CARE PARAMEDIC (PCP) ABILITY TO PERFORM SELECT SCHEDULE 2 PROCEDURES FROM REGULATION 257/00 OF THE *AMBULANCE ACT*:

- A) SUPPORT PCPs IN BECOMING CERTIFIED IN PRIMARY CARE PARAMEDIC AUTONOMOUS INTRAVENOUS (PCP AIV)
- B) SUPPORT PCPs IN BECOMING CERTIFIED TO ACCESS AND ADMINISTER A WIDER RANGE OF MEDICATION

12 IMPLEMENT A REQUIREMENT THAT ALL PRIMARY CARE PARAMEDIC RECRUITS BE PCP AIV CERTIFIED AS A CONDITION OF EMPLOYMENT WITH HPS

13 TRAIN ALL PARAMEDICS IN INTERNATIONAL TRAUMA LIFE SUPPORT (ITLS)

As described in Section 3.2, ACPs have a scope of practice that is broader than that of PCPs. While PCPs can effectively treat the majority of patients' illnesses or injuries, ACPs have broader assessment and treatment skills for more complex medical conditions.

To increase the likelihood of better outcomes for patients, HPS endeavours to make available an increased level of clinical practice. This includes adding ACPs over time to achieve a 90% ACP response rate for patients requiring ACP assessment or intervention as recommended in Section 5.2, as well as expanding the scope of practice of PCPs in the ways outlined below.

Autonomous Intravenous and Medications

Schedule 2 of Regulation 257/00 of the *Ambulance Act* lists the controlled medical acts that can be performed by ACPs as part of their intensive training. PCPs are also able to perform these controlled acts only with the authorization of the medical director of the Base Hospital Program.

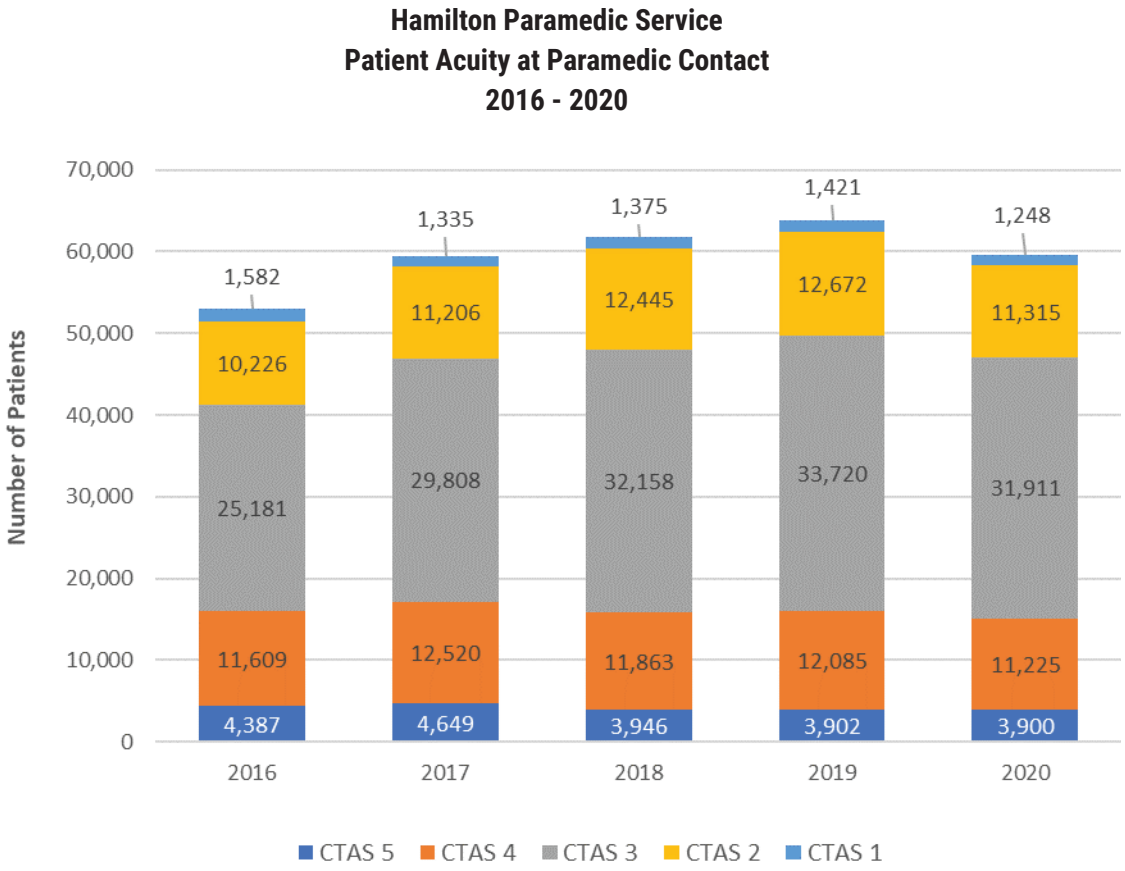
Two of these controlled medical acts within the scope of ACPs and performed by ACPs regularly are:

- Peripheral intravenous therapy placed in an extremity such as the hand, elbow, or foot
- Administration of drugs outside the scope of practice of PCPs

Training and certifying PCPs to include these additional two controlled medical acts would increase the knowledge and skills of PCPs to provide a higher level of care to the community.

In Section 5.2, the Canadian Triage Acuity Scale (CTAS) was described which categorizes the level of priority based on the severity of the patient's condition. CTAS 4 and 5 level patients typically require little to no medical intervention while CTAS 1, 2 and 3 patients are prioritized as urgent and likely to require paramedics to perform a controlled medical act.

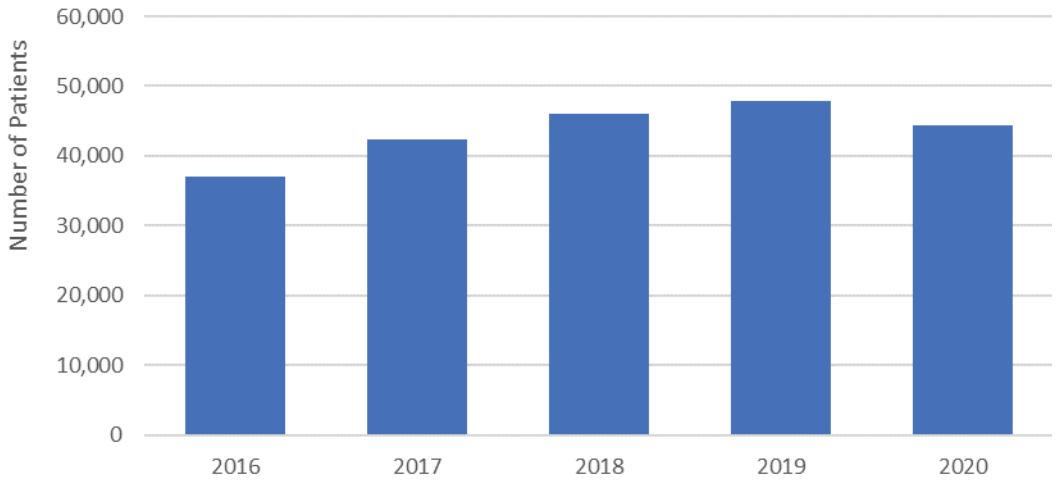
The chart below shows the number of patients per CTAS level served by HPS between 2016 and 2020.



CTAS 1 and 2 are high acuity patients. This results in the need for ACPs who are trained in providing potentially life-saving interventions to stabilize patients prior to and during the transport to hospital. CTAS 3 patients, while not as acute, may require a combination of comfort measures to control pain and minor stabilization interventions such as intravenous fluids.

Overall, the number of combined CTAS 1, 2 and 3 patients has been increasing since 2016 with the exception of 2020 when demand for service decreased in the early days of the pandemic, as illustrated in the following chart.

Hamilton Paramedic Service
Total CTAS 1,2,3 Patients at Paramedic Contact
2016 - 2020



Expanding the scope of practice of all PCPs would enable them to conduct more medical acts to assist with the increasing number of higher acuity patients in the CTAS 1 to 3 categories.

In fact, an analysis of electronic patient care records between 2016 and 2018, shows that currently PCPs are able to conduct 12 of the 20 most frequently performed medical procedures while ACPs have the capability to perform all 20 procedures. An expanded scope of practice of PCPs to the level of PCP AIV (Autonomous Intravenous) would include initiating intravenous therapy and administering medications through the intravenous line such as morphine for pain relief and midazolam to treat seizures. As a result, PCP AIVs would be able to perform 18 of the 20 most frequent medical procedures.

Order of Frequency	Procedure	Scope of Practice		
		ACP	PCP	PCP AIV
1	12 Lead Acquisition	✔	✔	✔
2	Normal Saline	✔		✔
3	ASA	✔	✔	✔
4	Salbutamol	✔	✔	✔
5	IV Cannulation	✔		✔
6	Lock	✔		✔
7	Dimenhydrinate	✔	✔	✔
8	Nitroglycerin	✔	✔	✔
9	Acetaminophen	✔	✔	✔
10	Morphine	✔		
11	Fluid Bolus	✔		✔
12	Ibuprofen	✔	✔	✔
13	Ketorolac	✔	✔	✔
14	Epinephrine 1:10,000	✔		
15	Midazolam	✔		
16	Glucagon	✔	✔	✔
17	Orotracheal Intubation	✔		
18	CPAP	✔	✔	✔
19	Glucose-Oral	✔	✔	✔
20	Epinephrine 1:1,000	✔	✔	✔

HPS paramedics who also work for other services and certified in PCP AIVs are authorized to perform these additional procedures when working for HPS. Training PCPs employed by HPS to the level of PCP AIV would enable PCPs to initiate intravenous and administer additional medications to help reduce patients' suffering more immediately. Without this, patients in the care of PCPs would have to wait to be transported and admitted to the Emergency Department before receiving medication.

While PCP AIVs will not have the same scope of practice as ACPs they will be better equipped to assist ACPs during high acuity calls. ACPs will be able to delegate some of procedures to the PCP AIV thereby freeing up the ACP to perform other procedures that only ACPs are certified to perform. This enables more efficient and timely care since practices such as assessments and treatment can occur simultaneously. Furthermore, there will be times when an ACP is not available even when each staffed vehicle has an ACP resource. Mandatory education, vacation and retirements may create instances when a vehicle is without an ACP. In this case, a certified PCP AIV can provide additional treatment for more complex medical conditions than is currently provided by a PCP.

Recognizing the significance of extending the scope of practice of PCPs to provide the community with the best possible level of service, HPS has recently collaborated with the Base Hospital Program to develop and deliver the PCP AIV Course. The first course was offered in April 2021 with 56 PCPs completing the training and 15 fully certified in PCP AIV as of August 2021. HPS will run a second course in the fall of 2021 with the goal of training an additional 48 PCPs. Through the course, paramedics gain knowledge, confidence, and competency in the aspects of IV initiation, fluid therapy and medication administration. Paramedics are given the opportunity to practice the newly acquired skills in a controlled classroom setting prior to moving to the clinical environment before being certified.

The PCP AIV Course is available to any PCP interested in broadening their scope of practice. Given that an expanded skillset would provide a higher level of care to the community, it is the objective of this Master Plan that HPS encourage and support existing PCPs to be certified in autonomous intravenous and administering additional medications. Not only will this result in more paramedics being able to perform more procedures, having more PCP AIVs would enable ACPs to be more available to tend to the most critical patients who require advanced level of care.

In addition to supporting existing PCPs to become certified in PCP AIV, the Master Plan further recommends that certification in PCP AIV be added as a condition of employment for new paramedic recruits. Over the course of this ten-year Plan, it is anticipated that most, if not all PCPs will become certified. With an increase in the number of ACPs as recommended previously and an increase in PCPs becoming certified to administer additional treatments at the level of PCP AIV, HPS will be better positioned to meet the medical needs of patients no matter the severity of their condition or where in the city they are located.

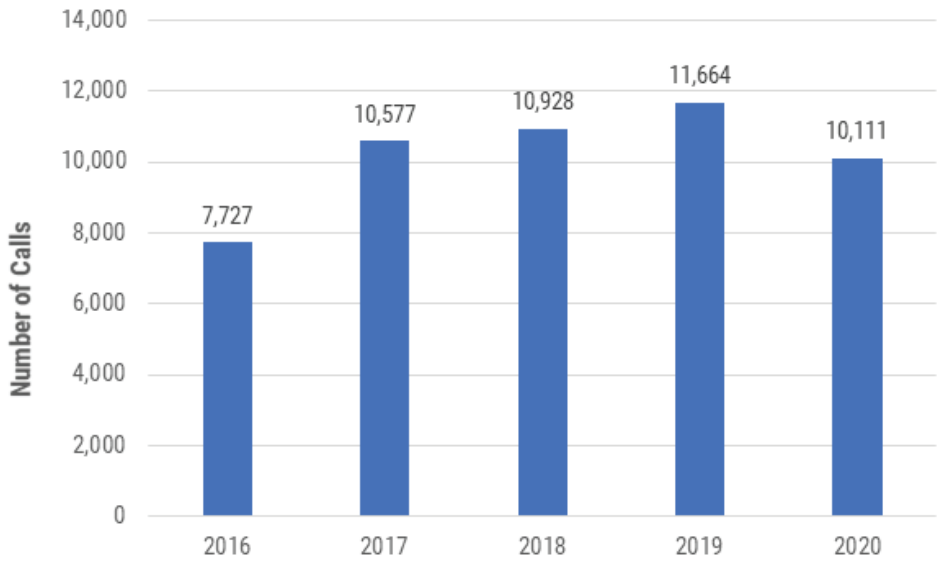
International Trauma Life Support

International Trauma Life Support (ITLS) is a global not-for-profit organization focused on the education of managing trauma emergencies outside of the hospital. ITLS is accepted internationally as the standard for pre-hospital trauma care and is considered a best practice among paramedic services in Ontario. The City of Toronto, Niagara Region and York Region currently provide ITLS training to their paramedics.

Trauma refers to the sudden onset of physical injuries that require emergency medical attention or intervention to prevent death and disability. Physical trauma can occur due to falls, vehicle accidents, burns, violence, animal attacks and other such unforeseen injuries or events. Currently, HPS actively transports trauma patients to two trauma facilities in Hamilton: Hamilton General Hospital for adults and McMaster Children's Hospital for infants, children, and youth. From 2016 through 2020, HPS had 51,007 calls for patients with traumatic conditions, making up 15% of all 911 events during this period.

In a city with a growing and aging population, urbanization of rural areas, events and natural features that attract large numbers of people, and an increasingly busy transportation network, HPS is experiencing an increase in call demand year over year including an increase in trauma emergencies. A slight decrease in 2020 trauma calls can be attributed to the decline in overall calls during the onset of the pandemic.

Hamilton Paramedic Service
Trauma Calls



Considering the growing number of trauma events, almost 51% from 2016 to 2019, Hamilton paramedics would be best equipped to care for trauma patients with the specialized ITLS training. ITLS training will ensure that paramedics are able to perform rapid assessments, appropriate intervention, and immediate identification of life-threatening injuries. ITLS also provides a standardized approach to trauma care that aligns with that taken by hospital trauma unit physicians. This continuity in care from pre-hospital to hospital can save critical time, decrease the number of missed injuries and reduce complications of multiple trauma.[91] In fact, in Ontario in 2011, an inquest into a fatality caused by traumatic injuries during a vehicle collision led the coroner to recommend that the curriculum of paramedic education be examined to ensure adequate trauma care and that ITLS be a mandatory continuing education program for all paramedics across the province.[92]

At present, college paramedic programs in Ontario do not include ITLS courses. Thus, the onus is on the service to provide ITLS training to their paramedics. HPS has recently received an offer from the Centre for Paramedic Education and Research (CPER), the base hospital responsible for medical delegation of Hamilton paramedics, to provide medical oversight for the ITLS program. It is the position of CPER that the standard of care is maintained and enhanced through this training.

The benefits to providing ITLS training to paramedics during their continuing medical education sessions are numerous:

- Public funds are utilized on services that will directly benefit the community through the delivery of enhanced quality of care
- Trauma care will not only meet but exceed the MOH Standards given the ITLS is an accredited internationally recognized program
- As one of the few direct delivery agents of the program in Ontario, HPS will have the option to offer this program to other services and generate revenue
- HPS is committed to continually improving its level of service and training all paramedics in ITLS will demonstrate this commitment
- Hamilton paramedics will be given the tools they need to perform to the best of their abilities in any situation and deliver the best care possible to their patients
- ITLS training will ensure a more coordinated approach to trauma care with the local trauma facilities

It is an objective of this ten-year Master Plan that over the coming years, HPS provide ITLS training to all paramedics to ensure the delivery of the highest level of trauma care possible resulting in positive outcomes for trauma patients.

91 Werman, Nelson, Campbell, Fowler and Gandy. Basic Trauma Life Support. Annals of Emergency Medicine. 1987; V.16(11), p 1240-1243
92 https://niagaraatlarge.com/2011/12/22/coroner-inquest-ends-with-recommendations-anzovino-family-feels-satisfied-with

5.6 Specialized Services

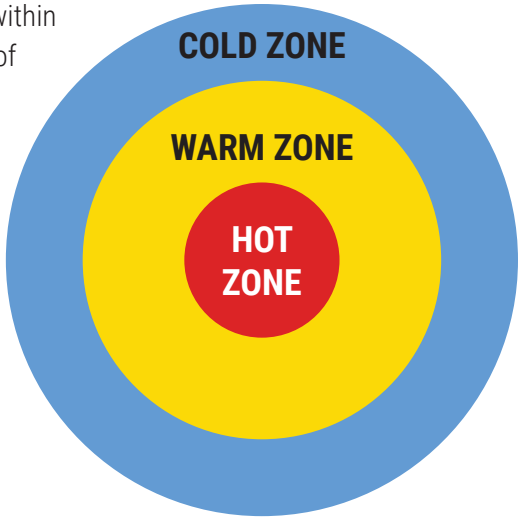
OBJECTIVES

14 ACQUIRE AN EMERGENCY RESPONSE UTILITY VEHICLE THROUGH THE REALLOCATION OF VEHICLE CAPITAL TO SERVICE EVENTS WHERE THE CONGREGATION OF PEOPLE INHIBITS ACCESS BY AN AMBULANCE

15 DEVELOP A FRAMEWORK FOR THE DELIVERY OF SPECIALIZED SERVICES TO INFORM OPERATIONAL AND CAPITAL DECISIONS

16 ENGAGE HOSPITAL PARTNERS TO JOINTLY ADVOCATE FOR THE MINISTRY OF HEALTH TO AUTHORIZE AND FUND THE ESTABLISHMENT OF A CRITICAL CARE TRANSPORT UNIT IN PARTNERSHIP WITH ORNGE

During an emergency response there are generally three zones within which first responders operate. The hot zone is at the center of the emergency. First responders who operate in this zone are directly responsible for eliminating the hazard and for rescuing people in this zone. The warm zone still presents risk of exposure to the hazard and is considered not secure or contaminated. As with the hot zone, first responders working in the warm zone are required to have specialized training to deal with the hazard. The cold zone is a secure area where there is no risk to the first responder. This is where paramedics typically receive patients who have been triaged from the hot zone where they would have received limited medical intervention or decontamination.



When paramedics do not operate in the hot and warm zones it limits access to the patient thereby delaying triage, assessment, and treatment of the patient. Furthermore, it can diminish the resources of first responders in these zones who must utilize their resources for patient care rather than for eliminating the hazard or rescue operations.

Having specialized paramedics support other first responders in the hot and warm zones enables these agencies to focus on their primary responsibilities while paramedics focus on providing immediate medical care to patients.

With the appropriate equipment and training, HPS will be able to provide the critical medical support required in unique events such as:

- High risk law enforcement operations
- Hazardous Materials (hazmat) and Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) incidents
- High angle rescues
- Mass gatherings
- Marine search and rescue operations
- Public order disturbances

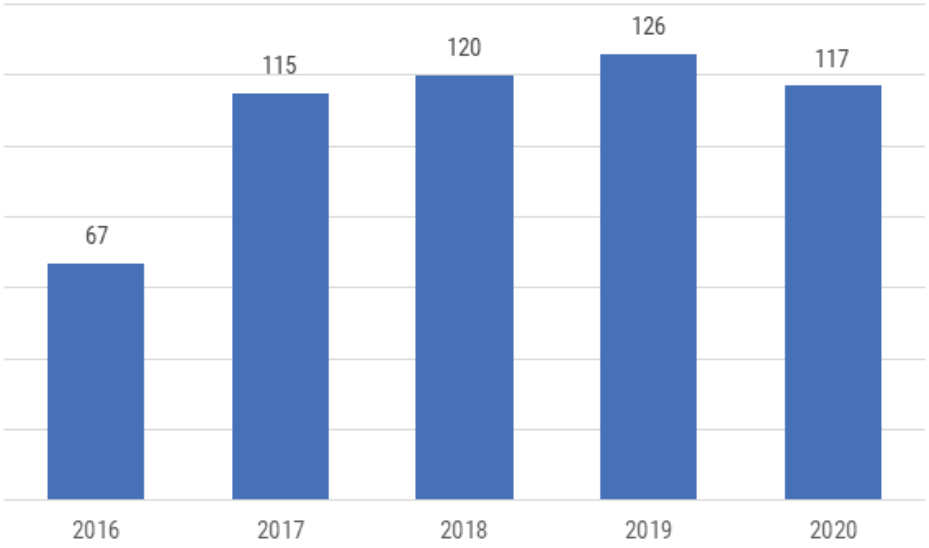
Tactical Paramedics

Tactical paramedics work closely with law enforcement to provide emergency medical care to police officers or civilians who are injured during tactical operations. Tactical operations include a range of dangerous events such as hostage situations, active shootings, bombings, high risk search warrants and the like. Tactical paramedics are highly specialized and trained in a number of competencies including tactical emergency casualty care, police operations, police tactics, CBRNE, K-9 medicine, riot control and explosive unit orientation.

As described earlier, HPS conducted a series of stakeholder consultations to inform the development of this Master Plan. Consultation with Hamilton Police Service revealed a need for tactical emergency medical support for their special operations.

Hamilton Police Service's Emergency Response Unit (ERU) is a highly trained tactical unit that supports police operations in high risk, potentially life-threatening situations. The ERU has been activated 545 times in the last four years in either full or partial deployment. Over 60% or 323 of these calls required paramedics to assist or be on standby.

Hamilton Police Service
Emergency Response Unit
Tactical Responses 2016 - 2020



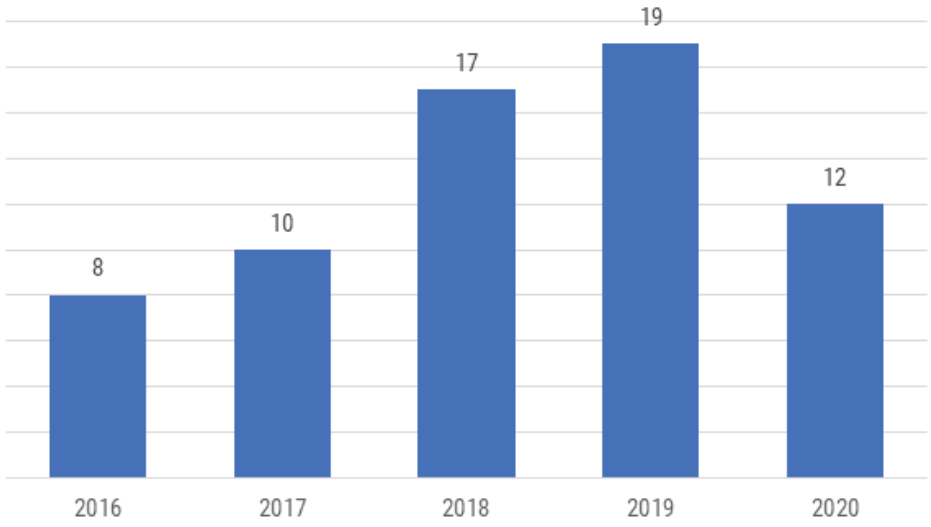
Hazmat and CBRNE

Some of the highest risks to the community as described by the City of Hamilton's Hazard Identification and Risk Assessment Report (2017) or the HIRA Report involve a hazardous material (hazmat). Chemical, biological, radiological, and nuclear and explosives or CBRNE was identified as having a "high" level of risk to the community and as such is ranked number 12 in the HIRA Report. While both risks involve substances that can cause harm to people and the environment, they differ in that hazmat incidents are generally smaller scale and accidental, for example, a chemical release due to an industrial fire or vehicle accident. In contrast, CBRNE events are the deliberate use of chemicals as a weapon for the purpose of causing harm. As a result, the lead agency may be either the fire department for hazmat responses or police services for CBRNE incidents.

Emergency response from paramedics in both situations would be similar. Paramedics can provide medical intervention, extrication, and treatment in the hot or warm zones. The National Fire Protection Association (NFPA) recognizes the benefit of medical integration into hazmat events and developed a standard for emergency medical response to a hazmat incident (NFPA 473).

The Hamilton Fire Department's hazmat response team was dispatched to 66 hazmat calls from 2016 to 2020 with an upward trend except for 2020 when the COVID-19 pandemic began.

Hamilton Fire Department
Hazmat Calls 2016 - 2020

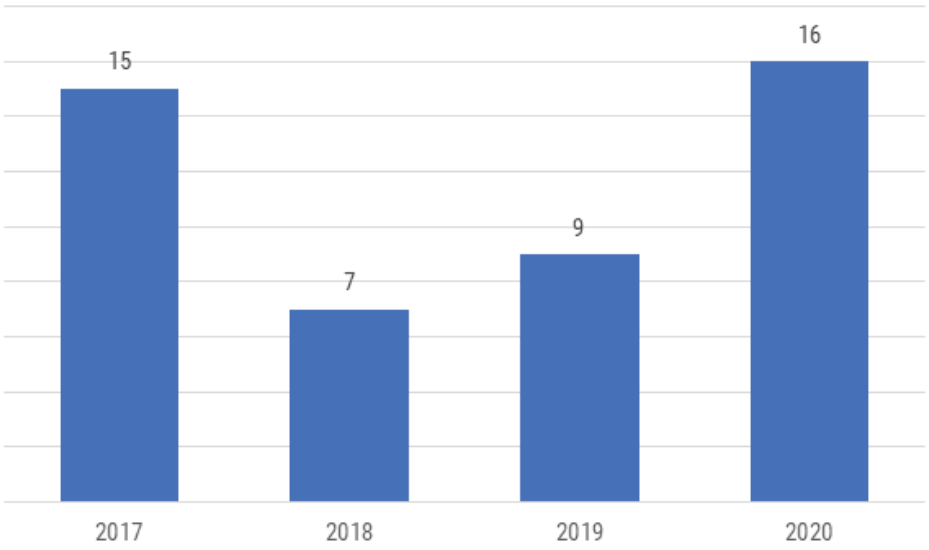


High Angle Rescues

As described in Section 2.0 Hamilton has a unique geography in which the escarpment runs through the length of the city. Hamilton has one of the highest numbers of waterfalls of any urban area of its size and has recently been deemed the Waterfall Capital of the World. This distinction has led to an increase in visitors to the escarpment, its trails, and waterfalls. This has posed challenges for the Hamilton Fire Department responsible to perform rope rescue operations as visitors attempt to get close to the falls or venture off the marked hiking trails. From 2017 to 2020, the Hamilton Fire Department conducted 47 high angle rope rescues.

Source: Hamilton Spectator, G. Yokoyama

Hamilton Fire Department
Rope Rescues 2017 - 2020



In 2018, the City of Hamilton erected signs and fencing and enforced fines for people attempting to cross barriers to get to the falls. As a result, there was a decline in the number of high angle rope rescue responses that year. However, these incidents increased in the following year and more significantly in 2020 when lockdowns during the pandemic meant more people began exploring the outdoors.

As most injuries related to high angles rescue are associated to falls from significant heights, injuries are often more severe requiring advanced medical interventions. In addition to the basic medical support provided by firefighters, there is an opportunity to better integrate paramedic response into the rescue to provide earlier advanced medical intervention. Working with the Hamilton Fire Department, paramedics can offer advanced medical interventions to stabilize and comfort the patient while firefighters focus on rescue and/or extrication. These medical interventions include:

1. Pain control for fractures with the use of morphine
2. Advanced airway and breathing management for unconscious patients
3. Intravenous and fluid therapy when there is blood loss
4. Other surgical interventions to stabilize respiratory status

Since extrication after a fall often involves tackling difficult terrain causing inadvertent movement of the patient, pain management is crucial in helping the patient be comfortable and calm, which in turn assists the rescue efforts of the firefighters.

Transferring care to a trauma hospital within an hour of a fall is critical to reduce complications associated with injuries in such incidents. However, the average duration for high angle rope rescue in 2019 was almost two and a half hours. Therefore, it is imperative that the patient receive advanced medical intervention by paramedics at the incident until transportation to a hospital is possible.

Mass Gatherings Response

Heavily populated events and festivals often require onsite medical care. Currently, HPS is only able to provide an ambulance to service mass gatherings. The challenge is navigating a large vehicle through the crowd to access the patient. The time it takes for the ambulance to safely make its way through a large and dense group of people could negatively impact the outcome of the patient who may require immediate medical attention. Furthermore, an ambulance parked idle at an event means it is unable to respond to an emergency out in the community, thereby diminishing community resources.

In Section 2.7, a description of Hamilton's arts and culture scene describes a flourishing sector of the economy. This cultural revival has attracted thousands of visitors to the city for a range of events including festivals, fairs, parades, celebrations, competitions, markets, concerts, and street fests. Over 2018 and 2019, the city hosted 56 mass gathering events with an estimated attendance of over 5,000 people per event.

In order to quickly access the patient in a mass gathering, a three-pronged response is required. The first step is to quickly access the patients. Bike Medics are specially trained paramedics on bicycles equipped with a defibrillator, life-support medications and a number of kits to manage trauma, bleeding, and respiratory problems. Due to their agility, Bike Medics can provide a rapid response in large crowds where it is difficult for an ambulance to access.

The second step in mass gathering response is to extricate the patient from the crowd. This requires a vehicle much smaller than a traditional ambulance. A specially equipped utility vehicle, similar to an all-terrain vehicle (ATV), can maneuver quickly through a crowd and transport the patient out of the area. The utility vehicle carries a range of medical equipment including a stretcher.

Once the patient is extricated from the crowd, the third step is to transfer the patient to a waiting ambulance should they require transport to the Emergency Department. The coordination of resources ensures that the medical care of the patient is continuous from the time the paramedics reach the patient through to the transfer of care to the hospital.

Source: Guelph Wellington Paramedic Service

Most paramedic services in Ontario provide rapid response paramedic coverage via bike units and/or utility vehicles for mass gatherings events. HPS would be better equipped to serve residents and visitors in Hamilton by establishing a Paramedic Bike Unit and acquiring a medical emergency utility vehicle to reach people in areas that cannot be accessed by a regular-size ambulance.

In 2020 and 2021, HPS submitted applications to community organizations for grants to contribute toward the establishment of a Paramedic Bike Unit. HPS was successful in obtaining almost $30,000 in grant funds which will be used to acquire bicycles, safety equipment, medical equipment, and training for paramedics. The HPS Bike Unit is expected to be operational in 2022.

A utility vehicle suitable for emergency medical response in Hamilton should be a four-season vehicle that can used in inclement weather. The vehicle will contain medical equipment, a stretcher and room for two attending paramedics. This Master Plan recommends that a utility vehicle be acquired within the first year of this Plan through the reallocation of vehicle capital for economical efficiency.

Marine Unit

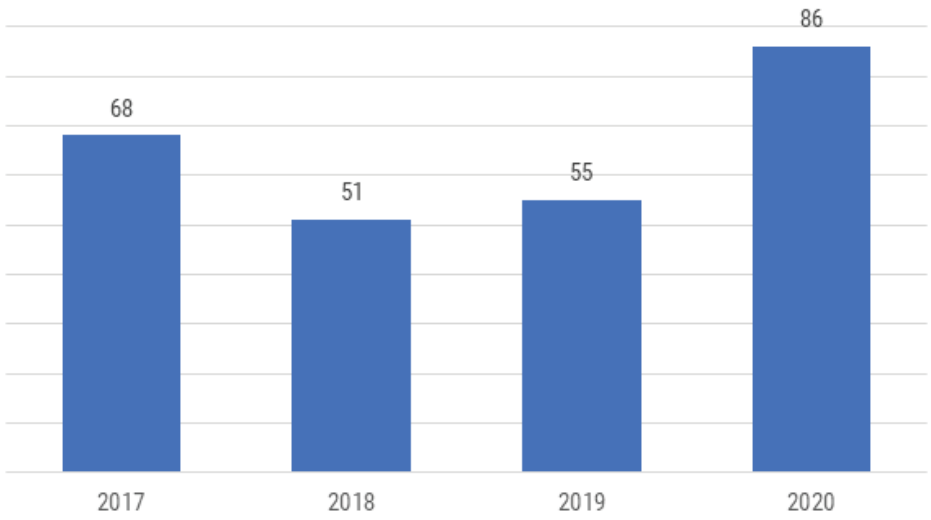
A key element to Hamilton's Transportation Network as described in Section 2.5, is the Port of Hamilton, the busiest of all Canadian Great Lakes ports. In addition to the vessel traffic, there is an increase in harbour traffic and on the lake during the summer months with recreational boaters. The Hamilton Police Service Marine Unit is responsible for policing approximately 250 square kilometres of water at the western end of Lake Ontario, including Hamilton Harbour and all other waterways in Hamilton. The Marine Unit conducts rescue operations and law enforcement on the Hamilton Harbour year-round. During the boating season from April through November, the Unit actively patrols the Hamilton Harbour and the western portion of Lake Ontario on a daily basis. Throughout December to March, the Unit conducts ice rescues and responds to marine calls on an emergency basis.

Marine Unit rescue on Lake Ontario
Source: Andrew Collins via Twitter

As with many other specialized services discussed in this section, receiving prompt and effective medical care can be a challenge when responding to emergencies on the water. Currently, paramedics wait on shore until police or other first responders access the patient, perform basic first aid then transport the patient back to land to paramedics. As with other emergency situations, the time it takes to retrieve and transfer the patient to the care of paramedics can have a significant negative impact on patient outcome depending on the medical or traumatic condition. As a result, some police services such as Toronto and Ottawa have partnered with paramedic services to integrate paramedic care into police marine units.

Since 2017, the Hamilton Police Service had 260 calls for the Marine Unit related to search and rescue, vessel in distress and ice rescue.

Hamilton Police Service
Marine Unit Responses 2017 - 2020



Trained paramedics can provide emergency medical care to people or police officers who become sick or injured in the marine environment. In addition to responding to medical emergencies, paramedics would also participate in delivering public education during routine patrols including such topics as:

- Water safety
- Drowning prevention
- Sun safety (burns, heat exhaustion, heat stroke, dehydration)
- Hypothermia signs and treatment
- CPR awareness
- Allergic reactions and epi-pen use
- Marine/boating First Aid kits
- Using 911

Public Order Unit

Police services will deploy a Public Order Unit (POU) to manage large crowds that gather for demonstrations, protests, or festivals. These gatherings while mostly peaceful may also require managing behaviours to preserve the safety of residents and property. Since the nature of such large-scale events can be unpredictable, the POU provides proactive crowd management to maintain public safety and prevent injuries or property damage. In instances where injuries do occur, having specially trained paramedics integrated in the Unit ensures immediate medical care.

Police services in Toronto, York and Ottawa have trained and equipped paramedics as part of their POUs. Although Hamilton Police Service's POU is not frequently deployed, 45 times from 2016 to 2020, having paramedics trained, equipped and available for integration into the POU provides support for preventative, emergent and urgent medical issues. Paramedics in the hot and cold zones would provide continual medical care from the time the patient is being extricated from the crowd until the care of the patient is transferred to a health care facility.

Unlike many other paramedic services in Ontario, HPS does not have specialized teams to be able to respond to the unique hazards that pose risks to the community. Integrating paramedics into specialized operations when required will result in immediate access to advanced medical care no matter the type of emergency. Furthermore, paramedics participating on specialized teams enable the first responders of the lead agency to focus their attention and resources on executing their core functions rather than performing basic medical care.

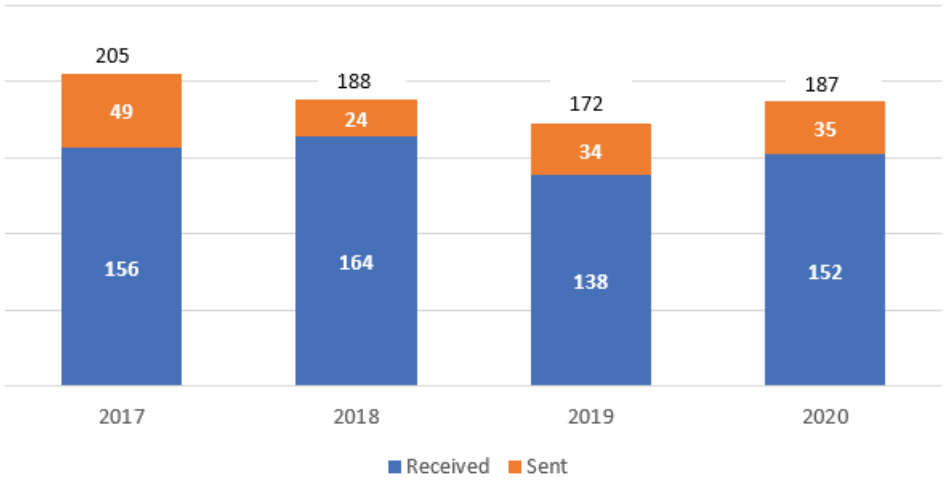
Given the range of unique risks that have the potential to cause harm to Hamilton's residents and visitors, this Master Plan recommends that following a review of specialized services required in Hamilton, a framework be developed for the delivery of these services by HPS. This framework will inform operational and capital decisions with regard to acquiring equipment and training for paramedics who participate on special teams.

Critical Care Transport Unit

Hamilton Health Sciences provides specialized regional programs to support hospitals in surrounding municipalities in caring for critically ill patients. These programs include advanced trauma, cardiac, stroke and burn care for both pediatric and adult patients. When a patient at a hospital within the region needs advanced treatment in one of these areas, urgent interfacility transfer is required. CritiCall Ontario is contacted to arrange transport with Ornge, the province's dedicated critical care ambulance service. Ornge's medics are Critical Care Paramedics (CCPs) who have an expanded scope of practice that focuses on intensive care with physician oversight.

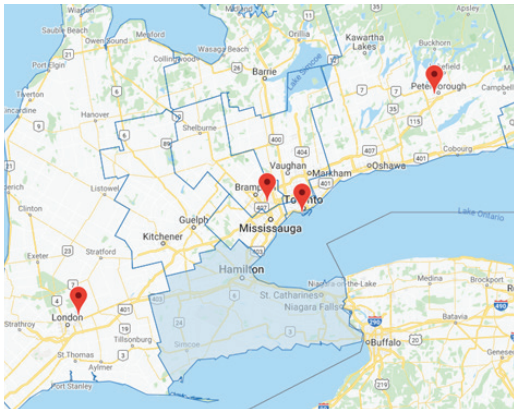
From 2017 to 2020, Ornge has transported 610 patients from regional hospitals to the Hamilton General Hospital for advanced care. In addition, over 142 critically ill patients required transport out of Hamilton General Hospital to another hospital in the region.

Ornge Transports To and From Hamilton General Hospital
2017 - 2020



Source: www.ornge.ca/stats-centre/healtcare-providers-statistics
Note: 'Sent' data is an underestimate as number of patients under 5 are not counted

During stakeholder consultations, hospital partners indicated a need for increased capacity for inter-regional transports. Given Ornge operates from just three locations in the region, London, Brampton and Toronto, the distance may result in delays in transporting the patient. For example, if a patient of a Niagara Region hospital requires transport to the Hamilton General Hospital, Ornge would have to travel the distance from London, Brampton, or Toronto to Niagara and then back to Hamilton. In many cases it is crucial that patients be transferred in a timely manner.



Capacity in terms of the number of critical care transport vehicles is also a challenge highlighted during the pandemic when Toronto-based hospitals depended on regional paramedic services to assist with transferring COVID-19 patients to inter-regional hospitals with available beds.

When it is not possible to arrange a critical care transfer when required, hospitals rely on local ambulance services to transport critically ill patients. This requires the hospital's medical staff such as doctor, registered nurse, or respiratory therapist to accompany the patient along with the paramedics resulting in fewer ambulances available for emergency response in the community. It also means fewer medical staff in the hospital for a potentially extended amount of time as they travel with the patient to a hospital in another part of the region. In turn, this can lead to a delay in emergency response and movement through the hospital.

To assist Ornge and provide additional service to Hamilton hospitals, this Master Plan recommends that HPS works with Ornge to establish a Critical Care Transport Unit (CCTU) operated by HPS. The HPS CCTU would be staffed by CCPs which prevents the need for hospital medical staff to accompany the patient during transport. HPS will collaborate with hospital partners to advocate for MOH to fully fund this specialized service.

Special Events Medics

As noted in Section 2.0 describing the City of Hamilton profile, Hamilton is home to national and local sports teams, host to many large-scale events such SuperCrawl and has a burgeoning film industry. HPS has been contracted by vent organizers to provide stand-by paramedic services for many of these events particularly for the film and sports industries. HPS brings on additional paramedics and utilizes a spare ambulance or ERV to provide care in dealing with serious accidents or minor injuries, illnesses and aliments that may occur during these events.

On average, HPS has entered into 18 contracts per year with the majority being with the film and sports industries. To date, these organizations have initiated contact with HPS having learned of the fee-for-service through word of mouth or via a online form on the HPS website.

As part of a framework for the delivery of specialized services, HPS will develop a more proactive and structured approach to seek and secure opportunities to provide services for special events and generate income. This includes coordinating with the City of Hamilton's Music and Film Office and other key partners to promote the availability of paramedic service support.

Supercrawl

Ice storm 2013 Source: Hamilton Spectator, G. Yokoyama

5.7 Contingency Response Planning

OBJECTIVE

17 PARTICIPATE IN DISRUPTIVE AND DISASTROUS EVENT PREPAREDNESS EXERCISES WITH COMMUNITY AND EMERGENCY RESPONSE PARTNERS INCLUDING ANNUAL EMERGENCY OPERATIONS CENTRE (EOC) EXERCISES BASED ON THE HAZARDOUS INCIDENTS IDENTIFIED IN THE HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA) REPORT

HPS is responsible to deliver pre-hospital assessment, treatment, and transport services to a city of over half a million people. Section 2.0 describes the profile of Hamilton as having a unique and varied geography, a significant industrial sector, the largest port in Ontario and an influx of students and visitors for the school year and during many large-scale festivals and events. In addition, with an increasing awareness of disastrous events globally, such as those related to extreme weather and mass violence, HPS must prepare to provide a wide range of paramedic services to meet the increasingly diverse needs of the city.

The City of Hamilton's Emergency Management Division reports the top risks to the community in the Hazard Identification and Risk Assessment Report (2017). Based on past occurrences and the potential impacts of each hazard, the HIRA Report identified the following top ten hazards in Hamilton:

Hazard	Lead Agency	Level of Risk
Hazardous Materials Incident/Spills – Fixed Site Incident	Hamilton Fire Department	Extreme
Flooding	Public Works	Extreme
Hazardous Materials Incident/Spills – Transportation Incident	Hamilton Fire Department	Extreme
Human Health Emergency	Public Health Services	Extreme
Energy Emergency (Supply)	Public Works	Extreme
Extreme Ice Storm	Utilities Provider	Extreme
Explosion/Fire	Hamilton Fire Department	Very High
Transportation Emergency – Rail	Hamilton Fire Department	Very High
Critical Infrastructure Failure – Telecommunications	Communications Provider	Very High
Active Shooter/Violent Situation	Hamilton Police Service	Very High

While HPS is not the lead agency for the identified hazards, in almost all cases paramedics are required to fulfil a major role. These hazards represent major incidents that involve multiple locations or that have a significant impact on City operations, facilities, or infrastructure. There is also the possibility of a significant impact on the public which may include people requiring emergency medical attention.

Trends in hazards across the city indicate an increase in the number of the following disastrous events: [93]

- Flooding due to weather events, overwhelmed or failed infrastructure, overwhelmed natural features after large rain event and rising lake levels
- Extreme heat and the number of days of extreme heat
- Landslides along escarpment
- Severe wind/tornadoes
- Human health emergencies (e.g., 2009 H1N1 pandemic, 2020 COVID-19 pandemic)
- Severe ice storms

93 Email correspondence from Emergency Management Coordinator, March 28, 2018

As a result of climate change, there is expected to be a rise in the intensity, duration, and frequency of precipitation events, both snow and rain. Climate change also causes an increase in the frequency and intensity of windstorms and ice storms.

Taking measures to predict, prepare or even prevent such hazardous events in the community helps to reduce the effects of the disaster. Conducting exercises that simulate emergency events with first responders, lead agencies and government builds preparedness in the following ways:[94]

- Validate response plans, policies, and procedures
- Test equipment and training
- Clarify roles and responsibilities of individuals and agencies
- Enhance inter-agency coordination and communication
- Identify gaps and areas requiring improvement
- Improve performance through practice

It is essential to be prepared to respond to potentially devastating events to mitigate the impacts and aid in recovery. It is therefore recommended that HPS help to initiate, coordinate, and participate in annual disaster preparedness exercises led by the City of Hamilton's Emergency Operations Centre. Such exercise will be based on the hazards identified in the HIRA Report. Furthermore, HPS should seek to organize and participate in other disruptive event preparedness exercises with first responders and community partners including hospitals, airport, and health care to build preparedness for scenarios such as public disorder, building collapse, mass evacuation or overdose epidemic.

94 Emergency Management Ontario, Minister of the Solicitor General, Guidelines for the Development of an Exercise Program https://www.emergencymanagementontario.ca/english/emcommunity/program_resources/exercise/exercise_guidelines_main.html

5.8 Logistics and Planning

OBJECTIVES

18 COMPLETE A THOROUGH REVIEW OF THE LOGISTICS AND PLANNING SECTION TO ENSURE RESOURCES AND CAPABILITIES MEET CHANGING AND GROWING DEMANDS OF THE SERVICE INCLUDING PREPAREDNESS FOR DISRUPTIVE INCIDENTS FOR HPS AND THE CITY OF HAMILTON'S HEALTH CARE DIVISIONS:

A) ADD LOGISTICS PERSONNEL TO MANAGE AN INCREASED WORKLOAD AS A RESULT OF ENHANCEMENTS TO FRONTLINE SERVICES

19 INVESTIGATE ASSUMING RESPONSIBILITY FOR PROCURING AND MANAGING MEDICAL SUPPLIES FOR CITY OF HAMILTON'S LONG-TERM CARE HOMES AND HAMILTON PUBLIC HEALTH SERVICES

A) ACQUIRE WAREHOUSE SPACE TO ACCOMMODATE THE CENTRALIZATION OF MEDICAL SUPPLIES FOR CITY OF HAMILTON DIVISIONS PROVIDING HEALTH CARE

B) EXPLORE THE POSSIBILITY OF PROVIDING RESPIRATOR TESTING FOR CITY OF HAMILTON DIVISIONS WHERE EMPLOYEES REQUIRE RESPIRATOR MASKS

20 IMPLEMENT A COMPREHENSIVE ASSET MANAGEMENT SYSTEM TO EFFECTIVELY MANAGE INVENTORY OVER THE LONG TERM FOR HPS AND THE CITY OF HAMILTON DIVISIONS WHERE APPLICABLE

21 DEVELOP A 'CLEAN AND GREEN' PLAN TO REDUCE THE CARBON FOOTPRINT OF HPS THAT INCLUDES EXAMINING THE FEASIBILITY OF ACQUIRING HYBRID OR ELECTRIC POWERED VEHICLES AND IMPLEMETING WIRELESS CHARGING STATIONS

The Logistics and Planning section is responsible for managing HPS's assets and information systems by performing the following activities:

- Life-cycle management of HPS vehicles, material and equipment, including procurement, distribution, inspection, cleaning, maintenance, minor repairs, and disposal
- Information systems administration and management of operational computer hardware and operational applications
- HPS information and data custody and management, including collection, collation, analysis, and presentation
- Coordination of facilities usage
- Logistics and support systems management, analysis and development and coordination of support by external organizations and entities
- Management of medical supply inventory
- Inventory control of medical supplies at stations

Logistics and Planning plays a critical role in the operations of HPS by providing paramedics with the tools and support that are essential to delivering quality patient care. This section of HPS ensures that paramedics have clean, operative vehicles stocked with medical supplies, pharmaceuticals, and well-functioning patient carriage equipment in accordance with provincial standards. The Logistics and Planning section ensures HPS vehicles have up-to-date technology for reliable communication and access to critical data. This section is also responsible for providing paramedics with uniforms and personal protective equipment and helps to resolve any facilities issues at stations. Logistics and Planning also operates records management and information systems to monitor and evaluate data related to operational performance, quality assurance, paramedic training and performance and cross border ambulance activity.

There are a number of partners HPS relies on to assist with a variety of logistics activities:

- City of Hamilton, Public Works Department, Facilities Management and Capital Programs – performs facility maintenance and repair
- City of Hamilton, Corporate Services Department, Information Technology Services – provides a variety of technology equipment, software, and administrative support
- City of Hamilton, Hamilton Fire Department, Mechanical Division – services HPS vehicles and select equipment
- City of Hamilton, Corporate Services Department – various divisions assist with HPS logistics activities including the Procurement Division and Legal and Risk Management Services Division
- External agencies – a number of external vendors are required to maintain specific HPS equipment such as cardiac monitors (Zoll), stretchers (Stryker) and dispatch radio system (MOH)

Vehicle and Equipment Maintenance

The Logistics and Planning section is responsible for ensuring all vehicles are specially configured, equipped and maintained to conform to the *Provincial Land Ambulance and Emergency Response Vehicle Standard, the Provincial Equipment Standards for Ontario Land Ambulance Services*, and the Ambulance Service Review.

As described in Section 3.2, through the Ambulance Service Review (ASR), the MOH evaluates compliance with these Standards. An audit of almost 70 requirements related to logistics such as vehicle and equipment maintenance and cleanliness is undertaken every three years. Failure to meet the Standards can result in the Service's land ambulance license being revoked.

Logistics Technicians are responsible to conduct regular inspections of medications, vehicles, and equipment. They must routinely clean vehicles and ensure they are stocked with the required medication and supplies and perform preventative maintenance of equipment. The current service standard based on logistics staffing capacity is to complete this process every 90 days although the industry best practice is at least monthly.

Furthermore, logistic technicians are responsible for stocking, maintaining, and cleaning paramedic response bags which hold medical equipment that paramedics carry to an incident. In total, HPS has over 1,000 response bags, medical kits and pouches. With the onset of the pandemic in 2020, it became even more critical for vehicles and equipment to be cleaned properly and more frequently. Logistic technicians had to increase cleaning activities and conduct a deep clean of all vehicles, equipment, and paramedic response bags after every shift.

Currently, dedicated logistics capacity in HPS is limited to one full-time Stores Clerk and three full-time Logistics Technicians working weekdays and weekends, with paramedic supervisors monitoring logistics activities after hours. Since 2014, HPS has added ten ambulances to its fleet and 100 paramedics. This alone has significantly increased the workload of logistics personnel not only in terms of maintaining and cleaning an expanded fleet and equipment but also managing additional uniform orders and medical supply inventory. In addition, the more frequent and enhanced cleaning required during the pandemic along with managing additional medical supplies such as PPE has increased an already heavy workload for logistics personnel.

HPS would like to move a cycle of comprehensive maintenance every 30 days to be in line with the industry best practice. However, managing an expanding fleet and increasing number of paramedic staff with the current complement of logistics personnel makes it difficult to achieve the Standard of completing this process, even every 90 days.

Being unable to adhere to the standard course of inspections, maintenance, stocking, and cleaning can pose a risk for HPS and the community. Expired medications and failed equipment can result in adverse patient outcomes. Contamination and contagions are potentially dangerous results of inadequate cleaning of vehicles and equipment. Failure to comply with the provincial vehicle and equipment Standards may be considered a violation of the Regulations and Standards issued pursuant to the *Ambulance Act*.

A thorough review of the Logistics and Planning Section is recommended by this Master Plan. Such a review will identity resources and capabilities required to meet changing and growing demands. Additional logistics personnel will be required to manage the increased workload as a result of additional ambulances, equipment, and paramedics prior to the pandemic which further burdened logistics personnel. Moreover, additional logistics technicians will be required to manage an increased inventory of medical supplies for the City of Hamilton in a centralized model as recommended below.

A review will also ensure preparedness for disruptive events such as the pandemic which increased the workload pressure of Logistics and Planning personnel who are essential to the operation of the service. Furthermore, as will be outlined in Section 6.0, a facilities review is recommended that will include logistics requirements. As such, a review the Logistics and Planning Section will include the logistics requirements identified in the facilities review.

Centralize Medical Supplies

The Logistics and Planning Section also manages medical supply inventory including procuring, storing, tracking, updating and distributing such supplies as pharmaceuticals, medical consumables such as syringes, needles, personal protective equipment (PPE) and medical equipment such as cardiac monitors and blood analysis systems. In addition to HPS managing its own medical supplies, it also handles the medical supply requirements of the Hamilton Fire Department (HFD). This prevents duplication of efforts, supports appropriate fire services-tired response to certain medical emergencies and creates cost-efficiencies by purchasing in bulk.

During stakeholder consultations, City of Hamilton partners expressed a desire for HPS to take control of purchasing, stocking, and tracking medical supplies. The City's long-term care homes, Hamilton Public Health Services and to some extent the HFD all have their own inventory of similar medical supplies to that of HPS. Localized purchasing makes uniformity in processes and prices of materials more difficult to achieve. Duplication in purchasing materials, loss of benefit of bulk purchases and additional administrative work are drawbacks resulting from divisions controlling their own medical supply inventory.

With the onset of the pandemic in March 2020, disadvantages to this localized approach to purchasing were amplified. During the early stages, municipalities, cities, and regions scrambled to secure PPE to ensure the safety of staff who provide critical services to the community. Federal and provincial PPE reserves were non-existent leaving municipalities competing for limited supplies from outside of the country. Several divisions within the City of Hamilton worked independently to try to secure PPE which presented the following inefficiencies:

- Several divisions competing for the same supplies from the same vendors
- Duplication of efforts as more than one employee performs the same task
- Loss of potential savings by not purchasing in larger quantities

The limited supply of PPE available to City employees meant some divisions had to institute a recycle/reuse program by cleaning PPE when possible and reserving the use of PPE unless it was essential. As noted earlier, the HFD reduced the number of medical responses to preserve PPE for paramedics. HPS's logistics personnel designed a program that enabled isolation gowns to be reused which was implemented for all City of Hamilton medical staff.

In addition to the challenges acquiring an adequate supply of PPE, complications in providing respirator testing also arose. The City of Hamilton as an employer is required to administer a fit test for employees who wear respirator masks such as an N95 to prevent infectious and hazardous agents from being inhaled. A fit test verifies the mask is the right size, creating an effective seal for the proper level of protection. Issues related to fit testing emerged during the early stages of the pandemic, including:

- Contractors used by some divisions for respirator testing were not available due to high demand
- For divisions that had the technology to conduct respirator fit testing in-house, related consumable supplies were difficult to obtain due to challenged logistic chains
- Lack of uniformity in testing methods used by divisions led to uncertainty about which method was most accurate

These challenges can be overcome should HPS become the sole provider of respirator testing for all divisions where employees are required to wear respirator masks. This Master Plan recommends that such an arrangement be explored.

As the pandemic progressed and vaccines became available challenges emerged obtaining adequate supplies of vaccines and consumable materials like syringes and needles. Similar to the issues experienced in securing PPE, divisions were simultaneously yet independently procuring vaccination supplies.

To address these challenges, several City divisions including the procurement office collaborated with the leadership of the Emergency Operations Centre to put into place the following solutions:

- A central supplies depot was established to coordinate and procure PPE and vaccine supplies for the entire city staffed by redeployed employees
- Divisions with established respiratory protection programs for fit testing were able to assist other divisions that depended on third party vendors

With these measures in place, HPS has been able to maintain a six-month supply contingency creating a readiness for any future disruptive events.

The pandemic has highlighted issues related to localized procurement and management of medical supplies. During a global health crisis, divisions within the City were in a position of competing for medical supplies. While the solutions implemented have been successful in mitigating these issues, they are temporary. The central supplies depot is scheduled to close in April 2022 and staff redeployed to the depot and to assist divisions with fit testing will return to their permanent positions.

Centralizing purchasing and management of medical supplies for City divisions providing health care would allow for more comprehensive control and optimization of inventory including management of supplies with expiry dates. Centralized record-keeping of orders and inventory helps to avoid under and over-stocking. Centralized purchasing will enable the use of computerized systems to automate the procuring process which can be integrated with accounting and stock control. Duplication of efforts and competition for supplies among divisions would be avoided with a centralized model. Purchasing in volume for multiple divisions has the potential to generate greater discounts. Furthermore, centralized purchasing is helpful to vendors as they can coordinate and deliver goods to a single buyer instead of many buyers. Finally, a centralized model would enable HPS and other divisions to be better prepared for future disruptive events by ensuring an ongoing perpetual six-month supply of essential medical materials is maintained with minimal waste.

Thus, this Master Plan recommends that HPS investigate the possibility of assuming responsibility for procurement and management of medical supplies for City of Hamilton's long-term care homes and Hamilton Public Health Services. HPS would control the procurement, storage, and management of and inventory of medical supplies for City divisions providing health care. HPS would be the central point of medical supplies for the City and issue supplies to respective divisions as needed. This would necessitate a logistical space large enough to house supplies of these City divisions. The current space for HPS inventory at Station 30 is inadequate for storing additional supplies of other divisions and given that the City's temporary supplies depot will close in 2022, a new logistical space is required large enough for the increased inventory. It is recommended that within the first year of this Master Plan, HPS acquire warehouse space that will accommodate the centralization of medical supplies for City divisions providing health care. Details on this facility are discussed further in Section 6.0 Facilities.

Asset Management

The Logistics and Planning Section is responsible to track all assets of HPS including an inventory of medical supplies and equipment and vehicles. Such assets are vital to the day-to-day operations of the service and need to be managed accurately and tracked in real-time.

Logistics and Planning has had limited access to a records management system. This means stock is issued without packing slips or a method of tracking available stock, past usage, backorders, or out-of-stock items. Manual records, including whiteboards and multi-user spreadsheets have been used to track drug expiry, equipment servicing intervals and other critical logistics' information.

In 2020, it became more important than ever for HPS to proactively manage assets as an evolving health crisis resulted in a global shortage of medical supplies. To ensure an adequate supply of medical inventory and equipment, especially when supply chains are disrupted, Logistics and Planning personnel began the process of transitioning to a computerized system. This modernized system tracks real-time supply levels and accurately forecasts supplies required to ensure critical stock is readily available and up to date.

Having a reliable, effective, and efficient inventory management system will help reduce costs and limit waste by preventing stock from expiring or being overstocked. It also supports patient care by having the right supplies and medications available when needed. A computerized management system will automate the procurement process and can be integrated with other systems such as accounting.

A robust asset management system is also required should HPS move to a model of centralized control of medical supplies for multiple City of Hamilton divisions, as discussed in the previous section. With more supplies being purchased, stored, and distributed to more locations, utilizing a computerized system will simplify the complexity that comes with managing increased inventory for multiple users.

It is essential to accurately track assets in order to effectively manage inventory and equipment. It ensures that paramedics have the tools they need to deliver quality patient care. As such, this Master Plan recommends that a comprehensive asset management system is fully implemented and can fulfill the evolving needs of the service over the long term including the potential to manage the medical inventory for City of Hamilton divisions.

Clean and Green Plan

In 2019, the City of Hamilton declared a climate change emergency and committed to developing a plan to achieve net-zero carbon emissions by 2050. The Community Energy and Emissions Plan sets out to reduce greenhouse gas (GHG), improve energy efficiency while also meeting Hamilton's future energy needs. The plan encompasses all aspects of energy use and GHG emissions including homes, industry, waste, and transportation.

As a predominantly vehicle-based service, HPS has a different carbon footprint than many other health care providers in the city. As HPS's demand for services increases and additional ambulances are added to the fleet, the amount of travel and fuel consumption increases. Distance travelled decreased slightly in 2020 from 2019 due to the decline in service demand during the first few months of the pandemic. From 2018 to 2020, HPS consumed a total of 1,886,197 litres of fuel purchased at a City of Hamilton facility.

Year	Kilometres Travelled	Litres of Fuel Used	
		Gasoline	Diesel
2018	1,834,070	614,074	827
2019	1,909,099	632,285	414
2020	1,887,557	637,423	1,174
TOTALS	**5,630,726**	**1,883,782**	**2,415**
	TOTAL LITRES	**1,886,197**	

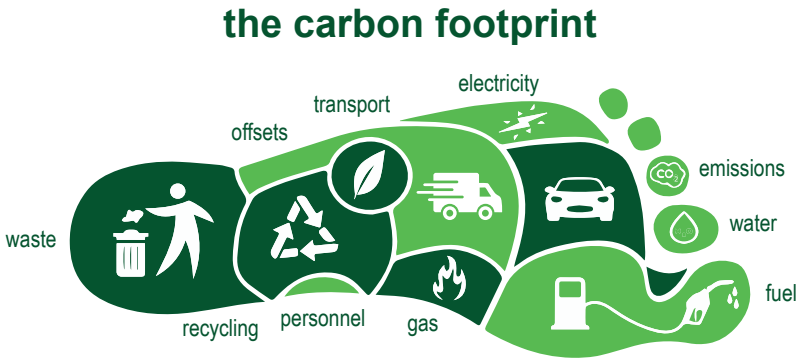
Fuel amounts rounded to nearest whole number.

In an effort to reduce the carbon emissions resulting from the fuel used by vehicles, HPS replaced two decommissioned ambulances with new hybrid ones in 2020. Not only does this hybrid technology reduce carbon emissions, it requires less fuel for the same distance saving on the cost of fuel while increasing mileage. It is estimated that this technology will be able to successfully reduce greenhouse gas emissions by 10.7 tonnes per vehicle each year.

In addition, all ambulances have anti-idling technology designed to control and monitor engine idling. Ambulances must be temperature controlled to preserve the pharmaceuticals they carry. Prior to installing this technology, ambulances' engines would have to run constantly even when an ambulance was stationary. Anti-idling technology automatically turns the engine off and on to maintain the interior temperature and charge the battery. This ensures the temperature requirement of the medications are maintained and patients are comfortable. Furthermore, anti-idling also saves fuel, reduces carbon emissions, and extends the life of the vehicle's charging system components. As this technology advances to include more functionalities such as solar powered idle reduction systems, HPS will consider updating ambulances.

During the beginning stages of the pandemic, logistics personnel designed and implemented a program to fulfill the City of Hamilton's need for medical isolation gowns which were in short supply. These are one-use gowns worn as part of PPE to protect the wearer from contact with pathogens such as the COVID-19 virus. Logistics established an arrangement with a uniform manufacturer to pivot their operations to make medical gowns. The manufacturer repurposed the material they used for uniforms to make medical gowns. Moreover, logistics personnel arranged for the cleaning and sterilization of the gowns so they could be reused. This ensured that all City of Hamilton staff who required medical gowns during the pandemic had access to them while reducing the need to dispose of one-use gowns.

HPS is committed to reducing GHG emissions to protect Hamilton's environment and contribute to creating a healthier community. As such, an objective of this Master Plan is to develop a 'clean and green' plan for HPS that advances the City's goal of achieving net-zero carbon emissions by 2050. A clean and green plan for HPS will align with and support the City's Community Energy and Emissions Plan. It will determine the current state of HPS's carbon footprint through a GHG audit to identify areas for improvement and establish actions to lessen HPS's impact on the environment. It also requires examining environmental trends, policies, green plans of other organizations and sustainability trends including the use of technology to mitigate climate change. HPS's clean and green plan will investigate the feasibility of replacing decommissioned ambulances with fully electric powered or hybrid ambulances. Furthermore, the plan will explore the technology of wireless electric charging stations for stationary ambulances located at HPS stations and hospitals. The plan will also consider utilizing LEED (Leadership in Energy and Environmental Design) certification to ensure any new and existing HPS buildings are green, highly efficient, and healthy.



5.9 Information Technology and Data Management

OBJECTIVES

22 DEVELOP AN IT STRATEGY BASED ON A COMPREHENSIVE REVIEW OF IT AND DATA MANAGEMENT INFRASTRUCTURE (BOTH HARDWARE AND SOFTWARE) TO IMPROVE OPERATIONAL EFFICIENCY

A) ACQUIRE SMARTPHONES FOR ALL PARAMEDICS WITH ADVANCED TECHNOLOGY TO INTEGRATE WITH DISPATCH SYSTEMS, ACCESS ELECTRONIC PATIENT CARE RECORDS (EPCRs) AND WORKPLACE SAFETY APPLICATIONS

23 WORK WITH THE PROVINCE AND THE GREATER HAMILTON HEALTH NETWORK TO LEVERAGE AND INVEST IN TECHNOLOGY TO BETTER INTEGRATE RECORDS TO ACHIEVE A ONE PATIENT, ONE RECORD APPROACH TO PATIENT CARE

24 IMPROVE INTEGRATION AND UTILIZATION OF VIRTUAL CARE PLATFORMS IN PARAMEDIC PATIENT CARE

Data Generation and Usage

Providing quality, cost-effective services requires making good decisions based on accurate data. Since 2013, HPS has made significant improvements in the development of systems for the collection, storage, analysis and reporting of data. These systems are essential to guide operations and fulfill regulatory requirements. HPS collects data for the following key purposes:

- Decision-making
- Describing
- Influencing
- Monitoring
- Informing
- Predicting
- Sharing
- Reporting

HPS takes the approach that questions about the business should drive the need to generate specific data, rather than gathering extensive and arbitrary data from which questions are subsequently determined. HPS employees use the following to guide them when generating data:

1. What operational question needs to be answered?
2. What type of analysis will be required to answer the question?
3. What data is needed for the analysis to answer the question?

Generating and utilizing quality data is critical to emergency medical services as it can identify trends and new ways to improve operations and patient care. Without proper data there is no ability to review what has been done and identify how to improve performance moving forward. Good data provides the information to make systems more efficient and in turn contributes to a positive outcome for patients.

HPS has been a leader in coordinating the use of data for a more effective system evaluation at both the local and provincial levels. In 2019, HPS initiated an effort to standardize key performance indicators for land ambulance services in Ontario. In coordination with other paramedic services in the province, key indicators are being identified and defined to produce standard baseline measures. This will enable all services across the province to evaluate and report on performance using the same KPIs. Standardized KPIs will make direct comparisons among services possible and provide a provincial baseline with which to gauge the performance of HPS. This work will be completed in late 2021 with plans to have these standardized KPIs adopted by the MOH for province-wide reporting.

To ensure HPS continues to generate robust quality data to improve the efficiency of systems and the delivery of patient care, more advanced software and hardware must be considered.

Information Technology

HPS utilizes a variety of IT hardware and software required for deployment activities, monitoring performance and regulatory requirements. Where possible, HPS partners with internal and external stakeholders to develop Information Technology (IT) systems. In this way, HPS is able to develop progressive IT solutions to increase operational efficiency in a cost-effective way. IT systems developed in collaboration with partners include:

- Interdev Technologies

  Provides mobile software for electronic patient care records (ePCR), Computer Aided Dispatch (CAD) Link to ensure paramedics receive dispatch data instantly and plots the fastest route to the scene, a dashboard website of real-time call data and various reporting tools. Interdev also supports secure feed of call data to FirstWatch (described below).

- Response Dashboard

  Through a partnership with Ottawa Paramedic Service, HPS was able to display real-time performance metrics of both paramedics and hospitals. This was replaced in 2021 by the Situational Awareness Dashboard (SAD) provided by Interdev Technologies.

- Statistical Software

  The Centre of Disease Control (CDC) offers a free (but limited) software program called Epi Info for public health practitioners and researchers. HPS utilizes this software to record and analyze information on MIH clients.

- Darkhorse Analytics

  A suite of software tools customized for HPS to conduct diagnostic and predictive analysis of response performance that can be viewed both temporally and spatially on a map of Hamilton.

- Integrated Decision Support (IDS)

  A collaborative sharing solution with a network of health providers across the province who exchange data about the care of shared patients. This builds on an integrated care model creating efficiencies, optimizing data, and improving quality and performance.

- FirstWatch

  This early event detection system interfaces with the different data systems utilized by first responders and analyzes data against customized criteria to provide real-time syndromic surveillance, situational awareness, operational analysis and alerting ability. Turning data into useful information in real-time enables informed, data-driven decisions to be made promptly.

- ClinicalConnect

  A secure, web-based portal operated by Hamilton Health Sciences that provides authorized health care providers access to patients' electronic medical information. This tool helps to bridge the gap between distinct information systems to support integrated health care delivery.

- HPS User Profile

  The development of a comprehensive profile of people who use land ambulance services in Hamilton is the result of a partnership with the Epidemiology Section of Hamilton Public Health Services.

- Automatic Vehicle Location (AVL)

  This software is utilized by the Computer Aided Dispatch (CAD) system to enable dispatch to identify the closest vehicle available for the most rapid response.

- BeWhere

  Software application tracks non-powered and movable assets through sensors to provided real-time information. HPS uses this program to track essential equipment as stretchers, stair chairs, cardiac monitors, suction units, and paramedic response bags. The software is integrated with the AVL system and provides real-time information of these assets.

Software is used on a variety of equipment utilized by paramedics. In addition to 22 desktop computers located at each station, HPS has approximately 118 rugged laptops mounted in ambulances with specialized software. These laptops are removable so paramedics can access and populate patient information in ePCRs on scene. Additionally, MIH Community Paramedics utilize tablets, six in total, to document program activities and client interactions while in the field.

Paramedic crews also utilize two-way radios in ambulances and at stations to receive call information from dispatch. However, advancements in technology allows for apps on smartphones to receive details of a call directly to paramedics' cell phones. As a result, paramedics do not have to be close to the radio or laptop and can get details on calls wherever they are. This technology also allows paramedics to access ePCRs and patient care plans on their phones. Thus, they can conveniently refer to this information when in the field with a patient or working with Emergency Department personnel. The immediate availability of information can save time in getting to and caring for a patient. Paramedics can also obtain patients' e-signatures on their phones. Smartphone technology enables paramedics to communicate directly with each other and other health care providers, individually or in groups, by text or video to gain easy access to additional supports and readily share information.

Currently, HPS Community Paramedics have smartphones that utilize this technology. Readily accessing a client's medical information on a device with specialized features that can fit into a pocket has helped to support the service Community Paramedics provide their clients.

Their smartphones also contain a workplace safety application with a panic alarm. This application will track the user's location through GPS and at the press of a button signals an emergency so support can be sent directly to their location. Community Paramedics usually work alone and often in someone's home, so this technology helps protect them in the face of possible danger or to prevent the escalation of harm.

Through the development of an IT strategy, as discussed below, this Master Plan recommends that smartphone devices with such progressive capabilities be available for all frontline paramedics to enhance their performance in caring for their patients and to protect their safety.

HPS depends on at least 24 varieties of software and/or databases to manage operations and is responsible for approximately 42 different tracking and reporting functions.

The following chart of data inventory illustrates the purpose of some of the software and databases utilized by HPS.

AVL	ADRS	People Soft	ePCR	LMS	Survey Monkey
Response data	Response data	Employee Info.	Patient charting	On-line training	Tuition reimburse
					Internal postings
					Veh. Check
					Paramedic Feedback

FDM	Shared Drives	Hard Copy	Arcabus	Parklane	HES.NET
Personal Info.	All documents	MOH credentials	Facility repairs	Employee injuries	Memo tracking
Veh. Maintenance	Incident reports				
MOH credentials	MOH credentials				
Equip. Inventory	Paramedic portal				

Time manager	EMS Narc	Track my AED	Docusign	Pre-Hos	Darkhorse
Employee sched.	Drug tracking	AED tracking	Tuition reimburse.	CP charting	Predictive analytics
		Expiry tracking			

Tracking and Reporting Documents (spreadsheets)					
BLSPCA	ED OLD time	Peer support	OT details	Tuition reimburse	Service statistics
RTCP	Call feedback to staff	Grievances	Emp. Injuries	Sup. CQI	Seniority list
Fit to sit	PR/media tracking	Missing documents	Veh. Maintenance	Facility deficiencies	uniform orders
Equip. maintenance					

Although these software and databases can be considered progressive, in many cases the acquisition of data involves manual processes through workflows that are cumbersome, inefficient and lack integration. This often results in one or more of the following issues:

- Reduced productivity and increased cost as additional resources are required for tasks that can be automated
- A need to make modifications to achieve to meet operational requirements
- Risk of not complying with legislative obligations due to lack of accurate information

Not only are there limitations with current software, the IT infrastructure on which HPS currently relies is further limited in the following ways:

- Inability to integrate databases within HPS
- Free software is limited, and enhanced features requires additional licensing at a cost
- Documents stored on hard drives have little to no protection from being deleted
- By-laws for records retention are difficult to enforce, as most software does not have built-in retention programming
- Lack of secure documents due to a cumbersome process to restrict access
- Lack of integration and access to data in other areas of the organization
- Limited ability to integrate with the broader health care system

In order to continue to deliver optimal service to the community now and into the future, HPS's IT infrastructure must continue to evolve. HPS must review the trends in future technology, particularly IT, that is utilized in the health care field. HPS investment in IT infrastructure must meet current and future needs and align with the broader health care system to ensure systems can be integrated. Therefore, an objective of this Master Plan is to develop an IT strategy that considers the following areas of IT infrastructure:

- Hardware that is updated, reliable and allows for the accurate and convenient collection of data
- Software that is secure and automates workflows and data generation
- Ability to connect with other systems inside and outside of the organization
- Data storage that allows for access to analytics software (for HPS and all City Departments)
- Analytics and reporting software for real-time systems

The development of an IT strategy to improve operational efficiency and in turn, patient care, must include a comprehensive review of the current state of HPS's IT and data management infrastructure to determine gaps, duplications, and opportunities to optimize existing systems and equipment. The strategy would also require an environmental scan to identify trends in technology, particularly in the health care field. A review of systems utilized by key City of Hamilton and community partners should be undertaken to ensure connectedness among systems is possible. It is also important to have knowledge of the plans key partners have for their IT investments into the future, so that the IT strategy developed by HPS aligns with the direction taken by others in the field. The strategy will consider ways to optimize current resources and leverage available IT resources through partners to meet IT requirements in a cost-effective manner.

Elements of an IT Strategy

Assess Current State	Conduct Environmental Scan	Determine IT Requirments	Establish Investment Plan	Develop Implementation Plan
Identify gaps, duplications and ways to optimize existing IT-related resources	Identify trends in IT and the health care field Identify IT plans of key partners	Identify software and hardware needs consider future needs and how to meet these needs (e.g. optimize existing resources, leverage resources through partnerships and purchase resources)	Identify the costs asscoiated with the IT requirements	Identify timelines and activities for implementing IT requirements using a phased approach

One Patient, One Record

An IT strategy for HPS must consider what is required to advance toward a health care system that is well-integrated. Connected and coordinated care that puts patients first is necessary to achieve the best possible outcome for a patient. As first responders and health care providers, paramedic services are an integral part of the health care system. Integrating systems, sharing data, and coordinating information must occur among paramedics, hospitals, clinics, Ontario Health Teams, primary care, Home and Community Care Services, long-term care, mental health care and other health care partners to create a seamless response to patient care.

Although there has been progress in integrating the health care system in Ontario with respect to coordinating access to patients' electronic information among some health care providers, the patient's care journey remains fragmented. The following scenario illustrates what a patient may currently experience.

Nazer is a senior who lives alone and whose primary language is Urdu. Nazer is dependent on insulin for managing diabetes and in the last few years has experienced a decline in mobility stemming from a back injury sustained a decade ago.

One day Nazer is in the living room watching television and begins to feel unwell so gets up to go to the bedroom to rest, but a feeling of light-headedness causes a loss of balance and results in a fall. Luckily Nazer is able to get back up, but still feels unwell and now has severe back pain. Nazer is scared and knows that the most immediate access to care is by calling 911. After some challenges communicating the issue to the dispatcher due to language barriers, an ambulance is dispatched as Code 4 urgent response because Nazer answered 'yes' to having shortness of breath.

The paramedics arrive on scene after receiving the call on the radio of their ambulance just after they were finishing their last call. The English-speaking paramedics are unable to have Nazer produce a health card but proceed to conduct a full assessment by communicating mostly through hand gestures and a free translation application one paramedic had downloaded on her personal phone. Through the assessment and a finger prick, paramedics found Nazer had low blood sugar and administered sugar water intravenously. Understanding Nazer was experiencing some level of back pain, they transport the patient to the nearest hospital.

The Emergency Department is very busy this day so Nazer must stay on the stretcher with the paramedics while they wait to be triaged. Nazer is feeling more uncomfortable as the minutes and even hours go by.

Finally, Nazer is seen and admitted and over the next two days in hospital, goes through a battery of tests to rule out any serious conditions. Nazer is not able to have visitors due to the COVID-19 pandemic, so feels extremely isolated.

The attending physician at the hospital sets up a series of follow-up appointments including falls prevention and pain management clinics, a physiotherapist, an endocrinologist, and a nutritionist. Nazer will need to arrange for transportation to these appointments and with worsened mobility issues due to the fall and some across town, one appointment will take up most of the day. This means Nazer will miss many of the daily visits from the Urdu-speaking neighbour who helps out and is the main source of socializing during a week.

It takes months for Nazer to complete all of the appointments set by the hospital doctor with some resulting in more appointments. With every appointment and practitioner, Nazer must repeat, in the best English possible, an explanation of how the fall happened, what treatments and tests have been undertaken, a list of medications being taken and medical history. Nazer is confused as to why appointments were not made with the practitioners who are already caring for Nazer and who have performed the same tests.

Nazer is grateful for the free health care but feels life has been turned upside down as it now consists mostly of medical matters. Nazer is tired and starts to feel depressed missing normal daily routine including the help and company of the neighbour. Overall, Nazer's health and well-being begin to decline.

A system of health care that is completely integrated and utilizes innovative technology would create a more seamless patient journey that is more efficient and yields better outcomes. Such a system would create a very different experience for the patient in this scenario.

After Nazer has called 911 the dispatcher retrieves the caller's electronic health record and sends it to the paramedics' smartphones. Since the paramedics are just finishing up another call, they are not near their ambulance but receive the call immediately on their cell phones.

On the way, the paramedic is able to review Nazer's electronic health record sent by dispatch that contains the patient's health card number and medical history which includes a test results, imaging, treatment plan and medications. They read that Nazer has diabetes and a back injury. The record identifies Nazer's primary care physician and that Nazer has been under the care of an endocrinologist and physiotherapist. The treatment plan shows Nazer is on a nutrition plan and does physiotherapy exercises at home.

When paramedics arrive, they use their cell phone's translator tool that uses artificial intelligence to not only translate what Nazer says into the phone but also translate the meaning and sentiment of the message. This means paramedics can quickly receive pertinent information that is accurate without any misunderstandings. They are also better able to gauge how Nazer is feeling.

They proceed to explain to Nazer, using the translation tool, the steps to the assessment, most of which are automated. Nazer is wearing a sensor patch, which the paramedic taps with their cell phone to obtain a glucose level that is automatically uploaded to Nazer's electronic health record. With the low reading the paramedics begin an intravenous to administer dextrose as per the endocrinologist's notes on the health record.

The paramedics are also able to measure Nazer's back pain level with an electronic pain assessment tool in addition to Nazer's verbal description and compare it against readings on the electronic health record from the hospital's pain management clinic. Results show that

Nazer's pain is less severe than recorded in previous readings and the medication Nazer has been prescribed will be effective in easing the pain. The paramedic confirms that Nazer has this medication in the house and it has not expired. The pain level reading and administration of medication is also uploaded to the electronic health record.

Nazer is already starting to feel better as the paramedics are discussing making a referral to the Home and Community Care Services and HPS's Mobile Integrated Health (MIH) so Nazer can receive ongoing care at home. Just then, the paramedic received a video call from Nazer's primary care physician who was alerted to their visit with the paramedics' updates to Nazer's electronic health record. The doctor was able to confirm with the paramedics the course of action taken was appropriate then set up a follow up appointment with Nazer for the next day. Nazer felt reassured by seeing and speaking to the doctor.

Within a week Nazer had a visit from a case manager at Home and Community Care Services who received Nazer's electronic health record when they were added to it by the paramedics. They helped to make Nazer's home fall-proof and arranged for a nutrition plan and physiotherapy exercises. A Community Paramedic from MIH, also added to the health record, visited Nazer at home to set up remote monitors to detect falls, pain, and glucose levels. If a predetermined threshold was reached in any of these areas, a Community Paramedic would respond immediately.

Nazer did not have to leave the house at all that week, did not have to duplicate tests that had already been taken, and did not have to repeat the story of medical issues and medications. Yet Nazer received quality medical care, quickly and conveniently with a positive outcome. Nazer felt better than ever knowing there was a whole team of health professionals collaborating to provide the best possible care. More importantly, Nazer never missed a visit with the neighbour who Nazer authorized to have access to the electronic health care records and support Nazer's health and well-being as part of the care team.

An integrated health care system where up-to-date patient information is shared in real-time among health care professionals who are connected ensures the right level of care is provided when it is required and where it is appropriate. This can reduce hospital visits when care can be provided where the patient lives or in another facility. It can prevent duplication in services and testing as practitioners would have access to services the patient has already received and results of their tests.

Having immediate access to complete, updated, and accurate information puts health care providers in the best position to make more informed decisions for delivering the optimal quality care. Consultations with key stakeholders in developing this Master Plan revealed a strong desire to advance toward more integrated systems for enhanced data sharing among health care providers. Thus, it is an objective of this Master Plan that HPS work with the province and the Greater Hamilton Health Network to leverage and invest in technology to better integrate records to achieve a one patient, one record approach. The IT strategy to be developed by HPS as described in the previous section must reflect this future vision of health care.

Virtual Care

Virtual care is a component of the health care system in Ontario that is growing. It ensures that everyone has access to health care whenever they need it and from wherever they are. Patients can connect to their health care providers by telephone or video from their devices to be assessed and treated without having to be seen in person.

Paramedics also utilize this resource to connect with physicians for support and guidance in treating patients. With the onset of the pandemic, paramedics have increasingly relied on this technology. This capability means a reduction in contacts with health providers while allowing for more timely, collaborative, and informed treatment decisions.

Often paramedics are called when a patient is unsure of the severity of their condition or when transportation to receiving health care is a barrier, even when the issue is not urgent. Paramedics can use virtual care to connect patients to health care practitioners to triage patients and treat non-urgent issues in the home, preventing unnecessary transports to the hospital. This collaborative approach with the patient, paramedic and health practitioner also enables a higher level of care.

In 2020, HPS partnered with St. Joseph's Healthcare Hamilton for Community Paramedics to have direct access to Emergency Department physicians virtually. Through this partnership, Community Paramedics can consult with a doctor while they are on scene or in the homes of their clients. This permanent program ensures that clients have prompt access to the resources they require without having to be transported to the hospital

Community Paramedics also use virtual health care with Remote Patient Monitoring (RPM) clients. In collaboration with Hamilton Health Sciences and St. Joseph's Healthcare this program was expanded in 2020 to include COVID-19 positive patients in addition to post-discharge acute patients. Community Paramedics were able to utilize virtual care to support these patients in their home virtually. By the end of July 2021, Community Paramedics had used virtual care 78 times, mostly to access hospital doctors who could discharge COVID-19 patients from the program.

Although HPS Community Paramedics have access to virtually connect with their clients' health care practitioners, this technology is underutilized. With the restrictions of the pandemic, use of this technology among practitioners has accelerated and expanded. Many health professionals, family physicians, specialists and hospitals have added remote options for patients and their care providers.

An objective of this Master Plan is to expand the use of virtual care platforms by HPS paramedics. The integration of virtual care platforms into the patient care performed by all frontline paramedics, in addition to Community Paramedics, provides easy and quick access to additional expertise and enables patients to be assessed and treated in their homes. Through awareness raising, training and education, HPS paramedics will be encouraged to increase their utilization of accessing health care practitioners remotely to support and improve the provision of health care to their patients.

5.10 Reliability Management System

OBJECTIVES

25 CREATE A FULL-TIME POSITION TO LEAD THE IMPLEMENTATION AND OPERATION OF THE RELIABILITY MANAGEMENT SYSTEM

26 PROCURE THE ONLINE LEARNING MANAGEMENT SYSTEM TO FACILITATE THE IMPLEMENTATION OF THE RELIABILITY MANAGEMENT SYSTEM

It is critical to optimize reliability in an organization of high-risk such as land ambulance services. Paramedics perform in complex, demanding environments where decisions have to be made quickly and any errors can have devastating consequences.

In order to ensure optimal performance, HPS must continue building a system that manages risks and minimizes errors. A system of policies, procedures, audits, reporting, training, and equipment that is focused on safety provides a framework for success. Such a system has been implemented in other high-risk fields such as health care, fire services and aviation. It's a system that promotes safety through a consistent, fair culture of accountability.

Since 2013, HPS has been working on creating high reliability based on a culture of trust and fairness where staff feels safe when reporting mistakes. Acknowledging errors is essential to be able to uncover flaws in the system and behaviours so they can be improved. HPS has been examining and revising elements of its system to reflect a fair and just culture that focuses on safety. For example, in 2019, HPS assessed all policies and procedures and developed a new policy manual with fewer, more concise policies that are relevant, up-to-date and include links to related and supportive information. All HPS policies now have a clear purpose and reflect a culture that prioritizes safety and trusts its employees to make good decisions. Policies are informative with the objective of guiding and supporting paramedics' work rather than being punitive. HPS has also designed a robust quality assurance program based on enhancing safety and treating employees fairly. For example, the initial focus of any internal investigation is on the weaknesses of the system and when an employee error occurs, the employee is supported not blamed.

A just culture emphasizes fairness, seeks the input of employees as the experts of the day-to-day operations and is constantly improving to ensure that employees can function effectively and safely. Such a culture enhances the engagement of employees. As noted earlier, in 2013 HPS scored 37% in overall in a score indicating the level of engagement felt by employees. Shortly thereafter, HPS began implementing the reliability management system and in 2017, the overall employee engagement score had increased to 55%. Despite this improvement there are more opportunities to strengthen the culture and enhance employee engagement. Continuing to implement the reliability management system will be critical to achieving these improvements.

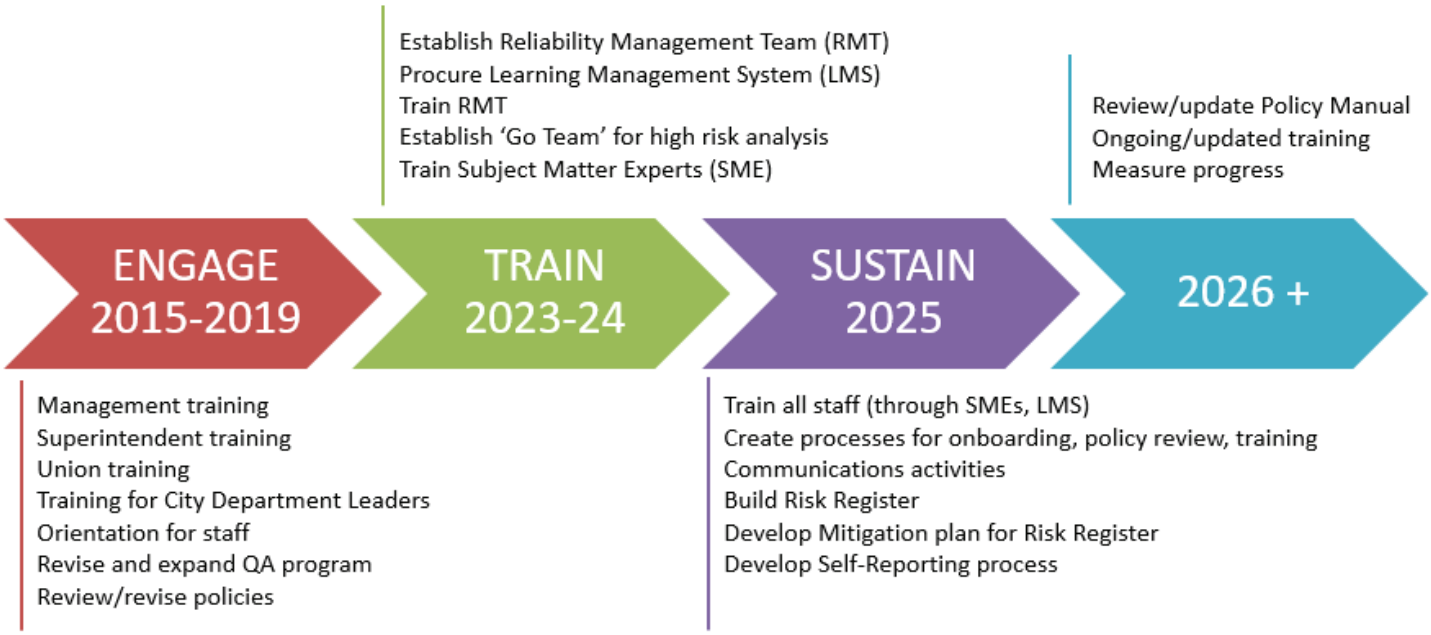
As of 2018, all HPS employees have received some level of information on the framework for creating a just and safe culture. Supervisors have received in-depth training on conducting investigations and audits using this framework. HPS management also has received in-depth training and is responsible for advancing an approach focused on a safe and just culture to ensure the system and employees are performing optimally.

Although HPS was the first land ambulance service in Ontario to adopt this framework, other services are now taking this approach and have made significant progress. For example, the Region of Peel has established a unit dedicated to advancing a culture of safety and fairness in their paramedic services. They have established a reliability team consisting of individuals from all segments of the organization to be subject matter experts and lead internal investigations. They have also acquired a learning management system to assist in training staff and management.

While HPS has been viewed as a leader among paramedic services in the province for implementing this framework and is often called on for advice and guidance by other services, recently progress has slowed due to strained resources and a focus on pandemic response. The Deputy Chief of Performance and Development and the Commander responsible for the Quality Assurance program have been carrying out the work of reliability management in addition to their core functions. As workloads increase fewer resources are available to advance this work to the next phase.

Transforming to a culture of safety, trust and fairness that can be sustained takes time, effort commitment and resources. Culture change evolves over time and cannot be achieved and sustained as a short-term project. Like other paramedic services, HPS requires dedicated resources to continue to build on the progress that has already been achieved toward creating a reliable system that prioritizes safety and fairness. As such, HPS will require at least one full-time employee dedicated to the work of implementing a reliability management system through continuous improvement and change management. This person would work closely with the Deputy Chief of Performance and Development and the Commander of Quality Assurance to regain momentum and move toward the next phase of this work. In addition, HPS needs to procure the online learning management system and accompanying materials to assist in implementing a reliability management system, including training courses for management and frontline staff.

Reliability Management System
Implementation Plan



6.0

FACILITIES

OBJECTIVES

27 SECURE A FACILITY IN THE SHORT TERM FOR AN OPERATIONAL HUB THAT INCLUDES A RESPONSE STATION, LOGISTICS CAPABILITIES AND A WAREHOUSE SPACE FOR THE CENTRALIZATION OF MEDICAL SUPPLIES FOR CITY OF HAMILTON DIVISIONS PROVIDING HEALTH CARE

28 CONDUCT AN HPS FACILITY STUDY AND DEVELOP A STRATEGY TO ADDRESS THE MEDIUM AND LONG-TERM NEEDS OF A GROWING SERVICE

A) MAINTAIN A FOCUS ON GREEN BUILDINGS TO OBTAIN LEED CERTIFICATION

As noted earlier, HPS has been expanding its fleet and workforce to meet growing demands for service, demands that are expected to continue to increase as the population grows and ages. As a result, HPS has outgrown the current vehicle and personnel space. Additional space is required immediately as well as an intermediate and long-term plan that ensures there is adequate space to accommodate future growth.

The MOH's *Provincial Equipment Standards for Ontario Ambulance Services* requires that equipment and medications be safely stored in the ambulance or ERV. Ambulances must be kept behind locked doors to prevent the damage and theft of critical equipment and pharmaceuticals onboard. In addition, medications must be stored in a temperature-controlled environment to maintain their efficacy. An ambulance or ERV stored outdoors is exposed to the harsh climate which can decrease the potency of medication. Moreover, the weather can also impact the vehicle's functioning. Storing ambulances and ERVs indoors helps to protect the vehicle, its contents and ensure it is ready to respond to calls immediately.

Indeed, part of the ASR (described in Section 3.2) conducted by the MOH to ensure ambulance services meet the certification standards is the expectation that:

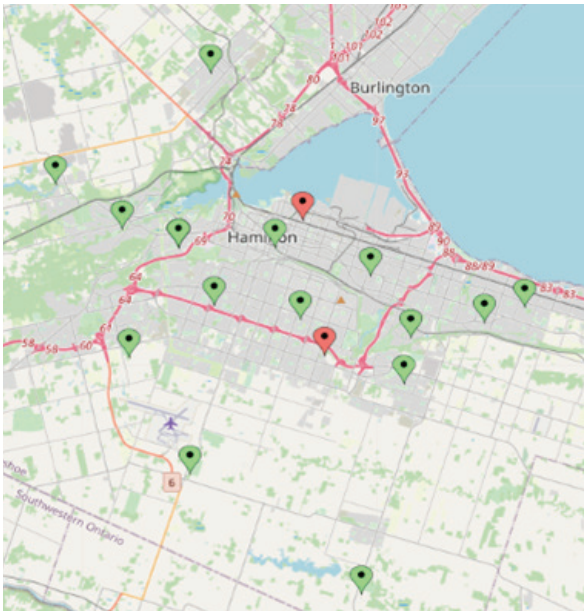
> Ambulances, ERVs, and ESUs [Emergency Service Units] are stored in a protected environment from heat or cold to protect medications.

Failure to meet this expectation puts the service at risk of being in non-compliance and can impact the renewal of certification to operate a land ambulance service.

Additional ambulances mean additional paramedics to staff them and more people require more space. When paramedics are not on a call, they need space that is close to ambulances and ERVs so they can quickly access the vehicle when a call is received. During downtime, paramedics need space to complete reports, undertake on-line training, eat, or decompress. As the number of paramedics needed to staff additional ambulances increases, space to accommodate them becomes scarce.

Current State

HPS currently operates out of 18 stations throughout urban and rural areas of Hamilton. HPS shares 16 stations with the Hamilton Fire Department (HFD) who owns these facilities and leases space to HPS. The remaining two stations are owned and occupied by HPS exclusively.



Hamilton Paramedic Service - Stand Alone Facility

Hamilton Paramedic Service/Hamilton Fire Department - Shared Facility

Sharing stations leads to more efficient use of resources, environmental benefits and reduced operating costs. The recent growth in HPS fleet in recent years has resulted in a lack of space to adequately house all ambulances and ERVs at the shared stations. Furthermore, the HPS stand alone stations, Stations 30 and 32, are both over capacity. Station 30 was built to properly store 17 vehicles. However, with the expansion of the fleet, there are currently 38 vehicles at Station 30, 35 of which need to be stored inside as the remaining three are administration vehicles and can be parked outside. Currently, 29 vehicles are parked inside. In order to accommodate them, vehicles are parked closely together and in areas of the floor designated for logistics activities. In addition, a temporary climate-controlled garage has been installed on the grounds to house a vehicle. The remaining six vehicles are spare ambulances which are maintained for operational continuity and contingency readiness in the event of a disruptive or disastrous event. These vehicles should also be inside, however with lack of space, they are parked outside, and personnel have to empty their contents to be stored inside the station. This impacts how quickly these vehicles can be accessed and equipped in the event a contingency response is required.

Station 30 Vehicle Placement				
Total Vehicles	**Spaces Inside**	**Vehicles Inside**	**Vehicles Outside that should be Inside**	**Admin Vehicles Outside**
38	17	29	6	3

HPS Station 30, Victoria Ave. N, Hamilton

Station 30 also serves as the logistics hub and includes an inventory warehouse. Here, vehicles are stocked and cleaned, equipment maintenance is performed, and equipment is distributed. This takes place among three buildings on the property due to lack of one large facility. Additionally, there is warehouse space for medical supplies and equipment, PPE, uniform inventory, tools, and parts. The warehouse is also utilized by the HFD to store uniforms, bunker gear, fire suppression consumable products and equipment.

With the number of vehicles, personnel and activities occurring at Station 30 there is limited space for paramedics to work or take breaks between calls. As a result, they have had to utilize the garage and functional areas to eat and rest. The lack of space has been particularly problematic with the COVID-19 restrictions requiring people maintain physical distancing inside buildings.

Logistics technicians also experience challenges with the lack of space as they require large open areas to conduct cleaning and disinfecting of vehicles and equipment and when performing maintenance on equipment. They also must move among three buildings to retrieve the materials they need to complete their tasks, resulting in inefficient workflow. Furthermore, logistics personnel are disrupted by the activity in the station unrelated to their tasks which further increases the time it takes to get vehicles operational-ready.

Due to the amount of activity at Station 30 requiring a high demand for electricity, compounded by an aging electrical infrastructure, Station 30 frequently experiences brownouts. When this occurs, there is a drop in voltage causing irregular and insufficient power supply. This not only affects productivity but fluctuations in power can damage electronic devices that are created to operate at specific voltages.

As recommended in Section 5.7, HPS will look to assume responsibility for procurement and management of the medical supplies for the City of Hamilton's long-term care homes and Hamilton Public Health Services. Since the space at Station 30 poses challenges for current HPS logistics activities, it would be inadequate for the additional inventory associated with a centralized model of medical supplies for the City of Hamilton. It is therefore recommended that HPS secure a facility to serve as an operational hub which would include a response station and accommodate logistics activities. This facility would provide enough space for logistic technicians to perform their duties without encroaching on paramedic activities. It would also contain a warehouse that can house HPS inventory along with the medical supplies for City of Hamilton divisions that are currently housed in a temporary depot which is scheduled to close in 2022.

HPS Station 32,
Limeridge Rd. E, Hamilton

Station 32, a facility exclusively used by HPS, is also operating beyond capacity. Station 32 is able to properly accommodate five vehicles, yet nine vehicles are currently assigned to this station. The overflow vehicles are for MIH activities and are parked outside so personnel must remove the contents of the vehicles to store indoors when the vehicle is not actively staffed. When the vehicle is actively staffed and stocked and left outside during inclement (hot or cold) weather it must idle to control interior temperatures which negatively impacts the environment through the emission of greenhouse gas.

An analysis of the space in stations shared with the HFD indicates these facilities are at full capacity with no available space for additional HPS vehicles. In some stations, HPS vehicles have double parked to ensure vehicles are indoors.

HFD/HPS Shared Station Capacity					
Station	**Number of Bays**	**HFD Vehicles**	**HPS Vehicles**	**Available Space**	**Use of Available Space**
Station 1 John St. N., Hamilton	8	6	2	0	
Station 3 Garth St., Hamilton	2	1	1	0	
Station 4 Upper Sherman Ave., Hamilton	5	4	1	0	
Station 7 Quigley Rd., Hamilton	3	1	1	1	Space required for HFD vehicles to drive through
Station 9 Kenilworth Ave. N., Hamilton	5	2	1	2	Space required for HFD vehicles to drive through
Station 10 Main W. and Norfolk, Hamilton	3	1	1	1	Space required for HFD vehicles to drive through
Station 12 Hwy 8, Stoney Creek	4	3	1	0	
Station 15 Arvin Ave., Stoney Creek	5	2	3	0	

HFD/HPS Shared Station Capacity					
Station	**Number of Bays**	**HFD Vehicles**	**HPS Vehicles**	**Available Space**	**Use of Available Space**
Station 17 Isaac Brock Dr., Stoney Creek	4	3	1	0	
Station 18 Hwy 56, Binbrook	6	4	1	1	Space required for HFD equipment
Station 19 Homestead Dr., Mount Hope	5	4	1	0	
Station 20 Garner Rd, Ancaster	4	1	2	1	Space required for HFD vehicles to drive through
Station 21 Wilson St., Ancaster	8	4	1	3	Space required for HFD vehicles to drive through
Station 23 Memorial Square, Dundas	6	4	1	1	Space required for HFD equipment
Station 24 Parkside Dr., Waterdown	6	4	2	0	
Station 25 Old Brock Rd., Greensville	5	4	1	0	

While there appears to be some spaces available for vehicles in shared stations 7, 9, 10, 20 and 21, these are drive-through stations that require surface area dedicated to the movement of large fire apparatus. Fire trucks must be able to pull in and drive out freely without having to back up due to obstruction from another vehicle. This enables the apparatus to exit the station quickly and easily when responding to an emergency. Stations 18 and 23 each have space for one vehicle, however, this is required for fire equipment that is stored on the facility floor.

A review of the vehicle space in exclusive HFD stations shows a similar situation, with no capacity for HPS vehicles.

HFD-Only Station Capacity				
Station	**Number of Bays**	**HFD Vehicles**	**Available Space**	**Use of Available Space**
Station 2 Upper Wellington, Hamilton	3	3	0	
Station 5 Stone Church Rd. E., Hamilton	4	3	1	Space required for HFD vehicles to drive through
Station 6 Wentworth St. N., Hamilton	4	4	0	
Station 8 Melvin Ave., Hamilton	2	2	0	
Station 11 Ray St., Hamilton	2	1	0	Station converted to single apparatus floor design
Station 13 (Mechanical Facility) Bay St. N., Hamilton	0	0	0	
Station 14 Chapel Hill Rd., Elfrida	3	3	0	
Station 16 Barton St. E., Stoney Creek	4	4	0	
Station 26 Lynden Rd., Lynden	4	4	0	
Station 27 Old Hwy 8, Rockton	4	3	1	Rural location
Station 28 Brock Rd., Freelton	3	3	0	

Almost all HFD stations are at full capacity. The space at Station 5 is required for fire apparatus to drive through and changes at Station 11 allow for just one vehicle. The only space available is at Station 27 in Rockton which is too far from the city where the majority of HPS calls occur and would increase response times.

Given that no adequate space exists at either HPS/HFD shared stations or HFD exclusive stations, it is the objective of this Master Plan that a comprehensive study of HPS facilities be conducted and a strategy be developed to address the medium and long-term facility needs.

However, there is an immediate need for space to house the six spare ambulances that are currently outside at HPS Station 30 due to overcrowding of vehicles inside. Additional space is required to accommodate vehicle enhancements expected over the next few years while the facility strategy is being developed and implemented with longer term solutions. Thus, HPS will need to secure a facility that can house ten vehicles, six to alleviate the congestion at Station 30 and four new vehicles expected by 2024.

Since the size of an ambulance and ERV with space to open doors and remove equipment is approximately 450 square feet, a floor space of approximately 4,500 square feet is required for vehicles. An additional 2,000 square feet of space is needed for personnel including offices, a lunchroom, lockers, and washrooms.

This Master Plan recommends that this facility also accommodates logistic activities. As described above, it would also contain warehouse space for HPS inventory and the medical supplies for City of Hamilton divisions providing health care. A facility of 5,000 to 7,500 square feet is required for logistics and warehouse capabilities.

In total, an operational hub will require a facility that is a minimum of 11,500 square feet and maximum of 20,000 square feet of space. This will accommodate the present need for a response station to meet growing demands and house existing vehicles for which there is no space, plus additional vehicles that will be added to the fleet in the short term. This facility will also be large enough for HPS logistics activities and include space for a warehouse for HPS inventory and medical supplies for City of Hamilton divisions such as long-term care homes and Hamilton Public Health Services.

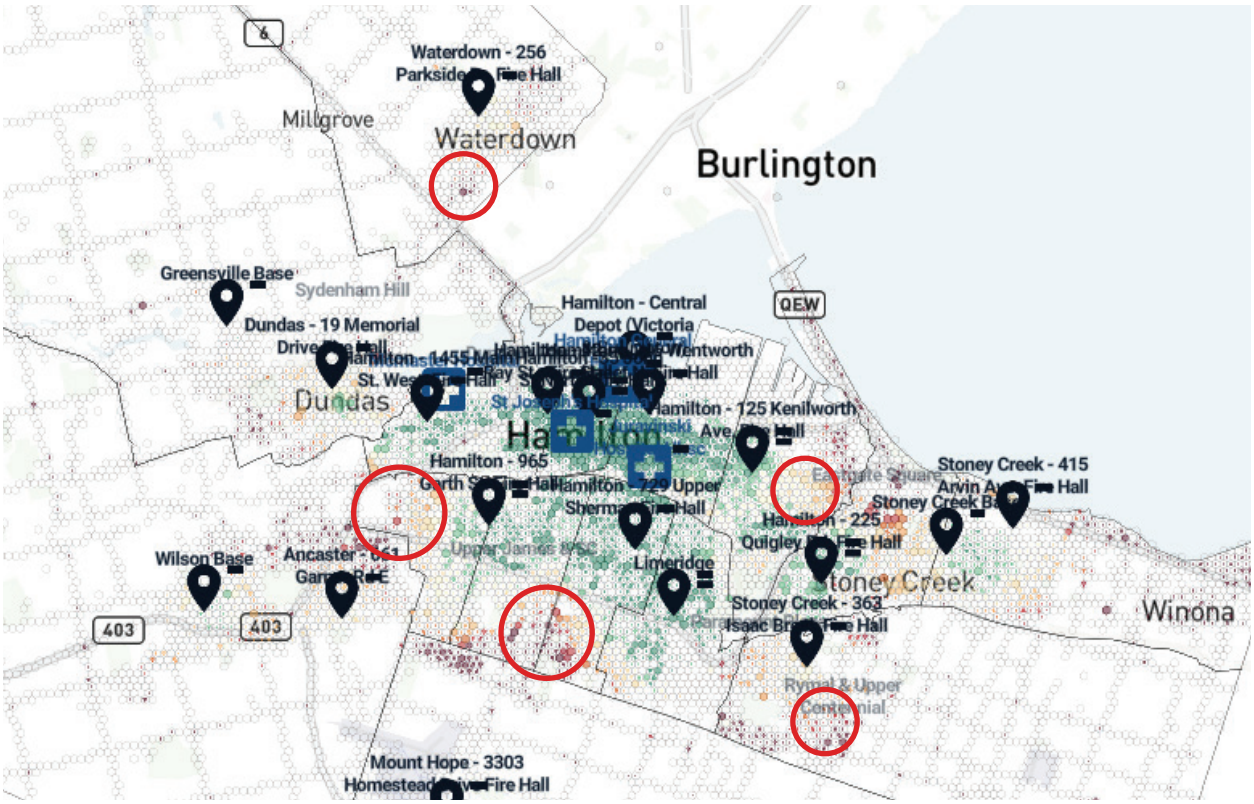
While the immediate need for space will be addressed by the objective to secure a facility for an operational hub, it will not be sufficient to accommodate an expanding service required to meet growing demands. Since 2014, ten ambulances have been added to the fleet to manage increasing service demands. Additionally, as discussed in Section 4.0, existing demand requires an additional 2.5 ambulances to handle five 12-hour shifts during peak periods. Furthermore, demand is predicted to continue throughout the course of this Master Plan by 3.3% per year which would require an enhancement of approximately one ambulance per year for ten years. Thus, more space will be required by year three of this Master Plan and beyond to accommodate the growing fleet and an increase in paramedics to staff each ambulance.

Therefore, this Master Plan recommends a facility study be conducted to develop a strategy to address the medium and long-term needs of a growing service. HPS will work with the City of Hamilton's Corporate Real Estate and Facilities Divisions to contract a third party to conduct a facility study that will assess the adequacy of HPS facilities against the operational needs of the service in the medium and long term.

The study will recommend a model that will identify station types and locations for optimal functioning and response time performance. For example, a model of a central reporting station with one-bay stations and/or traditional stations in strategic locations will be considered. A central reporting station and headquarter facility would be capable of housing many vehicles and include space for administration personnel. One-bay stations are considerably smaller than a traditional paramedic station and do not require parking spaces as they are a 'rest-and-ready' facility where paramedics can stop for a break during their shift. Traditional stations may still be required to serve rural areas of the city rather than vehicles being deployed from a central station located in the urban area, thereby increasing response time to rural areas.

This is the model utilized in Ottawa, where a central reporting station is in the busiest area of the city with rest-and-ready facilities throughout the city and four traditional stations in the outskirts of the city. Peel Regional Paramedic Services utilized a different model consisting of four hubs, similar to central reporting stations, to cover the quadrants of the city, with rest-and-ready facilities throughout the city and just one traditional station in the outer city limits.

Placement of stations will take into consideration areas of the city with high demand for service. According to a review of 2019 performance using the Darkhorse Analytics tool, areas of the city that would currently benefit by the addition of a paramedic station are as follows:



Placement of future stations to improve performance will be identified using the Darkhorse Analytics predictive software as part of the facility study.

As well, the facility study will examine the City of Hamilton's land use structure for planned urban and rural development as per the Growth Related Integrated Development Strategy (GRIDS2) in identifying station placement.

Ideal placement of facilities for functional operations such as cleaning and maintenance of vehicles and equipment will also be considered. The potential to co-locate in existing City of Hamilton facilities will be examined, either by sharing a facility or utilizing the same premises where space allows. Interagency co-location with health care or first responder partners will be also be studied.

The facility study will also assess the operational hub acquired in the short term for response, logistics and warehousing purposes as per the previous objective and provide a plan for fulfilling the medium to long-term needs for these functions.

HPS requires a comprehensive review of its facilities to ensure the operational structure and deployment of resources are optimal for the best outcome of a growing community with increasingly diverse needs. HPS is committed to ensuring that any renovations undertaken or newly constructed buildings that may be acquired as a result of the facility study will be green buildings that are healthy, efficient and produces cost-savings. HPS will seek to earn LEED (Leadership in Energy and Environmental Design) certification for its future facilities.

7.0

PEOPLE PLANNIING

OBJECTIVES

29 DEVELOP A 'PEOPLE PLAN' TO ENSURE HPS'S WORKFORCE CAN PERFORM OPTIMALLY IN A POSITIVE ENVIRONMENT NOW AND IN THE FUTURE, THAT INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING COMPONENTS:

ATTRACTION AND RECRUITMENT

A) WITH STAKEHOLDERS, DEVELOP A RECRUITMENT PROGRAM IN WHICH SELECT STUDENTS ARE SUPPORTED IN OBTAINING A COLLEGE DIPLOMA IN THE PARAMEDIC FIELD WITH THE GUARANTEE OF EMPLOYMENT WITH HPS UPON COMPLETION

B) BUILD RELATIONSHIPS WITH DIVERSE COMMUNITIES TO DEVELOP A PROGRAM THAT EXPANDS HPS RECRUITMENT ACTIVITIES AND PROMOTES CULTURAL COMPETENCY TO BETTER SERVE DIVERSE POPULATIONS. CONSIDER ESTABLISHING A CULTURAL LIAISON POSITION

RETENTION

C) DEVELOP A RETENTION PLAN WITH STAKEHOLDERS TO IDENTIFY CHALLENGES AND SOLUTIONS TO RETAINING PARAMEDIC PERSONNEL

D) REVIEW AND ENHANCE EMPLOYEE HEALTH AND WELLNESS ACTIVITIES THROUGH FURTHER DEVELOPMENT OF MENTAL HEALTH SUPPORTS, PEER SUPPORT TEAM ACTIVITIES AND REDUCING REPETITIVE STRAIN INJURY

E) ONGOING REVIEW AND ACTIONING OF EXISTING AND FUTURE CITY OF HAMILTON'S OUR PEOPLE SURVEY RESULTS TO STRENGTHEN WORKPLACE CULTURE

F) UTILIZING THE CITY OF HAMILTON'S EQUITY, DIVERSITY AND INCLUSION (EDI) FRAMEWORK AND ROADMAP AS A GUIDE, DEVELOP AND IMPLEMENT INITIATIVES TO STRENGTHEN EDI WITHIN HPS AND IN SERVING THE COMMUNITY

SUCCESSION

G) DEVELOP A SUCCESSION PLAN WITH PROJECTIONS FOR RETIREMENTS

H) CREATE A MANAGERIAL DEVELOPMENTAL POSITION TO OFFER THE OPPORTUNITY FOR EMPLOYEES TO DEVELOP CAREERS AND BE PREPARED TO POTENTIALLY SUCCEED MANAGERS

HPS values its people. The functioning and effectiveness of operations is because of the people. Without skilled, motivated, and engaged employees in all areas of the service, from paramedics to logistics technicians, schedulers, administrative staff, and data analysts, HPS would not be able to adequately serve the community. To ensure HPS continues to provide quality service and meet future service requirement and evolving community needs, a talented, dedicated workforce must be maintained. Achieving this requires focusing on attracting the right people and retaining them, providing a positive workplace culture, training and developing employees, supporting their health and well-being and when the time comes, ensuring they are succeeded by people who are prepared to step into the role.

To ensure HPS has a workforce that can successfully deliver the best possible care in the most efficient way, now and in the future, systematic planning for optimal people performance is required. Working with the City of Hamilton's Human Resources Division partners and guided by the City's Our People and Performance Plan, HPS will develop a People Plan that will include but not be limited to the components outlined below.

Attraction and Recruitment

Attracting the right people is an important part of developing a strong workforce. Paramedic services across the province compete for the same candidate pool which poses challenges in the recruitment of paramedics at HPS. The recruitment process is a lengthy one with multiple phases of interviewing, testing and orientation that consumes time and resources. Moreover, due to the high demand for paramedics across the region, a paramedic may be recruited by more than one service. This can lead to candidates leaving one service for another at anytime during the recruitment process or even once it is completed. As a result, the process must begin again to ensure HPS has recruited a sufficient number of paramedics to match service demands.

As part of its People Plan, HPS will carry out activities to attract, recruit and secure a workforce with the qualities and abilities to meet the service's needs now and into the future. To achieve this, HPS will explore developing a college paramedic recruitment program with stakeholders that would guarantee employment with HPS upon successful completion. Students for the program would be selected through an application process and receive tuition funding and support for the one-year program. Such a program enables HPS to select student applicants with the qualities required for an evolving service and ensure candidates reflect the diverse community they will be serving as paramedics. It also is an opportunity for HPS to support Hamilton residents with the desire to pursue a career as a paramedic but without the financial means. A college recruitment program would also help increase stability of candidates who would be committed to HPS employment as they enter the program. This program would see Hamilton investing in Hamiltonians who would then serve the Hamilton community.

HPS will also develop a framework to guide building and enhancing relationships with diverse communities to support the attraction and recruitment of paramedics, as well as promote culture competency within the HPS workforce. HPS will work with City of Hamilton bodies such as the Hamilton Immigration Partnership Council, the Urban Indigenous Strategy, and the LGBTQ Advisory Committee to facilitate connecting with diverse groups to learn how best to attract candidates for employment. Through such connections, HPS will also work to incorporate a cultural competency component into the orientation process by creating opportunities to interact with leaders and members of diverse communities. HPS will explore the possibility of creating a 'cultural liaison' role to facilitate building relationships and establishing programs with diverse groups to advance equity, diversity, inclusion, and cultural competency within the service.

Retention

An HPS People Plan will also include strategies aimed at retaining employees. Employee turnover impacts hiring and training costs, operational continuity, and workplace culture. Effective recruitment activities and a positive candidate experience are first steps in supporting employee retention. In addition to the recruitment activities described above, HPS will create a retention plan to reduce employee turnover, prevent attrition and increase retention. Working with the City of Hamilton's Human Resources Division, key stakeholders, union representatives and professional bodies such the Ontario Association of Paramedic Chiefs (OAPC), HPS will identify the challenges in retaining paramedic personnel and develop a plan of actionable solutions.

Mental Health

A key to retaining employees is ensuring they are healthy and well. In 2018, HPS established the Peer Support Team to build on the Road to Mental Health Readiness training delivered to employees. The Peer Support Team is made up of paramedic volunteers with the support and direction from a psychologist. Volunteers are trained to recognize and respond to their peers who may be experiencing mental health challenges. The Team provides assistance 24 hours a day, seven days a week in a variety of ways from simply checking in, to making referrals to appropriate health care services or health practitioner. This Team also promotes mental wellness through activities such as therapy dogs, acts of kindness among employees, awareness raising campaigns and distributing resources such as resiliency checklists. In 2020, the Peer Support Team was activated for peer assistance 221 times, up 75% from 2019 which saw 126 activations.

Physical Health

Promoting and protecting good physical health is also important to retaining employees. Paramedics have physically demanding and potentially dangerous jobs that can result in a range of injuries and illnesses. Paramedics are at greatest risk of strain or sprain injuries from overexertion or body motion. For a decade the most common injury sustained by HPS paramedics has been musculoskeletal injury due to repetitive strain. Furthermore, musculoskeletal injuries outnumber all other workplace injuries combined. As technology has advanced, equipment becomes easier for paramedics to handle. For example, paramedics once had to manually lift and load stretchers into the ambulance which resulted in musculoskeletal injuries. In 2016, with the support of Hamilton City Council, HPS was one of the first services in the province to replace all manual stretchers with powered stretchers. These stretchers have a hydraulic lift and load system thereby reducing the need for physical exertion. HPS continually seeks out and tests equipment to prevent workplace injuries. In a 2019 pilot study, HPS paramedics identified a state-of-the-art chair with which to lift patients downstairs or through narrow spaces. HPS is currently in the process of replacing the old stair chairs in all ambulances with the lighter weight, easier to handle chairs selected by paramedics.

As part of a People Plan, HPS will review and enhance employee health and wellness activities. This will include further development of mental health supports and enhanced Peer Support Team efforts. Furthermore, HPS will aim to keep employees physically healthy by identifying additional education, training, and new innovative equipment to reduce repetitive strain injuries in the workplace.

Workplace Culture

A positive work environment leads to engaged and satisfied employees and contributes to employee retention. Employees spend more than one-third of their lives in the workplace. Paramedics spend long hours with their peers often in high pressure, emergency situations. Having a workplace culture that is supportive, collaborative, respectful, inclusive as well as one that values and empowers employees is essential to the success of HPS operations and is reflected in the service delivered to the community

To ensure HPS continues to strengthen workplace culture, HPS will proceed with advancing toward a just culture through implementing a reliability management system as described in Section 5.9. A just culture is an environment in which fairness is emphasized, employees are supported not blamed when mistakes are made, and employee input is sought to determine ways to improve job effectiveness and safety.

HPS will also address opportunities to improve workplace culture through continuing to action the results of the City of Hamilton's employee survey. The Our People Survey measures employee engagement and gives employees an opportunity to express what matters most to them in the workplace and what areas need to be improved or maintained. As outlined in Section 3.2, HPS has been implementing an action plan based on the survey results from 2018. The action plan focuses on four areas for improvement:

- Career Advancement
- Workload/Staffing
- Recognition
- Morale

Actions for each of these areas include:

HPS Our People Survey Action Plan			
Career Advancement	**Workload/Staffing**	**Recognition**	**Morale**
Increase communication of job postings within HPS from all City of Hamilton departments	Increase number of ambulance vehicles and staffing by one vehicle each year	Develop a framework to formalize a robust employee recognition program	Increase time Supervisors spend with teams in the field and at stations
Increase awareness of opportunities for funding for conferences and tuition	Modify the Deployment Plan to decrease responses to event ratio	Ensure timely, formal recognition from the Chief and delivered by Supervisors to paramedics when patients and families commend their performance	Increase opportunities for staff to socialize and support each other
Establish committees for employee participation to contribute to decision-making processes	Increase Supervisor awareness of available tools to assist with managing workload	Increase a positive public profile of paramedics in media	Enhance two-way communication between staff and management
Create a development position to expose staff to managerial duties in all sections of HPS	Increase ability of Supervisors to coach and support their teams	Bolster recognition of all paramedics during Paramedic Week	Increase ability of crews to break for meals and after difficult calls

The City of Hamilton is repeating the Our People Survey in September 2021 with results expected in early 2022. A component of the HPS People Plan will be to continue to review, action and share the progress of the survey results with HPS personnel. This includes an updated action plan based on the results of the 2021 survey. HPS is committed to continually seeking input from employees about opportunities to strengthen the workplace culture through pulse surveys, suggestion boxes, emails, one-on-one discussions, and group discussions during Professional Development Days sessions.

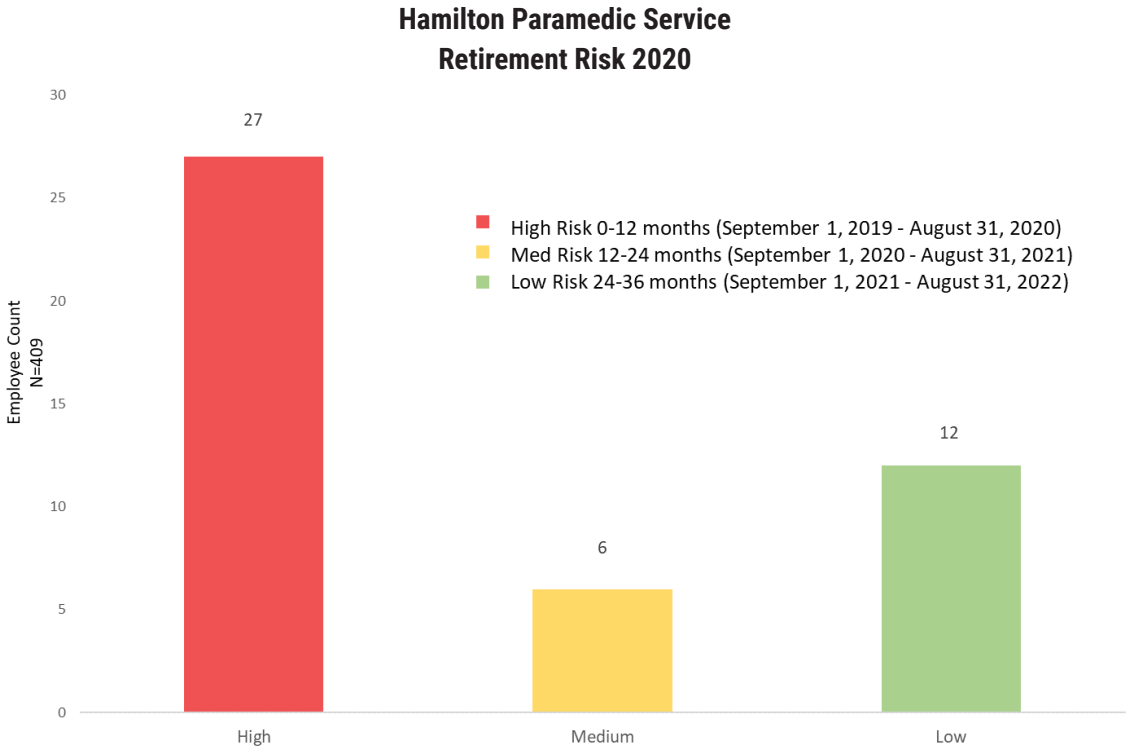
A culture in which people are treated equitably, where they feel included and one that celebrates diversity also contributes to a positive workplace environment. The Talent and Diversity Division of the City of Hamilton has recently embarked on the development of an equity, diversity, and inclusion (EDI) framework and implementation roadmap. This work will help to create, foster, and sustain a workplace culture where every employee feels included, supported, empowered, and has equal opportunity for growth and development. The EDI framework also extends to the community to ensure their values and interests are represented and their diverse needs are served in an equitable and inclusive manner.

Using the City's EDI framework and roadmap as a guide, HPS will develop and implement initiatives to strengthen EDI within the service and in serving the community. Initiatives such as targeted attraction and recruitment activities, increasing cultural competency through connections with diverse communities, training and education programs and creating opportunities for development and career advancement will be a part of the HPS People Plan to enhance workplace culture.

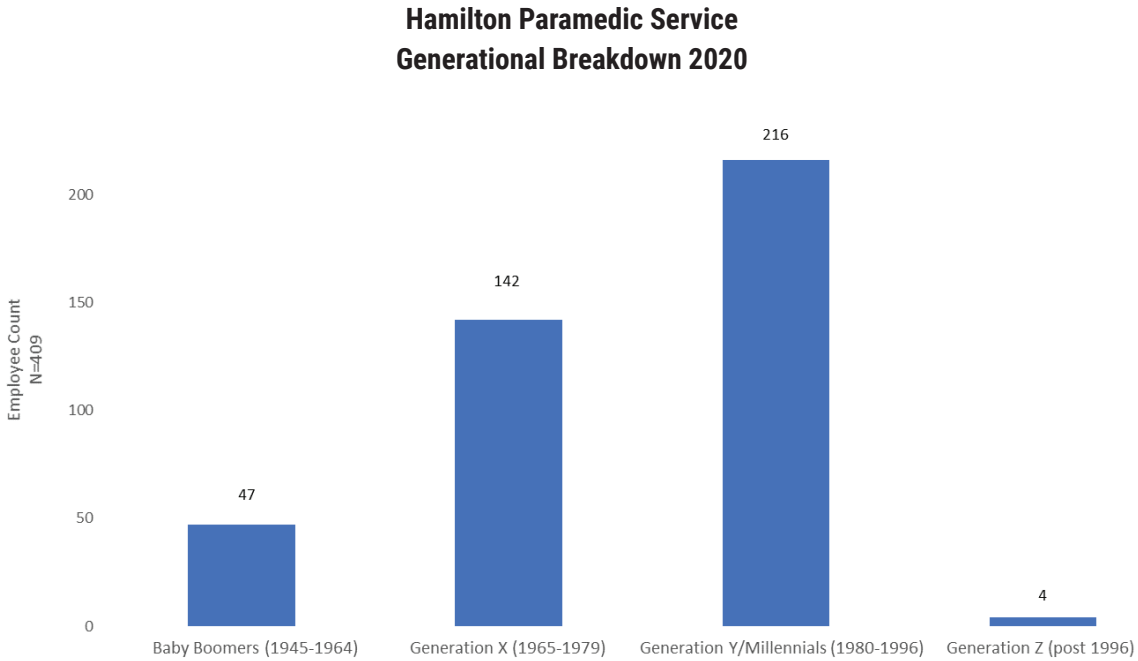
Succession

An HPS People Plan must also include a process to replace employees as they leave the service to avoid gaps in the workforce and ensure the seamless movement of talent. Succession planning identifies the positions that may need to be filled; the knowledge, skills and abilities required for these positions; and the people prepared to step into the positions. This may involve plans to develop employees' talent to match positions to be filled.

In 2020, a retirement risk analysis of the HPS workforce showed over 11% of employees are eligible to retire within the next two years. Almost 9% of the workforce is eligible to retire presently.



By the end of this 10-year Master Plan, almost half (46%) of the 2020 workforce will be 51 years and older with many eligible to retire.



In collaboration with the City of Hamilton's Human Resources Division, HPS will develop a succession plan with updated projections for retirement so positions can be filled by the right people in a timely manner. This is includes being prepared to fill leadership roles.

Developing new leaders is a key element to succession planning. HPS will work with Human Resources to establish a managerial developmental position. This full-time position would provide experience in each of the HPS sections over the course of one year. Once the year is completed another employee would be appointed to the position. This opportunity would develop employees for further career advancement in the service and build a pool of employees prepared to move into leadership roles. It will help to retain specialized knowledge and competencies that are passed on to potential future leaders. Such an opportunity also increases employee engagement and retention. This position will enable HPS to take a proactive leadership approach to seek out potential leaders, expose them to a wide range of experiences and develop their potential.

Having a plan to replace employees who retire, move on to new opportunities, or pass away with people prepared to promptly take on the role ensures HPS continues to operate smoothly, particularly in instances of sudden vacancies of key positions.

The HPS People Plan will also need to include plans for hiring staff. Throughout this Master Plan, objectives have identified for creating positions and making enhancements to existing positions. Adding ten paramedics per year, increasing the number of supervisors, logistics personnel, community paramedics and professional development staff for training as well as establishing positions for leads of the Cardiac Safe City program, Reliability Management System and possibly a Cultural Liaison requires a thorough plan with timelines and financial impacts.

Developing a People Plan that addresses these hiring needs and includes enhancing attraction, recruitment, retention, and succession activities and considers the current and future needs of HPS will ensure optimal performance of the workforce to best serve the community.

8.0

OBJECTIVES AND ACTIONS

The HPS Master Plan 2022–2031 has presented a series of objectives based on five priorities aimed at transforming the service through technology advancements, innovation, resource allocation and operational optimization.

The objective outcomes related to each priority are as follows:

Operational Integration	Infrastructure Progression	Service Delivery Optimization	Positive Work Culture Elevation	Healthy & Safe Communities Protection and Promotion
Modernized Dispatch	Adequate Response Resources	Enhanced Deployment	Just and Safe Culture	Expanded, Centralized and Sustained MIH
Centralized Logistics	Enhanced Logistics	Reduced Offload Delays	People-Focused Culture	Broadened Scope of Practice
Integrated Patient Records	Sufficient Facilities	Increased Cultural Compentency		Specialized Services
	Advanced IT	Increased Virtual Care		Contingency Response Preparedness
				Reduced Carbon Footprint

The Master Plan is summarized in the following chart organized by priorities with associated objective categories and actions that reference the objective number found within this Master Plan. Estimated timelines for implementing each action is included. Some objectives will require further investigation while others require the development of detailed implementation plans. Therefore, much of the first year of this Master Plan will entail planning before implementation can take place. The Master Plan will be updated to reflect the implementation plans once they have been developed.

This ten-year Master Plan is a dynamic document. It should be considered a 'baseline' to be regularly reviewed and updated on a yearly basis. As the needs of the community change, new developments arise and trends change, a continual update ensures the Master Plan remains relevant and cutting edge. Also, once actions have been completed and further actions identified, they will be added to the Master Plan. The Master Plan will undergo a complete refresh at the five-year mark which would then provide an ongoing 10-year forecast for required activities as adjusted by the experiences of the first five years.

HAMILTON PARAMEDIC SERVICE MASTER PLAN 2022-2031		
PRIORITY: Operational Integration		
Objective Category	**Objective Number and Action**	**Timeline**
Modernized Dispatch	**3.** Pursue operational responsibility of Hamilton's land ambulance dispatch with core dispatch funding remaining a provincial responsibility	2022-2025
Centralized Logistics for City of Hamilton Divisions	**19.** Investigate assuming responsibility for procuring and managing medical supplies for City of Hamilton's long-term care homes and Public Health Services	2022
	a. Acquire warehouse space to accommodate the centralization of medical supplies for City of Hamilton divisions providing health care	2022
	b. Explore the possibility of providing respirator testing for City of Hamilton divisions where employees require respirator masks	2022
Integrated Patient Records	**23.** Work with the Greater Hamilton Health Network to leverage and invest in technology to better integrate records to achieve a one patient, one record approach to patient care	2022-2027

PRIORITY: Infrastructure Progression		
Objective Category	**Objective Number and Action**	**Timeline**
Adequate Response Resources	**1.** An addition of five 12-hour shifts at peak demand hours, providing approximately 21,500 additional hours of staffed ambulance time is required to meet existing service demand	2024-2026
	2. An addition of one ambulance with ten paramedic staff per year for the next ten years is anticipated to address the projected growth in service demand	2022-2031
Enhanced Logistics	**18.** Complete a thorough review of the Logistics and Planning section to ensure resources and capabilities meet changing and growing demands of the service including preparedness for disruptive events for HPS and City of Hamilton health care divisions	2022-2023
	a. Add logistics personnel to manage an increased workload due to enhancements to frontline services	2024, 2026
	20. Implement a comprehensive asset management system to effectively manage inventory over the long term for HPS and City of Hamilton divisions where applicable	2022
Sufficient Facilities	**27.** Secure a facility in the short term for an operational hub that includes a response station, logistics capabilities and a warehouse space for the centralization of medical supplies for the City of Hamilton divisions providing health care	2022-2023
	28. Conduct a facility study and develop a strategy to address the medium and long term needs of a growing service	2024
	a. Maintain a focus on green buildings to obtain LEED certification	Post 2024

PRIORITY: Infrastructure Progression		
Objective Category	**Objective Number and Action**	**Timeline**
Advanced IT and Data Management Systems	**22.** Develop an IT strategy based on a comprehensive review of IT and data management systems (both hardware and software) to improve operational efficiency	2022
	a. Acquire smartphones for all paramedics with technology to integrate with dispatch systems, access to electronic patient care records (ePCRs) and workplace safety application	2022
	24. Improve integration and utilization of virtual care platforms in paramedic patient care	2022 - Ongoing

PRIORITY: Service Delivery Optimization		
Objective Category	**Objective Number and Action**	**Timeline**
Enhanced Deployment	**4.** Increase the number of Advance Care Paramedics (ACPs) to a level that enables 90% of calls requiring ACP intervention to have an ACP response	2022
	5. Redeploy Emergency Response Vehicles (ERVs) to improve response time performance	2023
	6. Update the Tiered Response Agreement (TRA) to reduce unnecessary use of Hamilton Fire Department resources on medical calls taking into consideration the impact of the modified TRA during the pandemic	2022
Reduced Offload Delays	**7.** Continue to implement and improve initiatives to reduce offload delay in collaboration with health care system partners	2022-Ongoing
Increased Cultural Competency	**29 b.** Build relationships with diverse communities to develop a program that expands HPS recruitment activities and promotes cultural competency to better serve diverse populations. Consider establishing a Cultural Liaison position	2022-2024
	29 f. Utilizing the City of Hamilton's equity, diversity, and inclusion (EDI) framework and roadmap as a guide, develop and implement initiatives to strengthen EDI within HPS and in serving the community	2022
Increased Use of Virtual Health Care Platforms	**24.** Improve integration and utilization of virtual care platforms in paramedic patient care	2022-Ongoing

PRIORITY: Positive Work Culture Elevation		
Objective Category	**Objective Number and Action**	**Timeline**
Just and Safe Culture	**25.** Create a full-time position to lead the implementation and operation of the reliability management system	2024
	26. Procure the online learning management system to facilitate the implementation of the reliability management system	2024
People-Focused Workplace Culture	**29 .** Develop a 'People Plan' to ensure HPS's workforce can perform optimally in a positive environment now and in the future that includes but is not limited to the following components:	2022-2023
	a. With stakeholders, develop a recruitment program in which select students are supported in obtaining a college diploma in the paramedic field with the guarantee of employment with HPS upon completion	2024
	b. Build relationships with diverse communities to develop a program that expands HPS recruitment activities and promotes cultural competency to better serve diverse populations. Consider establishing a Cultural Liaison position	2022-2024
	c. Develop a retention plan with stakeholders to identify challenges and solutions to retaining paramedic personnel	2022
	d. Review and enhance employee health and wellness activities through further development of mental health supports, Peer Support Team activities and reducing repetitive strain injury	2022
	e. Ongoing review and actioning of existing and future City of Hamilton's Our People Survey results to strengthen workplace culture	2022-2025
	f. Utilizing the City of Hamilton's equity, diversity, and inclusion (EDI) framework and roadmap as a guide, develop and implement initiatives to strengthen EDI within HPS and in serving the community	2022
	g. Develop a succession plan with projections for retirements	2022
	h. Create a managerial developmental position to offer the opportunity for employees to develop careers and be prepared to potentially succeed managers	2025

PRIORITY: Healthy and Safe Communities Protection and Promotion		
Objective Category	**Objective Number and Action**	**Timeline**
Expanded, Centralized and Sustained Mobile Integrated Health (MIH)	**8.** Increase the capacity of Mobile Integrated Health (MIH) to address growing demands for community and at-home support:	2022
	a. Create a full-time position to lead the Cardiac Safe City program	2025
	b. Ensure integration, involvement, and engagement of frontline paramedics in MIH activities	2022-Ongoing
	c. Advocate for additional community paramedic positions through Ministry of Health and the Greater Hamilton Health Network	2022
	9. Advocate for sustained funding of MIH to become a permanent component of primary care in Ontario in accordance with the Community Paramedicine Policy Framework developed jointly by Association of Municipalities Ontario (AMO) and the Ontario Association of Paramedic Chiefs (OAPC)	2022-Ongoing
	10. Develop a plan in collaboration with stakeholders to establish a central clinical hub to access MIH and other services, starting with installing a clinician in dispatch	2022-2030
Broadened Scope of Clinical Practice	**11.** Pursue Primary Care Paramedic (PCP) ability to perform select Schedule 2 procedures from Reg 257/00 of the *Ambulance Act*:	
	a. Support PCPs in becoming certified in Primary Care Paramedic Autonomous Intravenous (PCP AIV)	2022-2023
	b. Support PCPs in becoming certified to access and administer a wider range of medication	2023
	12. Implement a requirement that all PCP recruits be PCP AIV certified as a condition of employment with HPS	2023
	13. Train all paramedics to International Trauma Life Support (ITLS)	2024
Addition of Specialized Services	**14.** Acquire an emergency response utility vehicle through the reallocation of vehicle capital to service events where the congregation of people inhibits access by an ambulance	2022
	15. Develop a framework for the delivery of specialized services to inform operational and capital decision	2022
	16. Engage hospital partners to jointly advocate for the Ministry of Health to authorize and fund a Critical Care Transport Unit in partnership with Ornge	2023
Contingency Response Preparedness	**17.** Participate in disruptive and disastrous event preparedness exercises with community and emergency response partners including annual Emergency Operations Centre (EOC) exercises based on the hazardous incidents identified in the Hazard Identification and Risk Assessment (HIRA) Report	2022-Ongoing
Reduced Carbon Footprint	**21.** Develop a 'clean and green' plan to reduce the carbon footprint of HPS including examining the feasibility of acquiring hybrid or electric vehicles and implementing wireless charging stations	2022

9.0

FINANCIAL PROJECTION

In the following pages are the preliminary costs that have been estimated based on the objectives identified in this Master Plan that have known or anticipated financial impacts.[95]

It is presented in three scenarios. Each addresses the annual growth in service over ten years. In two senarios, the current demand for service is also addressed. That is, five 12-hour shifts at peak hours (which translates to an additional three ambulances and 25 staff) as per Objective 1.

Model A addresses the ongong growth demand in service with the addition of one ambulance with ten staff each year for the duration of this Plan. This model addresses the current demand for service with the addition of five 12-hour shifts at peak hours implemented in 2023.

Model B also addesses the annual growth demand with the addition of one ambulance and related staff resources each year for ten years. However, Model B addresses the current demand for service by phasing in the additional resrouces for peak hours over three years beginning in 2023.

As with the first two scenarios, Model C addresses the growing demand for service with an additional ambulance and ten staff annually for the duration of the Master Plan. However, Model C does not address the current needs. This will require optimizing existing resources to manage the current demands.

Each Model also includes the requirement for a spare vehicle in 2026 and another in 2031 with accompanying staff.

HPS will work with City of Hamilton council within the appropriate processes to assure the most effective approach is taken to finance objectives that require funding.

95 Although the Hamilton Paramedic Master Plan (2022-2031) was completed in 2021, it was deferred to be presented to City of Hamilton Council for endorsement in April 2022 subsequent to the 2022 budget cycle. Thus, to align with the 2023 budget cycle the Financial Projection Models commence in 2023 and extend for a ten-year term.

HPS Master Plan (2023 - 2032) Financial Projection - Model A											
Capital Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Vehicles - Quantity											
New Ambulances - Growth	1	1	1	2	1	1	1	1	2	1	**12**
New Ambulances - Demand	3	-	-	-	-	-	-	-	-	-	**3**
Vehicles - Costs											
New Ambulances - Growth	340,790	347,500	354,300	722,800	368,600	375,900	383,300	390,800	796,800	406,100	**4,486,890**
New Ambulances - Demand	1,022,370	-	-	-	-	-	-	-	-	-	**1,022,370**
Vehicles - Gross Costs	**1,363,160**	**347,500**	**354,300**	**722,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**5,509,260**
Sources of Funding											
DC Debt Funded	(298,000)	(304,000)	(310,000)	-	-	-	-	-	-	-	**(912,000)**
DC Reserve Funded	(263,000)	(43,500)	(44,300)	(279,000)	-	-	-	-	-	-	**(629,800)**
Unallocated Capital Levy	(30,000)	-	-	-	-	-	-	-	-	-	**(30,000)**
Total Sources of Funding	**(591,000)**	**(347,500)**	**(354,300)**	**(279,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**(1,571,800)**
Net Capital Costs - Vehicles	**772,160**	**-**	**-**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,937,460**
Facility - Costs											
New or Retrofit Facility	13,500,000	-	-	-	-	-	-	-	-	-	**13,500,000**
Facility - Gross Costs	**13,500,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13,500,000**
Sources of Funding											
WIP Funding - Station 32	(300,000)	-	-	-	-	-	-	-	-	-	**(300,000)**
DC Debt Funding	(4,500,000)	-	-	-	-	-	-	-	-	-	**(4,500,000)**
Debt Funding	(8,700,000)	-	-	-	-	-	-	-	-	-	**(8,700,000)**
Total Sources of Funding	**(13,500,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(13,500,000)**
Net Capital Costs - Facility	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Capital Costs - Vehicles and Facility	**772,160**	**-**	**-**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,937,460**
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Staffing Plan - FTE											
Ambulance Staffing - Growth	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	**100.00**
Ambulance Staffing - Demand	25.00	-	-	-	-	-	-	-	-	-	**25.00**
Logistics Technicians	-	4.00	-	TBD	-	-	-	-	-	-	**4.00**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	**-**
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	**-**
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	**-**
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	**-**
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	**-**
Total FTE	**35.00**	**14.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**129.00**
Staffing Plan - Gross Costs											
Ambulance Staffing - Growth	1,268,180	1,288,270	1,308,680	1,329,400	1,350,460	1,371,840	1,393,570	1,415,660	1,438,100	1,460,910	**13,625,070**
Ambulance Staffing - Demand	3,170,450	-	-	-	-	-	-	-	-	-	**3,170,450**
Logistics Technicians	-	336,020	-	TBD	-	-	-	-	-	-	**336,020**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	**-**
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	**-**
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	**-**
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	**-**
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	**-**
Staffing Plan - Gross Costs	**4,438,630**	**1,624,290**	**1,308,680**	**1,329,400**	**1,350,460**	**1,371,840**	**1,393,570**	**1,415,660**	**1,438,100**	**1,460,910**	**17,131,540**
Training Costs											
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
ITLS - International Trauma Life Support	-	200,000	-	-	-	-	-	-	-	-	**200,000**
Reliability Management System software	-	30,810	14,270	4,510	4,600	4,690	4,780	4,880	4,980	5,080	**78,600**
Training Costs	**-**	**230,810**	**14,270**	**4,510**	**4,600**	**4,690**	**4,780**	**4,880**	**4,980**	**5,080**	**278,600**
Consulting & Student Grants Costs											
Consultant - Facility Study	-	150,000	-	-	-	-	-	-	-	-	**150,000**
Annual Student Grants for Guaranteed Employment Program	-	250,000	-	-	-	-	-	-	-	-	**250,000**
Consulting & Student Grants Costs	**-**	**400,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**400,000**
Other Operating Costs											
Uniforms And Clothing	37,520	9,570	9,760	9,960	10,160	10,360	10,570	10,780	11,000	11,220	**130,900**
Oxygen	11,000	2,810	2,870	2,930	2,990	3,050	3,110	3,170	3,230	3,290	**38,450**
Medical Supplies	152,600	38,910	39,690	40,480	41,290	42,120	42,960	43,820	44,700	45,590	**532,160**
Laundry/Dry Cleaning Service	40,000	10,200	10,400	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**139,490**
Prescribed Medication Supplies	40,000	10,200	10,400	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**139,490**
Fuel-Unleaded Gasoline	96,680	24,650	25,140	51,280	26,150	26,670	27,200	27,740	56,580	28,860	**390,950**
Repairs & Maintenance - Auto	66,520	16,960	17,300	35,300	18,000	18,360	18,730	19,100	38,960	19,870	**269,100**
Transfer to Reserve for Vehicle & Equip Replacement (Amortization)	227,200	57,920	59,050	120,460	61,430	62,650	63,880	65,130	132,800	67,680	**918,200**
Building Operating Costs of New Facility (utilities, maintenance, etc.)	160,000	3,200	3,260	3,330	3,400	3,470	3,540	3,610	3,680	3,750	**191,240**
Principal Repayment for New Facility	331,100	340,290	349,750	359,470	369,470	379,740	390,300	401,150	412,300	423,760	**3,757,330**
Interest Payment for New Facility	241,900	232,700	223,200	213,500	203,500	193,200	182,700	171,800	160,600	149,200	**1,972,300**
Other Operating Costs	**1,404,520**	**747,410**	**750,820**	**857,930**	**758,030**	**761,700**	**765,510**	**769,280**	**887,290**	**777,120**	**8,479,610**
Gross Operating Costs	**5,843,150**	**3,002,510**	**2,073,770**	**2,191,840**	**2,113,090**	**2,138,230**	**2,163,860**	**2,189,820**	**2,330,370**	**2,243,110**	**26,289,750**
Sources of Funding											
Tax Stabilization Reserve[1]	(2,921,575)	-	-	-	-	-	-	-	-	-	**(2,921,575)**
Ministry Funding - LASG Agreement[2]	-	(2,924,775)	(1,668,610)	(1,199,510)	(1,253,685)	(1,209,310)	(1,216,745)	(1,224,280)	(1,231,835)	(1,296,535)	**(13,225,285)**
Total Sources of Funding	**(2,921,575)**	**(2,924,775)**	**(1,668,610)**	**(1,199,510)**	**(1,253,685)**	**(1,209,310)**	**(1,216,745)**	**(1,224,280)**	**(1,231,835)**	**(1,296,535)**	**(16,146,860)**
Net Operating Costs	**2,921,575**	**77,735**	**405,160**	**992,330**	**859,405**	**928,920**	**947,115**	**965,540**	**1,098,535**	**946,575**	**10,142,890**

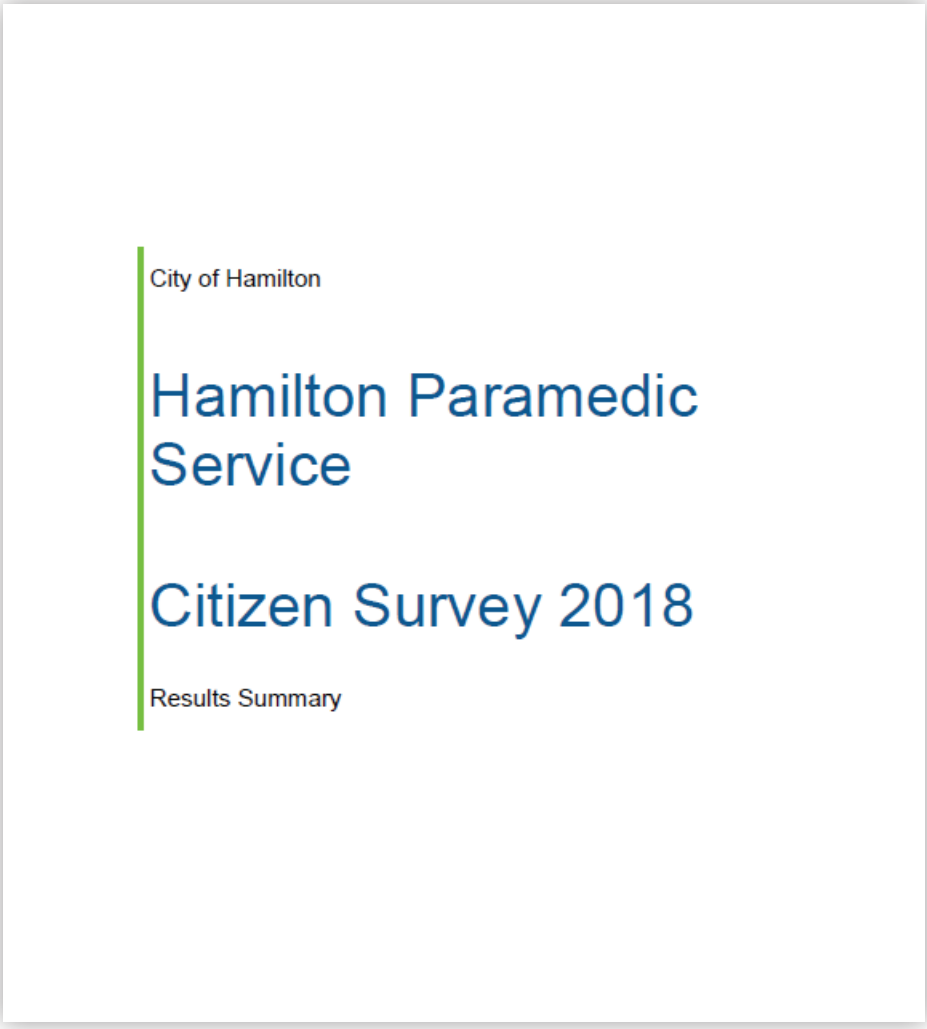
HPS Master Plan (2023 - 2032) Financial Projection - Model B											
Capital Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Vehicles - Quantity											
New Ambulances - Growth	1	1	1	2	1	1	1	1	2	1	**12**
New Ambulances - Demand	1	1	1	-	-	-	-	-	-	-	**3**
Vehicles - Costs											
New Ambulances - Growth	340,790	347,500	354,300	722,800	368,600	375,900	383,300	390,800	796,800	406,100	**4,486,890**
New Ambulances - Demand	340,790	347,500	354,300	-	-	-	-	-	-	-	**1,042,590**
Vehicles - Gross Costs	**681,580**	**695,000**	**708,600**	**722,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**5,529,480**
Sources of Funding											
DC Debt Funded	(298,000)	(304,000)	(310,000)	-	-	-	-	-	-	-	**(912,000)**
DC Reserve Funded	(263,000)	(268,000)	(273,000)	(279,000)	-	-	-	-	-	-	**(1,083,000)**
Unallocated Capital Levy	(30,000)	-	-	-	-	-	-	-	-	-	**(30,000)**
Total Sources of Funding	**(591,000)**	**(572,000)**	**(583,000)**	**(279,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**(2,025,000)**
Net Capital Costs - Vehicles	**90,580**	**123,000**	**125,600**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,504,480**
Facility - Costs											
New or Retrofit Facility	13,500,000	-	-	-	-	-	-	-	-	-	**13,500,000**
Facility - Gross Costs	**13,500,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13,500,000**
Sources of Funding											
WIP Funding - Station 32	(300,000)	-	-	-	-	-	-	-	-	-	**(300,000)**
DC Debt Funding	(4,500,000)	-	-	-	-	-	-	-	-	-	**(4,500,000)**
Debt Funding	(8,700,000)	-	-	-	-	-	-	-	-	-	**(8,700,000)**
Total Sources of Funding	**(13,500,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(13,500,000)**
Net Capital Costs - Facility	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Capital Costs - Vehicles and Facility	**90,580**	**123,000**	**125,600**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,504,480**
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Staffing Plan - FTE											
Ambulance Staffing - Growth	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	**100.00**
Ambulance Staffing - Demand	10.00	10.00	5.00	-	-	-	-	-	-	-	**25.00**
Logistics Technicians	-	4.00	-	TBD	-	-	-	-	-	-	**4.00**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	**-**
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	**-**
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	**-**
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	**-**
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	**-**
Total FTE	**20.00**	**24.00**	**15.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**129.00**
Staffing Plan - Gross Costs											
Ambulance Staffing - Growth	1,268,180	1,288,270	1,308,680	1,329,400	1,350,460	1,371,840	1,393,570	1,415,660	1,438,100	1,460,910	**13,625,070**
Ambulance Staffing - Demand	1,268,180	1,288,270	654,340	-	-	-	-	-	-	-	**3,210,790**
Logistics Technicians	-	336,020	-	TBD	-	-	-	-	-	-	**336,020**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	**-**
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	**-**
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	**-**
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	**-**
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	**-**
Staffing Plan - Gross Costs	**2,536,360**	**2,912,560**	**1,963,020**	**1,329,400**	**1,350,460**	**1,371,840**	**1,393,570**	**1,415,660**	**1,438,100**	**1,460,910**	**17,171,880**
Training Costs											
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
ITLS - International Trauma Life Support	-	200,000	-	-	-	-	-	-	-	-	**200,000**
Reliability Management System software	-	30,810	14,270	4,510	4,600	4,690	4,780	4,880	4,980	5,080	**78,600**
Training Costs	**-**	**230,810**	**14,270**	**4,510**	**4,600**	**4,690**	**4,780**	**4,880**	**4,980**	**5,080**	**278,600**
Consulting & Student Grants Costs											
Consultant - Facility Study	-	150,000	-	-	-	-	-	-	-	-	**150,000**
Annual Student Grants for Guaranteed Employment Program	-	250,000	-	-	-	-	-	-	-	-	**250,000**
Consulting & Student Grants Costs	**-**	**400,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**400,000**
Other Operating Costs											
Uniforms And Clothing	18,760	19,140	19,520	9,960	10,160	10,360	10,570	10,780	11,000	11,220	**131,470**
Oxygen	5,500	5,620	5,740	2,930	2,990	3,050	3,110	3,170	3,230	3,290	**38,630**
Medical Supplies	76,300	77,820	79,380	40,480	41,290	42,120	42,960	43,820	44,700	45,590	**534,460**
Laundry/Dry Cleaning Service	20,000	20,400	20,800	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**140,090**
Prescribed Medication Supplies	20,000	20,400	20,800	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**140,090**
Fuel-Unleaded Gasoline	48,340	49,300	50,280	51,280	26,150	26,670	27,200	27,740	56,580	28,860	**392,400**
Repairs & Maintenance - Auto	33,260	33,920	34,600	35,300	18,000	18,360	18,730	19,100	38,960	19,870	**270,100**
Transfer to Reserve for Vehicle & Equip Replacement (Amortization)	113,600	115,840	118,100	120,460	61,430	62,650	63,880	65,130	132,800	67,680	**921,570**
Building Operating Costs of New Facility (utilities, maintenance, etc.)	160,000	3,200	3,260	3,330	3,400	3,470	3,540	3,610	3,680	3,750	**191,240**
Principal Repayment for New Facility	331,100	340,290	349,750	359,470	369,470	379,740	390,300	401,150	412,300	423,760	**3,757,330**
Interest Payment for New Facility	241,900	232,700	223,200	213,500	203,500	193,200	182,700	171,800	160,600	149,200	**1,972,300**
Other Operating Costs	**1,068,760**	**918,630**	**925,430**	**857,930**	**758,030**	**761,700**	**765,510**	**769,280**	**887,290**	**777,120**	**8,489,680**
Gross Operating Costs	**3,605,120**	**4,462,000**	**2,902,720**	**2,191,840**	**2,113,090**	**2,138,230**	**2,163,860**	**2,189,820**	**2,330,370**	**2,243,110**	**26,340,160**
Sources of Funding											
Tax Stabilization Reserve[1]	(1,802,560)	-	-	-	-	-	-	-	-	-	**(1,802,560)**
Ministry Funding - LASG Agreement[2]	-	(1,805,760)	(2,398,355)	(1,613,985)	(1,253,685)	(1,209,310)	(1,216,745)	(1,224,280)	(1,231,835)	(1,296,535)	**(13,250,490)**
Total Sources of Funding	**(1,802,560)**	**(1,805,760)**	**(2,398,355)**	**(1,613,985)**	**(1,253,685)**	**(1,209,310)**	**(1,216,745)**	**(1,224,280)**	**(1,231,835)**	**(1,296,535)**	**(15,053,050)**
Net Operating Costs	**1,802,560**	**2,656,240**	**504,365**	**577,855**	**859,405**	**928,920**	**947,115**	**965,540**	**1,098,535**	**946,575**	**11,287,110**

HPS Master Plan (2023 - 2032) Financial Projection - Model C											
Capital Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Vehicles - Quantity											
New Ambulances - Growth	1	1	1	2	1	1	1	1	2	1	**12**
New Ambulances - Demand	-	-	-	-	-	-	-	-	-	-	-
Vehicles - Costs											
New Ambulances - Growth	340,790	347,500	354,300	722,800	368,600	375,900	383,300	390,800	796,800	406,100	**4,486,890**
New Ambulances - Demand	-	-	-	-	-	-	-	-	-	-	-
Vehicles - Gross Costs	**340,790**	**347,500**	**354,300**	**722,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**4,486,890**
Sources of Funding											
DC Debt Funded	(298,000)	(304,000)	(310,000)	-	-	-	-	-	-	-	**(912,000)**
DC Reserve Funded	(42,790)	(43,500)	(44,300)	(279,000)	-	-	-	-	-	-	**(409,590)**
Unallocated Capital Levy	-	-	-	-	-	-	-	-	-	-	-
Total Sources of Funding	**(340,790)**	**(347,500)**	**(354,300)**	**(279,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**(1,321,590)**
Net Capital Costs - Vehicles	**-**	**-**	**-**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,165,300**
Facility - Costs											
New or Retrofit Facility	13,500,000	-	-	-	-	-	-	-	-	-	**13,500,000**
Facility - Gross Costs	**13,500,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13,500,000**
Sources of Funding											
WIP Funding - Station 32	(300,000)	-	-	-	-	-	-	-	-	-	**(300,000)**
DC Debt Funding	(4,500,000)	-	-	-	-	-	-	-	-	-	**(4,500,000)**
Debt Funding	(8,700,000)	-	-	-	-	-	-	-	-	-	**(8,700,000)**
Total Sources of Funding	**(13,500,000)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(13,500,000)**
Net Capital Costs - Facility	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net Capital Costs - Vehicles and Facility	**-**	**-**	**-**	**443,800**	**368,600**	**375,900**	**383,300**	**390,800**	**796,800**	**406,100**	**3,165,300**
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
Staffing Plan - FTE											
Ambulance Staffing - Growth	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	**100.00**
Ambulance Staffing - Demand	-	-	-	-	-	-	-	-	-	-	-
Logistics Technicians	-	4.00	-	TBD	-	-	-	-	-	-	**4.00**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	-
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	-
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	-
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	-
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	-
Total FTE	**10.00**	**14.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**104.00**
Staffing Plan - Gross Costs											
Ambulance Staffing - Growth	1,268,180	1,288,270	1,308,680	1,329,400	1,350,460	1,371,840	1,393,570	1,415,660	1,438,100	1,460,910	**13,625,070**
Ambulance Staffing - Demand	-	-	-	-	-	-	-	-	-	-	-
Logistics Technicians	-	336,020	-	TBD	-	-	-	-	-	-	**336,020**
Cardiac Safe City Lead	-	-	TBD	-	-	-	-	-	-	-	-
Reliability Management System Lead	-	TBD	-	-	-	-	-	-	-	-	-
Cultural Liaison	-	TBD	-	-	-	-	-	-	-	-	-
Managerial Development Position	-	-	TBD	-	-	-	-	-	-	-	-
Supervisors	-	TBD	TBD	-	-	-	-	-	-	-	-
Staffing Plan - Gross Costs	**1,268,180**	**1,624,290**	**1,308,680**	**1,329,400**	**1,350,460**	**1,371,840**	**1,393,570**	**1,415,660**	**1,438,100**	**1,460,910**	**13,961,090**
Training Costs											
Operating Costs Details	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Total**
ITLS - International Trauma Life Support	-	200,000	-	-	-	-	-	-	-	-	**200,000**
Reliability Management System software	-	30,810	14,270	4,510	4,600	4,690	4,780	4,880	4,980	5,080	**78,600**
Training Costs	**-**	**230,810**	**14,270**	**4,510**	**4,600**	**4,690**	**4,780**	**4,880**	**4,980**	**5,080**	**278,600**
Consulting & Student Grants Costs											
Consultant - Facility Study	-	150,000	-	-	-	-	-	-	-	-	**150,000**
Annual Student Grants for Guaranteed Employment Program	-	250,000	-	-	-	-	-	-	-	-	**250,000**
Consulting & Student Grants Costs	**-**	**400,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**400,000**
Other Operating Costs											
Uniforms And Clothing	9,380	9,570	9,760	9,960	10,160	10,360	10,570	10,780	11,000	11,220	**102,760**
Oxygen	2,750	2,810	2,870	2,930	2,990	3,050	3,110	3,170	3,230	3,290	**30,200**
Medical Supplies	38,150	38,910	39,690	40,480	41,290	42,120	42,960	43,820	44,700	45,590	**417,710**
Laundry/Dry Cleaning Service	10,000	10,200	10,400	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**109,490**
Prescribed Medication Supplies	10,000	10,200	10,400	10,610	10,820	11,040	11,260	11,490	11,720	11,950	**109,490**
Fuel-Unleaded Gasoline	24,170	24,650	25,140	51,280	26,150	26,670	27,200	27,740	56,580	28,860	**318,440**
Repairs & Maintenance - Auto	16,630	16,960	17,300	35,300	18,000	18,360	18,730	19,100	38,960	19,870	**219,210**
Transfer to Reserve for Vehicle & Equip Replacement (Amortization)	56,800	57,920	59,050	120,460	61,430	62,650	63,880	65,130	132,800	67,680	**747,800**
Building Operating Costs of New Facility (utilities, maintenance, etc.)	160,000	3,200	3,260	3,330	3,400	3,470	3,540	3,610	3,680	3,750	**191,240**
Principal Repayment for New Facility	331,100	340,290	349,750	359,470	369,470	379,740	390,300	401,150	412,300	423,760	**3,757,330**
Interest Payment for New Facility	241,900	232,700	223,200	213,500	203,500	193,200	182,700	171,800	160,600	149,200	**1,972,300**
Other Operating Costs	**900,880**	**747,410**	**750,820**	**857,930**	**758,030**	**761,700**	**765,510**	**769,280**	**887,290**	**777,120**	**7,975,970**
Gross Operating Costs	**2,169,060**	**3,002,510**	**2,073,770**	**2,191,840**	**2,113,090**	**2,138,230**	**2,163,860**	**2,189,820**	**2,330,370**	**2,243,110**	**22,615,660**
Sources of Funding											
Tax Stabilization Reserve[1]	(1,084,530)	-	-	-	-	-	-	-	-	-	**(1,084,530)**
Ministry Funding - LASG Agreement[2]	-	(1,087,730)	(1,668,610)	(1,199,510)	(1,253,685)	(1,209,310)	(1,216,745)	(1,224,280)	(1,231,835)	(1,296,535)	**(11,388,240)**
Total Sources of Funding	**(1,084,530)**	**(1,087,730)**	**(1,668,610)**	**(1,199,510)**	**(1,253,685)**	**(1,209,310)**	**(1,216,745)**	**(1,224,280)**	**(1,231,835)**	**(1,296,535)**	**(12,472,770)**
Net Operating Costs	**1,084,530**	**1,914,780**	**405,160**	**992,330**	**859,405**	**928,920**	**947,115**	**965,540**	**1,098,535**	**946,575**	**10,142,890**

10.0

APPENDICES

Appendix A-1: Hamilton Paramedic Service Citizen Survey 2018


City of Hamilton

Hamilton Paramedic Service

Citizen Survey 2018

Results Summary

Hamilton Paramedic Service Citizen Survey 2018 - Report

Table of Contents

Background 1
Survey Methods and Administration 1
Survey Response and Report Notes 2
Key Findings 3
The Respondents 3
What the Hamilton Paramedic Service does 5
Rating of the Hamilton Paramedic Service 6
Response Time and Service Expectations 7
Awareness of and Opinion of "Off-Load Delay 9
Completion of First Aid Course and CPR course 10
Respondents who Have Called 911 in the Past 2 Years 11
Ward Level Analysis 16
Appendix A: Survey Tool 27
Appendix B: Survey Links on www.hamilton.ca 40
Appendix C: Detailed Response Summary 53
Appendix D: Survey Sample by Ward 68

Hamilton Paramedic Service Citizen Survey 2018 - Report

Background

The Hamilton Paramedic Service Citizen Survey 2018 is the Hamilton Paramedic Service's first citizen survey. The main objective of the survey is to gain a better understanding of residents' expectations and satisfaction levels regarding the services provided by the Hamilton Paramedic Service.

The findings from the Hamilton Paramedic Service Survey 2018 will help to inform the Hamilton Paramedic Service Multi-Year Plan.

Survey Methods and Administration

The survey tool and questions were developed by a project team comprised of members of the Hamilton Paramedic Service leadership team and City staff based on the identified objectives of the survey. The survey tool can be found in Appendix A.

A third party vendor, Metroline Research Group Inc. was contracted to conduct the survey through Computer Assisted Telephone Interviews (CATI). Hamilton based residential and cellular phone lines were randomly called and residents were invited to participate in the survey. To qualify for participation in the survey, the respondent had to be an adult age 18 years or over residing in Hamilton. For residential lines, the adult in the household with the most recent birthday was interviewed. For cellular lines, the person answering the call would be interviewed provided they met the age and residency requirements. The telephone surveys were conducted between March 2nd, 2018 and March 19th, 2018.

To supplement the telephone interviews and allow more residents to participate in the survey, an online version of the survey tool was made available on the City of Hamilton website. A banner advertising the survey with the survey link was placed on the most frequently visited pages on www.hamilton.ca. A list of the web pages where the banner was placed can be found in Appendix B. The online survey was active between February 26th and March 18th, 2018.

Both the telephone and online version of the survey was available in English and French.

Hamilton

Hamilton Paramedic Service Citizen Survey 2018 - Report

Survey Response and Report Notes

Metroline who conducted the telephone survey called approximately 15,938 randomly selected Hamilton based phone numbers and collected 550 completed responses.

The results of the telephone survey are accurate to +/- 4.2%, 19 out of 20 times (95% confidence interval) for the City of Hamilton residents. Data for subgroups of the total respondent universe would have a larger margin of error.

The online survey collected 277 surveys where a response was provided for at least one (1) survey question.

The findings presented in this report will primarily focus on the data collected through the phone survey which is a statistically representative sample of the City of Hamilton population. The results of the online survey are also provided as a supplementary source of information. It should be noted that the results from the two data sources should not be compared due to differences in survey methodologies. While the online survey expanded the opportunity for residents to participate in the survey, this survey methodology may be subject to self-selection bias and the collected surveys cannot be determined to be a statistically representative sample of the population.

For both the phone and online survey, respondents did not always provide a response to every question or may have responded "don't know". For some analyses these missing or "don't know" records have been removed. Hence, the universe of respondents (n) will vary for each question. The universe of respondents (n) is provided for all reported data and a full breakdown of responses including the missing and "don't know" response counts is provided in Appendix C.

Data shown may not add up to 100% due to rounding.

Hamilton Paramedic Service Citizen Survey 2018 - Report

Key Findings

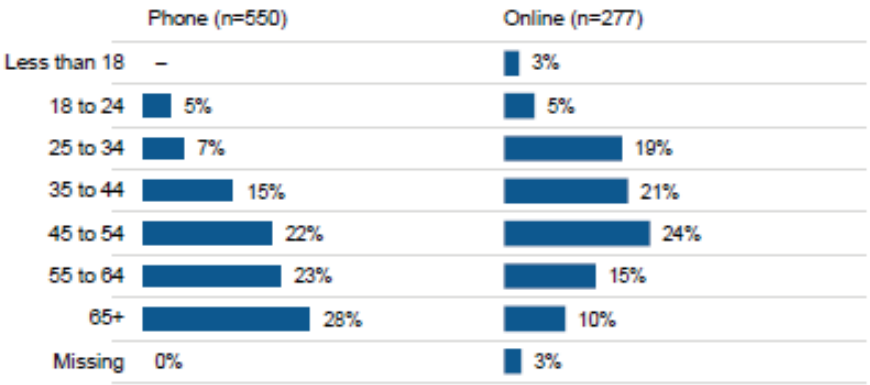
The Respondents

The following section provides some descriptors of the survey sample population such as age, gender and household income. These respondent characteristics provide some context of collected responses and may be helpful to keep in mind when reviewing survey results.

The following is the age, gender composition and household income for respondents from both the phone and online survey.

Over half (51%) of the phone survey respondents were over the age of 55.

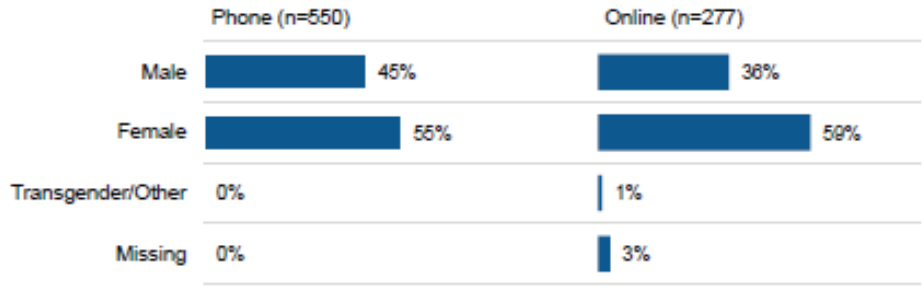
Age



Hamilton Paramedic Service Citizen Survey 2018 - Report

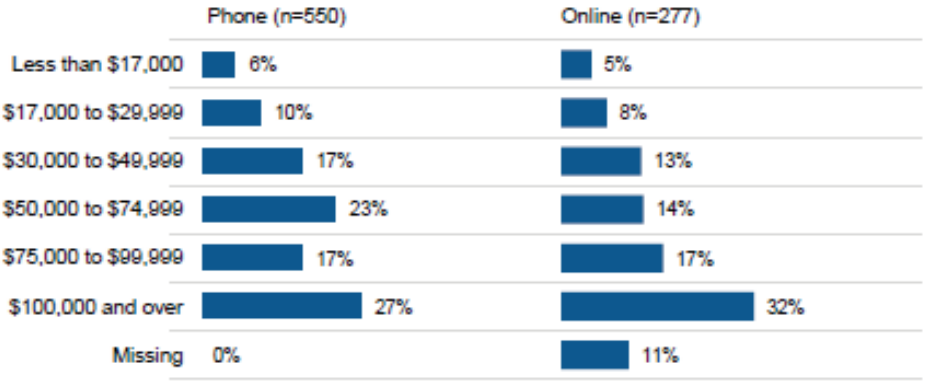
There were more female phone survey respondents than males.

Gender



Approximately 27% of phone survey respondents indicate their household income to be $100,000 or more.

Household Income



Hamilton

Hamilton Paramedic Service Citizen Survey 2018 - Report

What the Hamilton Paramedic Service does

As a lead in to the survey and to gain an understanding of what respondents think the Hamilton Paramedic Service does, the survey began with asking respondents to describe what they felt the Hamilton Paramedic Service does. A total of 746 responses to this question was collected from the phone and online survey. The following are the most common descriptions respondents from both the phone and online survey provided about what the Hamilton Paramedic Service does, listed in order by precedence.

Description/theme area of what Hamilton Paramedic Service does provided by respondents	Approximate number of mentions
Responds to "emergency" situations, emergency medical/illness, 911/emergency calls, accidents and life threatening situations	359
Provides transportation to the hospital or provides ambulance services	234
First responders, first to arrive on scene, are quick and responsive	95
Provides medical care	91
Provides pre-hospital care (at scene, en route to hospital, etc.), stabilizing a person's condition, providing an assessment of condition	85
Provides "help" or "care" to people in need	83
Saves lives, rescues	53
Stays with patients at hospitals until they are attended to by a doctor	21
Essential service	14
Provides First Aid	14

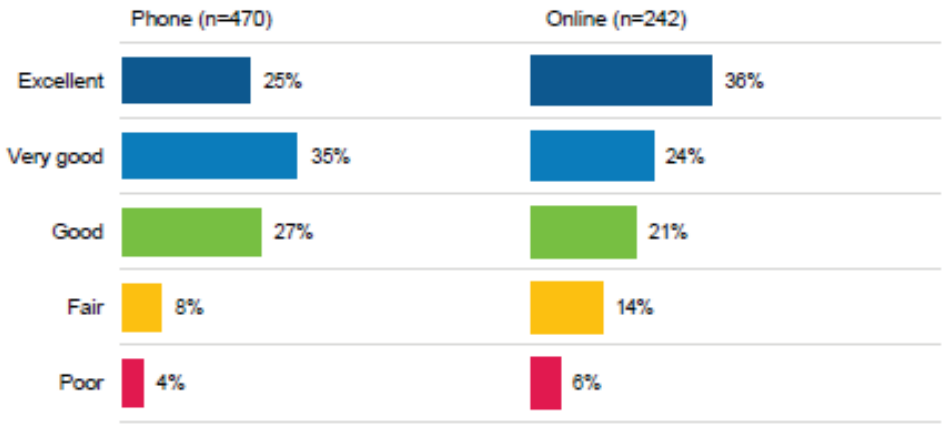
Hamilton Paramedic Service Citizen Survey 2018 - Report

Rating of the Hamilton Paramedic Service

Approximately 29% of phone survey respondents indicate having called 911 for an ambulance in the past two years for either themselves or a family member.

Based on either their experience or knowledge, the majority of respondents rated the services provided by the Hamilton Paramedic Service to be excellent, very good or good.

Based on your experience or knowledge of services provided by the Hamilton Paramedic Service, how would you rate the services provided by the Hamilton Paramedic Service?



Respondents that rated the Hamilton Paramedic Service as poor were asked to explain their rating. The most common reasons for a poor rating given by respondents from both the phone and online survey were:

1. Paramedics were rude or had a bad attitude
2. Response time was slow
3. Incorrect/improper diagnosis was provided
4. Paramedics provided bad service
5. Reference to the Yosif Al-Hasnawi incident

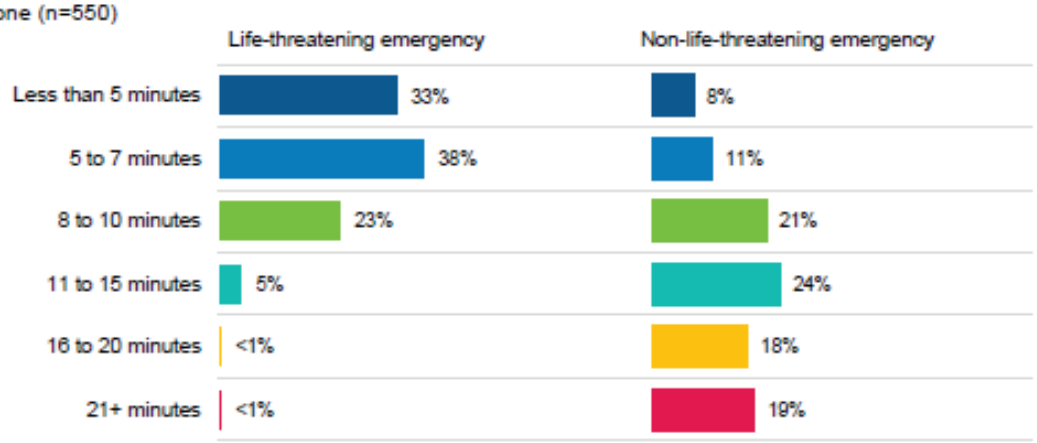
Hamilton Paramedic Service Citizen Survey 2018 - Report

Response Time and Service Expectations

Survey respondents' expectations of response time were very different for life-threatening emergencies and non-life threatening situations. The majority of phone survey respondents expect a response time of less than 10 minutes for life threatening emergencies. For non-life threatening emergencies, the majority of phone survey respondents expect a response time of 11 minutes or more.

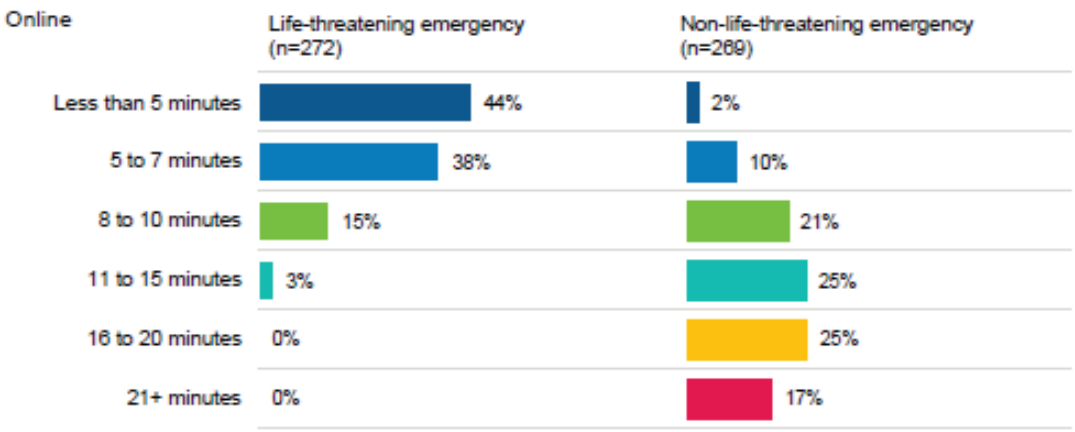
Considering driving time and traffic, how many minutes do you think is acceptable for paramedics to arrive for...

Phone (n=550)



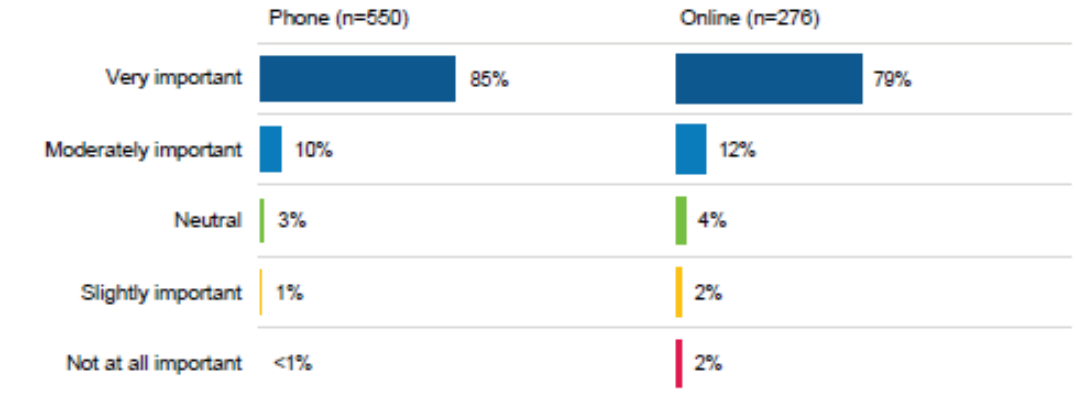
Hamilton Paramedic Service Citizen Survey 2018 - Report

Considering driving time and traffic, how many minutes do you think is acceptable for paramedics to arrive for...



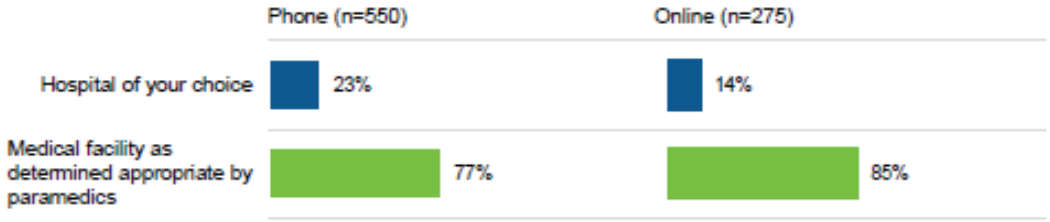
The majority (85%) of phone survey respondents felt it was very important for the paramedic dispatcher to provide care instructions over the phone prior to paramedics' arrival.

Consider the situation where you have called for an ambulance. How important is it to you for the paramedic dispatcher to provide care instructions to you over the phone prior to the paramedics' arrival?



The majority of phone survey respondents felt that they should be transported to a medical facility determined by paramedics to be most appropriate for their condition rather than to a hospital of their choice.

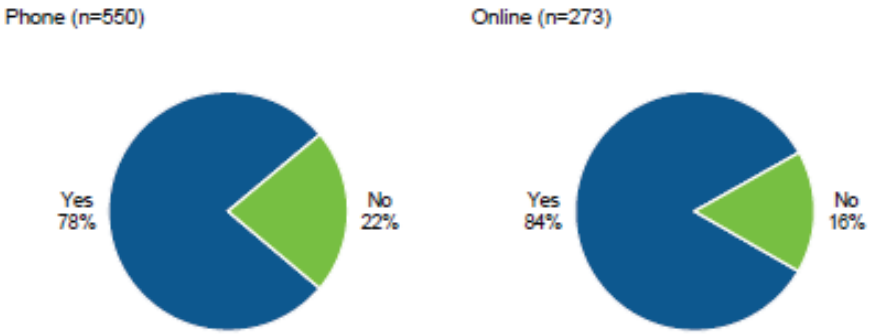
The paramedics arrive and assess your condition. They determine you have a minor non-life threatening medical issue (such as a broken bone) that requires further medical care. Which one of the following two options best reflects where you feel you should be transported to?



Awareness of and Opinion of "Off-Load Delay

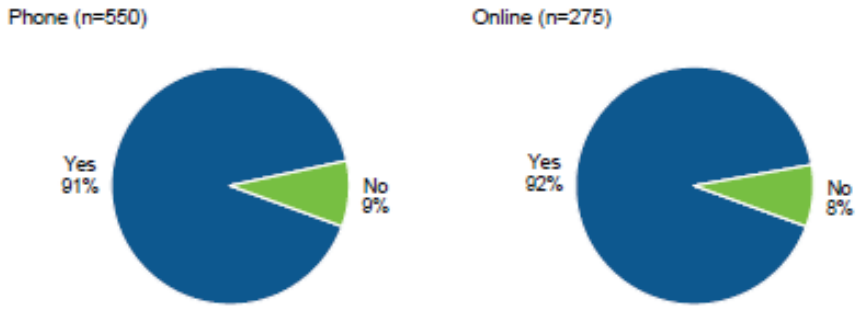
Approximately 78% of phone survey respondents are aware of the "Off-Load Delay" situation at hospitals.

You are taken by the ambulance to a hospital where you must wait to be seen by hospital staff. Are you aware of the current situation at hospitals known as "Off-Load Delay", where paramedics must wait with their patient until hospital staff assumes care?



The majority (91%) of phone survey respondents felt it would be acceptable for a paramedic to leave to respond to another 911 emergency call after settling a person with a non-life threatening medical issue in the emergency waiting room.

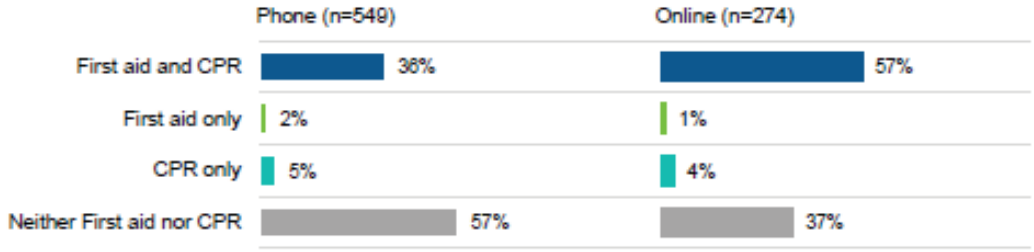
Considering you have a non-life threatening medical issue, do you feel it would be acceptable for the paramedic to settle you in the emergency waiting room and then leave to respond to another 911 emergency call?



Completion of First Aid Course and CPR course

Approximately 36% of phone survey respondents have completed both a first aid course and a CPR course in the past 2 years and 57% have completed neither.

Have you or anyone in your household taken a first aid course in the past 2 years?
Have you or anyone in your household taken a CPR (Cardio-pulmonary resuscitation) course in the past 2 years?



Hamilton

Hamilton Paramedic Service Citizen Survey 2018 - Report

Respondents who Have Called 911 in the Past 2 Years

There was 29% (158) of respondents from the phone survey that indicated having called 911 in the past 2 years either for themselves or for a family member.

Have you called 911 for an ambulance in the past 2 years, either for yourself or for a family member?

Phone (n=550)

In this section, responses from phone survey respondents that have called 911 for an ambulance in the past 2 years is compared to responses from respondents who have not called 911 for an ambulance in the past 2 years.

Differences between the responses from the two groups are indicated as follows:

- Red font – significantly lower
- Black font – no significant difference
- Green font – significantly higher

Hamilton

Hamilton Paramedic Service Citizen Survey 2018 - Report

Based on your experience or knowledge of services provided by the Hamilton Paramedic Service, how would you rate the services provided by the Hamilton Paramedic Service?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Excellent	37%	19%
Very good	37%	34%
Good	17%	33%
Fair	5%	10%
Poor	4%	5%

Considering driving time and traffic, how many minutes do you think is acceptable for paramedics to arrive for a life-threatening emergency such as loss of consciousness or seizures?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Less than 5 minutes	34%	33%
5 to 7 minutes	40%	38%
8 to 10 minutes	23%	22%
11 to 15 minutes	1%	6%
16 to 20 minutes	1%	1%
21+ minutes	0%	1%

Considering driving time and traffic, how many minutes do you think is acceptable for paramedics to arrive for a non-life-threatening emergency such as a broken bone

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Less than 5 minutes	7%	8%
5 to 7 minutes	10%	12%
8 to 10 minutes	25%	20%
11 to 15 minutes	27%	22%
16 to 20 minutes	18%	17%
21+ minutes	13%	21%

Consider the situation where you have called for an ambulance. How important is it to you for the paramedic dispatcher to provide care instructions to you over the phone prior to the paramedics' arrival?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Very important	79%	88%
Moderately important	15%	7%
Neutral	3%	3%
Slightly important	2%	1%
Not at all important	1%	1%

The paramedics arrive and assess your condition. They determine you have a minor non-life threatening medical issue (such as a broken bone) that requires further medical care. Which one of the following two options best reflects where you feel you should be transported to?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Hospital of your choice	18%	25%
Medical facility determined by the paramedics to be most appropriate to deal with your condition, which may be either a hospital, urgent care centre or walk in clinic etc.	82%	76%

You are taken by the ambulance to a hospital where you must wait to be seen by hospital staff. Are you aware of the current situation at hospitals known as "Off-Load Delay", where paramedics must wait with their patient until hospital staff assumes care?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Yes	86%	75%
No	14%	26%

Considering you have a non-life threatening medical issue, do you feel it would be acceptable for the paramedic to settle you in the emergency waiting room and then leave to respond to another 911 emergency call?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Yes	90%	92%
No	10%	8%

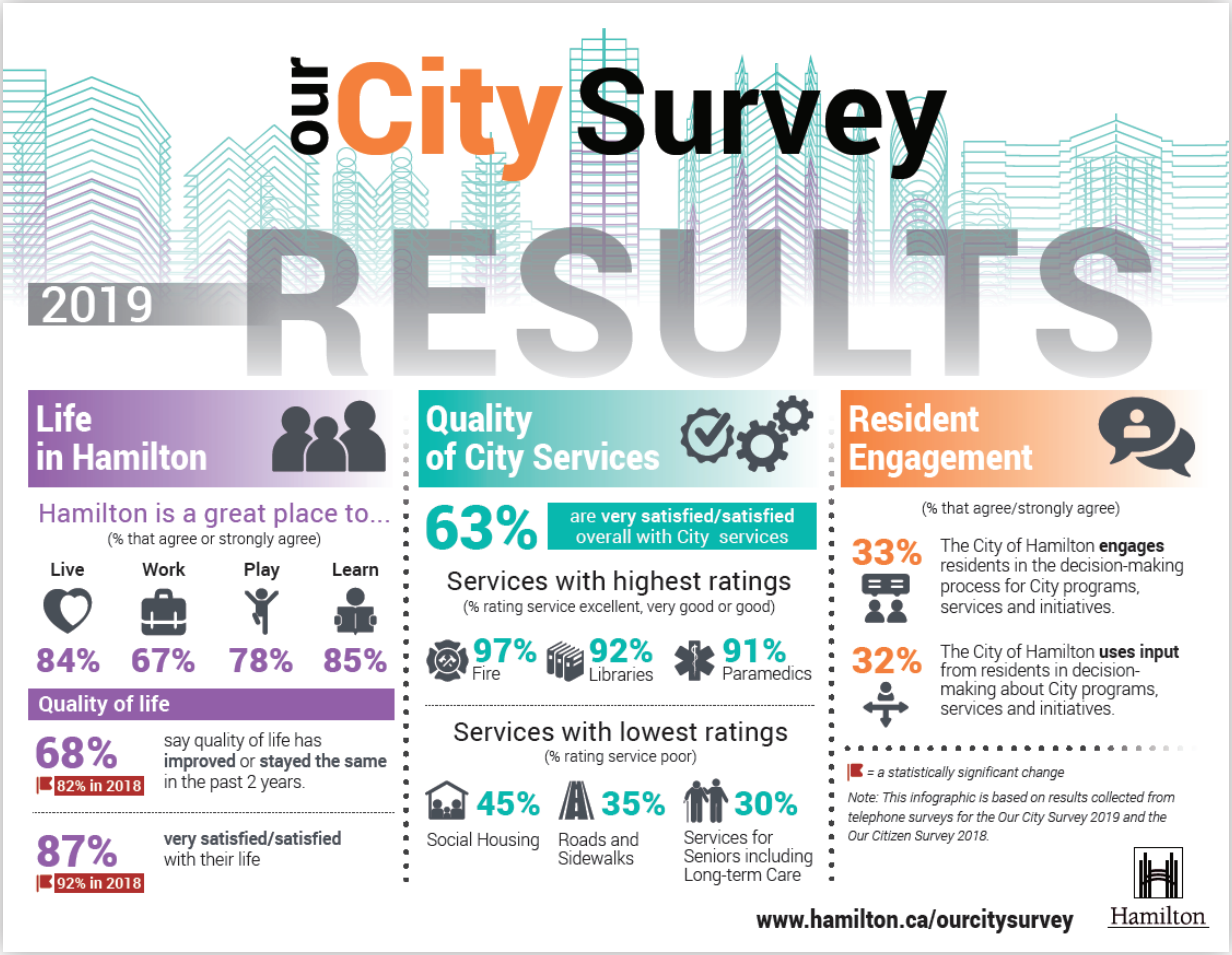
Have you or anyone in your household taken a first aid course in the past 2 years?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Yes	47%	35%
No	53%	65%

Have you or anyone in your household taken a CPR (Cardio-pulmonary resuscitation) course in the past 2 years?

	Has called 911 in the past 2 years	Has not called 911 in the past 2 years
Yes	48%	38%
No	52%	62%

Appendix A-2: City of Hamilton Our City Survey 2019



Appendix A-3: City of Hamilton Our People Survey 2017 – Hamilton Paramedic Service Results

City of Hamilton - Our People Survey 2017
Summary Results For: Hamilton Paramedic Services

Response Rate Summary

	Response Count	Employee Count	Response Rate
City of Hamilton	4877	7549	64.6%
*Community and Emergency Services (Your Parent Group)	1768	3292	53.7%
Hamilton Paramedic Services (Your Team)	141	343	41.1%

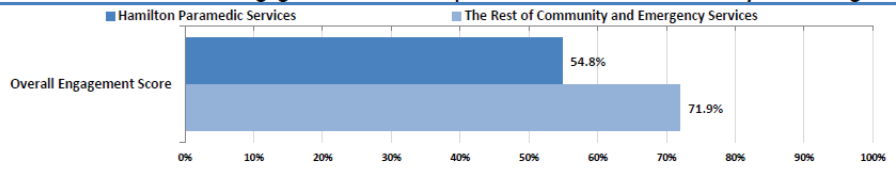
Your Team's 2017 Results

Comparison Type	Possible Strengths (Top 5)	Possible Opportunities for Improvement (Bottom 5)
2017 Drivers of Engagement (out of 48 measured)	Job: Clarity (87.8%) Work Area: Support for Diversity (82.7%) Div: Support for Diversity (80.6%) Org: Pride in Team / Division / Department (77.5%) Job: My Work Contributes to City's Vision and Mission (73.2%)	Job: Satisfied with Resources and Supplies (37.2%) Work Area: Continuous Improvement Practices (37.0%) Org: Opportunities for Career Advancement (33.6%) Work Area: Team Morale (31.7%) Work Area: Adequate Staffing and Attendance (23.6%)
2017 Driver Results Compared to the Rest of Community and Emergency Services	Work Area: Support for Diversity (0.1%) Job: Clarity (-0.1%) Div: Support for Diversity (-0.2%) Work Area: Importance of Mental Health (-0.4%) Work Area: Respectful Work Environment (-4.9%)	Work Area: Continuous Improvement Practices (-30.3%) Job: Satisfied with Resources and Supplies (-31.6%) Org: Opportunities for Career Advancement (-32.4%) Work Area: Team Morale (-37.5%) Work Area: Adequate Staffing and Attendance (-39.9%)

Note: For more detailed results refer to the Overall Analyses Section of your full data report.

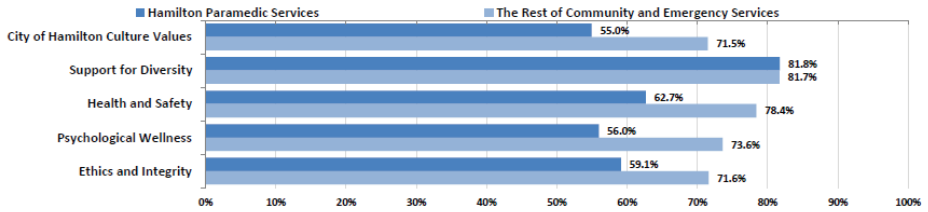
This summary of results is intended to aid in the action planning process and for quick / easy communication of results. We strongly encourage you to review the detailed report for other possible areas of interest to help your team focus efforts toward positive change.

Your Team's 2017 Overall Engagement Score Compared to the Rest of Community and Emergency Services

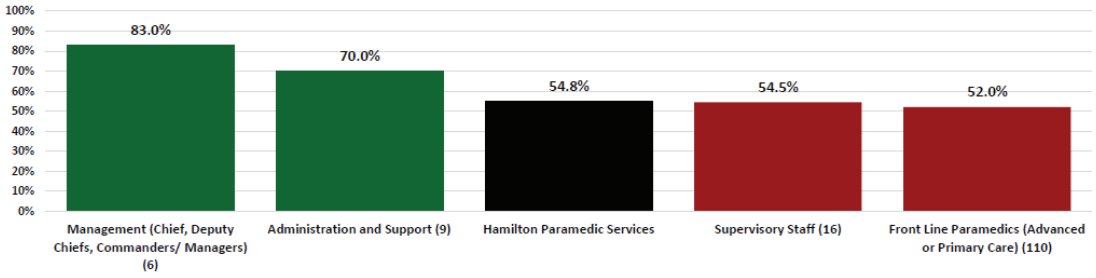


METRICS@WORK

Your Team's 2017 Survey Index Scores Compared to the Rest of Community and Emergency Services



2017 Overall Engagement Score Comparisons Among Groups That Report to You:



Note: Groups that are too small (less than 5 respondents) are not included in this graph and the following naming convention is used: "Group Name (response count)".
Note: For more detailed group level results refer to the Group Analyses Section of your full data report.

Interpreting Average Percetages (%)

Percentages are based on the arithmetic mean of responses across a 7-point scale for each Driver of Engagement, as depicted in the image to the right. The %'s represent the average level of agreement or engagement with each Driver (they are NOT the percentage of people who are engaged).

The image to the right provides a guide for interpreting what range of response can be considered higher or lower.

METRICS@WORK

City of Hamilton Paramedic Services: A User Profile

A collaborative project between Hamilton Paramedic and Public Health Services

June 2019

Background

In 2018, there were 61,856 logged paramedic services calls that resulted in a patient interaction in the City of Hamilton. Having a better understanding of the characteristics of these users would facilitate service provision and potentially identify areas where linkage with existing or developed community supports would improve assistance to patients. The goal of this project was to create a profile of current paramedic services users focusing primarily the following:

- service use across the lifespan
- understanding the characteristics of people who access the service many times

This information should be considered alongside community and political preferences, research evidence, and resources or assets when making decisions.

Analysis:
An extract from the Interdev database created for paramedic call dates between January 1, 2018 and December 31, 2018 was cleaned to exclude logged calls where no patient was found, patients were transported by another ambulance, calls were cancelled by dispatch, out of service, stand by service, and any logged calls with a blank return priority code.

Descriptive statistics were generated to describe the identified final primary problems, patient age, call volume per patient, pick up location, time of day, return priority, and the destination facility. The final primary problem was categorized into groups based on the type of problem reported. Unique patients were identified using name and date of birth and where available OHIP number.

Primary Problem

Overall the primary causes of logged paramedic calls include:

-**minor trauma** (e.g. hemorrhage, musculoskeletal, traumatic soft tissue problems, injuries)

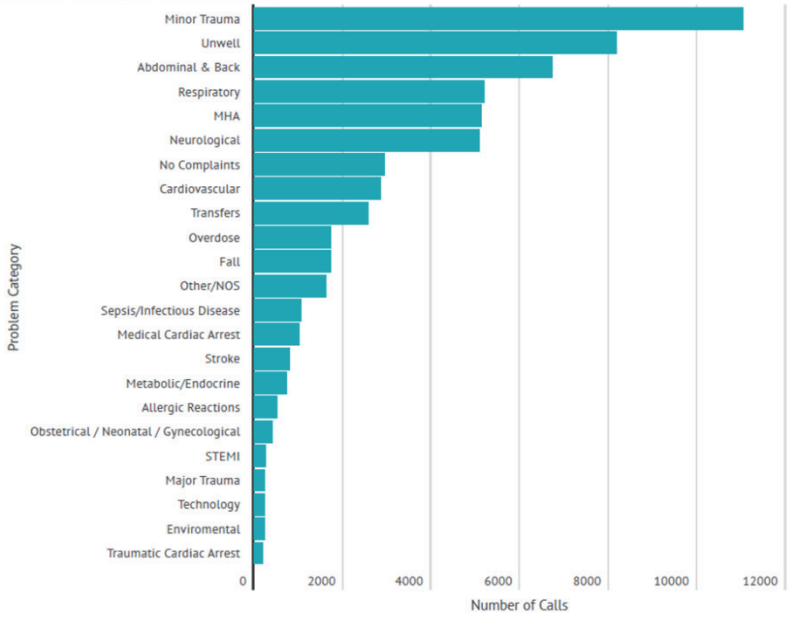
- **being unwell** (e.g. symptoms of weakness, dizziness)

- **abdominal & back problems** (e.g. abdominal/ pelvic/ rectal pain, back pain, nausea/ vomiting/ diarrhea, renal colic)

- **respiratory symptoms** (e.g. trouble breathing, suspected respiratory infection, non-ischemic chest pain, exacerbated respiratory disease, respiratory obstructions), and

- **mental health and addictions** (e.g. alcohol intoxication, behavioural/ psychiatric, withdrawal, failure to cope).

Final Primary Problem for All Logged Paramedic Calls With a Patient Interaction, City of Hamilton Paramedic Services 2018



Note: final primary problem is missing for 2.3% (1401) of all logged calls with a patient interaction

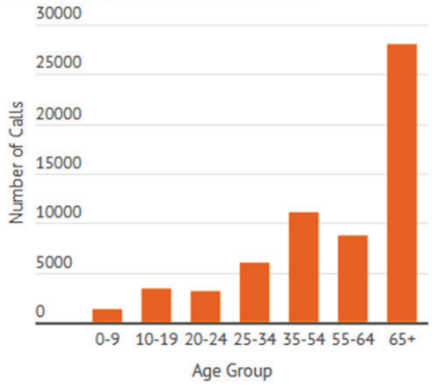
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

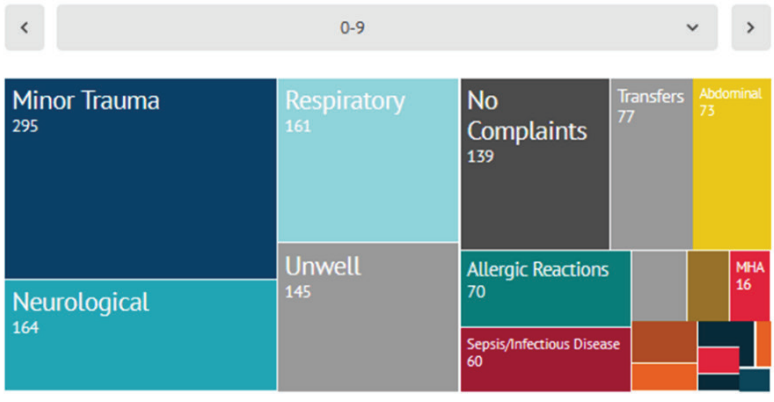
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

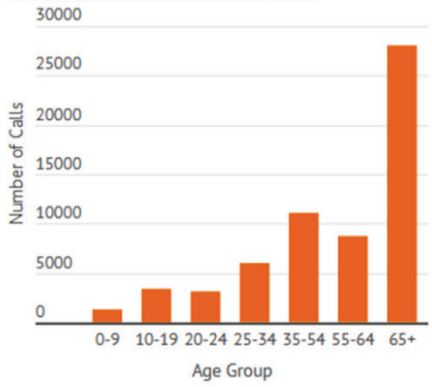
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

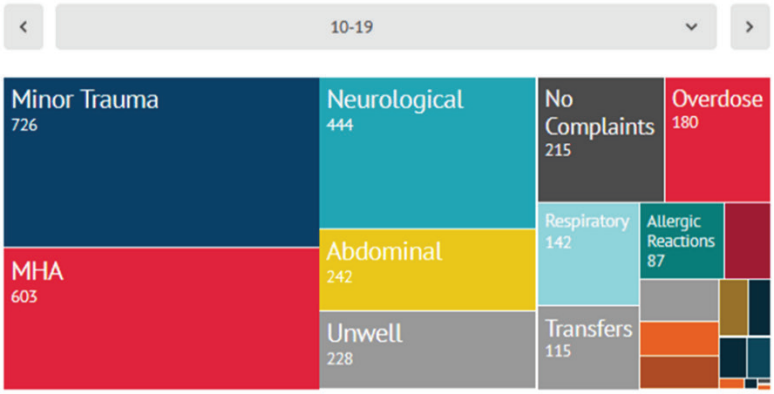
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

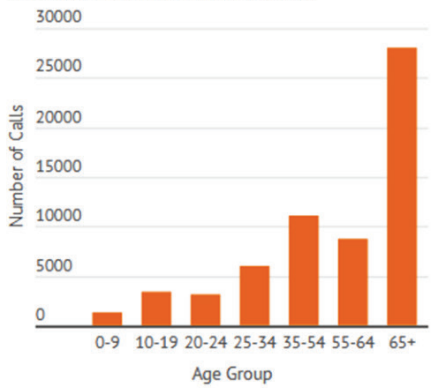
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

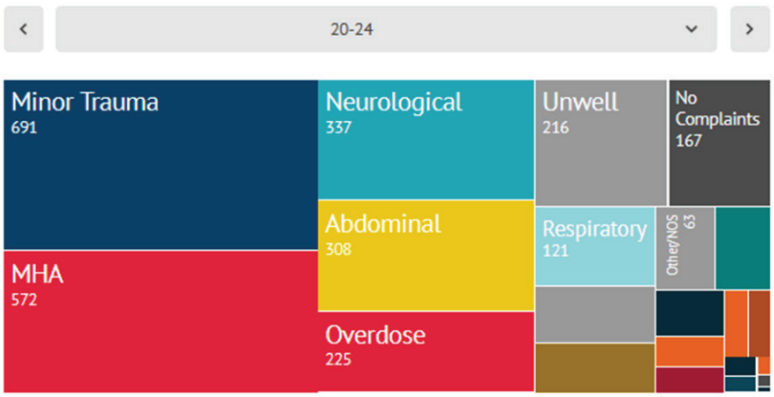
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

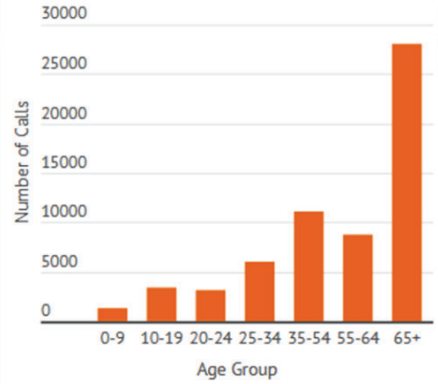
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

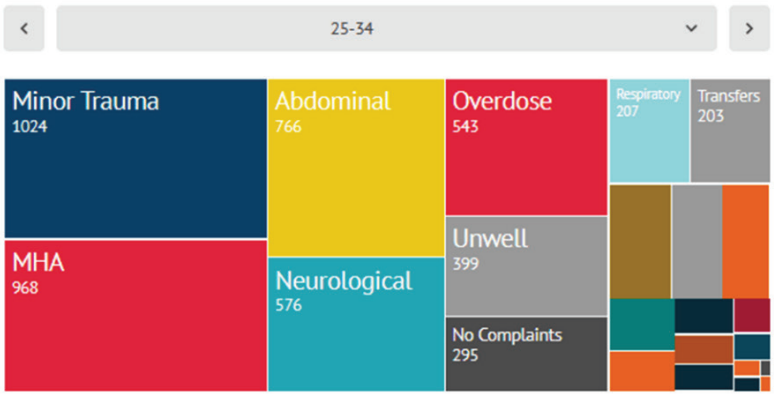
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

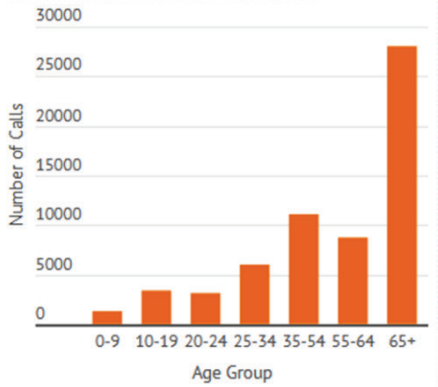
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

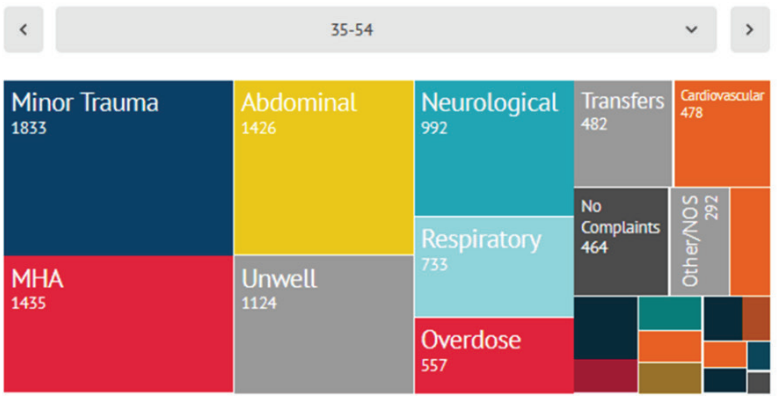
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

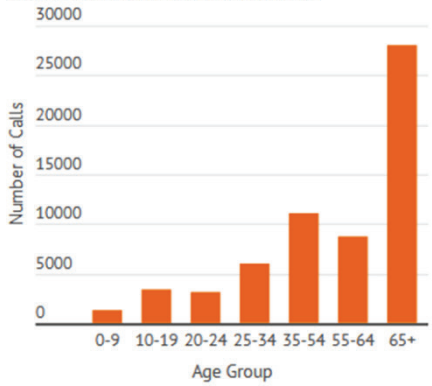
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

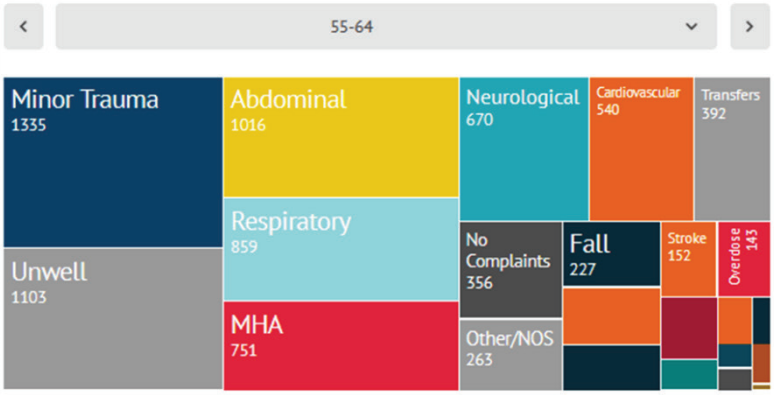
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

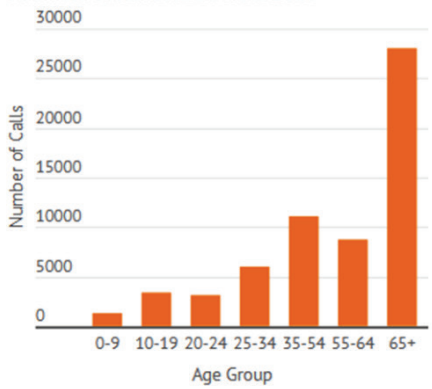
Made with infogram

Age Group

Call volumes generally increase with age. **Seniors age 65 years and older** make up 45% (28,007) of the total call volume followed by **adults age 35-54** (18%, n=11,140).

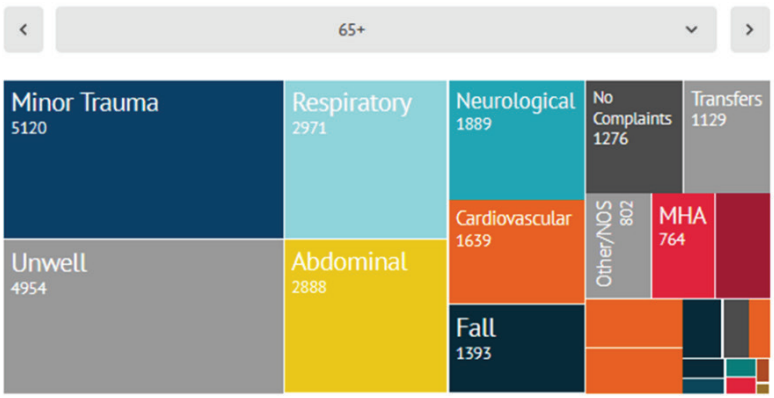
Across all age groups, **minor trauma** is the most frequent problem. Among the youngest age groups, **neurological problems** such as seizures, loss/ diminished consciousness and **having no complaints but requiring medical observation/ assessment** feature prominently. **Mental health & additions** and **overdoses** are common problems among adults, as well as, **abdominal & back related problems. Being unwell** and **respiratory problems** are common among the youngest and the oldest callers.

Total Call Volume by Age Group, City of Hamilton Paramedic Services 2018



Note: age is missing for 0.4% (235) of all logged calls with a patient interaction

Total Call Volume by Age Group and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

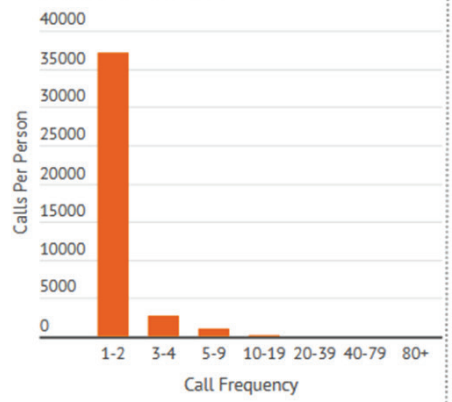
Call Frequency

The 61,856 paramedic calls in 2018 were made by **41,029 unique patients**. Ninety percent of callers called only 1 or 2 times during the 2018 calendar year. Nine percent of callers call 3 to 9 times.

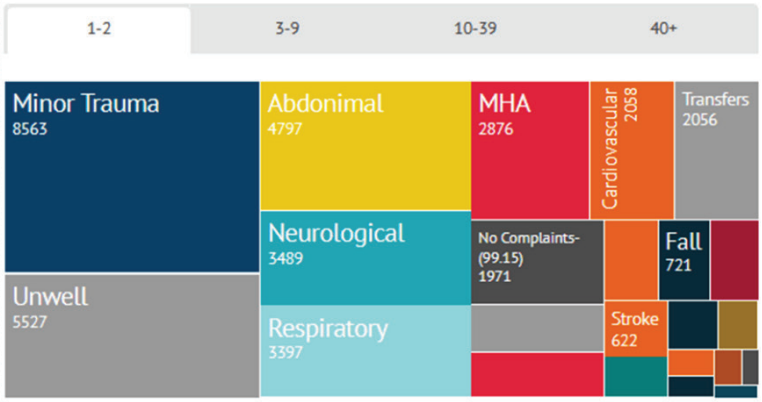
Common problems among low frequency callers include minor trauma, being unwell, abdominal & back related problems, neurological problems, and respiratory problems.

The most prominent problem among **higher frequency callers** are **mental health and addiction related issues.**

Annual Call Frequency, City of Hamilton Paramedic Services 2018



Total Call Volume by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

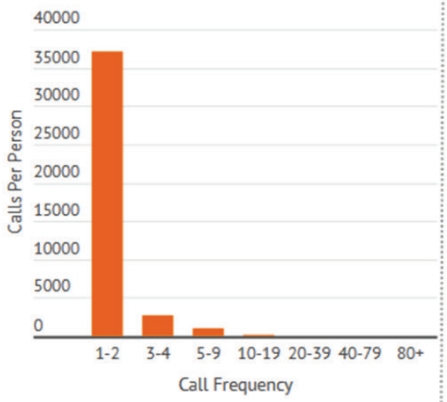
Call Frequency

The 61,856 paramedic calls in 2018 were made by **41,029 unique patients**. Ninety percent of callers called only 1 or 2 times during the 2018 calendar year. Nine percent of callers call 3 to 9 times.

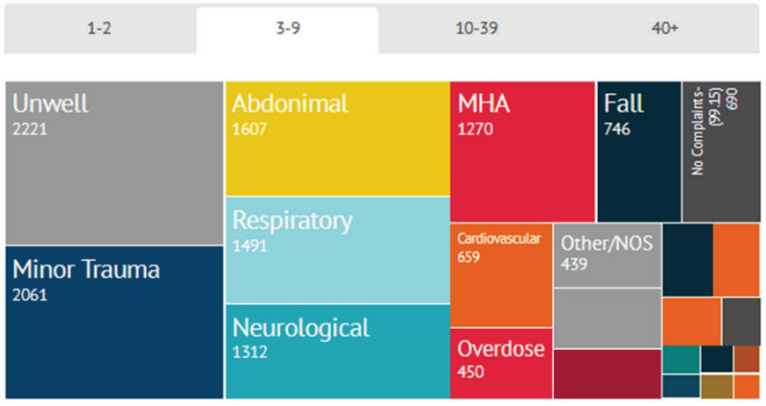
Common problems among low frequency callers include minor trauma, being unwell, abdominal & back related problems, neurological problems, and respiratory problems.

The most prominent problem among **higher frequency callers** are **mental health and addiction related issues.**

Annual Call Frequency, City of Hamilton Paramedic Services 2018



Total Call Volume by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

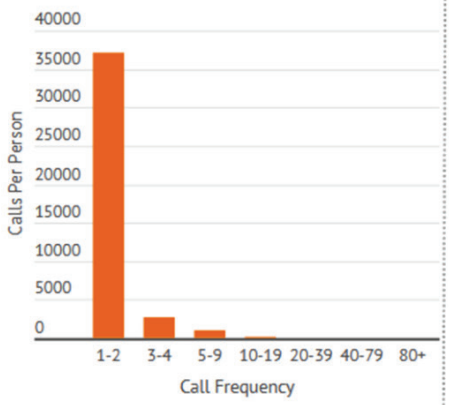
Call Frequency

The 61,856 paramedic calls in 2018 were made by **41,029 unique patients**. Ninety percent of callers called only 1 or 2 times during the 2018 calendar year. Nine percent of callers call 3 to 9 times.

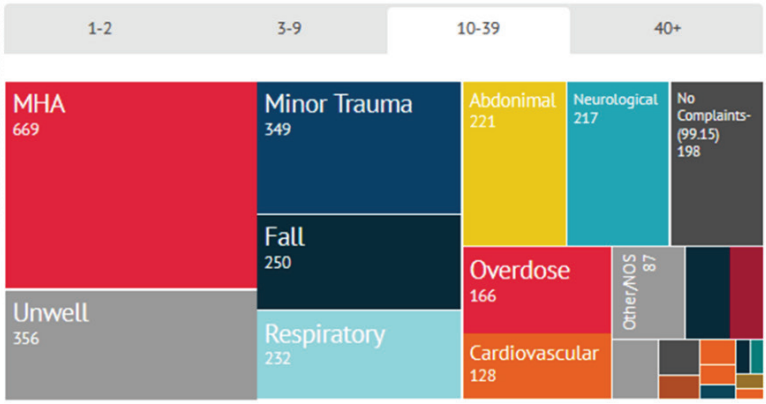
Common problems among low frequency callers include minor trauma, being unwell, abdominal & back related problems, neurological problems, and respiratory problems.

The most prominent problem among **higher frequency callers** are **mental health and addiction related issues**.

Annual Call Frequency, City of Hamilton Paramedic Services 2018



Total Call Volume by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

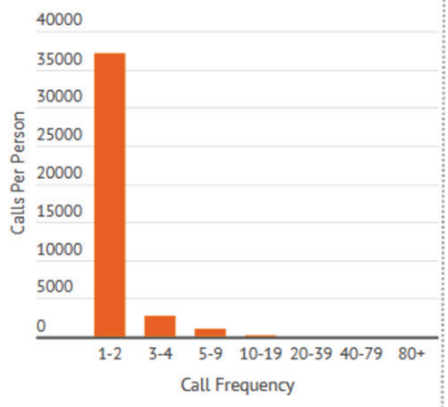
Call Frequency

The 61,856 paramedic calls in 2018 were made by **41,029 unique patients**. Ninety percent of callers called only 1 or 2 times during the 2018 calendar year. Nine percent of callers call 3 to 9 times.

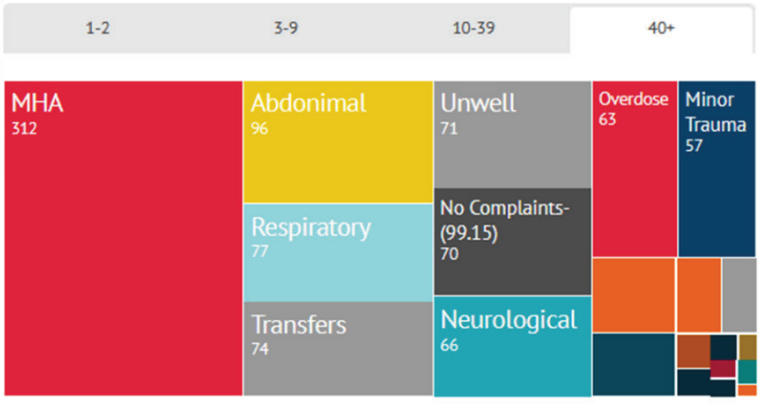
Common problems among low frequency callers include minor trauma, being unwell, abdominal & back related problems, neurological problems, and respiratory problems.

The most prominent problem among **higher frequency callers** are **mental health and addiction related issues**.

Annual Call Frequency, City of Hamilton Paramedic Services 2018



Total Call Volume by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

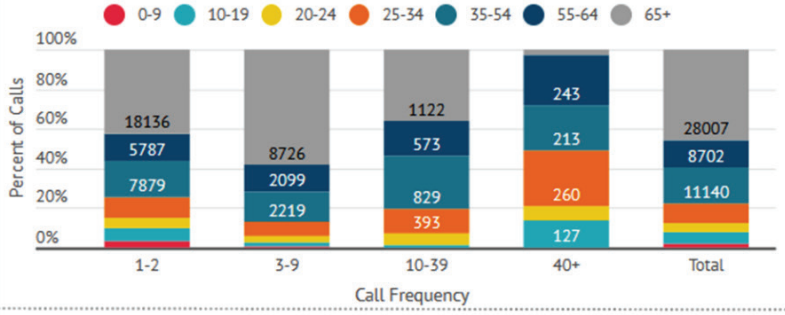
Call Frequency by Age Group & Time

Seniors are under-represented among high frequency callers.
Seniors age 65 years and older represent 3% of the callers with 40 or more calls in the year (compared to 45% of calls overall).

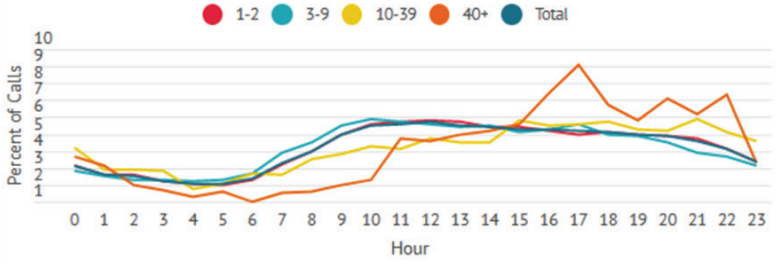
A higher proportion of high frequency callers are youth & young adults.
Youth age 10-19 represent 14% of the callers with 40 or more calls in the year (compared to 5% of calls overall). Adults age 25-34 represent 10% of all the paramedic service callers in 2018 but they represent 28% of the callers with 40 or more calls in the year.

Higher frequency callers call later in the day.
Calls between 4pm and 11pm represent 43% of the callers with 10-39 calls in the year and 53% of the callers with 40 or more calls per year (compared to 38% of calls overall).

Patient Age Group by Call Frequency for All Logged Paramedic Calls With a Patient Interaction, City of Hamilton Paramedic Services 2018



Call Time of Day by Call Frequency for All Logged Paramedic Calls With a Patient Interaction, City of Hamilton Paramedic Services 2018

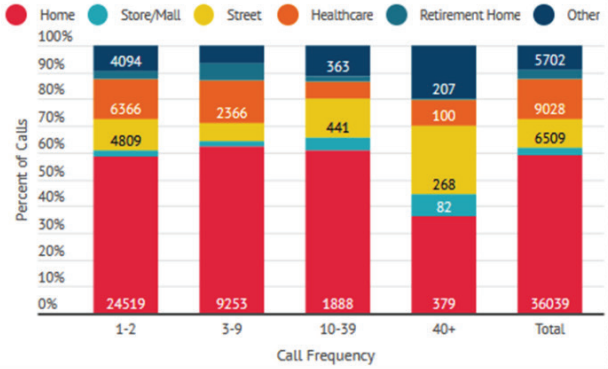


Share

Made with infogram

Call Frequency by Location

Patient Pick Up Location by Call Frequency for All Logged Paramedic Calls With a Patient Interaction, City of Hamilton Paramedic Services 2018

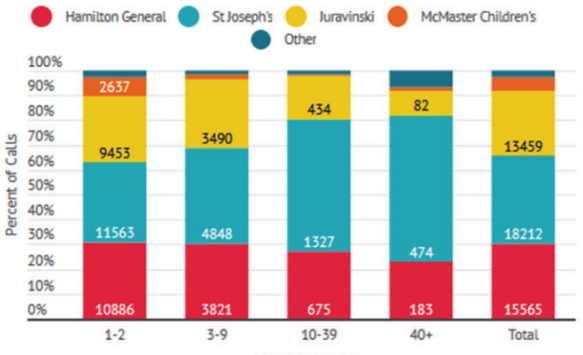


A higher proportion of high frequency calls are picked up on the street.
Patient pick up on the street represent 11% of all paramedic service callers in 2018. However, as call frequency increases past 10 calls, street pick up increases representing 14% of the callers with 10-39 calls in the year and 26% of the callers with 40 or more calls in the year.

Note: pick up location is missing for 1.5% (955) of all logged calls with a patient interaction

A higher proportion of higher frequency callers are transported to St. Joseph's hospital.
A patient destination of St. Joseph's hospital represents 35% of all paramedic patient trips in 2018. A higher proportion of high frequency callers are transport to St. Joseph's with 53% of the callers with 10-39 calls and 59% of the callers with 40 or more calls in the year being transported to that facility.

Patient Drop Off Location by Call Frequency for All Logged Paramedic Calls With a Patient Interaction and Patient Transport, City of Hamilton Paramedic Services 2018



Note: destination location is missing for 0.7% (382) of all logged calls with a patient interaction and transportation (i.e. includes return priority 0-4 only, n=51815)

Share

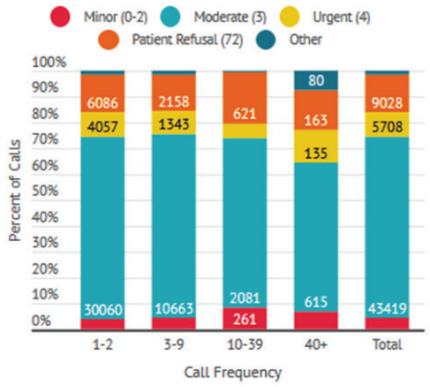
Made with infogram

Call Frequency By Return Priority

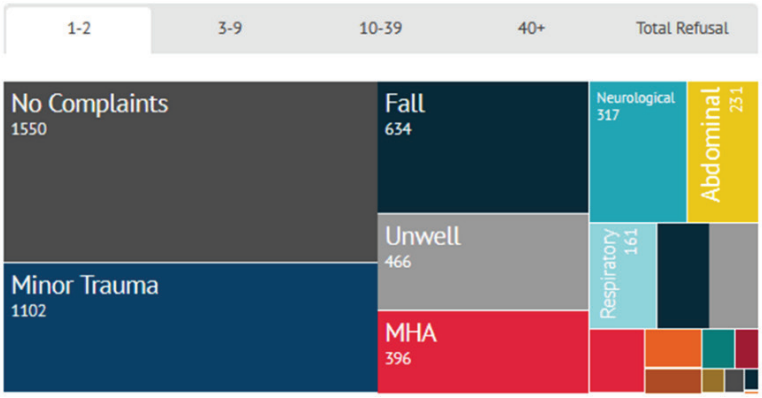
Overall, the majority of calls to paramedic services are categorized with a return priority of moderate (70%) and 9% of calls have a very urgent return priority. **Fifteen percent of callers refuse paramedic transport**. There is a higher proportion of calls identified as minor issues and patient refusals among those with a call frequency range of 10-39.

Common problems among patients who refuse paramedic transport include people with **no complaints** (i.e. dispatched to incident but no obvious injuries identified) and **falls including lift assists**. Among higher frequency callers, **mental health and addiction (e.g. behavioural/psychiatric calls)** related issues also feature predominantly for callers refusing paramedic transport.

Return Priority by Call Frequency, City of Hamilton Paramedic Services 2018



Patient Refusal by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

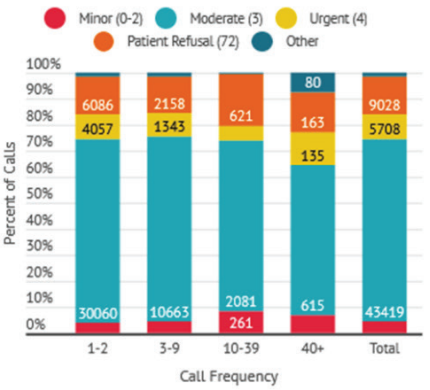
Made with infogram

Call Frequency By Return Priority

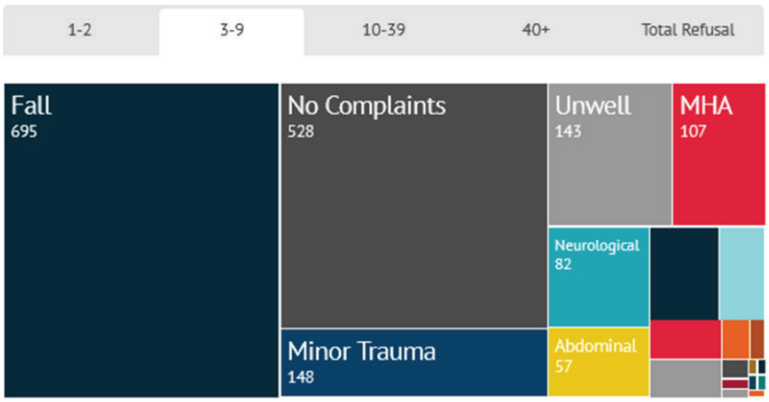
Overall, the majority of calls to paramedic services are categorized with a return priority of moderate (70%) and 9% of calls have a very urgent return priority. **Fifteen percent of callers refuse paramedic transport**. There is a higher proportion of calls identified as minor issues and patient refusals among those with a call frequency range of 10-39.

Common problems among patients who refuse paramedic transport include people with **no complaints** (i.e. dispatched to incident but no obvious injuries identified) and **falls including lift assists**. Among higher frequency callers, **mental health and addiction (e.g. behavioural/psychiatric calls)** related issues also feature predominantly for callers refusing paramedic transport.

Return Priority by Call Frequency, City of Hamilton Paramedic Services 2018



Patient Refusal by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

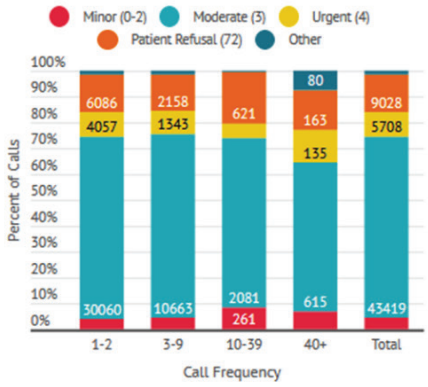
Made with infogram

Call Frequency By Return Priority

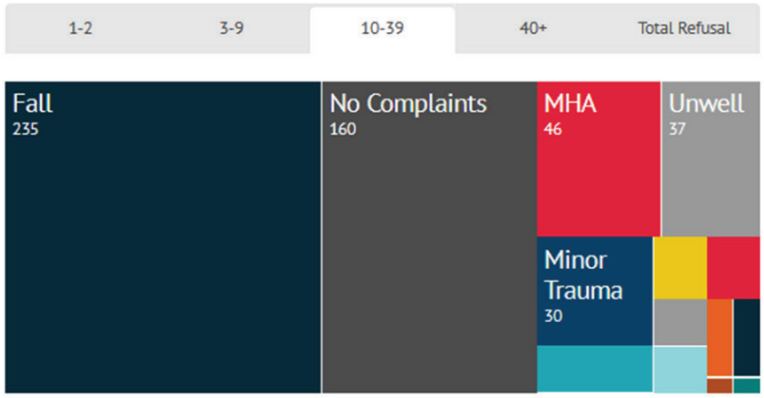
Overall, the majority of calls to paramedic services are categorized with a return priority of moderate (70%) and 9% of calls have a very urgent return priority. **Fifteen percent of callers refuse paramedic transport**. There is a higher proportion of calls identified as minor issues and patient refusals among those with a call frequency range of 10-39.

Common problems among patients who refuse paramedic transport include people with **no complaints** (i.e. dispatched to incident but no obvious injuries identified) and **falls including lift assists**. Among higher frequency callers, **mental health and addiction (e.g. behavioural/psychiatric calls)** related issues also feature predominantly for callers refusing paramedic transport.

Return Priority by Call Frequency, City of Hamilton Paramedic Services 2018



Patient Refusal by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

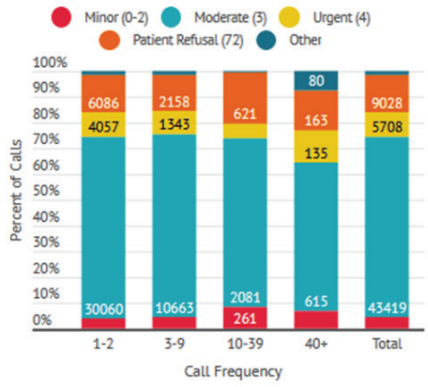
Made with infogram

Call Frequency By Return Priority

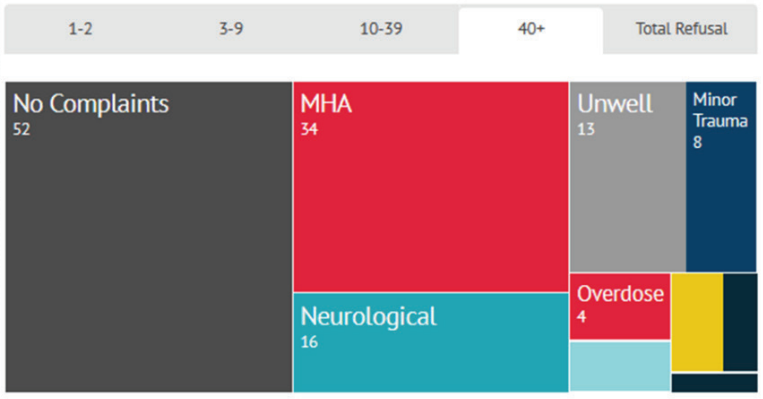
Overall, the majority of calls to paramedic services are categorized with a return priority of moderate (70%) and 9% of calls have a very urgent return priority. **Fifteen percent of callers refuse paramedic transport**. There is a higher proportion of calls identified as minor issues and patient refusals among those with a call frequency range of 10-39.

Common problems among patients who refuse paramedic transport include people with **no complaints** (i.e. dispatched to incident but no obvious injuries identified) and **falls including lift assists**. Among higher frequency callers, **mental health and addiction (e.g. behavioural/psychiatric calls)** related issues also feature predominantly for callers refusing paramedic transport.

Return Priority by Call Frequency, City of Hamilton Paramedic Services 2018



Patient Refusal by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

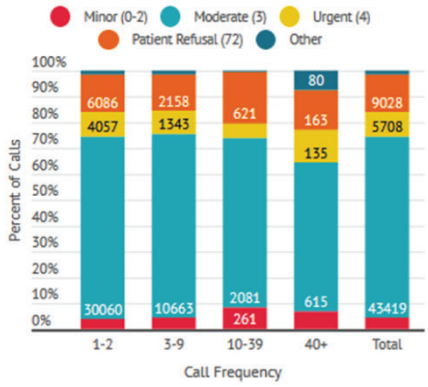
Made with infogram

Call Frequency By Return Priority

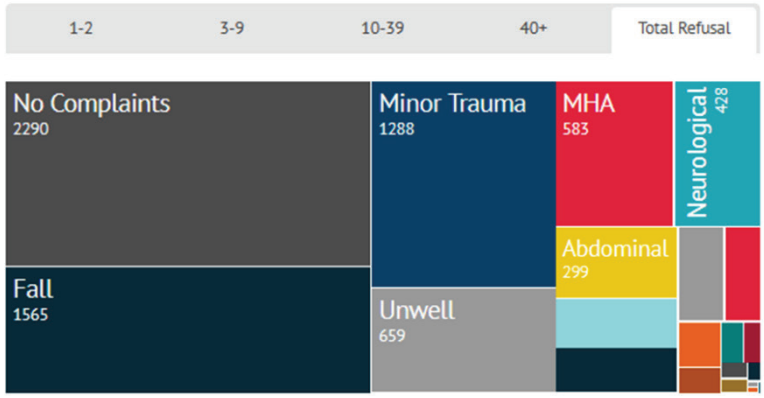
Overall, the majority of calls to paramedic services are categorized with a return priority of moderate (70%) and 9% of calls have a very urgent return priority. **Fifteen percent of callers refuse paramedic transport**. There is a higher proportion of calls identified as minor issues and patient refusals among those with a call frequency range of 10-39.

Common problems among patients who refuse paramedic transport include people with **no complaints** (i.e. dispatched to incident but no obvious injuries identified) and **falls including lift assists**. Among higher frequency callers, **mental health and addiction (e.g. behavioural/psychiatric calls)** related issues also feature predominantly for callers refusing paramedic transport.

Return Priority by Call Frequency, City of Hamilton Paramedic Services 2018



Patient Refusal by Call Frequency and Final Primary Problem Category, City of Hamilton Paramedic Services 2018



Share

Made with infogram

Key Messages

In 2018, there were 61,856 paramedic calls made by 41,029 unique patients

Seniors make up a large portion of the callers

Common problems include minor trauma, generally feeling unwell, abdominal or back problems, respiratory problems, and issues related to mental health & addictions

15% of callers refuse paramedic transport

- Fall/ Lift Assist
- No Complaints

High frequency callers make up a small proportion of callers but their needs are different

The most common problems among high frequency callers are mental health & addiction issues

Youth and young adults are over-represented among high frequency callers

More high frequency callers are picked up on the street, transported later in the day, and taken to St. Joe's hospital

Many high frequency callers who refuse paramedic transport are related to mental health & addiction issues

Share

Made with infogram

Appendix C-1: Sample Time on Task (ToT) Measurements – All Mondays in 2019

TIME ON TASK (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

MONDAY	HOUR OF DAY																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
week 1																								
week 2	0.88	0.88	1.19	1.00	0.73	0.52	0.75	1.05	1.36	1.46	1.24	1.88	1.55	2.01	1.28	0.91	1.97	1.34	1.02	1.42	1.04	1.21	1.18	1.37
week 3	1.13	0.62	0.83	0.83	0.91	1.07	0.68	0.92	0.91	1.52	0.98	1.51	0.98	1.08	1.19	1.30	1.27	1.19	0.91	0.78	1.67	1.11	0.78	0.94
week 4	0.97	1.08	1.40	0.96	0.61	0.86	0.64	1.39	1.01	1.27	1.22	1.59	2.37	2.55	1.34	2.02	1.36	1.04	1.38	1.05	1.25	1.12	0.91	1.32
week 5	0.72	1.19	1.39	1.32	1.10	2.05	1.30	0.99	1.43	2.08	1.47	1.31	2.21	2.28	2.58	1.42	2.27	1.27	1.40	0.89	2.74	1.97	1.45	1.08
week 6	1.57	1.97	0.95	1.18	2.21	0.77	1.08	1.70	1.27	1.33	1.74	2.64	1.57	1.47	0.69	1.77	2.76	1.11	1.56	2.19	1.50	0.83	2.49	0.89
week 7	1.12	1.24	1.34	0.99	0.89	0.89	1.03	1.15	1.28	0.99	0.99	1.61	1.91	1.25	1.38	1.45	1.64	1.68	1.66	2.13	1.32	1.47	1.53	1.10
week 8	1.11	0.68	1.11	1.42	1.07	1.24	0.70	1.23	1.85	1.42	1.76	1.27	1.36	1.99	1.99	1.00	1.26	1.21	1.18	2.31	1.72	1.63	2.46	0.85
week 9	0.94	1.16	4.22	1.05	1.04	0.98	0.68	0.62	0.78	1.60	1.50	1.72	2.12	2.78	1.33	3.08	1.85	1.55	1.43	1.42	1.59	2.20	1.52	1.19
week 10	1.49	0.90	0.86	1.54	0.86	0.82	1.08	0.86	1.61	0.83	1.25	1.35	1.48	2.27	1.45	2.65	2.65	1.59	0.98	0.98	1.36	1.05	2.35	1.74
week 11	0.74	1.26	1.21	1.22	0.96	0.58	1.12	1.09	1.32	1.95	1.00	0.94	2.15	2.19	2.28	1.37	0.96	1.59	1.24	1.10	1.02	0.79	1.11	0.87
week 12	1.01	1.28	1.17	0.70	1.09	0.95	0.82	1.26	0.96	1.39	1.35	1.57	2.30	2.55	1.09	1.84	1.77	2.36	1.27	1.58	1.32	1.27	1.20	2.40
week 13	1.14	0.97	1.13	1.20	1.20	1.17	1.16	0.83	0.96	1.34	1.99	1.59	1.77	1.35	1.55	1.38	2.83	1.74	1.36	1.66	1.35	1.42	0.75	1.51
week 14	2.46	1.06	1.23	0.84	1.36	1.00	0.85	1.45	1.24	1.10	2.01	1.70	1.48	1.56	1.65	0.69	2.04	1.16	1.25	1.17	1.72	1.09	0.81	1.67
week 15	1.13	1.01	1.29	1.04	0.72	1.54	0.75	1.88	1.32	0.77	1.42	1.09	1.10	1.56	0.92	1.60	1.66	1.19	1.48	1.22	1.23	1.37	0.61	1.04
week 16	1.49	0.50	1.92	1.11	1.09	1.62	0.72	1.65	1.59	1.82	2.48	1.78	1.38	1.93	2.19	1.88	1.38	1.58	1.22	1.03	1.24	0.84	0.99	1.43
week 17	1.24	1.03	1.13	1.43	1.07	0.93	0.86	1.28	1.48	1.33	1.62	1.78	1.05	1.40	1.37	1.04	1.35	1.60	1.12	0.85	0.97	0.93	1.04	1.41
week 18	0.94	1.00	1.03	0.94	1.40	1.04	1.08	1.19	0.78	1.29	0.91	1.60	0.86	1.69	1.38	1.54	0.95	1.25	1.31	1.48	1.18	1.39	1.28	1.52
week 19	1.45	0.79	0.69	1.00	1.60	0.76	1.14	0.88	1.52	0.92	1.30	1.14	0.87	1.30	2.18	1.50	2.14	0.84	0.98	0.67	0.99	1.11	0.92	1.38
week 20	0.90	0.85	1.43	1.25	1.60	1.36	1.30	1.23	1.09	1.47	1.11	1.10	1.09	1.82	1.66	1.07	1.45	1.61	1.01	1.31	0.77	1.11	1.28	1.12
week 21	0.65	1.07	0.86	0.46	1.46	0.59	0.69	0.86	0.85	1.15	1.09	1.16	1.11	1.35	1.20	1.07	1.20	0.99	1.21	1.49	1.80	1.55	0.79	1.02
week 22	0.85	0.95	0.77	1.66	0.47	1.32	0.90	1.37	0.53	1.33	1.33	1.44	1.55	2.27	1.82	1.64	1.69	1.16	1.15	1.77	1.05	1.17	1.03	0.94
week 23	0.65	0.81	0.88	1.18	0.96	0.92	0.88	1.02	1.44	1.36	1.15	1.77	1.10	1.37	2.02	1.90	1.63	1.48	1.21	1.14	0.99	0.88	1.11	1.45
week 24	0.81	0.82	0.95	0.78	0.78	0.74	0.77	0.42	1.19	1.26	1.26	0.91	0.96	1.23	1.14	1.26	1.42	1.15	1.13	1.09	0.78	1.39	0.83	1.21
week 25	1.22	0.88	0.90	0.87	1.21	1.29	0.95	0.85	0.86	1.29	0.86	1.27	1.95	2.22	1.28	1.57	0.95	1.02	1.15	0.71	0.66	1.33	0.93	0.80
week 26	0.86	0.79	1.14	1.16	0.83	0.99	1.42	1.25	1.20	1.12	1.53	1.39	1.09	1.44	0.90	1.25	1.06	1.52	1.26	1.36	1.59	1.15	1.45	0.92
week 27	0.85	0.94	0.63	0.69	1.40	0.79	0.29	1.16	0.93	1.05	1.02	0.87	1.08	1.19	1.20	1.86	1.24	1.40	1.07	1.06	1.20	1.38	1.36	1.47
week 28	0.60	1.01	0.85	1.32	0.73	1.37	1.86	2.82	2.42	1.79	1.32	1.45	1.62	1.24	1.55	1.21	1.42	2.00	1.38	0.94	1.02	1.19	1.14	1.16
week 29	0.89	0.88	1.01	0.34	0.94	0.92	1.09	0.79	0.71	1.36	1.20	1.37	1.45	1.71	1.81	1.07	1.90	1.66	0.80	1.50	1.13	0.95	0.86	1.76
week 30	1.09	1.43	0.95	1.38	1.05	1.15	0.55	0.79	1.29	1.43	1.80	1.68	1.63	2.28	1.15	1.52	1.13	0.84	1.55	1.85	1.11	1.81	0.73	0.82
week 31	1.92	1.10	1.08	0.92	1.23	2.13	0.95	1.36	1.12	1.35	1.23	2.20	1.61	1.02	2.46	1.73	0.68	1.16	0.95	1.43	1.22	1.44	1.92	0.85
week 32	1.05	0.89	1.35	1.02	1.08	0.89	0.64	1.43	1.03	1.39	0.88	1.38	1.51	1.08	1.94	1.31	2.05	1.35	0.71	1.52	1.36	1.54	1.40	0.90
week 33	0.68	1.35	1.15	1.20	1.15	1.03	0.80	1.16	1.31	1.01	1.17	1.05	1.04	1.02	1.60	1.07	1.27	1.42	1.06	1.26	0.87	0.78	1.09	0.97
week 34	1.08	1.02	1.11	0.93	1.56	1.20	1.22	1.35	0.75	1.08	1.41	1.20	1.16	2.22	1.46	1.55	1.68	1.24	1.09	1.28	1.22	1.04	0.95	1.02
week 35	0.77	0.87	0.81	0.74	1.08	0.66	1.57	0.98	1.30	1.51	0.94	1.59	2.18	1.26	1.85	1.63	1.25	1.31	1.37	0.98	0.88	1.87	1.13	1.12
week 36	1.02	1.02	0.84	0.83	1.52	0.68	0.66	1.25	1.50	1.18	1.57	1.59	1.91	1.76	1.49	2.01	1.26	1.68	1.34	1.46	0.44	1.55	1.39	0.81
week 37	1.09	1.72	0.95	0.64	1.13	1.23	0.88	0.90	1.25	1.28	1.30	1.28	1.38	1.06	1.49	1.37	2.92	1.62	1.22	1.30	1.51	1.31	1.44	1.17
week 38	2.28	0.55	0.87	1.27	1.27	0.69	0.97	0.83	1.00	0.72	1.90	0.99	1.07	1.23	1.13	1.28	1.05	1.03	1.36	0.91	1.39	1.10	1.05	0.83
week 39	0.86	1.11	0.79	0.95	0.82	1.24	1.10	1.47	1.64	1.53	1.59	1.70	1.62	2.45	2.55	1.55	1.13	1.78	1.32	2.00	1.90	1.29	1.04	0.91
week 40	1.35	0.76	1.29	0.63	2.26	0.75	0.76	1.30	1.64	1.40	1.27	1.98	2.15	1.58	1.65	1.65	2.36	1.03	1.53	2.46	1.57	1.26	1.10	1.44
week 41	0.76	0.74	0.98	0.64	1.03	1.00	1.24	1.74	1.30	1.55	1.42	2.17	1.44	1.69	2.01	1.34	1.99	1.62	1.03	2.13	0.88	1.21	1.02	1.01
week 42	0.53	0.77	1.12	1.18	1.18	0.84	0.97	0.89	1.17	1.52	1.12	0.87	2.05	1.41	1.45	0.88	2.14	1.55	0.94	1.33	1.44	1.46	0.92	1.17
week 43	1.50	0.82	1.52	1.63	1.59	1.05	0.71	1.24	0.94	1.32	1.52	1.91	1.72	1.71	1.19	1.55	2.25	1.53	1.44	1.15	1.21	0.46	1.16	1.53
week 44	1.94	0.85	1.38	1.76	1.99	0.96	0.50	1.16	0.92	1.84	1.29	0.98	1.25	1.78	1.94	1.34	1.40	1.31	0.86	1.71	0.97	1.53	1.81	0.96
week 45	1.53	0.98	1.53	1.55	1.15	0.83	1.09	1.21	0.92	1.47	1.24	1.35	0.94	1.86	1.91	1.83	1.77	0.95	1.43	0.81	1.21	1.19	1.53	1.58
week 46	0.45	0.92	1.67	0.90	0.81	0.83	1.19	0.80	0.94	1.25	0.88	1.84	1.53	1.07	2.28	2.06	1.64	1.42	1.49	1.52	1.56	1.82	1.26	1.38
week 47	0.42	0.98	1.26	1.40	1.22	1.35	0.84	1.15	1.68	1.16	1.67	1.64	1.11	1.39	1.64	1.92	1.54	1.45	1.49	1.10	1.47	0.99	1.17	0.77
week 48	0.80	0.68	0.47	0.65	1.14	1.07	1.20	1.03	1.06	0.80	1.23	1.38	1.15	1.74	1.86	1.59	1.49	1.49	0.83	1.57	1.18	1.02	1.15	1.00
week 49	0.92	0.98	0.86	0.83	0.94	0.89	0.57	1.17	1.10	1.08	1.01	1.40	1.29	2.06	1.07	1.21	0.88	1.07	0.95	0.62	1.16	0.75	0.77	1.30
week 50	1.60	0.85	0.85	0.99	0.91	1.07	0.83	1.13	1.09	1.08	2.31	2.47	2.06	1.35	1.42	1.37	1.95	1.84	1.10	1.05	1.77	0.91	1.43	1.34
week 51	0.89	1.02	1.06	0.97	1.08	1.10	3.98	1.50	0.99	1.08	1.44	1.56	1.94	1.55	1.33	1.69	1.73	1.34	1.19	1.40	1.40	1.34	1.45	1.46
week 52	0.92	1.39	1.08	1.01	0.87	1.07	0.68	0.57	0.77	1.05	1.20	1.28	1.28	1.92	1.69	1.34	1.54	1.42	1.00	1.28	1.34	1.08	1.00	0.94
week 53	1.18	1.01	1.04	0.87	1.14	1.14	0.78	1.39	1.31	1.30	1.89	1.37	1.36	0.91	1.30	2.58	1.45	1.13	1.17	1.29	1.97	1.50	1.04	1.39
Maximum	4.22																							
Average	1.28																							

Appendix C-2: 2019 Calendar ADRS Data Extract Tables – Hour of Day and Day of Week

MONDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

MONDAY	HOUR OF DAY																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1																									0
week 2	8	11	4	2	3	4	11	6	4	17	15	7	11	6	11	8	8	16	12	8	8	12	12	7	211
week 3	4	7	4	1	6	1	16	5	8	7	9	7	14	10	16	20	11	11	26	14	7	5	10	6	225
week 4	6	4	4	8	5	3	11	8	13	10	16	11	16	8	14	10	17	6	18	17	22	14	9	7	257
week 5	5	4	4	5	6	3	3	4	5	10	13	21	14	17	9	14	8	11	10	11	5	14	16	8	220
week 6	6	5	2	3	4	5	5	7	12	14	10	11	17	17	7	20	10	18	10	13	11	11	5	3	226
week 7	7	7	2	3	4	7	5	8	10	22	12	16	24	10	10	12	14	15	14	8	15	6	6	6	243
week 8	11	6	9	7	5	2	5	9	10	18	2	8	10	7	11	14	12	8	13	11	10	8	10	2	208
week 9	4	6	8	4	5	6	4	7	8	13	12	17	19	10	15	8	12	16	16	10	14	8	10	3	235
week 10	2	6	7	3	3	8	3	8	10	11	22	11	19	19	12	7	10	10	14	6	11	7	5	5	219
week 11	3	4	3	3	4	5	5	10	10	19	6	13	9	15	16	11	5	8	15	3	9	18	17	6	217
week 12	5	6	7	4	4	5	7	6	15	12	18	16	14	17	17	9	14	11	12	14	14	9	12	13	261
week 13	6	3	8	7	3	3	12	6	11	16	5	14	10	16	12	13	9	9	13	21	12	8	13	10	240
week 14	8	9	9	2	5	3	8	9	9	15	14	12	17	15	9	19	11	14	17	11	27	7	8	10	268
week 15	5	7	8	4	1	3	6	14	5	13	22	14	11	17	14	4	8	17	18	12	16	12	9	9	249
week 16	9	6	3	7	3	6	13	8	7	17	12	13	21	12	13	12	10	9	9	9	12	10	7	9	237
week 17	3	3	7	4	4	9	12	10	6	19	7	11	13	18	9	21	10	14	4	13	8	12	9	7	233
week 18	4	8	2	11	2	4	7	3	9	9	10	9	15	9	12	17	11	16	12	9	11	13	13	8	224
week 19	4	4	4	4	4	5	5	14	4	4	15	10	15	13	11	14	7	12	19	17	9	11	7	3	215
week 20	10	6	5	4	5	1	4	11	9	16	15	12	4	8	10	9	11	9	15	5	10	18	9	5	211
week 21	16	6	4	5	6	8	8	6	22	11	11	7	11	7	3	10	8	16	15	8	15	7	8	5	223
week 22	10	8	6	8	3	7	6	7	9	13	15	15	17	13	10	18	9	18	12	16	9	10	6	7	252
week 23	8	11	4	3	5	6	5	8	7	9	25	14	29	12	9	6	14	12	20	11	12	20	22	3	275
week 24	5	9	8	6	8	4	2	5	5	8	6	12	8	20	14	10	11	15	16	13	9	9	6	5	214
week 25	4	5	7	3	5	7	8	7	6	14	9	12	8	7	9	14	8	13	10	12	19	12	11	9	219
week 26	11	8	2	2	2	4	1	9	4	13	19	16	20	8	11	13	7	13	13	9	8	20	17	10	240
week 27	6	11	10	7	3	6	8	6	7	14	15	9	11	16	9	10	9	8	15	9	11	5	7	6	218
week 28	5	5	4	5	2	2	7	5	7	10	13	12	11	15	14	12	12	13	9	13	11	16	5	10	218
week 29	13	5	8	8	5	1	8	18	6	17	13	14	14	9	10	10	11	7	13	7	15	8	9	9	238
week 30	7	1	3	10	8	4	8	10	13	11	7	10	9	18	12	15	14	7	11	12	29	11	11	11	252
week 31	5	7	3	7	3	1	16	6	4	7	17	8	18	12	11	12	18	13	16	10	13	6	13	12	238
week 32	6	3	4	4	1	6	7	3	17	9	4	6	11	8	11	17	6	9	18	11	9	7	3	1	181
week 33	8	6	3	1	6	3	2	3	9	4	11	13	15	13	30	20	15	17	7	7	13	10	6	9	231
week 34	6	2	7	8	1	5	8	2	12	14	13	13	26	11	21	18	15	15	15	7	16	13	10	10	268
week 35	16	7	3	5	5	3	1	8	7	9	18	17	11	7	14	9	9	19	10	11	15	6	7	8	225
week 36	4	5	3	12	2	10	8	6	8	11	12	12	12	9	9	10	10	15	10	6	5	7	8	8	202
week 37	7	3	7	1	1	5	3	8	3	13	9	9	7	27	20	11	5	9	13	17	6	7	19	11	221
week 38	2	5	4	2	6	1	4	8	8	8	9	13	9	16	16	10	9	13	8	3	7	11	7	4	183
week 39	3	7	3	4	5	3	5	8	9	16	17	14	10	11	19	9	7	11	21	6	10	3	12	6	219
week 40	9	3	6	9	2	3	3	8	7	16	8	10	14	14	8	22	8	22	17	13	9	8	8	4	231
week 41	10	3	9	5	5	6	4	3	6	14	11	19	12	19	6	9	11	4	19	8	8	15	9	8	223
week 42	5	5	8	6	4	4	6	12	7	12	14	13	8	15	9	9	20	11	12	11	10	10	8	8	227
week 43	6	6	4	3	6	6	5	7	17	7	16	8	6	10	21	18	17	10	9	14	10	2	6	5	219
week 44	3	6	2	4	4	3	5	5	7	11	14	6	7	11	14	21	12	10	20	16	9	6	15	5	216
week 45	7	6	1	9	5	5	12	4	13	8	15	16	16	6	11	10	7	22	10	10	6	6	5	5	215
week 46	1	7	1	5	3	5	6	12	8	14	20	10	10	19	10	18	19	16	12	26	6	5	10	15	258
week 47	2	5	4	3	6	3	13	7	8	12	12	8	22	11	5	9	15	4	13	11	4	14	13	4	208
week 48	9	4	2	3	4	7	2	11	7	9	11	18	14	10	6	10	13	11	19	15	15	4	10	12	226
week 49	1	5	7	9	4	8	10	9	15	20	15	8	12	11	11	10	7	11	21	13	10	16	16	6	255
week 50	6	8	9	3	3	4	3	9	9	17	13	7	17	20	14	15	7	15	21	19	11	8	9	13	260
week 51	7	7	15	8	4	6	7	11	3	12	18	15	15	11	11	9	6	8	13	9	9	7	7	6	224
week 52	10	5	4	14	9	7	19	9	6	17	7	22	14	10	16	23	15	13	13	13	10	16	5	5	282
week 53	4	7	6	7	6	5	10	7	12	19	20	3	12	14	9	10	23	9	8	12	8	10	16	9	246
Total Responses (1-4)	332	303	271	275	218	241	362	400	453	661	672	622	709	664	631	669	575	639	726	590	588	518	511	376	12,006
Max	16	11	15	14	9	10	19	18	22	22	25	22	29	27	30	23	23	22	26	26	29	20	22	15	282
Mean	6.4	5.8	5.2	5.3	4.2	4.6	7.0	7.7	8.7	12.7	12.9	12.0	13.6	12.8	12.1	12.9	11.1	12.3	14.0	11.3	11.3	10.0	9.8	7.2	226.5
90th Percentile Rank	10	8	8.9	9	6	7	12	11	13	17.9	18.9	16.9	19.9	18.9	16.9	20	16.8	17	19.9	16.9	15.9	16	16	11	259.6

TUESDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

TUESDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1	16	16	12	6	12	5	10	7	6	21	3	9	6	7	12	13	14	5	7	9	14	19	15	11	255
week 2	7	4	5	5	2	3	5	6	7	8	15	11	16	13	18	13	14	18	10	11	7	13	11	10	232
week 3	12	4	5	4	1	5	3	6	11	9	6	12	15	3	15	10	11	12	9	16	9	11	9	6	204
week 4	5	3	3	6	3	5	13	4	14	7	10	14	9	10	18	13	11	9	17	7	9	13	4	5	212
week 5	9	5	7	3	6	6	7	1	4	13	11	11	6	10	15	12	13	6	13	8	5	20	10	7	208
week 6	3	5	8	8	4	5	10	6	5	17	16	13	14	9	18	8	18	11	26	11	12	15	7	5	254
week 7	2	6	4	4	3	7	4	6	10	16	20	13	11	20	11	7	12	8	13	13	15	7	8	5	225
week 8	1	5	5	6	5	7	4	7	12	8	12	14	8	11	13	3	15	14	2	14	8	9	9	5	197
week 9	9	2	2	2	2	6	4	6	9	7	11	14	15	10	9	10	9	17	9	12	8	10	4	10	197
week 10	2	10	7	3	8	1	1	4	5	10	17	13	14	7	16	14	11	3	16	16	3	12	7	6	206
week 11	6	1	7	6	5	5	7	14	15	18	16	9	12	8	16	7	4	10	9	14	13	6	8	5	221
week 12	9	6	4	3	3	5	6	6	16	8	5	24	8	6	13	13	10	6	6	13	7	11	5	4	197
week 13	2	3	6	5	6	3	5	7	11	10	5	6	13	12	8	14	18	9	14	8	10	9	11	8	203
week 14	6	5	3	3	8	3	5	10	10	15	21	10	15	16	9	11	8	6	12	15	8	8	12	10	229
week 15	8	4	7	7	9	1	8	3	9	4	22	11	17	10	8	14	16	13	9	12	12	7	12	2	225
week 16	11	6	4	6	4	4	10	7	8	10	18	13	17	10	5	7	7	10	10	8	8	9	6	14	212
week 17	14	5	4	3	5	3	5	11	8	12	21	12	21	20	7	20	10	13	9	9	10	17	9	8	256
week 18	6	7	4	7	5	2	11	4	5	14	15	17	8	14	9	6	14	13	17	22	5	5	3	9	222
week 19	5	5	6	2	3	2	4	9	9	7	17	24	18	6	11	15	18	18	13	8	9	10	11	7	237
week 20	5	8	2	4	2	3	6	6	6	14	11	5	8	15	8	11	20	19	11	9	10	10	12	11	216
week 21	2	5	2	5	3	3	5	5	16	15	14	11	12	17	3	13	20	13	16	13	15	10	7	5	230
week 22	8	3	2	6	8	3	3	8	13	6	10	13	10	17	7	8	12	10	9	7	8	10	10	6	197
week 23	2	3	1	10	3	4	3	4	5	14	15	9	7	8	9	13	10	14	13	18	10	7	9	14	205
week 24	4	2	5	3	3	2	7	5	6	16	23	16	18	13	15	3	11	11	14	7	8	17	7	4	220
week 25	9	4	1	5	2	4	9	6	8	9	13	21	18	18	7	23	14	10	13	13	7	11	9	6	240
week 26	5	9	5	11	5	3	4	13	6	22	15	14	15	16	12	16	12	11	18	17	12	9	3	6	259
week 27	5	7	7	4	2	4	8	4	13	9	12	18	17	9	9	8	8	20	10	8	10	14	14	9	229
week 28	3	4	5	6	2	7	6	8	8	12	21	14	10	10	13	3	9	18	15	10	10	7	20	11	232
week 29	7	3	10	7	4	5	5	6	9	11	10	13	10	18	9	4	15	11	12	17	2	5	6	4	203
week 30	17	4	3	4	4	6	5	15	4	12	6	13	6	24	12	13	16	12	11	13	11	10	15	10	246
week 31	9	12	7	1	4	2	6	5	14	14	16	18	8	17	10	10	16	13	17	15	9	9	8	12	252
week 32	7	8	9	6	1	5	4	9	5	11	10	8	4	10	8	12	12	11	5	10	9	16	14	5	199
week 33	6	5	3	2	3	3	7	7	14	13	12	8	15	18	18	9	14	16	13	15	8	10	14	12	245
week 34	9	6	8	3	8	9	12	4	12	14	12	10	5	8	10	5	8	3	10	11	8	4	13	5	197
week 35	11	3	4	2	3	3	5	5	3	13	12	12	14	12	8	6	12	9	18	19	5	8	10	14	211
week 36	4	3	2	1	7	8	8	6	9	11	13	20	23	18	9	10	19	24	18	11	12	16	5	4	261
week 37	4	7	7	3	1	4	3	5	11	14	13	18	14	18	11	10	17	12	13	5	12	9	17	9	237
week 38	5	3	7	3	1	5	8	3	12	10	11	17	22	12	13	11	12	8	12	4	13	11	3	4	210
week 39	11	3	3	7	4	2	2	5	5	12	21	24	19	15	7	21	11	13	12	9	11	10	8	7	242
week 40	4	3	4	3	3	6	5	7	7	15	17	28	17	15	10	18	23	6	10	12	12		7	4	236
week 41	7	6	7	4	3	4	10	10	6	10	11	10	16	13	19	22	15	10	25	6	10	7	11	3	245
week 42	4	2	1	3	2	6	9	7	12	15	9	16	6	17	15	5	16	8	21	5	11	16	23	2	231
week 43	2	3	3	2	4	2	7	3	12	21	11	19	8	19	9	20	11	16	19	3	7	6	7	7	221
week 44	6	2	3	6	3	10	1	13	8	12	22	12	17	6	9	14	17	14	15	14	6	7	8	13	238
week 45	8	5	3	5	5	3	9	4	8	12	15	13	22	11	21	9	17	18	10	7	8	12	12	7	244
week 46	14	4	5	6	3	2	5	8	5	15	17	15	15	11	16	19	16	14	11	9	16	10	6	8	250
week 47	12	6	3	7	1	7	6	14	13	24	16	17	7	15	17	3	11	7	10	16	9	13	7	6	247
week 48	7	3	5	6	8	8	8	11	12	14	18	12	16	10	10	11	18	16	16	20	9	8	11	10	267
week 49	3	2	2	3	3	2	5	8	19	10	17	12	7	10	18	15	16	11	13	6	7	7	2	4	202
week 50	8	3	5	12	3	7	6	8	13	12	8	7	12	12	9	8	8	16	12	8	16	7	14	7	221
week 51	9	5	3	5	9	4	14	5	14	12	13	12	6	13	8	11	6	12	11	13	11	10	5	9	220
week 52	1	6		3	5	5	7	8	11	18	15	10	14	22	6	16	13	18	10	18	13	12	11	16	258
week 53	9	11	6	3	8	2	8	4	5	14	21	23	12	18	11	13	8	16	11	8	6	4	12	8	241
Total Responses (1-4)	360	265	246	250	224	231	338	363	498	670	741	738	673	687	607	603	696	641	675	602	503	533	501	399	24,088
Max	17	16	12	12	12	10	14	15	19	24	23	28	23	24	21	23	23	24	26	22	16	20	23	16	267
Mean	6.8	5.0	4.7	4.7	4.2	4.4	6.4	6.8	9.4	12.6	14.0	13.9	12.7	13.0	11.5	11.4	13.1	12.1	12.7	11.4	9.5	10.3	9.5	7.5	227.2
90th Percentile Rank	11.8	8	7	7	8	7	10	11	14	17.8	21	20.8	18	18	18	18.8	18	18	18	17	13	16	14	12	254.8

WEDNESDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

WEDNESDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1	4	2	6	6	7	6	3	10	13	7	15	23	18	12	13	17	15	13	15	11	13	9	13	13	264
week 2	11	10	3	3	4	4	9	6	6	13	15	9	23	15	12	19	16	9	13	7	16	10	7	5	245
week 3	11	4	3	5	4	5	14	4	7	14	15	16	8	10	11	18	10	12	9	11	13	10	3	4	221
week 4	7	9	12	4	3	9	11	8	11	13	20	15	10	7	8	7	7	16	14	13	10	7	8	2	231
week 5	6	2	3	4	4	2	4	7	12	14	6	11	8	12	12	8	7	11	10	9	15	9	4	4	184
week 6	2	6		6	3	4	7	6	21	8	14	14	16	12	6	15	13	17	9	14	14	11	4	11	233
week 7	3	6	5	2	7	16	8	6	7	10	10	12	14	11	12	10	18	15	12	13	12	9	8	7	233
week 8	6	5	3	9	1	4	3	10	7	8	15	10	12	12	12	8	13	13	15	21	9	10	8	5	219
week 9	5	11	7	7	3	3	3	5	7	8	17	9	13	16	7	10	11	16	10	16	11	11	9	4	219
week 10	4	2	7	5	1	4	11	7	9	11	15	13	22	17	21	13	7	18	16	16	4	4	11	7	245
week 11	11	3	7	9	7		8	9	5	10	14	16	8	5	7	13	8	6	8	5	14	12	7	4	196
week 12	6	4	2	6	4	6	11	13	6	11	8	11	18	11	14	9	8	4	11	4	8	13	12	10	210
week 13	10	7	5	6	3	7	10	5	8	4	13	12	13	11	15	4	13	9	9	15	14	9	6	5	213
week 14	7	5	8	4	5	3	6	2	12	14	14	9	18	13	19	7	12	13	12	13	8	14	6	5	229
week 15	6	11	1	5	9	1	5	5	14	9	11	13	3	11	13	9	5	8	12	14	16	10	3	6	200
week 16	5	3	3	4	4	3	10	16	12	22	19	13	9	27	9	10	6	21	7	7	9	4	7	6	236
week 17	3	7	6	2	7	5	1	6	5	12	21	20	18	12	14	8	15	11	14	12	17	10	11	6	243
week 18	7	4	11	5	3	5	2	9	8	9	10	15	22	6	9	7	14	12	6	4	5	11	8	10	202
week 19	2	4	7	4	4	6		4	5	11	10	4	14	14	19	17	8	12	18	11	9	13	12	6	214
week 20	3	12	7	4	5	4	1	3	11	16	15	9	7	9	27	25	10	5	14	13	8	8	10	5	231
week 21	7	7	3	4	2	2	5	9	9	7	14	6	11	6	9	10	12	13	8	6	9	11	9	7	186
week 22	8	4	6	4	2	6		6	11	16	14	12	8	7	17	28	13	22	10	15	9	5	3	9	235
week 23	6	5	8	2	2	3	6	6	17	14	12	20	14	8	16	9	9	11	13	6	13	6	8	7	221
week 24	8	4	3	1	1	7	7	6	10	14	15	9	11	21	22	18	20	12	13	11	13	6	4	6	242
week 25	5	5	2	4	3	3	7	7	6	12	11	15	8	7	10	10	12	19	11	15	12	14	7	9	214
week 26	5	7	1	5	4	5	4	10	10	3	11	11	12	11	26	17	12	11	10	15	7	7	18	14	236
week 27	9	1	8	8	6	6	14	5	11	7	14	8	8	8	16	5	8	11	14	9	11	12	11	4	214
week 28	8	11	9	3	2	6	4	10	10	10	11	20	14	5	11	10	10	22	12	22	8	8	7	9	242
week 29	6	3	4	3	10	7	4	8	3	7	15	11	7	17	12	17	12	12	14	7	11	13	10	6	219
week 30	11	7	6	5	5	8	7	5	3	12	12	10	17	15	17	15	24	14	6	10	9	8	6	3	235
week 31	5	4	3	2	4	4		8	8	9	28	11	10	16	12	10	22	13	8	16	9	7	9	6	224
week 32	5	2	3	5	2	1	6	3	9	10	15	10	14	13	4	13	8	9	8	17	4	11	9	15	196
week 33	8	5	2	4	5	9	8	7	9	10	11	5	8	9	17	12	9	16	12	13	11	9	13	3	215
week 34	6	5	6		2	2	5	10	20	10	15	16	11	15	7	4	9	16	8	9	8	11	8	10	213
week 35	3	10	5	6	4	1	2	6	5	13	8	10	12	13	6	27	22	13	8	15	20	12	4	11	236
week 36	7	6	2	5	3	6	5	14	7	13	11	13	14	16	27	21	9	11	10	16	8	11	7	6	248
week 37	16	10	7	1	7	2	5	13	12	9	13	17	17	12	15	11	12	8	17	9	7	12	8	5	245
week 38	6	4	1	5		3	6	10	5	12	17	16	16	10	16	9	9	12	13	17	10	10	10	8	225
week 39	5	4	3	1	1	4	8	8	2	7	10	22	20	14	9	8	17	14	11	12	6	8	15	2	211
week 40	5	3	9	4	3	2	4	7	13	10	13	15	21	13	15	15	12	13	15	10	13	12	15	12	254
week 41	9	10	6	4	10	7	8	11	6	7	24	14	20	9	17	23	13	20	9	12	9	11	7	13	279
week 42	3	6	12	4	4	7	8	10	8	15	15	16	7	13	11	24	15	10	10	9	5	11	8	7	238
week 43	5		3	3		5	6	9	7	12	17	17	6	8	11	11	13	16	8	7	9	7	8	7	195
week 44	7	7	7	14	4	3	5	9	8	15	14	9	7	16	13	18	9	10	15	15	14	11	7	5	242
week 45	5	4	4	4	2	13	6	8	13	8	7	15	17	11	14	11	16	13	12	15	10	12	4	14	238
week 46	7	4	6	7	5	4	6	6	12	17	12	24	19	13	6	8	13	13	8	14	6	10	6	4	230
week 47	3	7	2	6	3	3	3	11	8	16	17	13	24	17	19	8	9	7	10	27	6	16	16	15	266
week 48	4	5	8	3	3	4	3	8	16	8	14	10	23	18	9	16	17	4	16	9	7	14	9	6	234
week 49	9	1	4	7	7	6	3	5	10	20	18	25	10	15	9	12	14	12	15	8	11	12	10	5	248
week 50	4	6	2	5	4	5	7	4	5	17	6	7	8	9	16	14	13	11	13	17	8	9	12	17	219
week 51	9	6	4	5	3	5	3	8	15	16	6	9	17	20	18	10	10	10	17	12	6	7	8	10	234
week 52	10	2	4	5	2	4	7	14	7	7	2	12	13	5	10	13	13	15	2	8	7	11	7	8	188
week 53																									0
Total Responses (1-4)	329	280	253	233	196	244	296	392	468	580	684	659	680	621	684	654	617	641	575	621	588	509	427	375	11,526
Max	16	12	12	14	10	16	14	16	21	22	28	25	24	27	27	28	24	22	18	27	20	16	18	17	279
Mean	6.4	5.5	5.1	4.7	4.1	4.9	6.1	7.7	9.3	11.3	13.4	13.1	13.4	12.2	13.4	12.9	12.2	12.6	11.3	12.2	10.0	10.0	8.5	7.5	222.5
90th Percentile Rank	10	10	8	7	7	7	10.2	11	13.9	16	17.9	20	20.9	17	19	20.8	17	17.9	15	16.9	14	13	12.9	13	247.4

THURSDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

THURSDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1	5	7	2	8	4	5	9	4	5	12	12	16	11	4	11	18	8	15	11	12	13	10	8	11	221
week 2	4	9	2	3	7	4	3	5	11	7	8	22	10	15	11	18	11	9	10	8	6	10	11	6	210
week 3	7	9	4	2	6	6	3	8	8	8	11	16	7	16	18	10	14	11	12	9	5	6	8	5	209
week 4	5	5	8	7	2	3	1	14	13	11	16	11	19	5	12	13	10	10	11	11	10	10	5	3	215
week 5	5	10	7	1	4	4	5	8	18	9	9	10	15	13	23	12	13	13	12	17	13	14	10	13	258
week 6	14	5	6	7	1	5	6	19	9	9	15	18	14	7	14	8	13	20	13	10	10	8	5	9	245
week 7	10	2	5	9	3	3	7	5	9	23	14	12	17	19	12	14	20	8	11	12	2	12	2	5	236
week 8	5	3	4	1	6	8	2	10	8	16	13	7	16	8	14	19	7	5	14	13	4	8	4	3	198
week 9	7	6	4	8	6	7	8	8	17	17	12	20	17	22	15	11	12	16	12	12	11	9	7	5	269
week 10	6	6		4	2	3	4	1	7	10	8	10	21	14	14	8	12	11	11	10	6	6	9	6	189
week 11	4	5	7	2	6	5	7	4	8	15	12	9	15	13	12	11	7	9	11	18	6	8	5	7	206
week 12	3	3	4	3	3	5	14	7	5	4	9	14	10	12	7	8	6	11	10	6	14	12	17	15	202
week 13	3	9	4	5	1	2	7	8	7	5	9	18	6	12	7	6	7	14	10	9	9	12	9	7	186
week 14	5	4	5	3	3	7	8	8	12	13	18	15	16	17	10	16	10	12	9	12	15	16	11	11	256
week 15	14	11	3	3	3	4	3	4	17	16	13	11	12	13	10	10	6	8	19	6	8	11	9	5	219
week 16	8	2		2	9	1	7	8	8	11	13	14	14	14	17	10	7	13	13	5	15	15	8	9	223
week 17	3	4	6	3	7	4	5	5	11	8	10	17	9	7	9	9	14	12	10	7	7	9	7	6	189
week 18	4	8	5	3	2	10	7	8	8	9	14	10	8	8	10	19	15	11	8	14	6	6	5	5	203
week 19	3	7	7	5	10	2	8	8	7	5	20	13	6	11	23	9	9	32	10	10	11	10	15	2	243
week 20	4	5	8	4	9	8	4	10	14	8	11	12	16	4	15	20	10	17	16	17	10	7	11	8	248
week 21	6	5	8	2	3	9	5	6	12	6	11	12	8	15	7	13	9	14	19	13	19	11	12	2	227
week 22	7	3	1	7	2	4	7	2	10	11	10	10	14	14	7	14	12	6	15	14	12	19	9	7	217
week 23	7	6	3	7	6	7	8	11	8	17	14	10	9	11	15	14	11	12	13	13	12	9	6	9	238
week 24	3	7	7	6	6	9	2	5	15	22	13	19	17	12	18	13	8	4	9	9	8	12	14	7	245
week 25	3	4	7	4	2	2	4	15	10	18	9	14	10	7	8	6	16	7	13	11	7	12	7	10	206
week 26	4	4	11	10	3	5	1	9	6	7	11	19	13	5	11	7	22	21	20	19	10	17	12	8	255
week 27	8	7	13	3	6	6	9	7	10	12	9	18	14	15	11	16	11	15	19	12	15	9	9	5	259
week 28	2	10	5	7	3	5	12	6	9	9	14	10	19	12	11	15	17	12	11	14	10	8	13	18	252
week 29	10	4	2	2	2	2	3	8	19	18	12	5	11	10	19	21	25	14	14	12	4	7	4	5	233
week 30	7	8	4	3	1	5	4	9	6	7	9	15	11	8	6	15	13	9	9	8	15	14	11	8	205
week 31	4	5	12	4	4	2	2	5	4	13	12	6	4	12	12	11	8	5	16	14	10	18	17	6	206
week 32	12	7	3	4	6	1	2	6	6	12	10	12	16	25	13	4	16	7	12	9	9	11	10	3	216
week 33	6	2	6	2	3	4	8	7	7	4	11	14	16	18	10	21	8	12	13	22	10	14	10	4	232
week 34	6	4	4	3	1	3	6	10	10	5	13	5	12	9	16	18	9	16	5	8	5	6	15	14	203
week 35	5	7	4	4	7	3	1	5	12	15	9	13	9	16	14	11	9	14	14	12	9	6	7	3	209
week 36	12	3	3	6	4	7	7	7	9	10	15	10	14	9	14	15	9	6	12	15	11	7	6	6	217
week 37	14	7	4	2	3	5	4	13	13	5	15	14	11	10	10	12	23	17	22	12	16	12	9	5	258
week 38	5	4	5	2	4	3	6	6	13	14	17	15	10	24	7	4	12	16	22	15	10	11	8	1	234
week 39	5	5	10	3	6	4	6	17	11	12	18	8	7	8	17	20	9	10	11	16	12	6	6	9	236
week 40	11	7	7	4	3	2	4	10	9	16	15	10	16	17	14	9	13	11	7	10	6	5	6	9	221
week 41	9	3	4	1	4	4	11	18	24	19	11	8	12	11	17	24	8	14	6	15	23	12	12	12	282
week 42	4	8	2	7	4	7	7	5	6	8	17	5	12	10	15	10	9	6	11	7	10	13	9	11	203
week 43	5	5	2	5	1	7	7	4	4	16	14	22	8	19	13	15	12	10	19	7	10	5	3	6	219
week 44	3	5	5	1	9	5	10	10	5	7	13	18	13	16	18	16	17	18	4	13	17	10	7	9	249
week 45	2	7	8	7	6	3	7	11	7	14	19	13	13	15	7	14	12	19	12	22	9	2	9	9	247
week 46	5	9	6		2	5	7	9	15	24	14	14	16	16	15	7	13	17	8	8	15	8	12	3	248
week 47	8	7	2	6	5	3	4	7	18	14	18	11	12	14	11	22	12	21	18	7	16	9	10	11	266
week 48	3	5	3	3	2	6	8	10	8	15	13	11	16	15	14	11	17	12	12	18	7	17	11	8	245
week 49	3	5	3	3	5	4	8	9	6	12	9	9	18	12	15	7	10	22	18	10	8	7	5	13	221
week 50	6	1	4	4	3	3	4	5	6	18	6	14	17	14	12	12	7	7	12	11	14	11	3	8	202
week 51	9	5	5	6	6		3	6	6	11	15	12	16	12	10	16	11	12	10	12	7	6	5	4	205
week 52	6	4	8	8	4	4	10	5	17	7	15	14	20	9	13	19	8	15	19	5	20	16	20	13	279
week 53																									0
Total Responses (1-4)	319	293	262	219	220	235	305	415	523	614	658	665	673	654	664	681	607	658	658	611	547	529	463	387	11,860
Max	14	11	13	10	10	10	14	19	24	24	20	22	21	25	23	24	25	32	22	22	23	19	20	18	282
Mean	6.1	5.6	5.2	4.3	4.2	4.6	5.9	8.0	10.1	11.8	12.7	12.8	12.9	12.6	12.8	13.1	11.7	12.7	12.7	11.8	10.5	10.2	8.9	7.4	223.8
90th Percentile Rank	10.9	9	8	7	7	7	9	12.8	17	18	17	18	17	17.9	17.9	19.9	17	18.9	19	17	15.9	15.9	13.9	12.9	258

FRIDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

FRIDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1	7	2	5	5	5	8	12	13	11	9	14	14	14	9	24	12	12	15	12	12	11	11	11	8	256
week 2	7	11	8	5	3	3	12	9	6	13	15	15	17	14	13	14	8	10	23	12	8	8	11	9	254
week 3	5	7	5	2	3	2	2	14	11	13	16	13	11	14	19	19	13	8	13	15	8	3	17	5	238
week 4	4	11	4	3	3	2	4	11	10	4	12	9	10	10	9	22	11	11	14	9	12	9	15	8	217
week 5	6	13	1	8	5	8	7	11	15	16	23	6	12	7	11	13	15	17	15	14	8	15	5	6	257
week 6	6	10	7	6	4	7	6	6	5	7	9	6	14	10	10	11	11	16	15	24	9	14	21	16	250
week 7	4	6	13	2	1	4	3	8	13	6	11	21	13	17	20	11	15	10	9	14	5	11	12	14	243
week 8	4	4	2	6	6	4	2	8	8	9	6	14	12	8	8	5	14	15	7	16	13	8	5	7	191
week 9	7	7	5	7	7	6	9	12	5	15	12	10	18	14	17	11	12	14	10	18	7	10	14	13	260
week 10	4	2	6	3	3	5	4	5	12	8	17	9	7	10	16	25	11	8	15	14	15	10	14	23	246
week 11	7	3	5	3	5	5	8	12	9	6	17	16	6	17	12	27	15	7	12	8	10	11	7	9	237
week 12	5	2	9	3	3	4	7	3	9	8	12	9	17	14	12	10	9	15	7	10	6	7	7	7	195
week 13	7	2	6	2	8	5	3	11	10	13	10	14	3	16	22	13	20	25	19	11	7	8	10	10	255
week 14	7	5	5	7	4	5	1	6	9	9	11	14	11	8	11	16	11	12	8	13	12	9	7	7	208
week 15	4	10	3	8	4	3	4	9	13	8	8	16	9	8	10	12	13	8	11	4	9	4	14	9	201
week 16	6	4	3	4	12	5		8	8	7	2	10	13	7	8	8	9	16	10	4	8	8	8	2	170
week 17	8	8	15		5	4	5	6	8	10	13	18	8	5	9	8	16	10	15	6	10	8	22	3	220
week 18	10	4	7	6	4	2	6	9	17	10	15	21	32	15	12	16	20	3	18	7	12	9	15	13	283
week 19	3	3	4	8	4	4	2	4	21	25	12	14	12	12	13	8	9	9	12	5	12	9	5	9	219
week 20	8	3	2	4	5	4	6	9	11	9	4	9	13	15	19	12	16	31	13	14	11	15	6	9	248
week 21	4	9	3	6	3	3	2	11	7	8	18	12	13	9	11	9	5	12	11	5	8	18	14	16	217
week 22	6	2	1	5	4	8	7	9	11	10	18	9	18	10	12	13	9	12	10	10	9	14	11	5	223
week 23	10	4	9	4	2	6	8	14	11	11	9	8	12	19	12	16	17	15	17	17	5	11	8	10	255
week 24	4	5		3	3	2	9	5	11	12	18	14	12	13	14	8	10	8	12	13	9	18	13	6	222
week 25	7	5	4	4	1	7	9	12	17	14	7	9	15	11	16	16	16	16	9	11	8	8	9	9	240
week 26	11	1	6	9	6	3	2	9	13	16	5	17	7	7	15	8	13	14	11	18	16	5	16	13	241
week 27	3	4	5	3	2	4	9	10	13	11	14	13	11	14	9	13	27	16	12	17	14	6	8	8	246
week 28	12	8	4	4	3	2	7	11	11	12	11	13	21	15	14	12	8	4	10	5	7	16	6	10	226
week 29	6	3	3	5	4	4	10	7	8	13	19	10	15	11	25	12	12	8	14	7	12	7	9	9	233
week 30	4	4	7	3	2	4	6	8	4	10	8	14	5	24	13	17	5	20	5	17	16	11	8	6	221
week 31	13	14	2	3	2	6	3	3	8	20	8	18	9	8	12	14	5	7	12	16	7	8	19	13	230
week 32	9	7	6	2	1	4	5	6	15	7	10	16	13	15	6	20	15	10	10	13	12	10	7	13	232
week 33	6	4	6	4	2	1	6	4	7	19	11	12	12	11	5	17	7	17	5	13	4	10	9	7	199
week 34	15	6	3	12	4	1	4	9	9	17	15	17	18	12	18	11	11	12	18	9	8	6	8	14	257
week 35	8	9	3	4	3	4	3	11	10	5	10	15	14	13	14	18	11	9	11	8	12	8	9	9	221
week 36	2	3	6	4	5	6	5	8	7	8	14	12	23	11	11	18	16	12	8	9	9	5	6	10	218
week 37	9	5	4	4	3	3	10	8	2	14	8	14	5	21	11	14	15	16	10	13	2	8	8	15	222
week 38	7	4	2	6	5	5	5	10	8	6	5	16	17	15	13	15	15	16	6	5	19	14	14	14	242
week 39	2	6		5	1	1	3	7	7	14	20	3	15	13	15	10	13	14	14	15	13	17	12	8	228
week 40	7	8	3	5	3	7	5	5	13	13	5	17	13	13	7	11	9	20	11	10	12	7	10	5	219
week 41	11	6	9	3	5	7	6	12	13	5	22	17	16	17	11	12	17	17	15	29	10	13	14	8	295
week 42	9	4	4	9	4	6	5	2	9	9	14	5	18	17	10	15	13	24	7	19	16	23	8	5	255
week 43	7	5	6	2	3	2	7	4	10	11	12	22	12	10	17	5	11	16	9	12	10	8	7	15	223
week 44	9	14	9	11	14	6	7	1	11	10	9	8	9	11	12	8	11	16	12	8	12	6	13	8	235
week 45	8	8	7	2	7	1	5	7	6	10	10	10	16	16	15	11	16	15	15	24	10	8	8	8	243
week 46	5	8	6	6	4	2	3	4	15	17	13	8	7	9	12	19	12	19	18	8	10	15	11	8	239
week 47	6	2	3	3	2	1	6	7	11	15	11	13	23	10	10	15	14	11	8	14	15	11	11	6	228
week 48	8	1	7	4	1	2	5	8	6	12	9	8	12	14	15	14	7	14	12	14	7	4	9	7	200
week 49	5	8	8	8	6	5	6	12	12	7	12	11	7	9	13	10	9	10	9	7	10	9	11	7	211
week 50	9	4	2	6	4	7	6	9	15	26	16	11	14	12	10	11	15	18	12	12	18	12	12	6	267
week 51	5	11	4	2	4	5	13	10	10	14	10	21	7	15	17	13	10	13	25	7	9	11	8	12	256
week 52	7	6	8	7	5	8	2	6	10	8	17	9	20	18	8	15	9	15	12	13	7	9	10	9	238
week 53																									0
Total Responses (1-4)	353	305	265	250	212	223	292	423	531	589	627	660	681	653	678	693	643	706	628	628	529	523	552	486	12,130
Max	15	14	15	12	14	8	13	14	21	26	23	22	32	24	25	27	27	31	25	29	19	23	22	23	295
Mean	6.8	5.9	5.3	4.9	4.1	4.3	5.7	8.1	10.2	11.3	12.1	12.7	13.1	12.6	13.0	13.3	12.4	13.6	12.1	12.1	10.2	10.1	10.6	9.3	233.9
90th Percentile Rank	10	10.9	9	8	6	7	9	12	15	16.9	18	17.9	18	17	18.9	18.9	16	18.9	17.9	17.9	15	15	15	14	256.8

SATURDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

SATURDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1	7	9	10	6	3	6	7	13	2	9	13	12	14	12	8	10	8	15	14	5	9	10	8	10	220
week 2	9	5	4	8	6	4	12	6	9	6	12	4	7	12	9	9	6	9	4	6	8	6	13	8	182
week 3	5	14	4	10	5	3	7	5	4	18	6	17	14	8	14	8	9	8	11	11	8	13	8	5	215
week 4	6	7	5	3	3		5	6	9	10	10	9	9	16	16	5	9	7	9	11	14	12	6	5	192
week 5	5	10	13	3	14	8	5	8	8	5	8	6	15	16	6	9	11	7	25	5	15	9	9	12	232
week 6	6	7	10	11	8	8	7	4	7	10	6	6	17	8	15	14	7	12	10	11	5	3	3	5	200
week 7	2	11	13	9	6	6	7	4	9	5	5	8	11	20	10	19	12	17	10	8	14	3	10	11	230
week 8	8	6	3	9	7	5	11	8	7	6	6	11	9	13	9	12	8	10	2	7	10	8	8	5	188
week 9	6	12	4	8	4	6	6	9	8	8	14	11	16	16	10	13	12	15	12	6	6	10	13	5	230
week 10	7	6	6	6	7	3	5	5	11	11	12	14	13	11	16	10	10	12	19	10	16	6	15	15	246
week 11	8	3	3	7	3	4	5	10	6	8	14	8	7	8	8	19	8	11	8	12	9	8	14	8	199
week 12	12	10	11	2	5	5	3	8	4	4	6	10	8	10	12	9	7	12	15	15	9	15	12	6	210
week 13	7	10	6	9	5	5	4	10	7	6	7	13	13	6	10	9	13	11	9	25	14	7	15	10	231
week 14	15	16	3	1	3	4	2	9	10	10	12	12	25	8	18	7	11	16	10	10	16	11	8	6	243
week 15	7	7	6	6	5	5	13	6	9	2	14	13	14	16	5	8	9	9	20	9	10	17	7	12	229
week 16	5	3	8	4	4	5	8	12	13	6	8	13	4	7	8	18	9	17	13	16	9	13	2	5	210
week 17	6	6	9	6	4	3	4	5	6	4	11	13	18	12	9	8	16	6	6	13	6	12	12	12	207
week 18	5	11	6	6	3		10	8	12	4	9	5	9	20	14	6	20	19	7	10	11	9	7	5	216
week 19	8	4	7	5	6	3	5	7	9	7	15	13	13	17	15	8	15	15	8	9	7	9	7	13	225
week 20	4	10	12	5	4	6	8	3	7	10	12	10	10	10	5	6	7	17	9	12	7	11	4	6	195
week 21	11	5	4	5	5	5	4	9	5	5	3	12	11	19	8	19	20	7	22	19	11	8	13	6	236
week 22	13	5	10	4	4	4	6	2	5	6	7	8	11	8	12	13	10	8	6	13	8	13	10	10	196
week 23	6	8	8	5	3	4	6	11	3	9	12	10	8	20	14	11	16	14	14	12	7	12	8	6	227
week 24	13	6	6	8	1	9	7	8	8	13	13	2	3	8	7	13	11	8	12	11	9	7	15	6	204
week 25	6	7	13	2	6	4	12	10	7	9	13	10	4	11	13	5	11	11	17	12	8	10	14	8	223
week 26	5	12	15	13	6	5	2	5	4	9	12	13	19	15	8	11	15	13	8	9	18	4	13	10	244
week 27	6	11	6	11	4	2	7	8	8	3	10	16	15	6	10	14	8	10	14	11	18	12	13	4	227
week 28	3	6	10	6	5	2	5	4	13	6	8	10	19	15	15	9	13	10	7	14	3	8	4	11	206
week 29	4	5	9	4	11	2	7	10	6	10	10	13	10	10	11	12	13	10	15	11	17	16	18	9	243
week 30	16	7	12	5	4	3		14	8	13	13	9	17	12	10	8	12	4	7	23	8	16	11	12	244
week 31	9	6	7	10	7	3	3	1	10	7	14	10	20	10	10	16	19	13	16	6	12	11	5	10	235
week 32	6	8	5	5	3	4	10	2	6	11	5	11	8	17	6	8	5	6	15	12	14	5	11	8	191
week 33	8	3	5	10	3	2	6	6	9	12	13	9	16	18	16	15	12	7	16	18	5	16	11	8	244
week 34	3	6	1	5	4	2	3	9	11	14	11	13	8	26	10	10	11	15	25	10	12	15	7	7	238
week 35	5	12	8	4	4	3	8	10	13	17	8	10	9	5	8	16	13	11	18	16	12	7	16	7	240
week 36	4	5	10	6	4	4	5	11	13	5	7	10	18	14	10	7	12	8	4	7	11	14	11	8	208
week 37	6	2	13	8	3	4	8	4	8	7	16	10	11	16	10	16	14	12	5	11	10	13	12	10	229
week 38	14	9	11	7	14	7	11	14	9	14	5	10	19	21	25	16	18	12	13	17	8	5	12	11	302
week 39	11	10	4	3	7	4	6	14	6	15	15	16	16	14	13	13	9	11	10	18	7	9	9	10	250
week 40	7	4	10	13	2	6	4	6	7	9	13	10	11	13	19	9	10	14	6	11	11	10	13	5	223
week 41	10	9	15	6	1	1		4	5	11	6	13	11	10	4	13	12	8	14	14	12	11	5	11	206
week 42	9	7	6	3	3	4	2	7	5	5	11	7	16	11	15	8	15	12	7	10	16	16	11	6	212
week 43	6	12	11	5	7	9	5	5	7	11	5	17	10	10	12	11	15	14	17	14	5	9	21	13	251
week 44	12	14	7	17	1	7	5	1	12	7	7	20	17	7	8	13	9	11	6	15	11	9	7	8	231
week 45	12	6	8	8	2	6	8	5	7	6	13	12	12	4	15	12	6	9	12	4	10	9	6	10	202
week 46	3	7	11	8	2	5	8	2	6	9	4	6	8	12	15	8	14	21	10	15	23	13	7	8	225
week 47	7	8	11	4	2	3	4	7	7	4	6	16	10	8	13	8	16	8	10	18	9	10	2	8	199
week 48	3	9	6	7	3	6	2	6	14	6	24	11	14	7	12	15	8	15	10	6	10	9	12	9	224
week 49	15	9	10	5	2	3	4	7	11	5	8	8	9	15	9	12	9	21	7	12	12	10	11	12	226
week 50	23	10	6	7	6	3	6	4	14	10	14	6	16	12	8	14	15	16	20	15	9	5	6	7	252
week 51	19	13	8	11	4	6	4	5	12	16	13	6	12	19	8	15	17	18	18	13	16	16	9	13	291
week 52	11	10	9	3	2	5	5	12	11	11	18	13	13	25	18	11	16	16	13	11	7	13	9	6	268
week 53																									0
Total Responses (1-4)	424	418	418	342	240	226	307	369	427	444	537	555	647	664	589	588	611	618	615	619	552	533	513	441	11,697
Max	23	16	15	17	14	9	13	14	14	18	24	20	25	26	25	19	20	21	25	25	23	17	21	15	302
Mean	8.2	8.0	8.0	6.6	4.6	4.3	6.1	7.1	8.2	8.5	10.3	10.7	12.4	12.8	11.3	11.3	11.8	11.9	11.8	11.9	10.6	10.3	9.9	8.5	224.7
90th Percentile Rank	13.9	12	12.9	10.9	7	7	10.1	11.9	12.9	13.9	14	15.8	18	19.9	16	16	16	17	18.9	17.9	16	15.9	14.9	12	249.2

SUNDAYS

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

SUNDAY	HOUR OF DAY																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
week 1																									0
week 2	3	7	11	6	3	5	14	7	10	8	7	19	9	10	11	8	9	4	22	7	18	7	12	5	222
week 3	6	2	7	4	9	4	3	5	3	18	10	15	7	6	10	16	10	7	14	9	11	11	4	7	198
week 4	5	6	4	4	4	3	2	9	10	15	12	6	15	11	13	5	7	6	12	8	9	10	15	6	197
week 5	5	10	10	10	4	1	17	4	15	9	9	5	11	8	8	13	7	6	12	7	12	5	7	7	202
week 6	10	11	6	3	7	5	7	8	8	7	12	16	10	12	13	15	24	17	11	6	8	6	8	10	240
week 7	13	4	4	10	2	5	5	11	6	7	12	9	8	11	8	13	6	7	8	11	12	15	6	7	200
week 8	6	11	16	6	9	8	14	10	13	13	15	8	7	22	17	6	9	9	13	9	10	9	10	13	263
week 9	3	4	4	7	4	7	1	9	5	7	5	10	12	7	15	16	9	9	11	2	8	7	6	11	179
week 10	7	10	5	12	5	4	9	6	5	9	5	10	10	10	7	13	11	13	15	13	10	11	10	6	216
week 11	16	4		9	6	3	11	4	5	5	10	9	16	18	18	7	10	6	6	14	17	10	13	6	223
week 12	13	11	6	11	6	4	4	12	4	11	25	10	14	17	15	6	8	11	13	11	8	12	12	19	263
week 13	3	6	3	7	10	6	6	4	8	9	8	4	16	10	11	12	5	11	14	5	13	10	7	11	199
week 14	11	5	11	5	10	7	4	13	3	5	11	9	13	13	8	6	9	16	24	9	6	12	8	6	224
week 15	10	7	12	4	4	3	5	10	7	10	14	13	16	15	22	5	13	8	15	14	9	11	12	10	249
week 16	13	4	4	2	2	5	6	8	17	9	13	6	4	18	19	11	8	23	13	9	19	8	14	5	240
week 17	11	6	10	3	3	4	4	9	7	7	6	12	10	12	11	11	14	7	17	7	6	9	8	1	195
week 18	6	12	2	4	6	4	6	1	4	8	4	10	20	4	17	16	12	4	14	9	17	7	8	8	203
week 19	9	4	6	4	3	5	10	3	10	5	21	11	13	13	8	9	4	14	11	15	6	25	10	4	223
week 20	7	7	4	7	5	4	5	7	9	11	11	9	14	13	7	15	4	15	18	10	12	9	8	6	217
week 21	6	6	11	9	4	5	4	2	5	9	10	14	5	18	13	7	10	7	10	14	6	14	18	4	211
week 22	6	5	11	9	3	4	9	7	3	11	12	14	18	15	18	10	9	8	33	17	12	12	4	12	262
week 23	5	8	8	5	6	6	8	6	8	9	14	8	20	20	12	14	11	9	13	5	6	16	7	13	237
week 24	10	2	10	8	9	8		8	8	9	17	6	15	10	9	10	10	10	8	5	5	12	6	7	202
week 25	7	10	9	5	6	6	2	13	14	9	10	10	9	5	9	13	9	12	13	12	4	8	14	9	218
week 26	5	10	6	11	6	6	3	6	4	6	17	13	14	13	12	8	17	12	14	12	10	8	11	8	232
week 27	9	9	3	5	8	4	3	15	10	16	11	11	7	10	11	18	7	23	14	13	10	20	4	7	248
week 28	5	14	9	7	7	3	17	3	5	11	8	13	7	16	9	11	11	17	21	18	5	18	12	10	257
week 29	13	7	4	2	3	4	5	6	5	10	13	10	25	15	7	6	14	7	21	10	8	5	9	5	214
week 30	7	8	12	4	3	8	11	12	7	19	13	9	15	8	12	9	10	12	12	12	7	13	7	7	237
week 31	11	5	7	2	7	2	6	4	7	10	13	9	5	12	12	15	11	21	18	2	11	16	13	5	224
week 32	8	5	8	6	2	4	4	7	8	9	13	12	10	14	23	12	10	10	8	11	11	7	18	3	223
week 33	2	1	12	6	4	3	3	2	7	13	10	14	6	11	4	5	4	11	11	7	13	9	8	9	175
week 34	14	8	6	5	6	8	3	9	5	10	16	17	11	21	10	9	14	12	18	12	6	6	5	6	237
week 35	1	18	6	7	3	3	5	4	11	6	9	9	13	8	21	9	10	10	7	13	4	5	11	9	202
week 36	7	9	10	14	5	4	4	4	12	5	17	9	15	12	12	11	8	11	17	11	6	11	6	5	225
week 37	12	6	11	10	4	5	9	1	6	11	7	11	6	16	8	9	11	7	14	9	8	5	11	8	205
week 38	16	8	7	5	2	7	7	6	9	7	13	19	11	12	16	9	11	12	11	11	7	8	12	9	235
week 39	8	12	15	12	7	5	8	5	3	10	10	17	11	9	19	10	9	9	15	9	11	5	13	9	241
week 40	12	11	7	8	7	4	9	9	11	4	5	10	10	15	9	9	4	12	5	6	19	12	4	5	207
week 41	8	6	6	6	8	9	8	5	12	14	9	12	14	8	21	10	4	13	16	7	16	12	2	9	235
week 42	11	3	6	6	3	7	10	3	6	11	7	11	11	15	8	6	10	12	22	13	5	7	9	7	209
week 43	7	11	9	6	9	7	12	11	8	14	11	8	23	22	22	16	9	12	7	13	9	9	3	6	264
week 44	8	6	9	12	9	4	7	4	10	9	16	7	15	13	9	10	5	7	4	4	9	9	8	10	204
week 45	10	12	9	10	3	3	12	11	8	9	16	11	15	12	12	5	4	8	22	8	14	6	6	6	232
week 46	8	8	3	7	6	1	3	3	10	10	5	12	22	15	14	1	9	21	16	14	11	4	6	10	219
week 47	9	4	4	6	8	5	9	4	4	13	9	12	4	14	16	16	15	6	7	13	7	8	8	7	208
week 48	8	10	10		2	5	5	10	8	2	5	13	9	18	9	15	7	14	12	15	4	21	8	6	216
week 49	12	10	5	10	5	2	6	10	13	12	13	16	12	13	10	11	4	11	9	11	19	7	8	8	237
week 50	9	11	9	7	2	7	6	3	7	4	12	6	15	10	11	12	8	7	6	14	12	9	21	8	216
week 51	11	8	2	9	6	8	5	3	5	5	9	11	19	8	9	13	9	9	13	6	8	20	8	9	213
week 52	5	7	10	11	7	6	13	4	15	19	8	10	4	18	12	14	8	13	16	14	4	16	10	5	249
week 53	11	4	7	6	7	3	6	9	10	8	4	19	15	9	12	14	22	16	11	10	16	8	3	3	233
Total Responses (1-4)	438	393	386	354	279	253	355	349	413	497	572	574	636	665	649	550	493	574	707	526	514	540	471	392	11,580
Max	16	18	16	14	10	9	17	15	17	19	25	19	25	22	23	18	24	23	33	18	19	25	21	19	264
Mean	8.4	7.6	7.6	6.9	5.4	4.9	7.0	6.7	7.9	9.6	11.0	11.0	12.2	12.8	12.5	10.6	9.5	11.0	13.6	10.1	9.9	10.4	9.1	7.5	218.5
90th Percentile Rank	13	11	11	11	9	7.9	12	11	12.9	14	16	16	18.9	18	19	15.9	14	16.9	21	14	16.9	16	13.9	10.9	249

Appendix C-3: Statistical Calculations Response Volumes
Mondays in 2019

HAMILTON PARAMEDIC SERVICE
DISTRIBUTION OF CALLS (TRANSPORTS) BY DAY OF WEEK AND HOUR OF DAY
1 JAN - 31 DEC 2019

MONDAY	HOUR OF DAY																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
week 1																									
week 2	8	11	4	2	3	4	11	6	4	17	15	7	11	6	11	8	8	16	12	8	8	12	12	7	211
week 3	4	7	4	1	6	1	16	5	8	7	9	7	14	10	16	20	11	11	26	14	7	5	10	6	225
week 4	6	4	4	8	5	3	11	8	13	10	16	11	16	8	14	10	17	6	18	17	22	14	9	7	257
week 5	5	4	4	5	6	3	3	4	5	10	13	21	14	17	9	14	8	11	10	11	5	14	16	8	220
week 6	6	5	2	3	4	5	5	7	12	14	10	11	17	17	7	20	10	18	10	13	11	11	5	3	226
week 7	7	7	2	3	4	7	5	8	10	22	12	16	24	10	10	12	14	15	14	8	15	6	6	6	243
week 8	11	6	9	7	5	2	5	9	10	18	2	8	10	7	11	14	12	8	13	11	10	8	10	2	208
week 9	4	6	8	4	5	6	4	7	8	13	12	17	13	10	15	8	12	16	16	10	14	8	10	3	235
week 10	2	6	7	3	3	8	3	8	10	11	22	11	13	13	12	7	10	10	14	6	11	7	5	5	219
week 11	3	4	3	3	4	5	5	10	10	19	6	13	9	15	16	11	5	8	15	3	9	18	17	6	217
week 12	5	6	7	4	4	5	7	6	15	12	18	16	14	17	17	9	14	11	12	14	14	9	12	13	261
week 13	6	3	8	7	3	3	12	6	11	16	5	14	10	16	12	13	9	9	13	21	12	8	13	10	240
week 14	8	9	9	2	5	3	8	9	9	15	14	12	17	15	9	13	11	14	17	11	27	7	8	10	268
week 15	5	7	8	4	1	3	6	14	5	13	22	14	11	17	14	4	8	17	18	12	16	12	9	9	249
week 16	9	6	3	7	3	6	13	8	7	17	12	13	21	12	13	12	10	9	9	9	12	10	7	9	237
week 17	3	3	7	4	4	9	12	10	6	19	7	11	13	16	9	21	10	14	4	13	6	12	9	7	233
week 18	4	8	2	11	2	4	7	3	9	9	10	9	15	9	12	17	11	16	12	9	11	13	13	8	224
week 19	4	4	4	4	4	5	5	14	4	4	15	10	15	13	11	14	7	12	19	17	9	11	7	3	215
week 20	10	6	5	4	5	1	4	11	9	16	15	12	4	8	10	9	11	9	15	5	10	18	9	5	211
week 21	16	6	4	5	6	8	8	6	22	11	11	7	11	7	9	10	8	16	15	8	15	7	8	5	223
week 22	10	8	6	8	3	7	6	7	9	13	15	15	17	13	10	18	9	18	12	16	9	10	6	7	252
week 23	8	11	4	9	5	6	5	8	7	9	25	14	23	12	9	6	14	12	20	11	12	20	22	9	275
week 24	5	9	8	6	8	4	2	5	5	8	6	12	8	20	14	10	11	15	16	13	9	9	6	5	214
week 25	4	5	7	9	5	7	8	7	6	14	9	12	8	7	9	14	8	13	10	12	19	12	11	9	219
week 26	11	8	2	2	2	4	1	9	4	13	19	16	20	8	11	13	7	13	13	9	8	20	17	10	240
week 27	6	11	10	7	3	6	8	6	7	14	15	9	11	16	9	10	9	8	15	9	11	5	7	6	218
week 28	5	5	4	5	2	2	7	5	7	10	13	12	11	15	14	12	12	13	9	13	11	16	5	10	218
week 29	13	5	8	8	5	1	8	18	6	17	13	14	14	9	10	10	11	7	13	7	15	8	9	9	238
week 30	7	1	9	10	8	4	8	10	13	11	7	10	9	18	12	15	14	7	11	12	23	11	11	11	252
week 31	5	7	3	7	3	1	16	6	4	7	17	8	18	12	11	12	18	13	16	10	13	6	13	12	238
week 32	6	3	4	4	1	6	7	3	17	9	4	6	11	8	11	17	6	9	18	11	9	7	3	1	181
week 33	8	6	3	1	6	3	2	3	9	4	11	13	15	13	30	20	15	17	7	7	13	10	6	9	231
week 34	6	2	7	8	1	5	8	2	12	14	13	13	26	11	21	18	15	15	15	7	16	13	10	10	268
week 35	16	7	3	5	5	3	1	8	7	9	18	17	11	7	14	9	9	19	10	11	15	6	7	8	225
week 36	4	5	3	12	2	10	8	6	8	11	12	12	12	9	9	10	10	15	10	6	5	7	8	8	202
week 37	7	3	7	1	1	5	3	8	3	13	9	9	7	27	20	11	5	9	13	17	6	7	19	11	221
week 38	2	5	4	2	6	1	4	8	8	8	9	13	9	16	16	10	9	13	8	3	7	11	7	4	183
week 39	3	7	3	4	5	3	5	8	9	16	17	14	10	11	13	9	7	11	21	6	10	3	12	6	219
week 40	9	3	6	9	2	3	3	8	7	16	8	10	14	14	8	22	8	22	17	13	9	8	8	4	231
week 41	10	3	9	5	5	6	4	3	6	14	11	19	12	13	6	9	11	4	19	8	8	15	9	8	223
week 42	5	5	8	6	4	4	6	12	7	12	14	13	8	15	9	9	20	11	12	11	10	10	8	8	227
week 43	6	6	4	3	6	6	5	7	17	7	16	8	6	10	21	18	17	10	9	14	10	2	6	5	219
week 44	3	6	2	4	4	3	5	5	7	11	14	6	7	11	14	21	12	10	20	16	9	6	15	5	216
week 45	7	6	1	9	5	5	12	4	13	8	15	16	16	6	11	10	7	22	10	10	6	6	5	5	215
week 46	1	7	1	5	3	5	6	12	8	14	20	10	10	13	10	18	19	16	12	26	6	5	10	15	258
week 47	2	5	4	3	6	3	13	7	8	12	12	8	22	11	5	9	15	4	13	11	4	14	13	4	208
week 48	3	4	2	3	4	7	2	11	7	9	11	18	14	10	6	10	13	11	19	15	15	4	10	12	226
week 49	1	5	7	9	4	8	10	9	15	20	15	8	12	11	11	10	7	11	21	13	10	16	16	6	255
week 50	6	8	9	3	3	4	3	9	9	17	13	7	17	20	14	15	7	15	21	19	11	8	9	13	260
week 51	7	7	15	8	4	6	7	11	3	12	18	15	15	11	11	9	6	8	13	9	9	7	7	6	224
week 52	10	5	4	14	9	7	19	9	6	17	7	22	14	10	16	23	15	13	13	13	10	16	5	5	282
week 53	4	7	6	7	6	5	10	7	12	19	20	3	12	14	9	10	23	9	8	12	8	10	16	9	246
TOTAL	332	303	271	275	218	241	362	400	453	661	672	622	709	664	631	669	575	639	726	590	588	518	511	376	12,006
Min	1	1	1	1	1	1	1	2	3	4	2	3	4	6	3	4	5	4	4	3	4	2	3	1	181
Max	16	11	15	14	9	10	19	18	22	22	25	22	23	27	30	23	23	22	26	26	23	20	22	15	282
Average	6.4	5.8	5.2	5.3	4.2	4.6	7.0	7.7	8.7	12.7	12.9	12.0	13.6	12.8	12.1	12.9	11.1	12.3	14.0	11.3	11.3	10.0	9.8	7.2	231
3rd Quartile	8	7	7	7	5	6	8	9	10	16	15	14	16	16	14	17	14	15	17	13	13	12	12	9	244
90th Percentile Rank	10	8	8.3	9	6	7	12	11	13	17.3	18.3	16.3	19.3	18.3	16.3	20	16.8	17	19.3	16.3	15.3	16	16	11	260
95th Percentile	13.1	10.2	10.8	11.2	7.8	9.0	15.0	13.8	16.4	20.3	22.6	19.3	23.8	21.8	21.3	22.1	19.1	20.5	22.6	20.0	21.1	18.5	17.9	13.4	273

Appendix C-4: Maximum Experienced Demand Heat Map
Day of Week, Year and Hour of Day – Fiscal Years 2013 through 2020

Maximum Responses by Hour of Day

2013 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	17	9	8	8	11	9	11	14	17	24	17	20	19	21	21	19	14	14	16	14	24	18	15	16
Tuesdays	22	14	17	12	10	9	12	11	18	16	24	24	17	18	18	18	21	18	13	30	26	18	15	13
Wednesdays	12	8	13	9	7	10	11	17	21	30	23	18	18	20	21	18	20	17	18	16	14	15	15	13
Thursdays	12	10	10	9	9	15	9	15	14	16	23	29	20	20	26	24	23	19	19	21	16	17	13	15
Fridays	13	13	9	9	8	10	9	10	17	19	26	20	25	18	21	22	23	16	20	17	21	18	15	19
Saturdays	14	14	13	13	10	8	10	10	13	15	15	19	19	17	17	16	18	20	15	16	16	20	21	16
Sundays	14	13	12	14	11	9	10	13	18	16	15	27	18	18	25	15	16	19	21	20	19	17	13	10

Maximum Responses by Hour of Day

2014 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	13	10	13	7	7	10	16	14	16	21	23	21	18	26	21	19	20	24	18	17	20	21	15	13
Tuesdays	11	10	12	11	8	8	12	13	18	19	18	19	25	20	20	19	21	22	21	16	16	13	19	14
Wednesdays	11	12	18	15	13	9	11	15	25	20	22	25	20	23	26	20	25	19	20	22	18	19	16	11
Thursdays	9	9	7	10	11	8	12	14	14	21	23	22	23	24	26	20	16	23	16	21	20	18	15	14
Fridays	15	11	13	8	10	7	17	14	14	24	18	21	24	27	23	22	19	25	16	20	16	16	14	15
Saturdays	13	13	18	11	12	7	12	16	13	17	15	21	17	21	24	18	16	23	18	17	21	20	20	17
Sundays	16	13	12	12	9	9	9	11	16	18	16	15	20	22	20	17	16	18	23	15	15	19	16	20

Maximum Responses by Hour of Day

2015 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	14	17	10	9	8	9	12	13	17	27	30	27	24	21	19	32	26	20	20	20	21	19	14	12
Tuesdays	14	10	13	8	12	10	12	15	14	18	33	22	20	21	25	21	22	18	18	19	15	19	16	15
Wednesdays	13	9	17	9	12	10	14	12	14	24	23	20	21	22	19	22	21	21	22	18	21	16	15	13
Thursdays	20	17	8	9	9	11	13	11	19	19	22	21	21	24	24	21	20	22	22	21	21	17	15	11
Fridays	16	12	11	10	8	10	14	15	16	19	20	21	20	22	22	17	21	21	20	16	18	15	16	14
Saturdays	13	15	10	10	11	11	10	9	16	14	17	25	20	18	18	23	21	18	18	21	19	20	21	13
Sundays	15	16	13	9	9	8	14	13	14	13	19	26	19	26	23	20	17	16	21	26	28	18	14	13

Maximum Responses by Hour of Day

2016 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	13	12	11	12	10	12	17	16	24	20	20	21	32	26	23	21	21	22	19	19	19	15	18	12
Tuesdays	13	14	12	12	8	7	22	15	18	21	22	22	22	21	21	19	28	26	23	23	19	20	17	17
Wednesdays	12	12	10	10	10	9	15	16	23	22	25	20	21	20	22	20	18	22	24	19	16	19	17	15
Thursdays	14	13	10	15	9	10	12	18	17	17	21	21	21	22	21	26	21	23	22	17	19	20	14	13
Fridays	16	19	13	15	12	13	10	17	20	23	18	20	20	21	17	35	20	20	21	18	17	22	18	19
Saturdays	17	15	16	10	13	11	14	13	14	18	17	20	21	18	21	19	21	21	23	26	22	17	17	26
Sundays	19	19	17	15	10	11	18	16	17	21	22	22	24	19	21	21	18	21	22	19	19	28	23	14

Maximum Responses by Hour of Day

2017 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	12	11	15	12	9	11	17	17	19	21	21	22	22	19	19	21	22	26	25	20	24	24	17	15
Tuesdays	13	11	11	13	13	12	16	16	18	20	22	24	23	21	25	29	23	21	26	24	18	22	17	14
Wednesdays	14	17	12	10	9	13	14	12	21	24	25	24	22	30	26	25	20	30	24	25	19	19	14	14
Thursdays	17	13	11	11	9	10	15	21	19	20	20	35	24	26	21	20	23	21	20	25	19	22	16	24
Fridays	13	24	12	11	11	10	12	16	15	23	23	26	22	21	27	24	24	21	24	26	22	21	20	19
Saturdays	16	22	19	18	12	16	15	10	19	24	20	21	21	20	23	22	24	20	23	24	22	16	18	14
Sundays	16	16	18	14	11	9	13	14	16	22	18	23	27	24	24	29	18	34	19	19	20	19	21	14

Maximum Responses by Hour of Day

2018 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	16	10	13	7	7	10	16	14	16	21	23	21	18	26	21	19	20	24	18	17	20	21	15	13
Tuesdays	15	10	12	11	8	8	12	13	18	19	18	19	25	20	20	19	21	22	21	16	16	13	19	14
Wednesdays	15	12	18	15	13	9	11	15	25	20	22	25	20	23	26	20	25	19	20	22	18	19	16	11
Thursdays	17	9	7	10	11	8	12	14	14	21	23	22	23	24	26	20	16	23	16	21	20	18	15	14
Fridays	20	11	13	8	10	7	17	14	14	24	18	21	24	27	23	22	19	25	16	20	16	16	14	15
Saturdays	15	13	18	11	12	7	12	16	13	17	15	21	17	21	24	18	16	23	18	17	21	20	20	17
Sundays	20	13	12	12	9	9	9	11	16	18	16	15	20	22	20	17	16	18	23	15	15	19	16	20

Maximum Responses by Hour of Day

2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	16	11	15	14	9	10	19	18	22	22	25	22	29	27	30	23	23	22	26	26	29	20	22	15
Tuesdays	17	12	10	12	9	10	14	15	19	24	23	28	23	24	21	23	23	24	26	22	16	20	23	16
Wednesdays	16	12	12	14	10	16	14	16	21	22	28	25	24	27	27	28	24	22	18	27	20	16	18	17
Thursdays	14	11	13	10	10	10	14	19	24	24	20	22	21	25	23	24	25	32	22	22	23	19	20	18
Fridays	15	14	15	12	14	8	13	14	21	26	23	22	32	24	25	27	27	31	25	29	19	23	22	23
Saturdays	23	16	15	17	14	9	13	14	14	18	24	20	25	26	25	19	20	21	25	25	23	17	21	15
Sundays	16	18	16	14	10	9	17	15	17	19	25	19	25	22	23	18	24	23	33	18	19	25	21	19

Maximum Responses by Hour of Day

2020 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	12	11	13	14	13	10	16	18	25	29	31	32	26	18	28	23	24	20	23	23	16	19	22	16
Tuesdays	13	12	9	10	13	12	14	24	17	25	22	23	22	24	19	27	20	21	23	19	24	20	15	12
Wednesdays	20	17	15	16	10	10	17	14	18	18	21	20	24	24	23	29	26	23	27	19	19	17	21	15
Thursdays	18	15	10	12	10	12	21	15	30	22	24	26	23	22	23	24	31	26	24	20	19	22	17	20
Fridays	14	10	14	11	12	16	15	19	18	22	26	24	23	20	26	22	23	24	26	29	21	19	15	17
Saturdays	13	18	12	18	11	10	12	13	19	23	21	18	20	19	23	22	29	21	30	22	21	23	16	18
Sundays	17	16	12	13	14	13	13	12	17	20	26	23	24	20	27	22	23	29	24	26	20	17	24	16

APPENDIX C
Service Demand

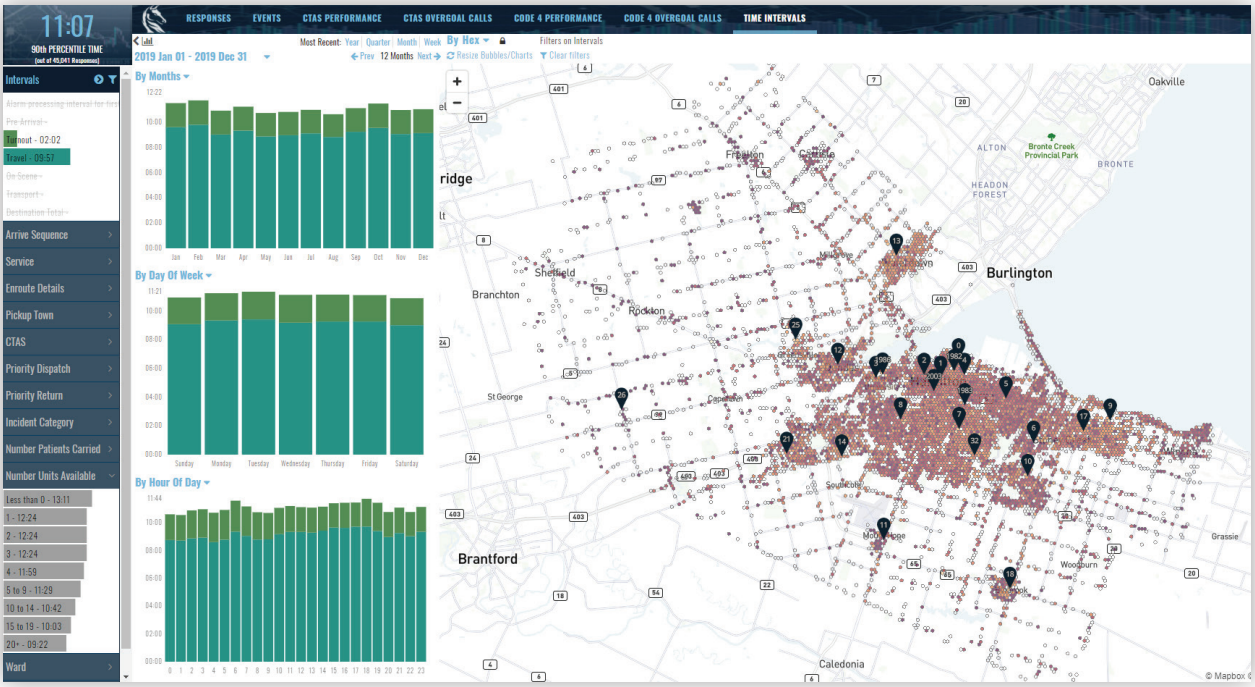
Appendix C-5: Darkhorse Analytics
Vehicle Availability and Emergency Call Response Time
– Time of Day and Day of Week 2018-2020

2018 – RESPONSES PRIORITY 1 TO 4 – HOUR OF DAY, DAY OF WEEK, MONTH – HAMILTON SERVICE ONLY

2018 – RESPONSE TIME PERFORMANCE – URGENT ONLY – T2-T4 ONLY – BY HOUR OF DAY, DAY OF WEEK AND UNITS AVAILABLE

2019 – RESPONSES PRIORITY 1 TO 4 – HOUR OF DAY, DAY OF WEEK, MONTH – HAMILTON SERVICE ONLY

2019 – RESPONSE TIME PERFORMANCE – URGENT ONLY – T2-T4 ONLY – HOUR OF DAY, DAY OF WEEK AND UNITS AVAILABLE



2020 – RESPONSES PRIORITY 1 TO 4 – HOUR OF DAY, DAY OF WEEK, MONTH - HAMILTON SERVICE ONLY

2020 – RESPONSE TIME PERFORMANCE – URGENT ONLY – T2-T4 ONLY – HOUR OF DAY, DAY OF WEEK AND UNITS AVAILABLE

Appendix C-6: 90th and 95th Percentile Experienced Response Demand Heat Map
Fiscal Years 2013 through 2020

90th Percentile by Hour of Day

2013 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	8	7	7	6.6	6	6	8	9	13	17.3	16	16.3	13	14.3	14	15	13	11.3	13.3	12	11.4	11.5	13.4	8
Tuesdays	8.4	7	7	5	6.3	6	6	8.3	11	13.3	13	15	13	15	15	13.4	13	15.2	12	13	11.2	14	11.4	8
Wednesdays	8	6	7.2	6.5	6	5.3	7	9.2	11	14	16.2	15	15.2	15.2	15.2	14	13.2	14	13	14	11	11	11	9
Thursdays	7	7	7.3	7	6	6.4	7	11.2	11.4	12	16	14.2	16	15	16	14.6	16	14	13	12	13	12	10	9.2
Fridays	8	7	7	7.5	5	5	7.4	8	10	14	14.2	14	16	15.2	15	15	12	15	12.2	13.2	13.2	13	11	10.2
Saturdays	10	11	11	7	6	5.2	7	9	8	13	12.2	14.6	14.4	13.2	13.2	13	12	14	13	12	14	15	10.2	13
Sundays	10.3	10	9	9.5	7	5.7	6.3	8.3	8.3	13.3	11	13	13	13	14	12	13	13	12.6	13.3	12	11.3	10.5	9

90th Percentile by Hour of Day

2014 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	8	7	8	6	6	6.2	8.1	9	13	15	16.9	16	14.9	16	15	16	15	15	14.1	13.9	13.9	13	13	9.9
Tuesdays	9.1	6	8	6	6.1	5.2	10	11	11	12.9	15	14	16	15	15.8	14.9	13.9	14	14	12.9	13.9	11	11	8
Wednesdays	7.8	8.2	7.2	7.3	7	7	8.9	10.8	14	16.9	15.8	16.8	14.8	12.8	14	14.8	16	14.8	15	14.8	13.8	11	11.8	9
Thursdays	7	7	7	6	6	6	8	10.9	12	13	16	15	15	14	14	14	14	15	13.9	15	13	12	12	10
Fridays	9.1	7	7.2	6	5	5	8	9	10.9	15	15	16.9	14.9	15	16.8	16.9	15	16	13.9	15.9	11	12.9	12.9	11.9
Saturdays	11	10	11.9	7	7	6	9.1	8	9	11	13	13.9	13	15.9	14.9	14	13	12	14	14.9	13	14.9	13	10.9
Sundays	10.9	10.9	11.1	8	6	6	8	8	11.9	11	14	13.9	14.9	17.9	14	13.8	12.9	14	14.9	11	12	13.8	13.9	9.9

90th Percentile by Hour of Day

2015 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	8.3	6	7	8	5.7	6	9	10	12.3	17	19	19	18	17.3	15	20.3	16.3	15.3	16.3	13	14	12.3	11	9
Tuesdays	8	7.6	8	6	6.3	6.5	8	10.3	11.3	15	15	15	15.3	16	19.2	17	17.3	13.3	15.3	13	11.3	15	11	9.5
Wednesdays	9	7	6	6	5.5	5.5	9.4	8	11	16.3	17.3	17	16	15.3	15	15.3	14.3	15	15.3	14.3	15.3	12.3	10.3	10
Thursdays	9	6	6.4	5	5.7	6	9	9	14.2	15.2	16.2	17.2	16	17.6	16	15	13.4	15.3	16	15	15.2	14	12	8.2
Fridays	9	7.2	7	8	6	6.2	8	10.2	13.2	15	15	17	18.2	17	15.2	15	15.2	17	16.2	14	13	13	14	10.4
Saturdays	11.2	11.3	9	8	7	7	8	7	11	12.2	15	15.2	15.2	15	12.4	14	14.6	16	14.2	16	14	15.2	13	11
Sundays	9	12	9	8	7	6	8	10	9.3	11	12.3	13.3	15.3	17.3	16	12	14.3	14	16.3	14.3	15.3	12.6	10.6	10.8

90th Percentile by Hour of Day

2016 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	9.4	7.4	7	6.4	6	7.4	10	10.6	14.3	15	16	18	18.3	17.3	17	16	17.3	18	16.3	16	15	13	12.6	11
Tuesdays	10	8.4	7	7	6	6	8	10.3	13	14.3	16.3	16	17.3	14.6	15	17	16.6	17.6	16.3	15.3	15	12.3	13	12
Wednesdays	9	8	6.3	6.3	8	5.8	11	10.4	13.3	15.3	14	17	17.3	15.3	16.3	16	16	16	14.4	15	14.4	15	12	12.4
Thursdays	8	9.4	8	7	6	6	9	11	12.3	13.3	17	15.3	17.3	15	15.3	16	17.3	18.3	17	14	14	12	12	10.3
Fridays	9.2	8.4	8	7	7	7	8	12.3	11.2	13.4	14.4	15.2	17	17.2	15	18.4	14.2	17	17	14.2	14	14.2	13	13
Saturdays	11	10	10	8	7.3	8	9	9	11.2	13	14	13	17	15	15	16.2	14	15	16	16.2	14	15.2	14.2	14
Sundays	13.3	11	11	8.5	7	7.4	10	10.3	11.3	13.3	15	15	15	15	14.3	14	13.3	15	15.3	14	12.3	15	12.3	12

90th Percentile by Hour of Day

2017 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	10	9	10.9	8.9	6	7.9	10	12	14.9	17	17.9	18	15	17	16	17.9	18	16.8	17	15	16.8	13	11.9	11
Tuesdays	9.2	8	8	8.2	7	7	12	10	11.4	16.2	18	18.2	17	17.2	18	20.2	18.2	16	16.2	16	15	15	13	10.2
Wednesdays	9	6	7.2	7.2	7.2	8	11	11	13.2	15.2	17.6	18.2	18	19.2	18.2	17.6	18.2	17.2	19	19	16	15	11.2	11
Thursdays	11	8.2	8.2	8.2	6.2	7	11	10.2	13	17	17.2	19	16.4	18.2	17.2	17	15.2	17.2	17.2	17	14.2	13	12	14
Fridays	11	9.2	8.2	7	6.2	8	9	12	14	16.2	18.2	19	16	16	17	17.2	17.4	17	17.4	17.2	17	18	15.2	13.2
Saturdays	12	11.2	11	9.2	7.2	8	9.2	8.2	14	13	14.2	16.2	16	16.2	18	15	15.2	17	17.2	16	16	13	12.2	12.2
Sundays	12	12.2	9.4	9	7.2	7	10	9	13.2	14	14	16	15.2	17	15	17	16	16.2	17	17	15.2	14	14	10.2

90th Percentile by Hour of Day

2018 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	10.8	7	8	7.9	7.9	7	9	11.9	14	16	18	19.8	17	18	15	18.8	17.8	16	18	15.8	16.8	15	13	13
Tuesdays	10	7.9	9	9	7	7	11	13	13.9	15.9	15.9	20	17.8	18	20.7	18.9	17	16.9	16.9	19.8	17	16	13.9	11
Wednesdays	10	10	7	7	7.2	7	9	11.9	15	16.9	19.9	17	16.9	18.9	16.9	17.9	16.9	15	19	18.8	16	14	13	11
Thursdays	9	10	7	8	8	8.9	9	11	12	16	23	17.9	20.9	19	17.9	15	17	17.9	20	15.9	15	15	14.9	10
Fridays	10	8	9	7	7	8	10	10	12.9	16	15	17	17	19	18	18	18	20.9	19	19	16.9	17	15	12.9
Saturdays	11.9	10	9	8.9	8.1	7.2	10	10	11	13	14.9	17.9	17.9	16	16.8	18.8	15.9	16.9	17	17	15.9	14.9	15.8	13
Sundays	13	11	11	9.9	8	8	10	11	11	13.9	17.8	15	16	16.9	16	15	14.9	17	16.9	16	16.9	16.9	13	13.9

90th Percentile by Hour of Day

2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	10	8	8.9	9	6	7	12	11	13	17.9	18.9	16.9	19.9	18.9	16.9	20	16.8	17	19.9	16.9	15.9	16	16	11
Tuesdays	11	7.9	7	7	8	7	10	11	14	16.9	21	20.9	18	18	18	18.9	18	18	18	17	13	16	14	12
Wednesdays	10	10	8.1	7	7	7.1	10.3	11	14	16	18	20	21	17	19	21	17	18	15	17	14	13	12	13
Thursdays	11	9	8	7	7	7.1	9	13	17	18	17	18	17	18	18	20	17	19	19	17	16	16	14	13
Fridays	10	11	9	8	6	7	9	12	15	17	18	18	18	17	18	19	16	19	18	18	15	15	15	14
Saturdays	14	12	13	11	7	7	10.2	11	13	14	14	16	18	20	16	16	16	17	19	18	16	16	15	12
Sundays	13	11	11	11	9	7.9	12	11	12.9	14	16	16	18.9	18	19	15.9	14	16.9	21	14	16.9	16	13.9	10.9

90th Percentile by Hour of Day

2020 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	10.9	9	9.9	7.9	7	7	10	11	14	17.9	19	20	17	16	17.9	17	17.9	14	17.9	15.9	13.9	12	12.9	11
Tuesdays	8.9	7	7	7	7	8.9	9	11.9	12	14	16.9	16	19	16	17	16.9	17.9	18	16.9	16.9	16	14	12	10
Wednesdays	9	9	8	7	7	8	11	13	13.6	15	18	18.8	18.6	16.8	17.8	18	16.8	18.8	18.8	15.8	14	14.8	14.8	10.8
Thursdays	10.9	10	7	7	6.9	7	10	11	14.9	17.8	17.8	17	17.8	17	17	17.8	17	17.8	18.8	14	15.8	16.8	12	12.8
Fridays	9	8	9	8	8	7.1	9	13	12	14.9	17.9	18.9	19	17	20	17.9	19	18	20	19	16	13	13.9	13
Saturdays	11	10.9	10	9	7	8	10	11	12	14	16.8	16	15.9	16	17	16.9	18.9	17	20	18	16.9	14	14	12
Sundays	10.9	10	10.1	9	9.1	8	8.9	9.9	12.9	13	17	16	16	14	16	17	14.9	19.6	18.9	15	15	14.9	14	13

Service Demand

APPENDIX C

95th Percentile

Mondays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	10.8	8.0	7.6	8.0	7.7	7.3	9.5	12.4	14.8	19.4	17.6	18.6	16.3	16.9	17.3	17.5	14.3	13.8	15.2	13.9	15.2	14.4	14.3	11.7
Mondays	10.0	8.3	9.9	7.1	6.6	8.4	11.0	11.7	14.5	18.7	20.2	18.6	17.8	20.2	18.2	18.0	17.8	18.6	16.9	16.3	16.1	15.9	14.7	11.2
Mondays	11.3	9.2	8.7	9.2	7.2	7.0	10.8	12.5	14.6	21.5	22.2	21.4	20.5	19.9	18.4	23.5	19.7	18.3	19.0	17.0	17.5	15.3	13.3	11.5
Mondays	11.8	10.1	8.5	8.6	7.8	9.3	13.2	13.8	18.3	18.6	19.1	21.3	21.7	21.4	18.8	18.9	19.3	19.6	19.1	19.0	17.8	14.4	15.1	12.3
Mondays	11.8	10.6	11.9	9.8	7.5	9.3	13.0	14.7	16.9	20.3	19.5	21.2	19.5	19.3	18.5	19.9	20.3	20.3	20.2	18.1	19.8	17.6	14.5	13.0
Mondays	13.6	9.0	10.8	10.1	9.2	7.6	11.3	14.8	16.7	19.0	22.0	23.1	20.2	22.1	18.5	21.6	21.6	19.9	20.4	19.0	19.0	18.1	15.3	14.5
Mondays	13.1	10.2	10.8	11.2	7.8	9.0	15.0	13.8	16.4	20.9	22.6	19.9	23.8	21.8	21.3	22.1	19.1	20.5	22.6	20.0	21.1	18.5	17.9	13.4
Mondays	12.3	10.8	11.5	9.8	8.9	9.2	12.2	14.1	17.7	22.0	23.1	24.9	21.3	18.5	21.6	20.8	21.1	18.0	20.4	17.8	15.6	15.8	16.4	13.6

95th Percentile

Tuesdays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Tuesdays	12.2	9.4	10.1	7.1	8.2	7.2	8.3	10.8	14.3	15.4	18.0	17.5	14.9	17.2	16.9	16.5	15.8	17.1	13.2	18.2	15.6	15.5	13.6	10.4
Tuesdays	10.8	8.5	9.0	7.4	7.2	6.5	11.1	12.6	14.4	15.7	16.3	16.6	20.4	17.9	18.2	17.8	16.9	17.7	17.4	14.9	15.5	12.6	13.9	10.6
Tuesdays	10.1	8.6	10.0	7.3	8.2	8.0	10.0	12.3	13.5	17.0	20.1	18.8	18.5	19.0	21.6	19.3	19.1	15.7	18.3	16.0	14.3	16.8	13.4	11.7
Tuesdays	11.7	11.1	8.9	8.6	6.7	7.5	12.2	13.3	15.8	17.7	20.5	18.9	20.0	17.7	18.2	18.8	21.0	20.6	20.5	18.8	17.1	16.4	15.4	13.5
Tuesdays	11.7	9.5	9.2	10.6	9.1	9.4	13.7	12.7	15.5	18.2	20.8	20.8	19.4	20.6	21.4	22.7	21.1	18.7	20.4	18.5	17.5	17.2	15.3	12.0
Tuesdays	12.6	9.1	11.0	9.8	8.6	8.4	12.7	15.0	17.2	17.7	18.8	24.3	20.8	21.2	22.9	21.9	20.3	19.6	19.9	23.1	19.8	18.4	17.2	14.2
Tuesdays	14.4	10.6	9.5	9.4	9.2	8.5	12.1	13.0	16.9	20.8	23.6	23.7	22.6	22.2	19.7	21.4	21.2	21.1	21.6	20.1	15.6	17.7	18.0	14.2
Tuesdays	11.0	8.8	8.2	8.6	8.9	10.2	11.9	15.4	14.5	19.5	19.3	19.1	21.5	20.2	19.2	20.4	20.6	20.5	20.5	19.0	20.1	16.6	14.6	12.1

95th Percentile

Wednesdays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Wednesdays	10.3	7.2	9.2	7.9	7.0	7.9	9.3	11.9	14.2	18.0	18.3	16.9	16.6	18.6	18.0	16.9	17.1	16.9	15.3	16.4	12.7	12.8	13.0	11.2
Wednesdays	9.4	9.8	10.9	9.3	8.8	8.0	10.3	12.3	18.1	19.1	18.3	20.4	17.7	17.5	18.7	17.2	18.8	16.6	17.5	17.1	15.8	14.4	13.8	10.6
Wednesdays	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Wednesdays	10.5	9.9	8.2	7.7	8.9	7.5	11.5	12.4	17.2	19.0	18.0	20.0	18.7	18.8	19.2	18.3	17.8	18.6	17.9	17.7	15.6	17.2	14.5	14.1
Wednesdays	10.7	10.3	9.2	8.5	8.4	9.7	12.6	11.9	17.5	18.9	21.4	21.7	20.5	22.7	21.1	22.4	20.3	22.1	21.3	21.3	18.4	17.3	13.8	13.0
Wednesdays	13.0	11.5	9.1	9.4	8.9	8.6	12.8	14.1	18.7	19.7	24.1	21.0	20.9	22.5	23.4	20.9	21.3	18.7	22.1	23.0	18.6	17.3	17.2	13.6
Wednesdays	12.0	11.2	10.6	9.2	8.5	10.5	12.2	13.8	17.3	19.0	22.5	22.5	23.9	21.0	24.0	24.4	20.5	20.8	18.0	21.3	17.0	15.2	15.2	14.7
Wednesdays	12.5	11.5	10.1	10.2	8.6	9.4	13.9	14.5	16.1	17.3	20.2	21.5	22.2	20.1	20.4	22.2	21.1	21.9	22.6	18.2	17.5	16.3	16.7	13.0

95th Percentile

Thursdays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Thursdays	9.3	8.8	8.6	7.7	7.2	9.0	8.3	12.9	13.6	14.5	19.4	20.2	18.5	18.3	18.4	18.2	19.0	17.1	16.7	16.0	14.8	14.3	12.0	12.1
Thursdays	8.8	7.9	7.3	8.0	7.7	7.2	9.8	12.2	13.7	16.9	19.6	18.0	18.6	18.1	18.4	17.4	16.6	17.9	16.2	17.8	15.2	15.3	14.7	11.4
Thursdays	12.0	9.4	7.5	6.5	7.3	7.3	10.7	10.6	16.6	17.3	19.3	19.9	18.3	21.0	19.0	18.1	16.9	18.5	19.4	17.9	17.7	16.0	14.0	10.4
Thursdays	11.3	11.3	9.2	9.5	7.4	7.6	11.4	13.9	14.2	17.1	20.8	18.1	20.0	19.7	18.6	20.8	19.5	20.5	20.4	16.3	16.5	15.6	13.6	11.9
Thursdays	13.1	10.8	9.8	10.5	7.9	8.7	12.6	13.3	16.7	18.8	19.3	24.3	20.0	22.0	20.9	19.9	19.4	20.0	20.2	20.0	17.3	16.8	14.0	17.3
Thursdays	12.7	12.4	9.2	9.9	8.4	10.5	11.2	14.3	15.4	18.6	24.3	20.9	23.3	22.1	20.9	18.7	19.1	20.5	23.5	19.4	19.5	18.1	17.5	12.9
Thursdays	12.4	10.2	10.6	8.9	8.8	8.9	11.7	15.5	18.9	21.8	19.0	21.1	20.9	21.9	20.6	22.9	20.3	23.1	21.0	19.8	19.2	17.7	16.6	14.8
Thursdays	13.4	11.5	8.6	8.7	8.3	9.7	13.6	13.5	19.1	19.8	21.3	20.9	20.5	20.4	20.3	20.4	21.7	21.0	21.5	17.9	18.6	19.2	14.3	15.1

95th Percentile

Fridays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Fridays	10.4	9.6	8.8	8.2	6.8	7.4	8.0	9.6	13.1	16.3	18.4	17.3	18.5	18.1	17.5	19.2	16.7	17.0	14.6	16.0	16.0	15.5	14.4	13.8
Fridays	11.1	9.1	9.8	7.3	7.0	6.5	10.3	11.2	12.5	18.6	16.9	18.6	17.9	18.6	19.1	18.7	17.8	18.8	15.9	17.5	13.9	14.4	14.9	13.8
Fridays	11.2	9.2	8.6	9.1	7.3	7.9	10.1	12.5	15.1	17.4	18.2	18.9	20.0	19.3	18.9	17.2	18.2	18.8	18.2	16.1	15.5	14.0	15.9	13.0
Fridays	11.9	11.7	10.1	9.8	8.8	9.7	9.7	14.2	16.0	17.7	17.3	17.9	19.4	20.0	17.7	22.7	17.5	19.4	18.4	17.8	16.3	17.5	16.0	14.3
Fridays	12.0	13.0	10.0	8.4	8.5	9.5	12.1	14.6	15.8	19.5	21.6	22.2	19.1	18.8	20.8	21.0	21.4	20.3	20.8	21.1	19.6	18.8	17.6	15.7
Fridays	13.7	11.1	11.4	8.5	9.7	9.9	11.1	12.9	15.3	18.0	18.0	20.2	20.1	23.6	25.2	21.5	21.8	22.4	22.0	21.9	20.2	19.1	17.3	15.0
Fridays	12.2	12.5	11.0	9.7	8.9	8.4	11.4	14.4	17.4	20.7	21.3	21.3	23.6	20.3	21.6	22.3	20.6	23.9	20.3	22.6	17.2	18.1	18.5	17.0
Fridays	11.8	10.0	10.2	9.4	9.6	9.8	11.5	16.0	14.9	18.8	21.2	22.2	21.6	20.1	23.9	20.7	22.1	21.5	23.1	22.4	19.0	16.9	16.1	15.6

95th Percentile

Saturdays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Saturdays	12.1	12.5	11.7	9.9	7.6	6.7	8.7	9.8	10.1	14.7	14.6	17.5	16.9	15.4	15.5	14.9	14.4	16.2	15.0	14.7	16.5	17.2	14.5	15.3
Saturdays	12.5	12.0	13.7	9.0	8.9	7.1	10.9	10.3	10.7	14.2	14.8	16.4	15.3	18.5	18.6	16.6	15.1	16.1	16.6	16.1	17.4	17.0	15.7	13.6
Saturdays	12.8	12.9	9.8	9.2	8.7	8.6	9.3	8.3	12.7	14.6	16.4	19.4	18.7	17.8	15.8	17.1	17.3	17.8	16.5	18.8	16.2	17.4	17.0	13.0
Saturdays	13.9	12.6	12.4	9.1	9.1	9.1	11.1	11.2	12.9	16.2	15.9	16.3	19.0	17.1	18.0	17.9	17.5	18.7	19.7	21.0	18.3	17.0	16.1	17.7
Saturdays	13.6	14.4	14.0	11.6	9.4	10.4	12.1	10.1	16.3	17.3	17.8	19.0	17.5	18.5	21.9	17.6	19.6	20.0	20.3	19.3	18.3	15.4	16.0	13.6
Saturdays	13.8	12.4	11.9	10.5	10.0	9.1	11.9	12.1	13.4	15.5	17.4	20.3	20.9	20.0	20.2	21.2	18.1	21.0	20.0	22.1	18.3	16.5	18.3	14.8
Saturdays	16.8	14.4	14.8	12.9	10.1	8.2	11.6	13.9	14.1	16.0	18.5	17.8	21.5	22.9	19.5	18.7	19.2	19.9	22.5	20.7	18.6	17.4	17.9	14.0
Saturdays	12.5	13.2	11.9	12.1	8.3	9.4	11.2	12.9	14.2	17.7	19.1	18.4	18.0	17.9	20.1	20.5	23.0	19.4	23.1	21.4	19.5	17.2	15.6	15.3

95th Percentile

Sundays	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Sundays	13.0	11.4	10.9	11.0	8.2	7.3	7.8	10.6	11.5	15.3	13.7	17.6	15.6	15.1	17.5	14.7	14.4	15.0	15.9	16.6	15.0	14.2	12.3	10.4
Sundays	13.2	12.9	12.8	9.5	7.7	7.4	9.3	9.7	13.5	14.0	16.2	15.4	17.2	19.0	17.4	16.5	15.4	16.7	17.4	13.8	14.2	15.7	14.5	13.0
Sundays	12.0	13.0	12.3	9.3	8.4	7.2	10.9	11.4	11.7	12.9	15.0	17.6	17.3	20.6	17.4	15.3	17.3	16.3	17.9	18.5	19.3	14.9	12.4	12.6
Sundays	15.7	14.0	14.6	11.4	8.5	8.5	12.1	13.3	14.1	16.3	17.8	18.3	18.5	16.3	17.8	16.6	16.9	17.7	19.1	17.4	16.3	19.0	15.2	13.3
Sundays	14.3	14.5	13.3	10.4	9.1	7.9	11.5	12.3	16.1	16.5	15.9	19.5	19.7	20.4	18.3	20.2	18.4	21.6	20.1	19.6	17.9	16.5	17.0	13.1
Sundays	16.0	14.0	13.5	11.5	9.5	10.0	11.6	13.7	13.3	16.7	19.9	17.6	19.8	19.3	18.4	17.4	20.0	20.2	19.6	18.9	20.4	18.9	15.3	16.0
Sundays	15.4	14.3	14.1	12.8	10.1	8.7	14.6	13.6	14.8	17.0	19.6	18.2	22.2	21.3	21.6	18.1	17.7	20.1	24.5	17.4	18.4	19.6	17.1	13.5
Sundays	13.8	11.9	11.8	10.9	11.2	9.2	11.0	11.2	14.0	16.6	20.8	20.2	19.7	17.8	20.2	20.7	19.0	22.8	22.3	20.0	18.4	17.0	17.1	15.4

Appendix C-7: 2019 Statistical Measures – Hour of Day and Day of Week

2019 Time On Task

	90% TOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	90% TOT	1.88	1.64	1.75	1.64	1.62	1.48	1.74	1.92	1.93	2.15	2.16	2.54	2.69	2.63	2.59	2.50	2.32	2.25	2.33	2.51	2.28	2.02	2.05	2.04
Tuesdays	90% TOT	1.89	1.69	1.74	1.73	1.62	1.60	1.69	1.94	1.94	2.24	2.63	3.19	3.31	3.46	3.32	3.19	3.32	2.87	2.57	2.99	2.65	2.37	2.49	2.18
Wednesdays	90% TOT	1.95	2.05	2.07	1.86	1.82	1.52	1.74	2.02	2.24	2.47	2.99	3.12	3.59	3.45	3.34	3.32	2.90	2.55	2.42	2.46	2.26	2.36	2.17	2.05
Thursdays	90% TOT	1.72	1.85	1.88	1.75	1.87	1.63	1.69	1.83	1.94	2.20	2.36	2.62	2.83	3.05	2.94	2.85	2.63	2.48	2.40	2.35	2.18	2.23	2.10	1.90
Fridays	90% TOT	1.74	1.81	1.70	1.62	1.75	1.54	1.70	1.95	1.99	2.32	2.48	2.70	2.80	3.09	3.14	2.92	2.65	2.63	2.53	2.77	2.45	2.35	2.19	2.12
Saturdays	90% TOT	1.93	1.65	1.84	1.70	1.74	1.61	1.67	1.82	1.86	2.10	2.57	2.74	2.80	2.94	3.09	2.93	2.69	2.49	2.36	2.59	2.31	2.27	2.14	2.06
Sundays	90% TOT	1.97	1.88	1.83	1.69	1.80	1.61	1.61	1.82	2.01	2.03	2.09	2.24	2.46	2.33	2.24	2.50	2.19	1.98	2.06	2.17	1.92	1.94	2.01	1.92

	3rd Quartile	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	3rd Quartile	1.41	1.37	1.32	1.36	1.31	1.21	1.33	1.51	1.59	1.62	1.60	1.71	1.75	1.82	1.88	1.83	1.76	1.60	1.62	1.62	1.57	1.44	1.42	1.46
Tuesdays	3rd Quartile	1.39	1.28	1.36	1.32	1.42	1.32	1.33	1.52	1.56	1.68	1.77	2.04	2.02	2.19	2.23	2.05	2.13	1.79	1.67	1.86	1.64	1.65	1.63	1.60
Wednesdays	3rd Quartile	1.47	1.47	1.49	1.43	1.43	1.22	1.37	1.53	1.66	1.69	1.93	2.01	2.23	2.17	2.18	2.14	1.98	1.74	1.71	1.77	1.60	1.55	1.54	1.48
Thursdays	3rd Quartile	1.34	1.45	1.47	1.35	1.46	1.30	1.31	1.50	1.58	1.64	1.68	1.79	1.92	2.00	1.95	1.95	1.99	1.67	1.66	1.61	1.57	1.54	1.57	1.44
Fridays	3rd Quartile	1.39	1.40	1.36	1.29	1.36	1.26	1.39	1.55	1.57	1.69	1.71	1.91	1.88	1.90	2.16	2.02	1.86	1.80	1.63	1.76	1.64	1.58	1.62	1.58
Saturdays	3rd Quartile	1.42	1.34	1.38	1.33	1.37	1.28	1.25	1.45	1.50	1.63	1.75	1.89	1.85	1.97	2.05	1.99	1.94	1.70	1.70	1.75	1.60	1.54	1.51	1.50
Sundays	3rd Quartile	1.52	1.41	1.33	1.34	1.51	1.29	1.26	1.45	1.51	1.62	1.57	1.64	1.63	1.74	1.73	1.73	1.67	1.55	1.51	1.61	1.48	1.48	1.52	1.46

	Average	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mondays	Average	1.06	0.96	0.96	0.97	1.00	0.96	0.91	1.12	1.18	1.22	1.20	1.30	1.33	1.34	1.38	1.38	1.26	1.20	1.17	1.23	1.25	1.08	1.09	1.11
Tuesdays	Average	1.05	0.97	1.15	1.03	1.13	0.99	0.94	1.15	1.16	1.32	1.36	1.49	1.49	1.63	1.58	1.49	1.60	1.36	1.18	1.34	1.27	1.22	1.20	1.22
Wednesdays	Average	1.10	1.12	1.16	1.10	1.14	0.95	0.98	1.16	1.26	1.34	1.47	1.49	1.62	1.58	1.55	1.52	1.42	1.27	1.20	1.27	1.19	1.20	1.13	1.17
Thursdays	Average	0.98	1.08	1.09	1.03	1.13	1.03	0.95	1.04	1.19	1.31	1.27	1.31	1.40	1.46	1.42	1.40	1.39	1.24	1.22	1.18	1.19	1.18	1.16	1.07
Fridays	Average	1.04	1.09	1.09	1.01	1.04	0.98	0.94	1.16	1.13	1.26	1.32	1.38	1.44	1.45	1.56	1.45	1.37	1.33	1.19	1.32	1.23	1.20	1.23	1.13
Saturdays	Average	1.17	1.01	1.02	1.07	1.04	0.95	0.90	1.06	1.14	1.21	1.37	1.43	1.38	1.49	1.47	1.43	1.39	1.26	1.23	1.26	1.21	1.20	1.09	1.12
Sundays	Average	1.05	1.04	1.01	1.00	1.14	1.03	0.87	1.11	1.18	1.24	1.16	1.26	1.24	1.24	1.27	1.33	1.21	1.14	1.08	1.16	1.13	1.12	1.12	1.03

Actual Response Volume Per Hour

90% **90th Percentile by Hour of Day**

	2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
2019	Mondays	10	8	9	9	6	7	12	11	13	18	19	17	20	19	17	20	17	17	20	17	16	16	16	11
2019	Tuesdays	11	8	7	7	8	7	10	11	14	17	21	21	18	18	18	19	18	18	18	17	13	16	14	12
2019	Wednesdays	10	10	8	7	7	7	10	11	14	16	18	20	21	17	19	21	17	18	15	17	14	13	12	13
2019	Thursdays	11	9	8	7	7	7	9	13	17	18	17	18	17	18	18	20	17	19	19	17	16	16	14	13
2019	Fridays	10	11	9	8	6	7	9	12	15	17	18	18	18	17	18	19	16	19	18	18	15	15	15	14
2019	Saturdays	14	12	13	11	7	7	10	11	13	14	14	16	18	20	16	16	16	17	19	18	16	16	15	12
2019	Sundays	13	11	11	11	9	8	12	11	13	14	16	16	19	18	19	16	14	17	21	14	17	16	14	11

Experienced Response Volume Per Hour

MAX **Maximum Experienced Volume by Hour of Day**

	2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
2019	Mondays	16	11	15	14	9	10	19	18	22	22	25	22	29	27	30	23	23	22	26	26	29	20	22	15
2019	Tuesdays	17	12	10	12	9	10	14	15	19	24	23	28	23	24	21	23	23	24	26	22	16	20	23	16
2019	Wednesdays	16	12	12	14	10	16	14	16	21	22	28	25	24	27	27	28	24	22	18	27	20	16	18	17
2019	Thursdays	14	11	13	10	10	10	14	19	24	24	20	22	21	25	23	24	25	32	22	22	23	19	20	18
2019	Fridays	15	14	15	12	14	8	13	14	21	26	23	22	32	24	25	27	27	31	25	29	19	23	22	23
2019	Saturdays	23	16	15	17	14	9	13	14	14	18	24	20	25	26	25	19	20	21	25	25	23	17	21	15
2019	Sundays	16	18	16	14	10	9	17	15	17	19	25	19	25	22	23	18	24	23	33	18	19	25	21	19

95% **95th Percentile Experienced Volume by Hour of Day**

	2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
2019	Mondays	13.1	10.2	10.8	11.2	7.8	9.0	15.0	13.8	16.4	20.9	22.6	19.9	23.8	21.8	21.3	22.1	19.1	20.5	22.6	20.0	21.1	18.5	17.9	13.4
2019	Tuesdays	14.4	10.6	9.5	9.4	9.2	8.5	12.1	13.0	16.9	20.8	23.6	23.7	22.6	22.2	19.7	21.4	21.2	21.1	21.6	20.1	15.6	17.7	18.0	14.2
2019	Wednesdays	12.0	11.2	10.6	9.2	8.5	10.5	12.2	13.8	17.3	19.0	22.5	22.5	23.9	21.0	24.0	24.4	20.5	20.8	18.0	21.3	17.0	15.2	15.2	14.7
2019	Thursdays	12.4	10.2	10.6	8.9	8.8	8.9	11.7	15.5	18.9	21.8	19.0	21.1	20.9	21.9	20.6	22.9	20.3	23.1	21.0	19.8	19.2	17.7	16.6	14.8
2019	Fridays	12.2	12.5	11.0	9.7	8.9	8.4	11.4	14.4	17.4	20.7	21.3	21.3	23.6	20.3	21.6	22.3	20.6	23.9	20.3	22.6	17.2	18.1	18.5	17.0
2019	Saturdays	16.8	14.4	14.8	12.9	10.1	8.2	11.6	13.9	14.1	16.0	18.5	17.8	21.5	22.9	19.5	18.7	19.2	19.9	22.5	20.7	18.6	17.4	17.9	14.0
2019	Sundays	15.4	14.3	14.1	12.8	10.1	8.7	14.6	13.6	14.8	17.0	19.6	18.2	22.2	21.3	21.6	18.1	17.7	20.1	24.5	17.4	18.4	19.6	17.1	13.5

Appendix C-8: Combined Response Measure and Time on Task (ToT)
Measures of Staffing Requirements

Weighted Response Volumes - Hourly Responses x Hourly Time On Task

1) 90th Percentile Volume

90% Volume x 90% Time on Task

2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	18.8	13.1	15.6	14.7	9.7	10.4	20.9	21.1	25.1	38.5	40.8	42.9	53.5	49.7	43.8	49.9	39.0	38.2	46.4	42.4	36.2	32.2	32.8	22.5
Tuesdays	20.8	13.3	12.2	12.1	13.0	11.2	16.9	21.4	27.2	37.9	55.1	66.7	59.5	62.2	59.8	60.3	59.7	51.6	46.3	50.8	34.5	38.0	34.9	26.1
Wednesdays	19.5	20.5	16.7	13.0	12.7	10.8	17.9	22.2	31.3	39.5	53.7	62.5	75.4	58.7	63.5	69.7	49.2	46.0	36.3	41.9	31.6	30.6	26.0	26.6
Thursdays	18.9	16.6	15.0	12.2	13.1	11.6	15.2	23.7	32.9	39.6	40.2	47.1	48.2	54.9	53.0	57.0	44.8	47.1	45.6	39.9	34.8	35.7	29.4	24.7
Fridays	17.4	19.9	15.3	13.0	10.5	10.8	15.3	23.3	29.8	39.5	44.6	48.6	50.4	52.6	56.5	55.5	42.4	50.0	45.5	49.9	36.7	35.3	32.9	29.7
Saturdays	27.0	19.8	23.9	18.7	12.2	11.3	17.1	20.0	24.2	29.4	36.0	43.8	50.5	58.7	49.5	46.8	43.1	42.4	44.8	46.7	37.0	36.2	32.1	24.7
Sundays	25.6	20.7	20.1	18.6	16.2	12.7	19.3	20.0	26.0	28.4	33.5	35.9	46.4	41.9	42.5	39.7	30.6	33.5	43.3	30.4	32.4	31.1	28.0	20.9

2) 95th Percentile Response Volume

95th Percentile Volume x 90% Time on Task

2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	24.7	16.7	19.0	18.2	12.6	13.3	26.0	26.6	31.7	45.0	48.8	50.5	63.9	57.2	55.2	55.2	44.3	46.0	52.7	50.2	48.1	37.4	36.8	27.3
Tuesdays	27.3	17.8	16.6	16.2	14.9	13.7	20.4	25.2	32.8	46.6	62.0	75.7	74.6	76.7	65.4	68.3	70.2	60.4	55.6	60.0	41.4	42.0	44.8	30.9
Wednesdays	23.4	22.8	22.0	17.0	15.4	16.0	21.2	27.7	38.8	46.9	67.1	70.3	85.9	72.4	80.4	80.9	59.4	53.2	43.5	52.5	38.5	35.7	32.9	30.1
Thursdays	21.3	18.9	19.9	15.6	16.5	14.5	19.7	28.2	36.6	48.0	44.8	55.3	59.1	66.9	60.7	65.2	53.5	57.2	50.3	46.5	41.8	39.4	34.8	28.1
Fridays	21.3	22.7	18.6	15.7	15.6	13.0	19.3	28.0	34.5	48.0	52.8	57.6	66.1	62.7	67.7	65.2	54.6	62.8	51.3	62.7	42.1	42.5	40.7	36.1
Saturdays	32.5	23.7	27.1	21.9	17.5	13.2	19.4	25.2	26.3	33.6	47.7	48.7	60.2	67.2	60.4	54.8	51.8	49.5	53.2	53.6	43.0	39.5	38.4	28.8
Sundays	30.3	26.9	25.8	21.6	18.2	13.9	23.5	24.8	29.8	34.5	41.1	40.8	54.6	49.5	48.3	45.3	38.6	39.8	50.5	37.8	35.3	38.0	34.3	26.0

95th Percentile Volume x 3rd Quartile Time on Task

2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	18.5	13.9	14.3	15.1	10.2	10.8	19.9	20.8	26.0	33.9	36.2	34.1	41.7	39.5	40.1	40.5	33.5	32.7	36.7	32.4	33.3	26.7	25.6	19.5
Tuesdays	20.0	13.5	13.0	12.4	13.1	11.2	16.1	19.7	26.4	35.0	41.8	48.3	45.7	48.7	43.8	43.9	45.1	37.6	36.1	37.4	25.6	29.3	29.3	22.7
Wednesdays	17.6	16.4	15.9	13.1	12.1	12.8	16.7	21.0	28.8	32.2	43.3	45.2	53.3	45.4	52.3	52.3	40.7	36.2	30.7	37.7	27.2	23.5	23.4	21.7
Thursdays	16.7	14.9	15.5	12.0	12.8	11.5	15.3	23.1	29.9	35.8	31.8	37.8	40.0	43.8	40.2	44.6	40.5	38.5	34.9	31.9	30.2	27.2	26.0	21.3
Fridays	17.0	17.5	14.9	12.5	12.1	10.6	15.8	22.3	27.2	34.9	36.5	40.8	44.4	38.6	46.6	45.1	38.2	42.9	33.1	39.8	28.2	28.6	30.0	26.8
Saturdays	23.9	19.2	20.3	17.1	13.8	10.5	14.5	20.1	21.3	26.0	32.3	33.7	39.6	45.1	40.1	37.2	37.2	33.8	38.4	36.1	29.8	26.9	27.1	21.0
Sundays	23.4	20.2	18.9	17.2	15.2	11.1	18.4	19.7	22.4	27.6	30.9	29.8	36.1	37.1	37.3	31.4	29.5	31.0	37.0	28.0	27.2	29.0	26.0	19.7

3) Maximum Volume

Maximum x 90% Time on Task

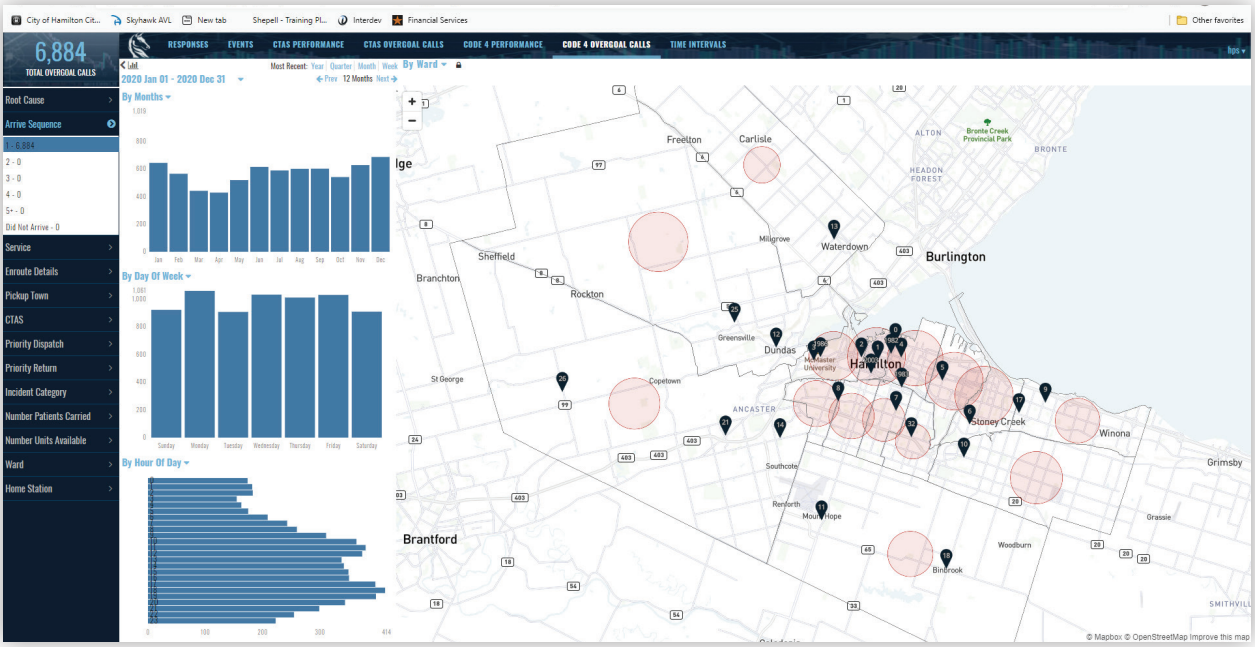
2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	30.1	18.1	26.3	22.9	14.5	14.8	33.1	35	43	47	54	56	78	71	78	57	53	49	61	65	66	40	45	31
Tuesdays	32.2	20.2	17.4	20.7	14.6	16.0	23.6	29	37	54	60	89	76	83	70	73	76	69	67	66	42	47	57	35
Wednesdays	31.3	24.5	24.8	26.0	18.2	24.4	24.4	32	47	54	84	78	86	93	90	93	69	56	44	66	45	38	39	35
Thursdays	24.0	20.3	24.4	17.5	18.7	16.3	23.6	35	46	53	47	58	60	76	68	68	66	79	53	52	50	42	42	34
Fridays	26.1	25.3	25.5	19.5	24.5	12.3	22.1	27	42	60	57	59	90	74	78	79	72	82	63	80	47	54	48	49
Saturdays	44.4	26.4	27.6	28.9	24.3	14.5	21.8	25	26	38	62	55	70	76	77	56	54	52	59	65	53	39	45	31
Sundays	31.5	33.9	29.2	23.7	18.0	14.5	27.3	27	34	39	52	43	61	51	51	45	52	46	68	39	36	49	42	37

Maximum x 3rd Quartile Time on Task

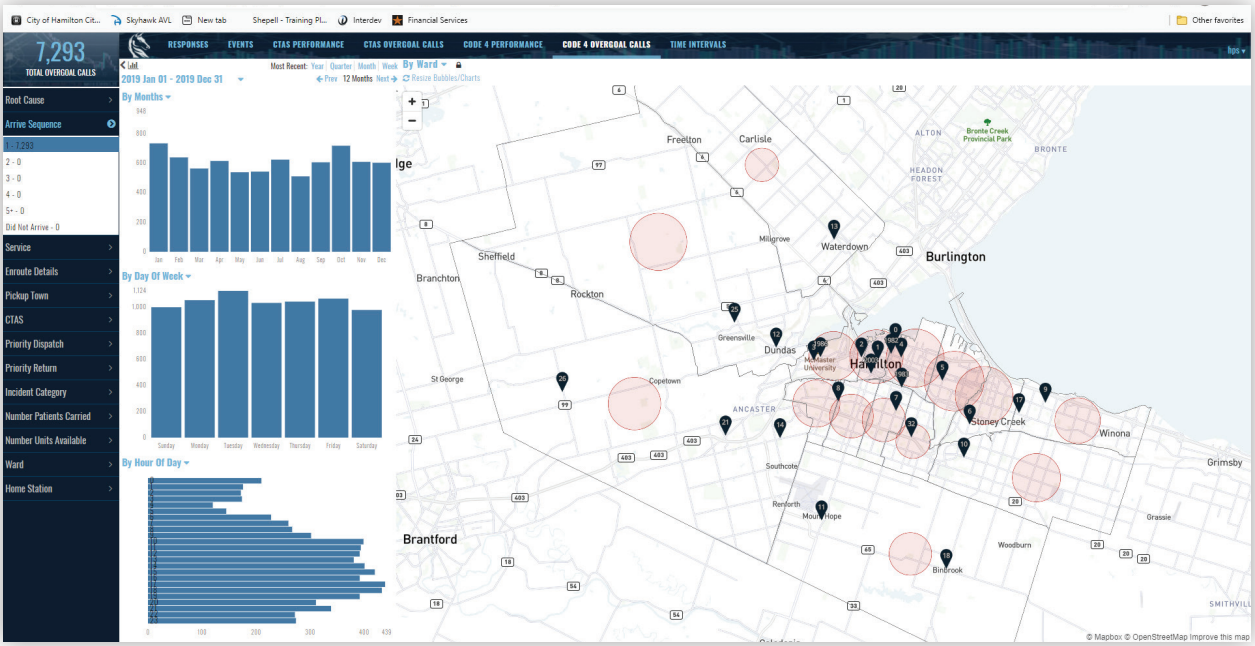
2019 Calendar	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Mondays	22.6	15.0	19.8	19.0	11.8	12.1	25.3	27.1	34.9	35.6	40.0	37.7	50.9	49.0	56.3	42.2	40.4	35.1	42.2	42.1	45.7	28.8	31.3	21.9
Tuesdays	23.6	15.3	13.6	15.9	12.8	13.2	18.6	22.8	29.7	40.4	40.8	57.1	46.5	52.6	46.8	47.2	49.1	42.9	43.4	41.0	26.3	33.1	37.5	25.6
Wednesdays	23.5	17.7	17.9	20.0	14.3	19.6	19.1	24.5	34.8	37.2	54.0	50.1	53.4	58.5	58.8	60.1	47.6	38.2	30.7	47.7	32.0	24.8	27.8	25.1
Thursdays	18.8	16.0	19.1	13.5	14.6	13.0	18.4	28.4	37.9	39.4	33.6	39.3	40.3	49.9	44.9	46.9	49.8	53.4	36.6	35.4	36.2	29.3	31.4	26.0
Fridays	20.8	19.6	20.4	15.5	19.0	10.1	18.1	21.7	33.0	43.9	39.4	42.0	60.1	45.7	54.1	54.5	50.1	55.7	40.8	51.0	31.2	36.3	35.6	36.2
Saturdays	32.7	21.4	20.7	22.5	19.1	11.5	16.2	20.3	21.1	29.3	41.9	37.9	46.1	51.2	51.3	37.8	38.7	35.8	42.5	43.7	36.8	26.2	31.8	22.5
Sundays	24.4	25.4	21.3	18.8	15.1	11.6	21.4	21.7	25.7	30.8	39.3	31.2	40.7	38.3	39.7	31.1	40.1	35.6	50.0	29.0	28.2	37.0	32.0	27.6

Appendix C-9: Darkhorse Diagnostics – 2018, 2019, 2020 – Actual Performance – Overgoal (>10 minutes) Calls by Ward

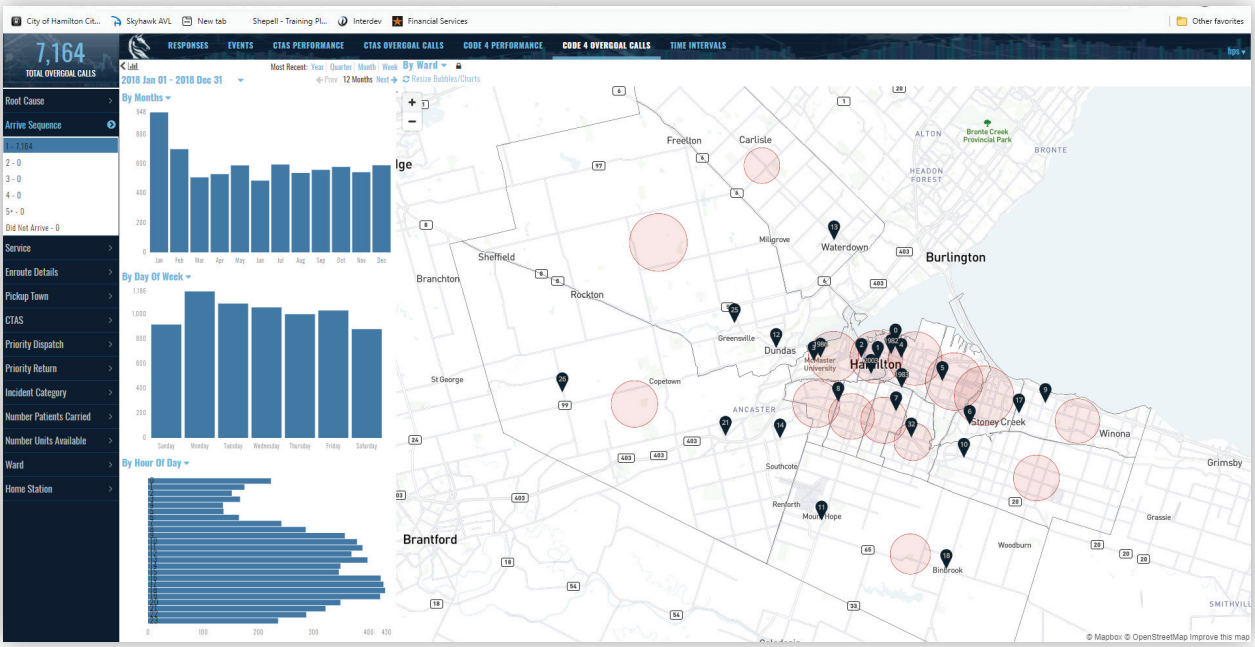
2020 – CODE 4 OVERGOAL (> 10 MINUTES) BY WARD



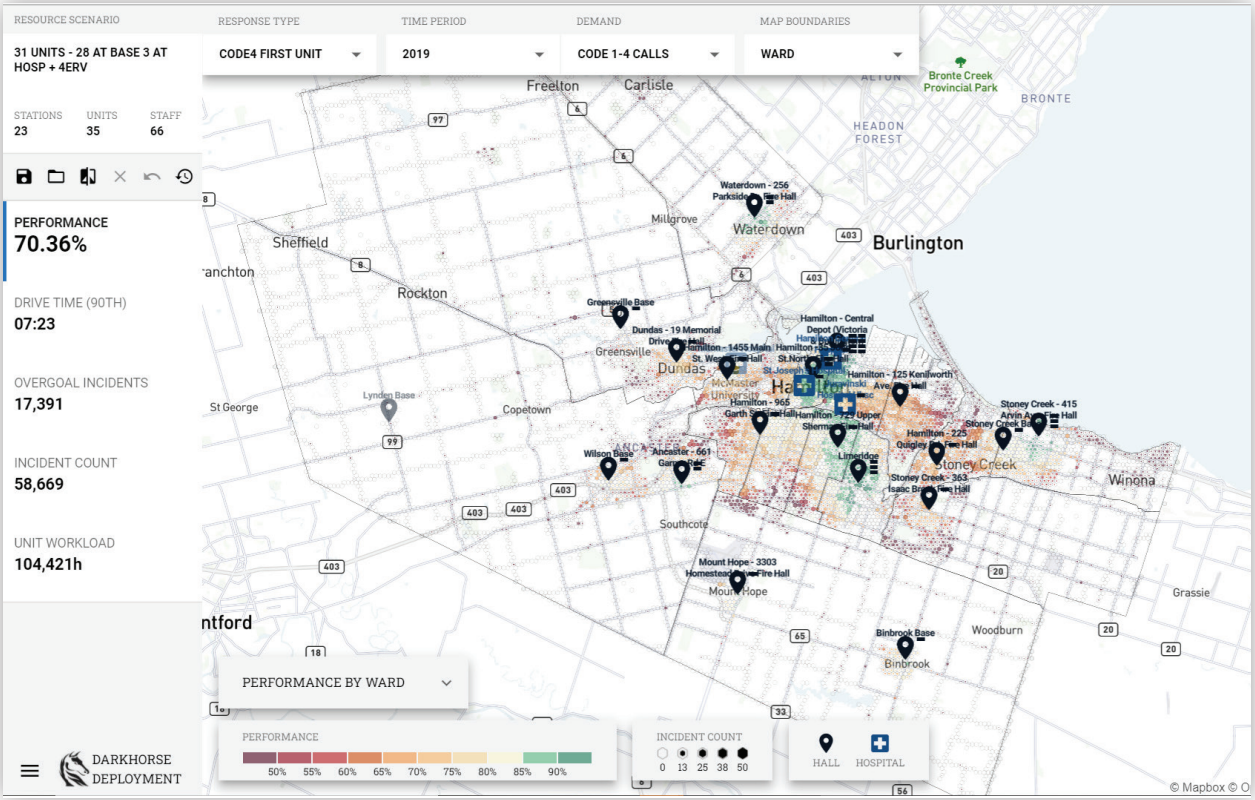
2019 – CODE 4 OVERGOAL (> 10 MINUTES) BY WARD

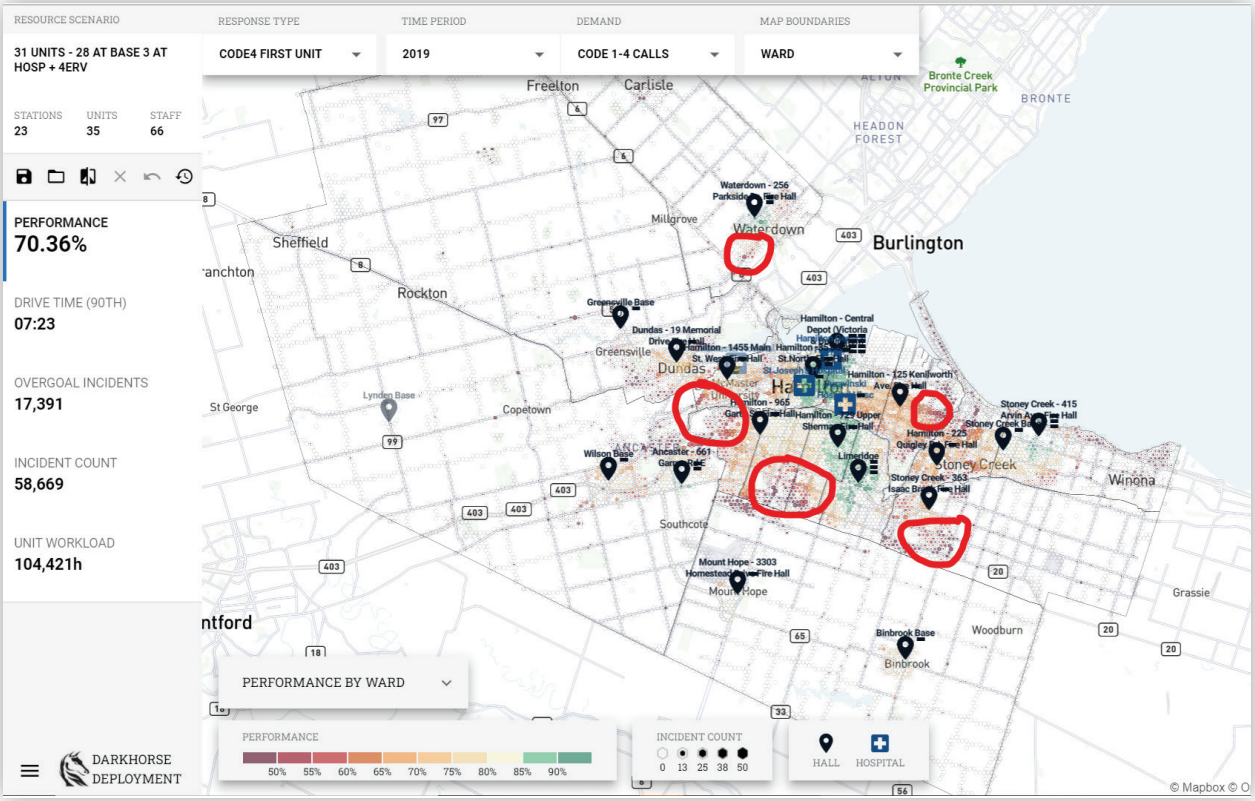


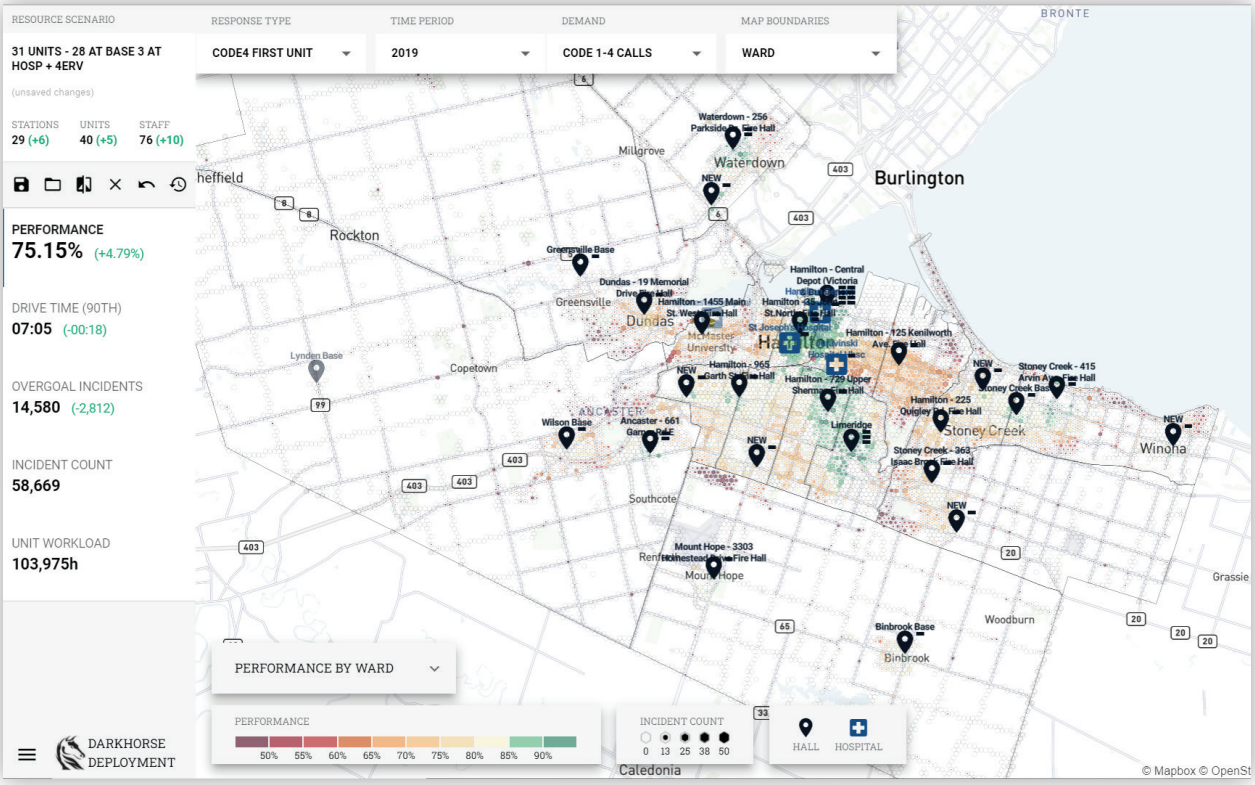
2018 – CODE 4 OVERGOAL (> 10 MINUTES) BY WARD



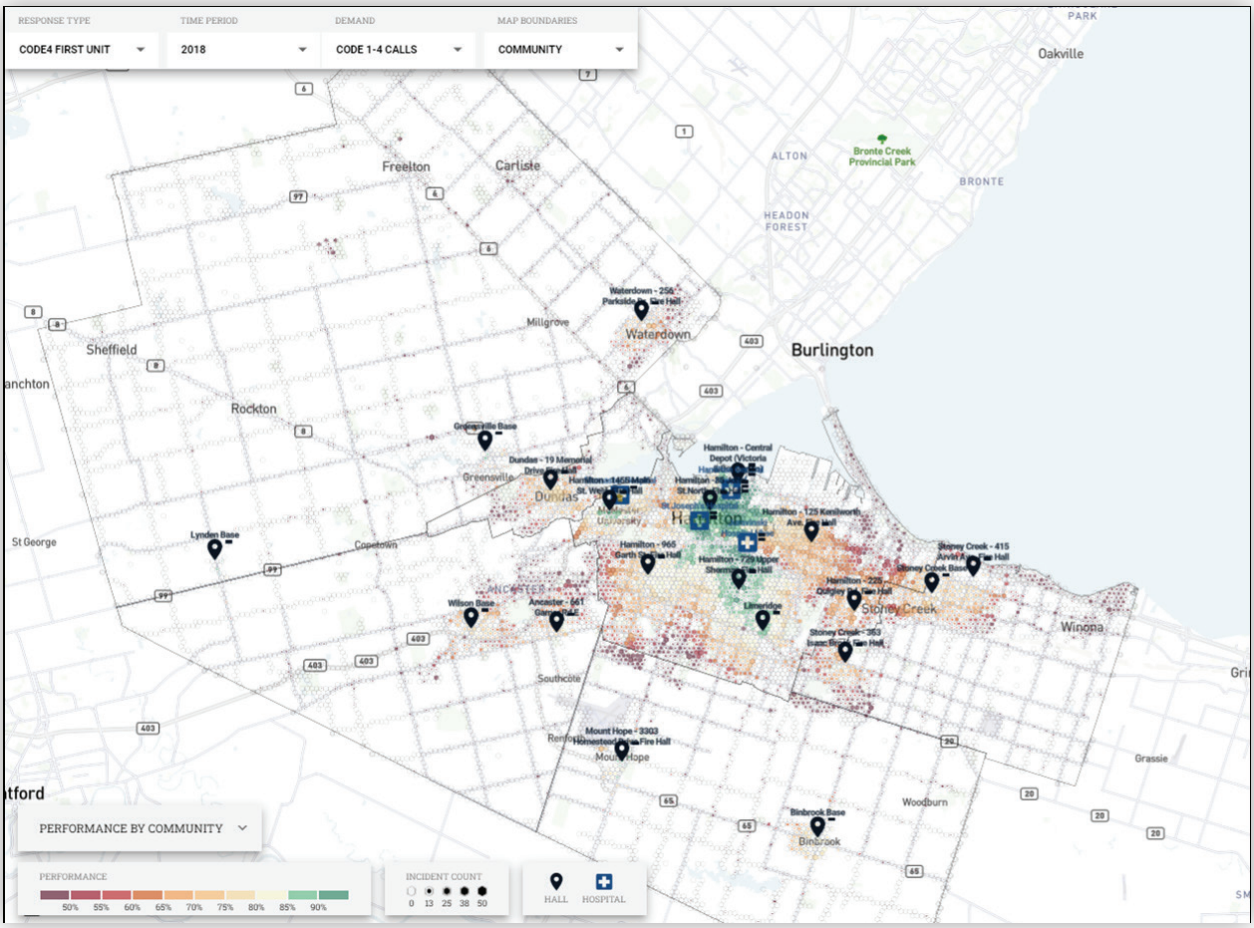
Appendix C-10: Darkhorse Deployment Analyzer – Current Performance, Areas for Improvement, and Projected Performance by Ward

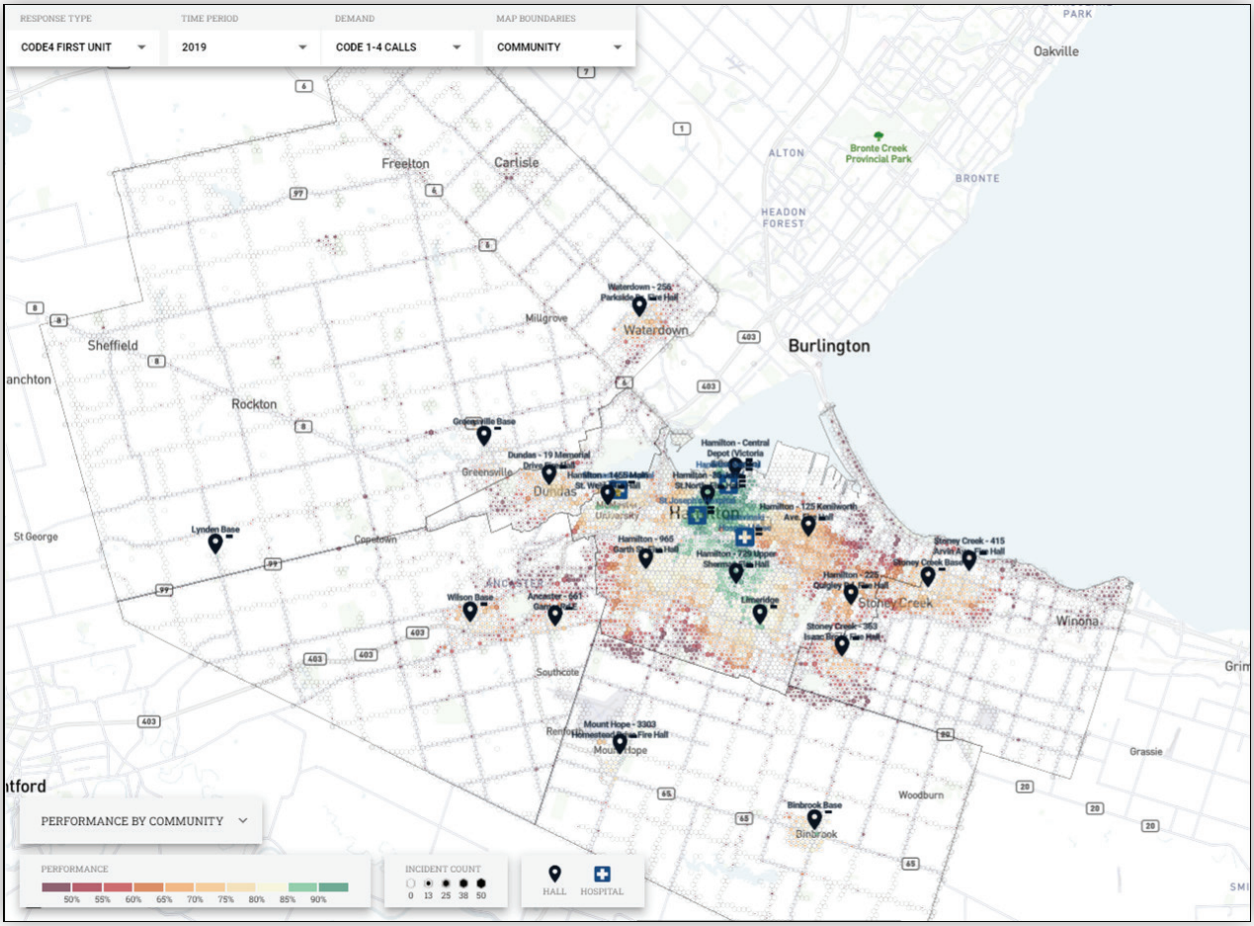


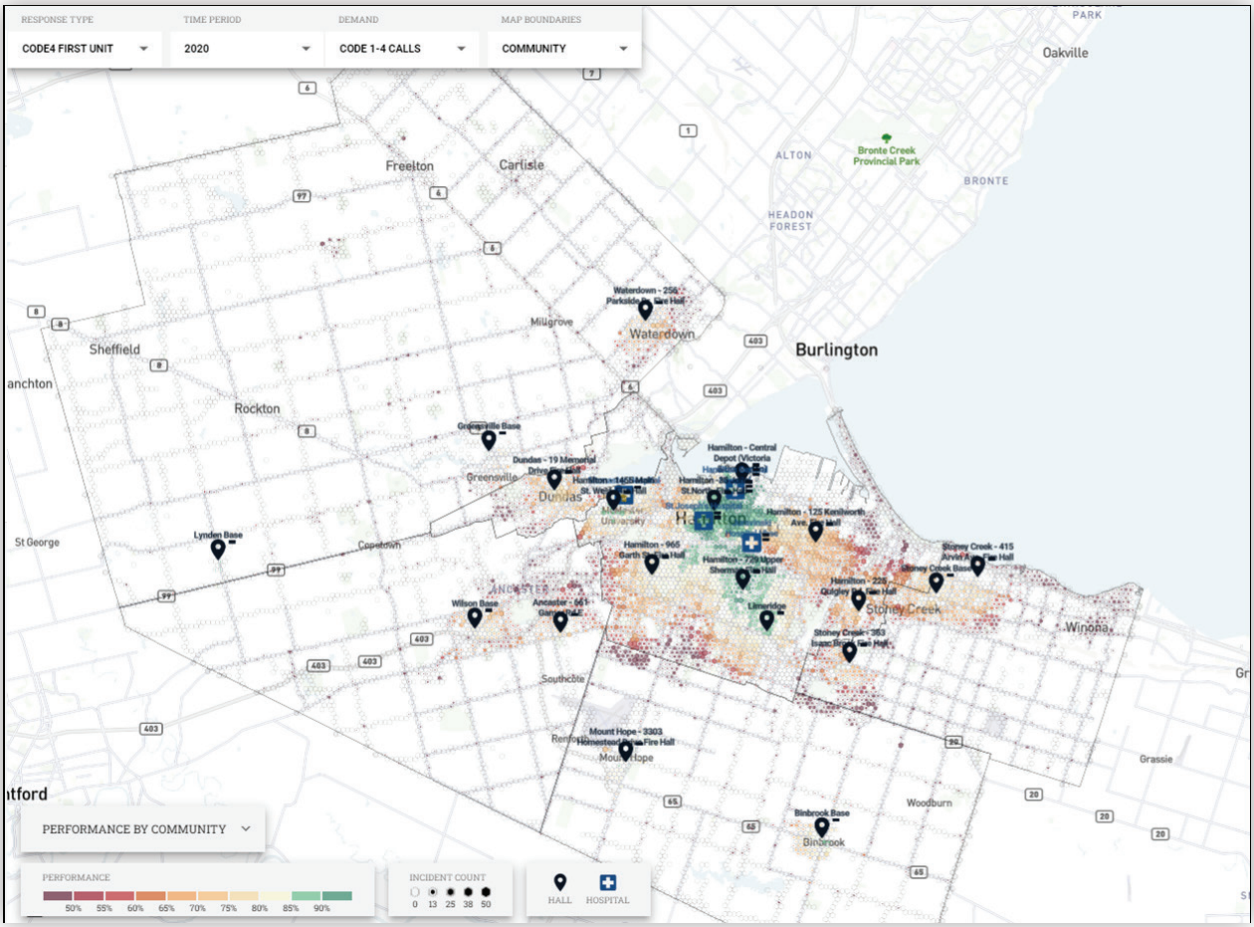



RESOURCE SCENARIO
31 UNITS - 28 AT BASE 3 AT HOSP + 4ERV
(unsaved changes)
STATIONS 29 (+6)
UNITS 40 (+5)
STAFF 76 (+10)
RESPONSE TYPE
CODE4 FIRST UNIT
TIME PERIOD
2019
DEMAND
CODE 1-4 CALLS
MAP BOUNDARIES
WARD
PERFORMANCE
75.15% (+4.79%)
DRIVE TIME (90TH)
07:05 (-00:18)
OVERGOAL INCIDENTS
14,580 (-2,812)
INCIDENT COUNT
58,669
UNIT WORKLOAD
103,975h
PERFORMANCE BY WARD
PERFORMANCE
50% 55% 60% 65% 70% 75% 80% 85% 90%
INCIDENT COUNT
0 13 25 38 50
HALL
HOSPITAL
DARKHORSE DEPLOYMENT
BRONTE
Millgrove
Waterdown
Burlington
Rockton
Greensville
Dundas
Hamilton
Copetown
Lynden Base
Wilson Base
Southcote
Mount Hope
Stoney Creek
Winona
Grassie
Woodburn
Binbrook Base
Binbrook
Caledonia
© Mapbox © OpenSt

Appendix C-11: Darkhorse Deployment Analyzer – Changes from 2018, 2019, 2020 as compared to 2031 Projections




RESPONSE TYPE
CODE4 FIRST UNIT
TIME PERIOD
2019
DEMAND
CODE 1-4 CALLS
MAP BOUNDARIES
COMMUNITY
PERFORMANCE BY COMMUNITY
PERFORMANCE
50% 55% 60% 65% 70% 75% 80% 85% 90%
INCIDENT COUNT
0 13 25 38 50
HALL
HOSPITAL
Oakville
Freelton
Carlisle
ALTON
Bronte Creek Provincial Park
BRONTE
HEADON FOREST
Waterdown
Burlington
Sheffield
Rockton
Greensville
Dundas
Hamilton
Stoney Creek
Winona
Grassie
Woodburn
Binbrook
St George
Lynden
Copetown
Southcote
Mount Hope
Ancaster
Wilson
Limeridge

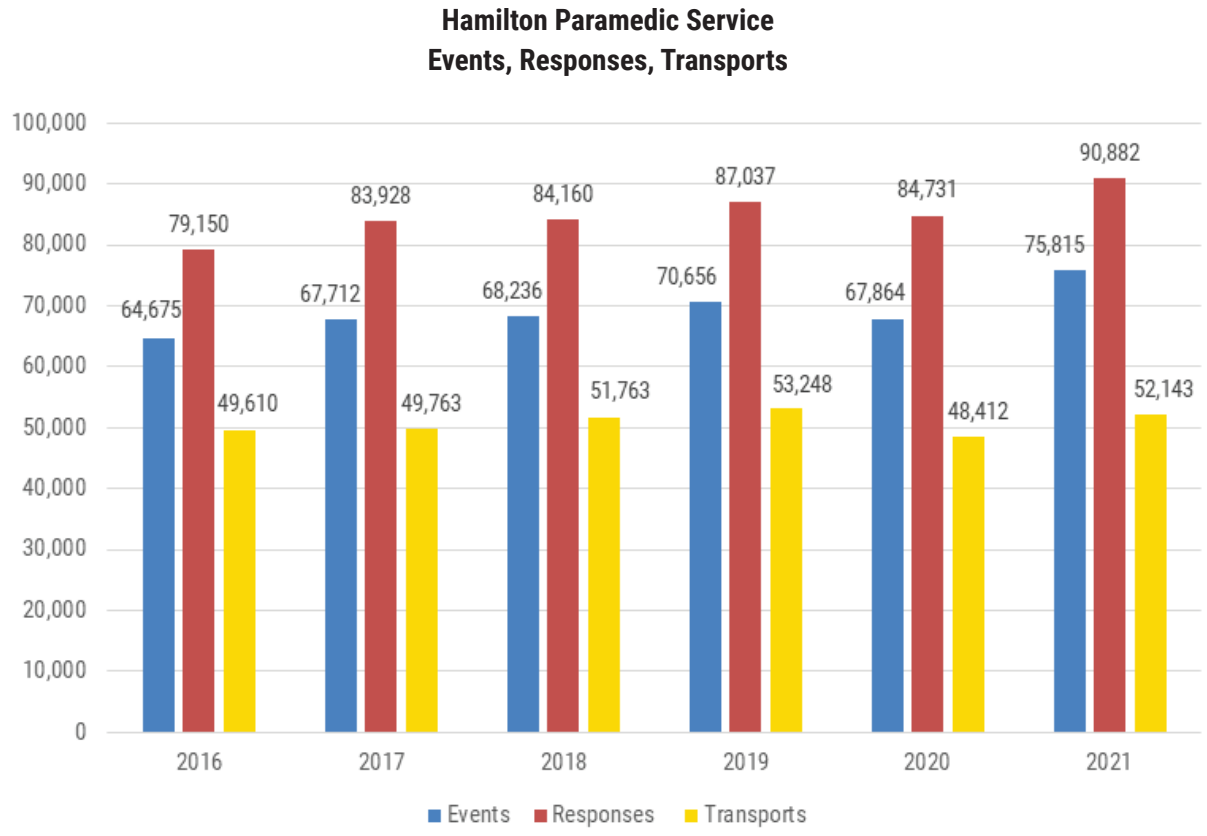

RESPONSE TYPE
CODE4 FIRST UNIT
TIME PERIOD
2020
DEMAND
CODE 1-4 CALLS
MAP BOUNDARIES
COMMUNITY
PERFORMANCE BY COMMUNITY
PERFORMANCE
50% 55% 60% 65% 70% 75% 80% 85% 90%
INCIDENT COUNT
0 13 25 38 50
HALL
HOSPITAL
Oakville
Freelton
Carlisle
ALTON
Bronte Creek Provincial Park
BRONTE
HEADON FOREST
Waterdown
Burlington
Sheffield
Rockton
Greensville
Dundas
Hamilton
Stoney Creek
Winona
Grassie
Woodburn
Binbrook
St George
Lynden
Copetown
Southcote
Mount Hope
Ancaster
Wilson
Limeridge

Appendix D: Addendum – 2021 Service Metrics

Since this Master Plan was completed in October 2021, key service metrics have been compiled for the 2021 year that illustrate service levels higher than that in the years prior to the pandemic.

Events, Responses, Transports

Metrics for events, responses and transports in 2021 show that as predicted the demand for service continues to increase at a rate of four percent each year, with the exception of the 2020 when the onset of the pandemic saw a decline in call demand.

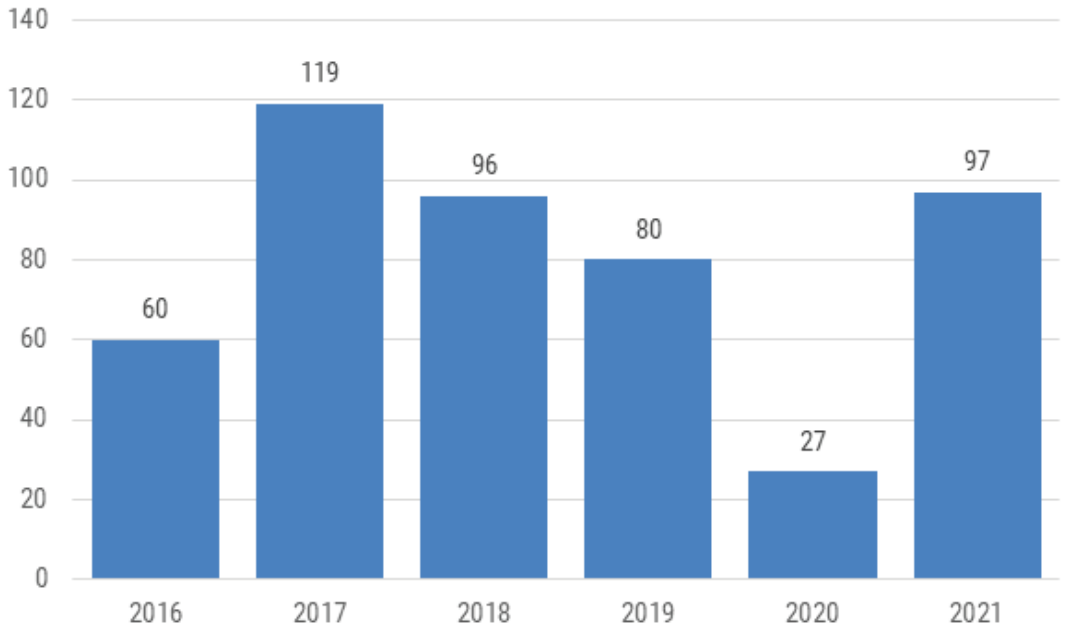


In 2021, HPS had 75,815 events an average of 208 per day and 90,892 responses an average of 249 per day. Both metrics are an increase from the pre-pandemic levels in the years leading up to and including 2019. The total number of transports to hospitals in 2021 was 52,143 or 143 per day on average, down from the pre-pandemic total in 2019 but higher than years prior to 2019.

Code Zero Events

The number of times there was one or fewer ambulances available to respond to an emergency call in 2021 was 97 or an average of 8 per month. This surpasses the pre-pandemic totals in 2018 and 2019.

Hamilton Paramedic Service
Code Zero Events



Offload Delays

In total, paramedics spent 32,075 hours in emergency departments waiting to transfer the care of a patient to the hospital. This is more than in previous years with a total of 27, 512 hours in 2018 and 30,549 hours in 2019 spent in offload delay (OLD) for more than 30 minutes.

The frequency of time spent in OLD that last longer than three hours has been increasing since before the pandemic began in 2020.

Frequency of Offload Delays				
Hours	**2018**	**2019**	**2020**	**2021**
1-2	12,127	12,782	9,135	12,105
2-3	3,018	3,590	2,120	3,584
3-4	1,058	1,308	772	1,530
4-5	328	429	205	645
5-6	103	146	63	223
6+	46	54	25	126

This chart shows that the frequency of OLDs longer than the interim target of 60 minutes 90% of the time is increasing to levels higher than before than pandemic. For example, there were 126 OLDs lasting more than 6 hours in 2021 which is more than double the previous largest amount in 2019. Similarly, the frequency of OLDs lasting between three to four, four to five and five to six hours in 2021 surpasses previous years.

Mobile Integrated Health

Community paramedicine programs through the Mobile Integrated Health (MIH) team continued to be busy in 2021:

- 129 clients were immunized against influenza
- 1,145 clients were cared for through the @Home program
- 198 clients were monitored at home remotely
- 908 clients received assistance from Social Navigators
- 23 patients were taken to an addiction management facility rather than to the Emergency Department
- 90 patients received palliative care from paramedics in their homes
- 270 patients received paramedic care at home while they await long-term care placement

Pandemic Response

In addition to the MIH activities listed above, responding to the needs of the community as a result of the COVID-19 pandemic continued in 2021. In collaboration with Hamilton Public Health Services, MIH carried out the following activities:

- 14,319 COVID-19 swabbing tests performed
- 3,994 COVID-19 vaccines administered to homebound patients
- 9,766 identified by paramedics in their care as suspected COVID-19 positive requiring extra measure to mitigate the risk of exposure and transmission
- Paramedics utilized their technology to assist in conducting in-house fit testing for other City of Hamilton divisions (e.g., Public health and Long-Term Care) to ensure respirator masks were the right fit to ensure the proper level of protection

Given the 2021 service metrics demonstrated an expected upward trend in call demand, code zero events and offload delays, and a continued heavy reliance on MIH activities, the objectives of this Master Plan finalized in October 2021 are further supported and as such remained unaltered as a result of the 2021 service metrics.

Hamilton | Hamilton Paramedic Service