



Region of Waterloo * Paramedic Services
PERFORMANCE MEASUREMENT

Performance Measurement Report
For the Period of January – December 2018
Produced on May 27th, 2019



Region of Waterloo * Paramedic Services PERFORMANCE MEASUREMENT

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Summary

A. Volume and Service Level Indicators

Indicator	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Total Number of Vehicle Responses	52,982	55,696	+5.1%
Rate of vehicle responses per 1,000 population*	89.2	92.6	+3.9%
Unit Utilization	41.8%	41.2%	-1.5%

C. Efficiency Indicators

Indicator	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Offload Delay (monthly average)*	16.1 days	26.4 days	+64.0%
Code Yellow Time	9.9%	7.9%	-20.4%
Code Red Time	0.6%	0.8%	+27.6%

B. Compliance and Quality Assurance Indicators

Indicator	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Paramedic Services Response Time to Emergency Calls	9min 21sec	9min 15sec	-1.1%
Response Time Performance Plan Compliance Resuscitation calls (CTAS1)	78.6%	72.3%	-8.7%
Response Time Performance Plan Compliance Emergent calls (CTAS2)	81.4%	81.7%	+0.5%

D. Service and Quality Impact Indicators

Indicator	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Stroke Patient to Stroke Facility*	90.0%	89.4%	-0.6%
Return of Spontaneous Circulation*	12.8%	14.6%	+14.6%
Heart attack (STEMI) protocol*	64.4%	62.0%	-3.6%

*A similar indicator is captured, with some variation in measurement units, within a portion of the MBN Canada (formerly OMBI) reporting process.



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A. Volume and Service Level Indicators

Definition of Indicator Group

Quantity type indicators that show values related to work intake and work breakdown (how much did we do?).

Summary of Results

There were 55,696 vehicle responses by Paramedic Services in 2018; an increase of 5.1 per cent from 2017. Although the 3.9 per cent increase in the rate of vehicle responses per 1,000 people in 2018 was much lower than the average increase of 8.0 per cent experienced over each of the last three years, it was more than three times faster than the 1.2 per cent growth in regional population growth experienced in 2018. Ambulances were in use 41.2 per cent of the time in 2018 compared to 41.8 per cent in 2017; well above the master plan established a benchmark of target of 35 per cent. Above this threshold it becomes difficult to ensure an ambulance will be available for the next call in a reasonable time. Monitoring unit utilization allows for proactive planning to ensure community needs are met in a reasonable time while using a sustainable level of deployed staff. Ambulance use in 2018 ranged from an hourly low of 24.5 per cent at 5AM to an hourly high of 53.8 per cent at 11AM. Two additional 12 hour ambulance shifts were added in February 2018 with immediate effect lowering ambulance from 48.3 per cent in February 2018 to 37.7 per cent in March 2018 despite increased vehicle response volume. For unit utilization, a decreasing trend is considered positive, while an increasing trend is seen as a negative.

Indicator Name	Indicator Definition	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Number of Vehicle Responses	A measure of service demand. The total number of ambulances or emergency response units (vehicles) that responded to calls dispatched to Region of Waterloo Paramedic Services inside or outside of Waterloo Region. More than one vehicle may respond to a single call; for example, multiple casualty incidents.	52,982	55,696	+5.1%
Rate of Vehicle Responses per 1,000 population	A measure of service demand. The rate of vehicle responses per 1,000 population to calls dispatched to Region of Waterloo Paramedic Services inside or outside of Waterloo Region. More than one vehicle may respond to a single call; for example, multiple casualty incidents.	89.2	92.6	+3.9%
Unit Utilization (ambulance use)	Unit utilization measures the per cent of time that ambulances and emergency response units are actively engaged in responding to calls (codes 1 to 4) – as opposed to being deployed waiting for calls.	41.8%	41.2%	-1.5%



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Number and rate of vehicle responses per 1,000 population, by dispatch priority code and year

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st to December 31st, 2013-2018

Overall priority code	Number of vehicle responses						2013→2018
	2013	2014	2015	2016	2017	2018	
1 – Deferrable	517	465	164	122	86	78	
2 – Scheduled	162	151	129	119	80	83	
3 – Prompt	11,218	11,340	13,011	13,066	13,748	14,689	
4 – Urgent	28,341	30,140	32,040	35,270	39,068	40,846	
Rate per 1,000 (YTD)	71.5	74.0	78.9	83.3	89.2	92.6	
Annual change (%)	-1.6%	3.5%	6.6%	5.5%	7.1%	3.9%	
Total vehicle responses (YTD)	40,238	42,096	45,344	48,577	52,982	55,696	
Annual change (%)	-0.6%	4.6%	7.7%	7.1%	9.1%	5.1%	
Total vehicle responses (annual)	40,238	42,096	45,344	48,577	52,982	55,696	
Annual change (%)	-0.6%	4.6%	7.7%	7.1%	9.1%	5.1%	

Source: ADRS (May 27th, 2019)

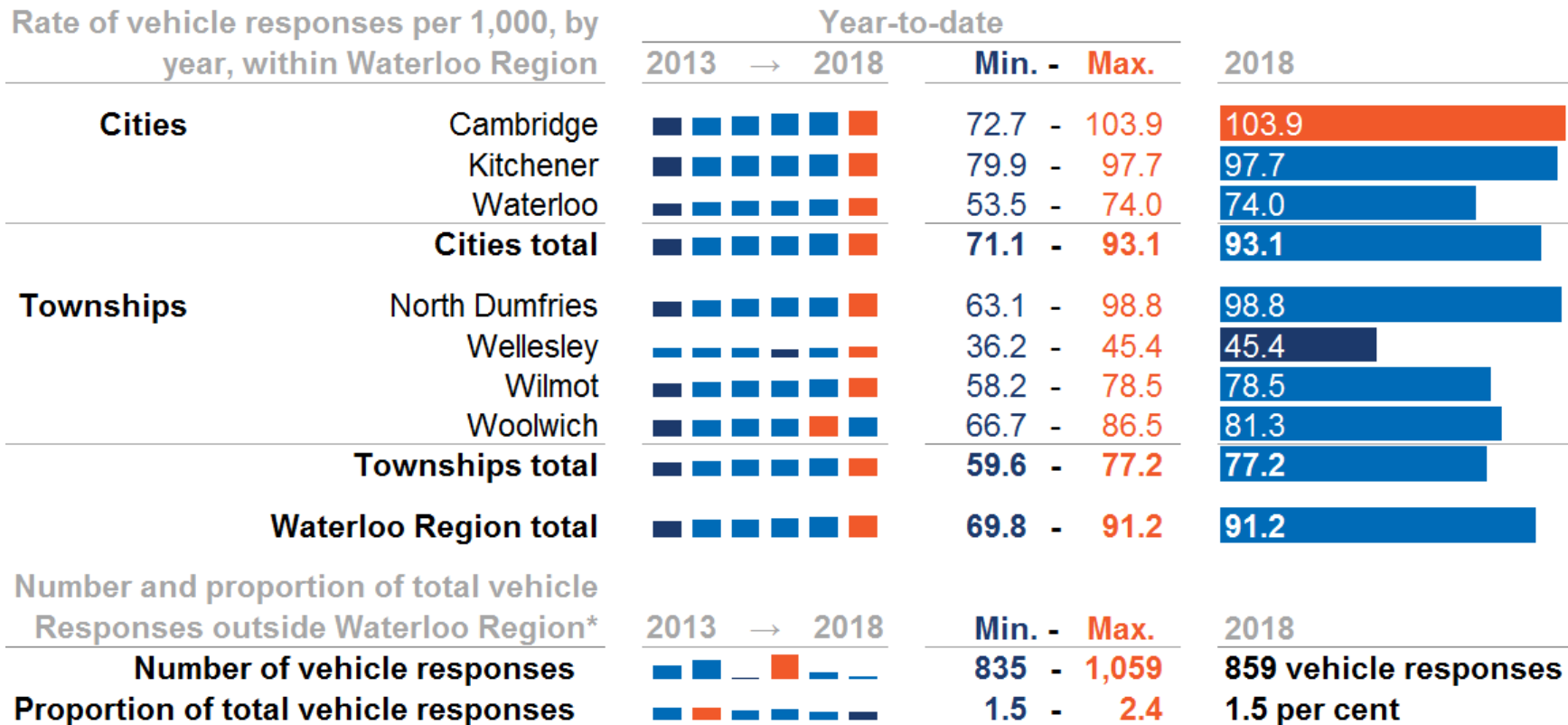
■ Lowest value
 ■ Middle value(s)
 ■ Highest value



Region of Waterloo * Paramedic Services PERFORMANCE MEASUREMENT

Rate of vehicle responses per 1,000 population, by municipality and year

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st to December 31st, 2013-2018



* A population based rate of vehicle responses cannot be accurately calculated for calls outside of Waterloo Region because it is not possible to determine an accurate service population (denominator).

Source: ADRS (May 27th, 2019)



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Number and rate of vehicle responses per 1,000 population, by municipality and month

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st to December 31st, 2018

Rate of vehicle responses per 1,000, by month, within Waterloo Region

		Jan → Dec	Year-to-date (YTD)	
			Rate per 1,000	Total calls
Cities	Cambridge		103.9	14,217
	Kitchener		97.7	24,908
	Waterloo		74.0	10,320
	Cities total		93.1	49,445
Townships	North Dumfries		98.8	1,048
	Wellesley		45.4	524
	Wilmot		78.5	1,693
	Woolwich		81.3	2,127
	Townships total		77.2	5,392
Waterloo Region total			91.2	54,837
Outside Waterloo Region total*				859
Waterloo Region Paramedic Services total*				55,696

* A population based rate of vehicle responses cannot be accurately calculated for calls outside of Waterloo Region because it is not possible to determine an accurate service population (denominator).

Source: ADRS (May 27th, 2019)

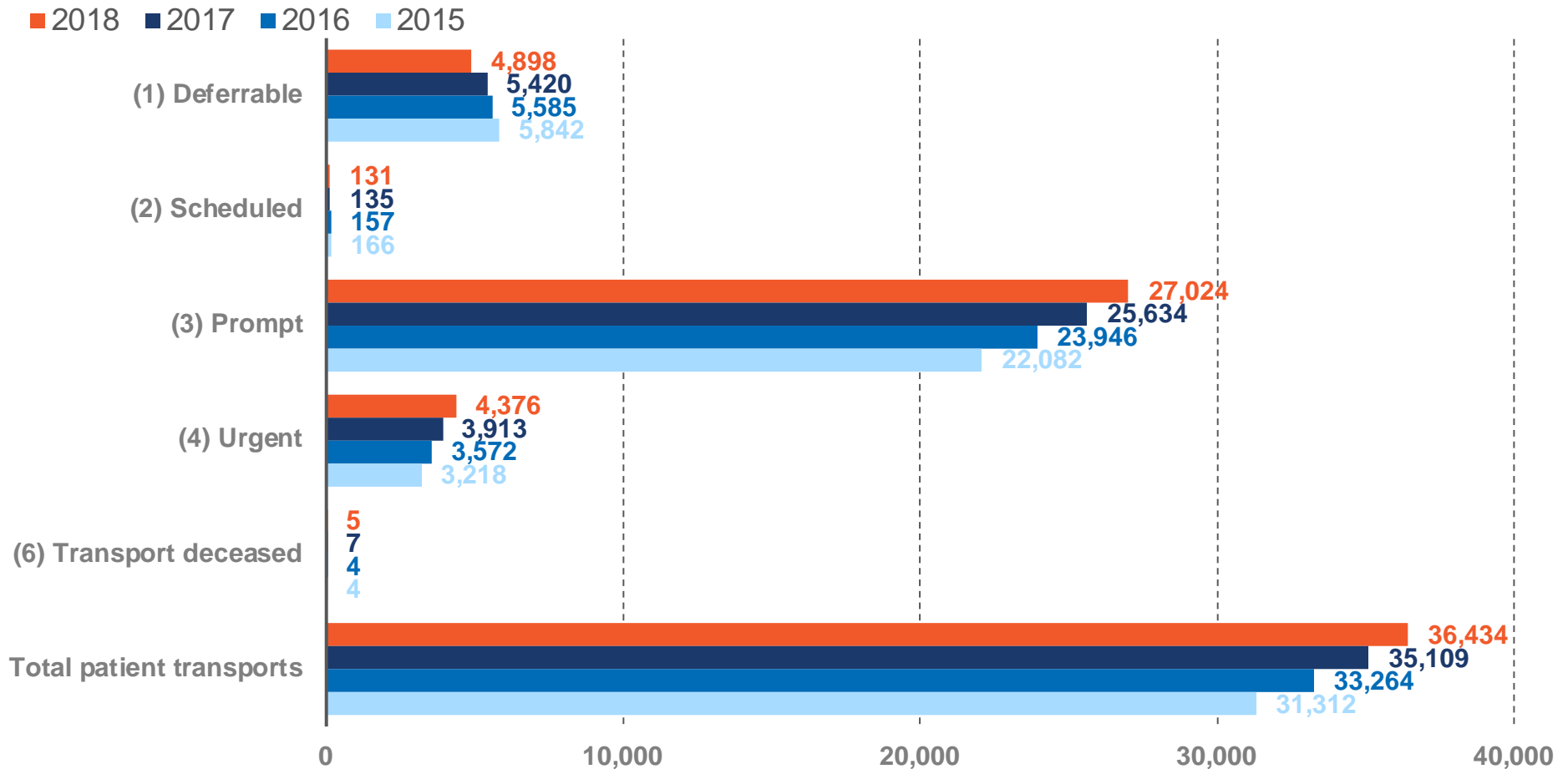
Lowest value
 Middle value(s)
 Highest value



Region of Waterloo * Paramedic Services PERFORMANCE MEASUREMENT

Number of patient transports, by return priority code

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st to December 31st, 2015-2018



Source: TabletPCR (May 27th, 2019)



Region of Waterloo * Paramedic Services PERFORMANCE MEASUREMENT

Various measures of service provided by Region of Waterloo Paramedic Services, by year

Inside and outside of Waterloo Region, January 1st to December 31st, 2013-2018

Measure	2013	2014	2015	2016	2017	2018	2013 → 2018	Per cent change (2013-2018)
Number of unique calls (T1, code 1-4)	35,229	37,232	39,384	42,187	45,774	47,866		35.9
Number of vehicles dispatched (T2, code 1-4)	40,238	42,096	45,344	48,577	52,982	55,696		38.4
Number of vehicles arriving on scene (T4, code 1-4)	36,373	37,884	40,352	43,400	46,849	48,950		34.6
Number of vehicles transporting patients (T6, code 1-4)	27,408	29,143	30,645	32,720	34,629	35,750		30.4
Number of patients transported (T6, code 1-4)	28,725	29,425	30,989	33,064	34,774	35,910		25.0
Per cent of vehicles dispatched arriving on scene	90.4	90.0	89.0	89.3	88.4	87.9		-2.8
Per cent of vehicles arriving on scene transporting patients	75.4	76.9	75.9	75.4	73.9	73.0		-3.1

Note that due to differences between the ADRS and TabletPCR data sources, there may be variance between similar indicators.

Source: ADRS (May 27th, 2019)

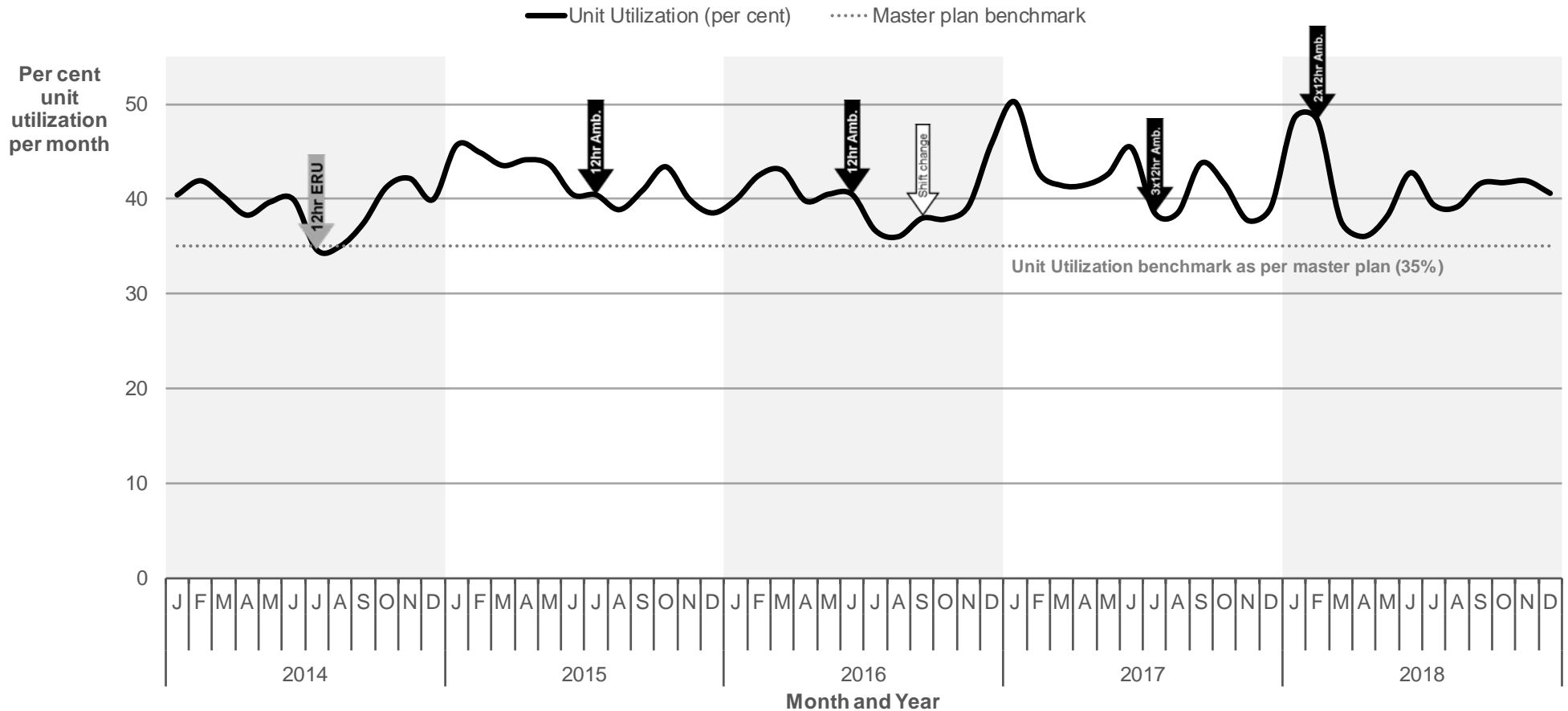
Lowest value
 Middle value(s)
 Highest value



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Unit Utilization (ambulance use), by month

Region of Waterloo Paramedic Services, January 1st, 2013 to December 31st, 2018



Note: For unit utilization, a decreasing trend is considered positive, while an increasing trend is seen as a negative.

Source: ADRS (May 27th, 2019)



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B. Compliance and Quality Assurance Indicators

Definition of Indicator Group

Indicators that monitor Paramedic Services' adherence to internal process, procedure, legislated mandates etc. (how well did we do it?).

Summary of Results

For 2018 the 80th percentile response time to emergency calls (code 4) within Waterloo Region was 9 minutes and 15 seconds; 6 seconds (1.1 per cent) faster than in 2017. Paramedic Services continues to monitor response times observed from urban, suburban, and rural perspectives, as defined by call density, against informal benchmarks. Response times vary according to population and road density. Drives times are longer in rural areas. All Response Time Performance Plan (RTPP) targets were met in 2018 and compliance results indicate that urgent calls are being given a more appropriate priority and attended to faster. Setting faster times for more urgent calls and progressively slower times for less urgent calls is a standard approach. Data from Waterloo Fire Rescue and the Cambridge Fire Department for 2017 and 2018 were included in the sudden cardiac arrest (SCA) measure for the first time in this report. The 50th percentile for SCA response times for 2018 was 5 minutes and 6 seconds; 15 seconds faster than in 2017. A defibrillator was on scene within six minutes or less 61.8% of the time in 2018. The SCA indicator will remain an underestimate under all data fire department data can be included. Work continues to incorporate data from all fire departments into the measure.

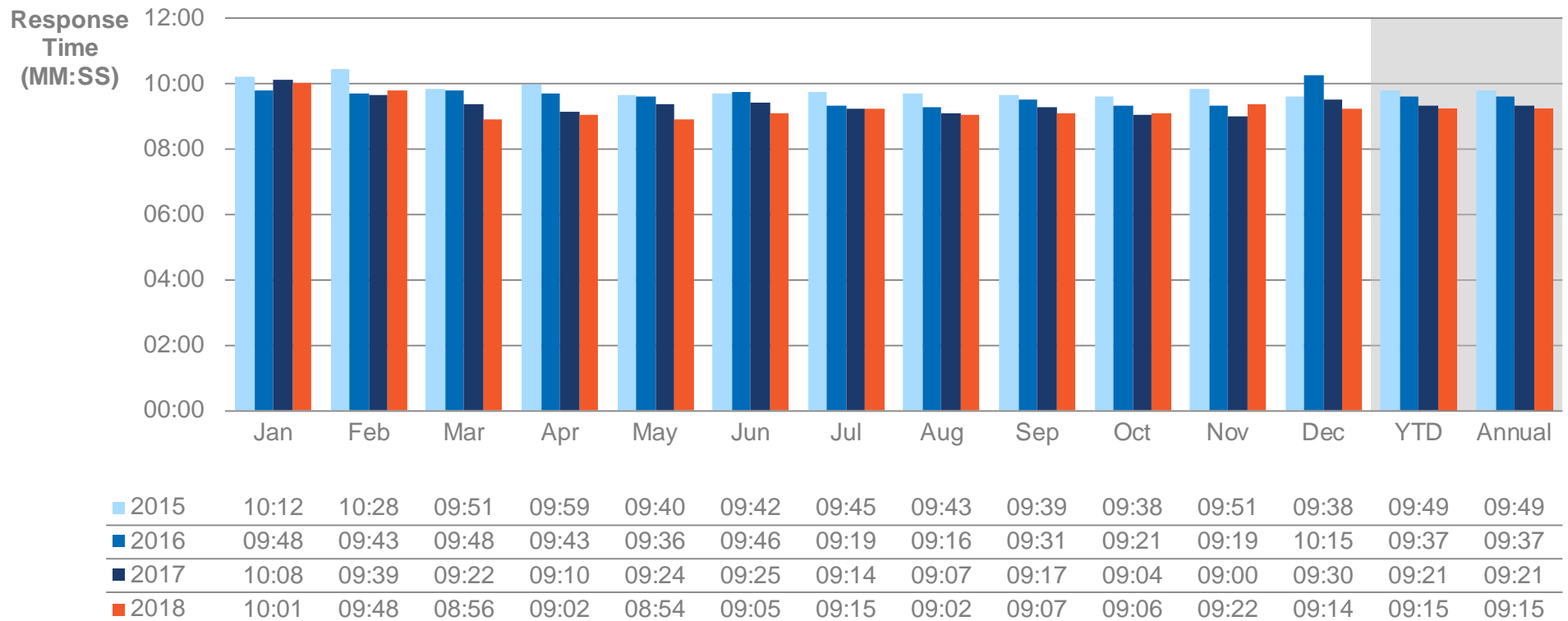
Indicator Name	Indicator Definition	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Paramedic Services Response Time to Emergency Calls	A measurement of the Paramedic Services' ability to meet performance a summary performance indicator, response time to code 4 calls, 80 th percentile.	9min 21sec	9min 15sec	-1.1%
Response Time Performance Plan Compliance Resuscitation calls (CTAS1)	Resuscitation calls involve conditions that are, or may pose, an imminent threat to life or limb or risk of deterioration requiring immediate aggressive interventions; ideal physician assessment is immediate. The current target for resuscitation calls is a response time of 8 minutes or less 70 per cent of the time or better.	78.6%	72.3%	-8.7%
Response Time Performance Plan Compliance Emergent calls (CTAS2)	Emergent calls involve conditions that potentially threaten to life, limb or function, requiring rapid medical interventions or delegated acts; ideal physician assessment is within 15 minutes. The current target for emergent calls is a response time of 10 minutes or less 80 per cent of the time or better.	81.4%	81.7%	+0.5%



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Response time to emergency calls (code 4), 80th percentile, by month

Any paramedic service, inside Waterloo Region, January 1st, 2015 to December 31st, 2018



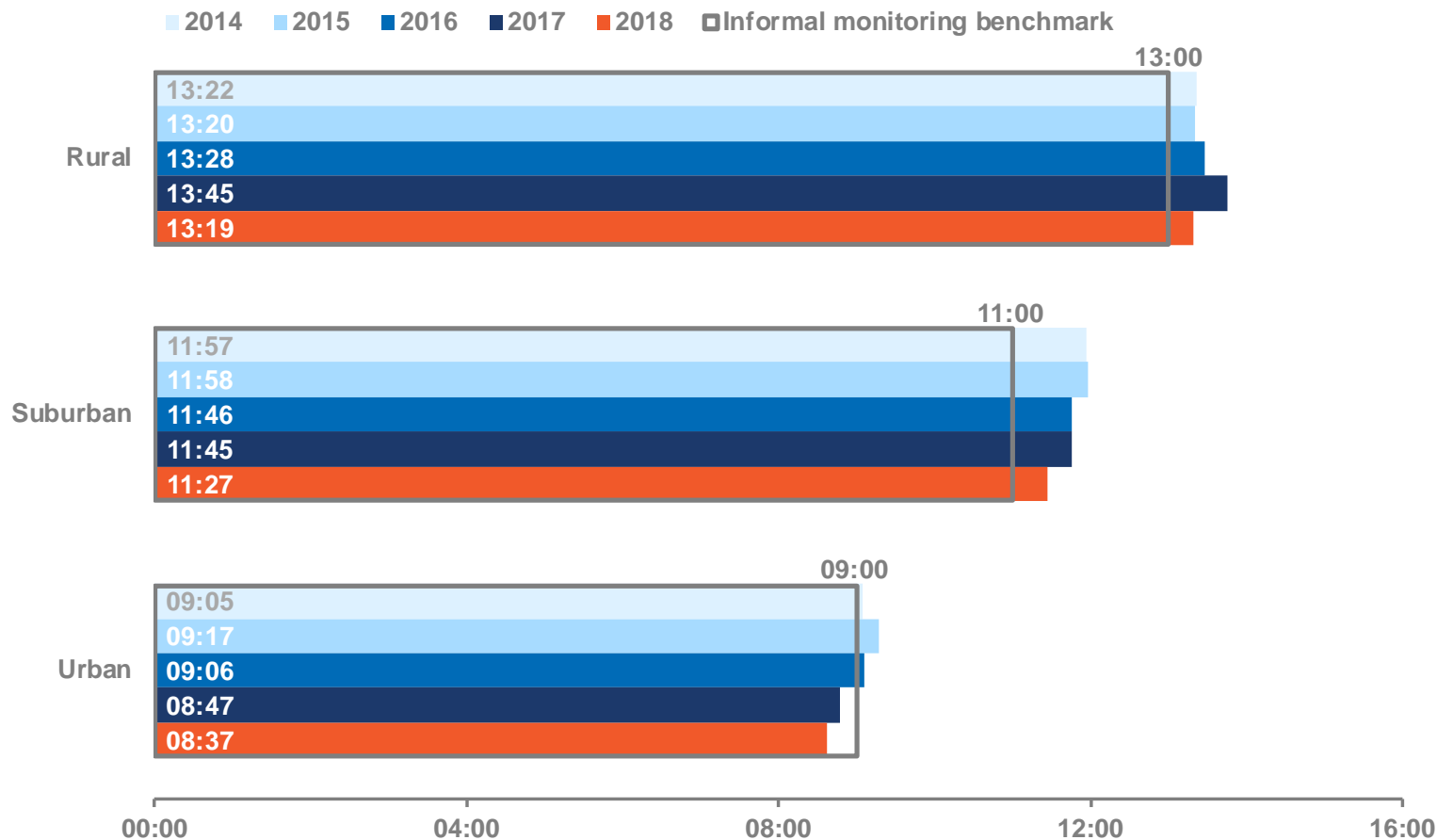
Sources: ADRS (May 27th, 2019)



Region of Waterloo * Paramedic Services PERFORMANCE MEASUREMENT

Response time to emergency calls (code 4), 80th percentile, by vehicle response density

Any paramedic service, inside Waterloo Region, January 1st, 2014 to December 31st, 2018



Source: ADRS (May 27th, 2019)



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Compliance to 2018 response time performance plan, by Canadian Triage Acuity Score (CTAS)

Region of Waterloo Paramedic Services, inside or outside of Waterloo Region, January 1st to December 31st, 2017 and 2018

Type of call	Response Time Target Paramedic Services notified (T2) to arrive scene (T4)	Approved 2018 Region of Waterloo target	2017		2018	
			Per cent compliance	Percentile time (mm:ss)	Per cent compliance	Percentile time (mm:ss)
Sudden Cardiac Arrest	Defibrillator response in 6 minutes or less (set by MOHLTC)	50% or better (Paramedic and Fire)	60.8%	05:21	61.8%	05:06
CTAS 1 (resuscitation)	Paramedic Services response in 8 minutes or less (set by MOHLTC)	70% or better (Paramedic Services only)	78.6%	07:13	72.3%	07:46
CTAS 2 (emergency)	Paramedic Services response in 10 minutes or less	80% or better (Paramedic Services only)	81.4%	09:48	81.7%	09:44
CTAS 3 (urgent)	Paramedic Services response in 11 minutes or less	80% or better (Paramedic Services only)	80.8%	10:52	81.9%	10:39
CTAS 4 (less urgent)	Paramedic Services response in 12 minutes or less	80% or better (Paramedic Services only)	83.2%	11:20	83.4%	11:18
CTAS 5 (non-urgent)	Paramedic Services response in 12 minutes or less	80% or better (Paramedic Services only)	80.1%	11:59	80.4%	11:52

*Sudden Cardiac Arrest now also includes data from Waterloo Fire Rescue, and the Cambridge Fire Department.

Source: ADRS and TabletPCR (May 27th, 2019)



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C. Efficiency Indicators

Definition of Indicator Group

Indicators that outline how timely Paramedic Services is being performed by staff and offered to the Region (how well did we do it?).

Summary of Results

Currently, an average of 26.4 ambulance days per month are lost to offload delay. A total of 316.4 ambulance days were lost to offload delay in 2018. Total days lost to offload delay has increased of 64.0 per cent compared to 2017 resulting in the loss of 123.5 additional ambulance days relative to 2017. Paramedic Services continues to work with area Emergency Departments to minimize losses due to offload delay. Relative to 2017, there were 189 fewer code yellow events and 176.7 fewer hours spent in code yellow in 2018 while there were 34 more code red events and 15.3 more hours spent in code red in 2018 compared to 2017. The effects of two additional 12-hour ambulances, added in late February 2018, were immediately evident. Despite sustained call response volumes there were fewer events and time spent in both code yellow and code red in March. However, the effects of the new resources were short lived as time spent and number of events of code yellow and code red had returned to historical levels by May.

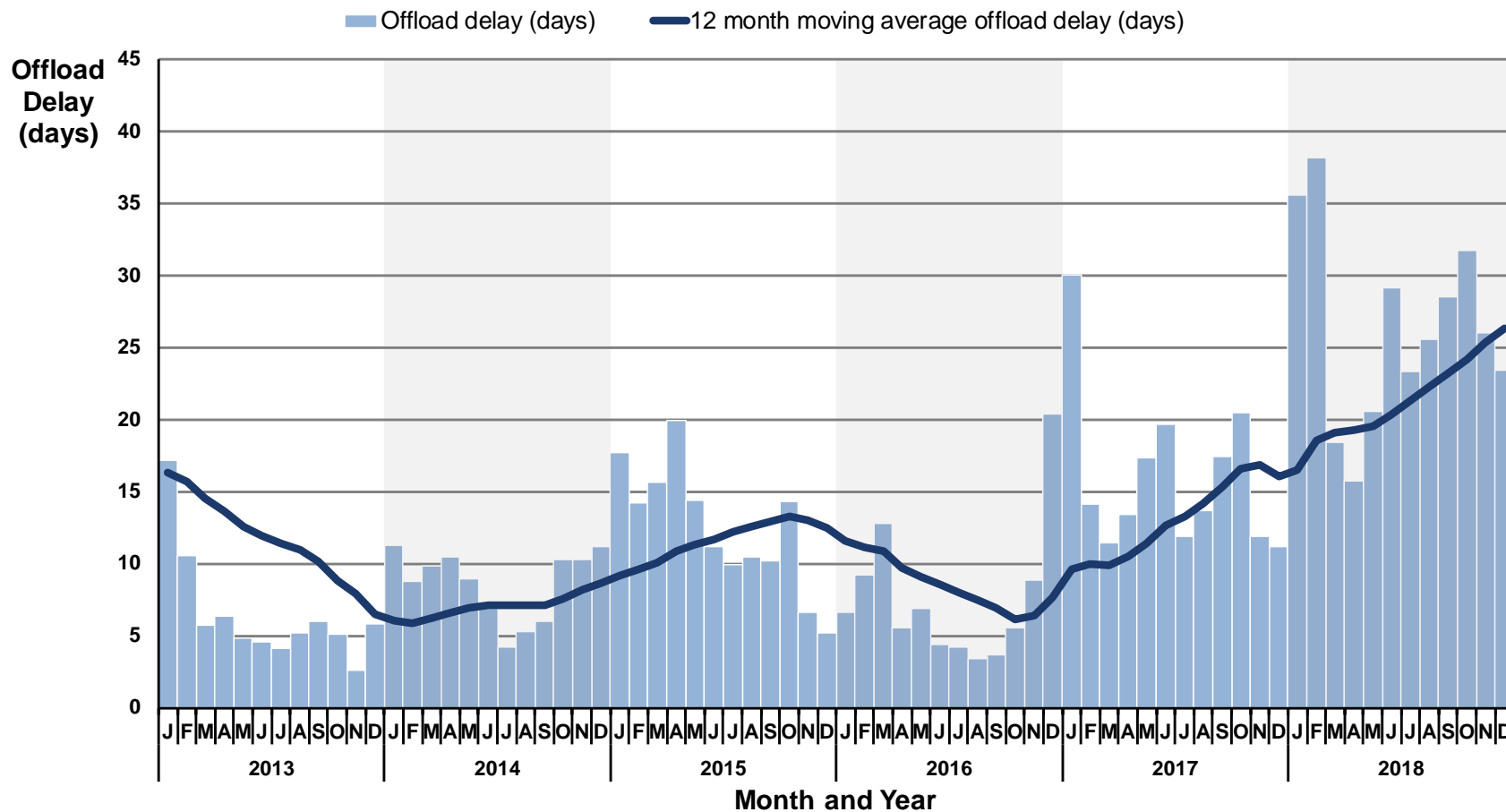
Indicator Name	Indicator Definition	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Offload Delay (monthly average)	The 12 month moving average number of 24 hour ambulance days lost to offload delay over the course of a month.	16.1 days	26.4 days	+64.0%
Code Yellow Status	The percentage of time where Paramedic Services is in a Code Yellow Status for the month (\leq three vehicles available).	9.9%	7.9%	-20.4%
Code Red Status	The percentage of time where Paramedic Services is in a Code Red Status for the month (zero vehicles available).	0.6%	0.8%	+27.6%



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Ambulance days and moving average of ambulance days lost to offload delay, by month

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018



For offload delay, a decreasing trend is considered positive, while an increasing trend is seen as negative.

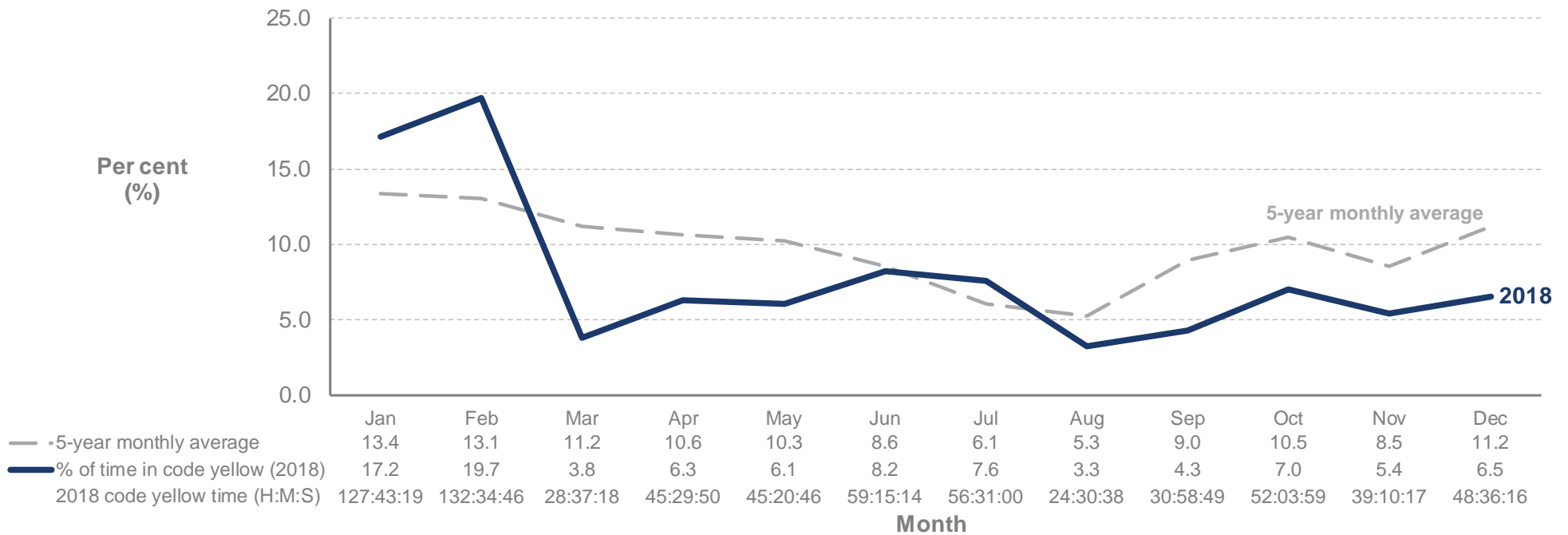
Source: TabletPCR (May 27th, 2019)



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Percentage of time in code yellow status, by month

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018



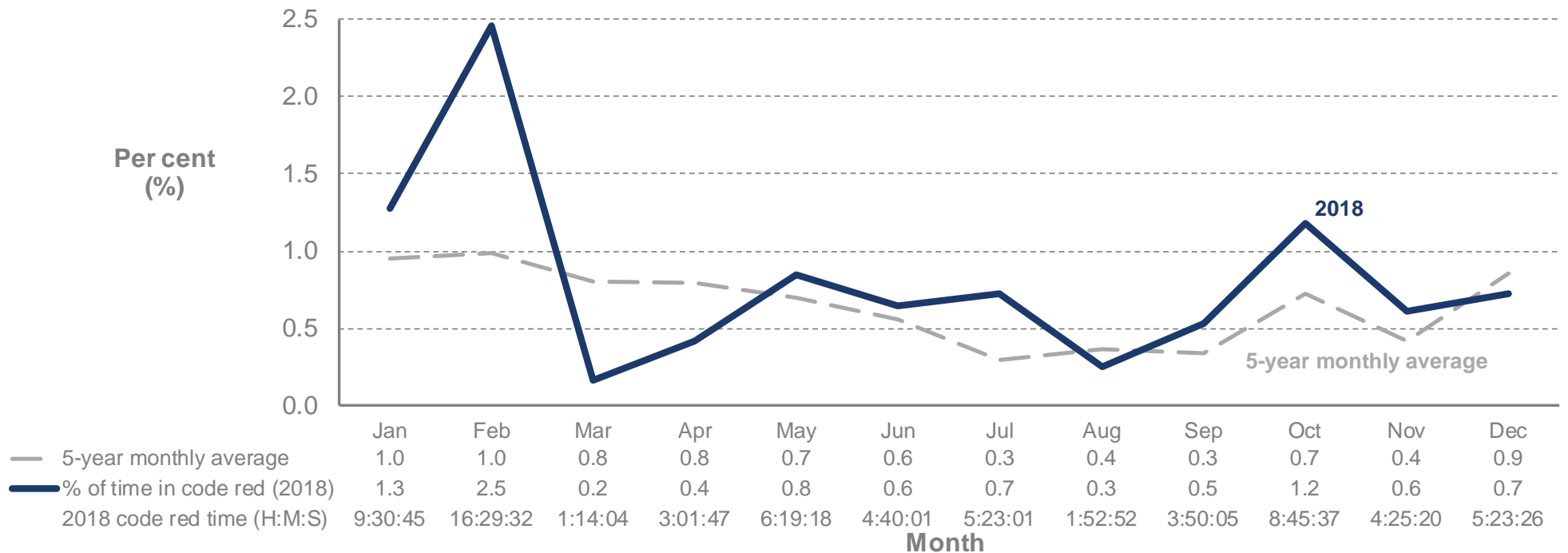
Source: CACC (May 27th, 2019)



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Percentage of time in code red status, by month

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018



Source: CACC (May 27th, 2019)



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D. Service and Quality Impact Indicators

Definition of Indicator Group

Indicators that measure not only the timely provision of service, but how well that service is being provided by Paramedic Services' staff (How well is the service being performed?).

Summary of Results

For 2018, 89.4 per cent of all stroke patients, and 99.4 per cent of all stroke protocol eligible patients, were transported to a stroke facility; consistent with the historical trend. The percentage of cardiac arrest patients with the return of pulse improved 14.6 per cent between January and December 2017 and 2018. As any return of spontaneous circulation is deemed to be positive, results are in an acceptable range. Heart attack STEMI (ST-segment elevation myocardial infarction) protocol compliance (providing care in less than 90 minutes) was 3.6 per cent lower from the previous year. Note that service type indicators tend to fluctuate around the average over time, due to the small number of cases and the large number of complex variables involved in these cases.

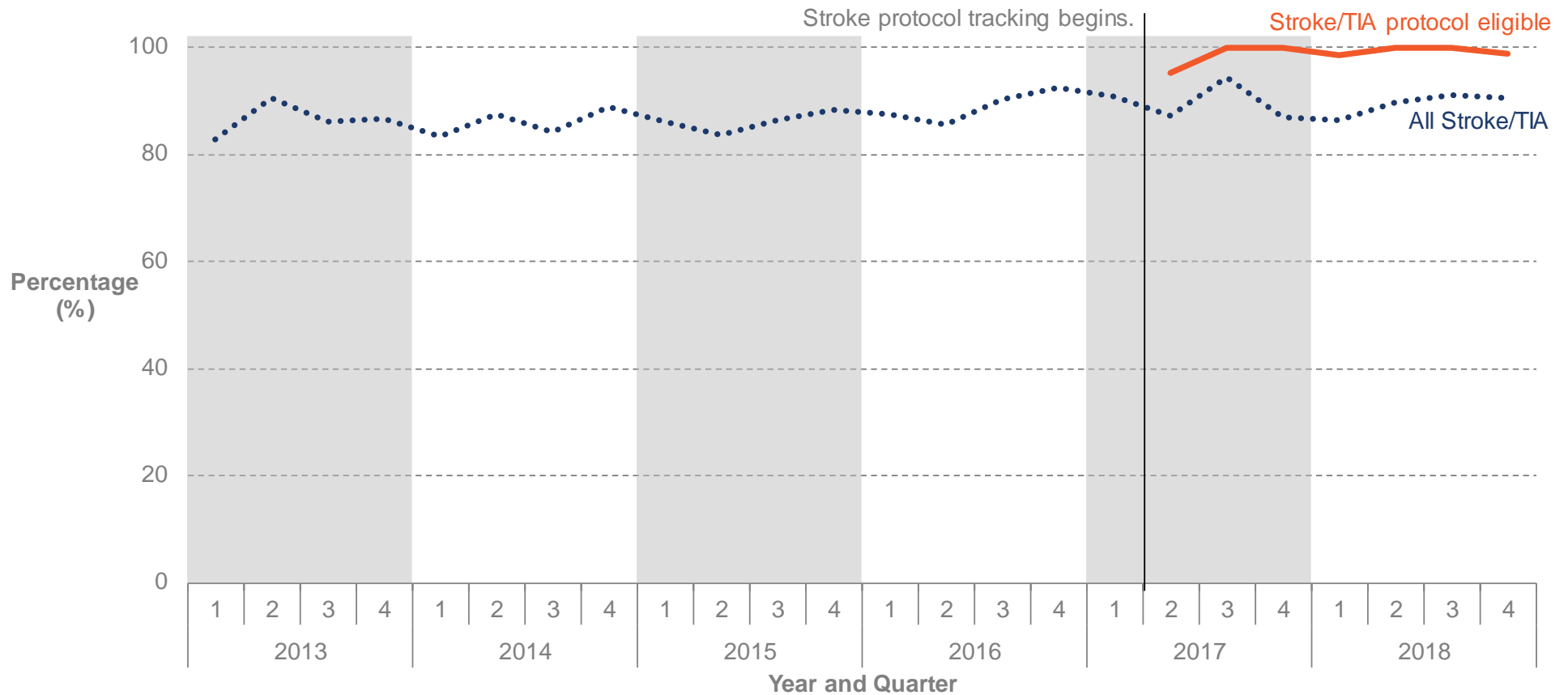
Indicator Name	Indicator Definition	Jan to Dec 2017	Jan to Dec 2018	Per cent change
Stroke Patient to Stroke Facilities	The percentage of all stroke patients, not stroke protocol eligible patients, taken to stroke facilities. The stroke protocol outlines that only patients with certain symptoms within certain timelines require transport to a stroke facility. Due to this, a value less than 100% may not represent a missed target.	90.0%	89.4%	-0.6%
Return of Spontaneous Circulation (ROSC)	The percentage of cardiac arrest patients with the return of pulse.	12.8%	14.6%	+14.6%
Heart attack (STEMI) Protocol ST-Segment Elevation Myocardial Infarction	Percentage of STEMI patients where care was provided in less than 90 minutes ('STEMI' represents a type of heart attack). *Note: indicator results are shared among Paramedic Services and St. Mary's Hospital. Paramedic Services can only control time from patient contact to arrival at St. Mary's Hospital; the remaining time to the 90 minute target is hospital dependent.	64.4%	62.0%	-3.6%



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Percentage of stroke patients transported to a stroke facility†, by quarter

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018

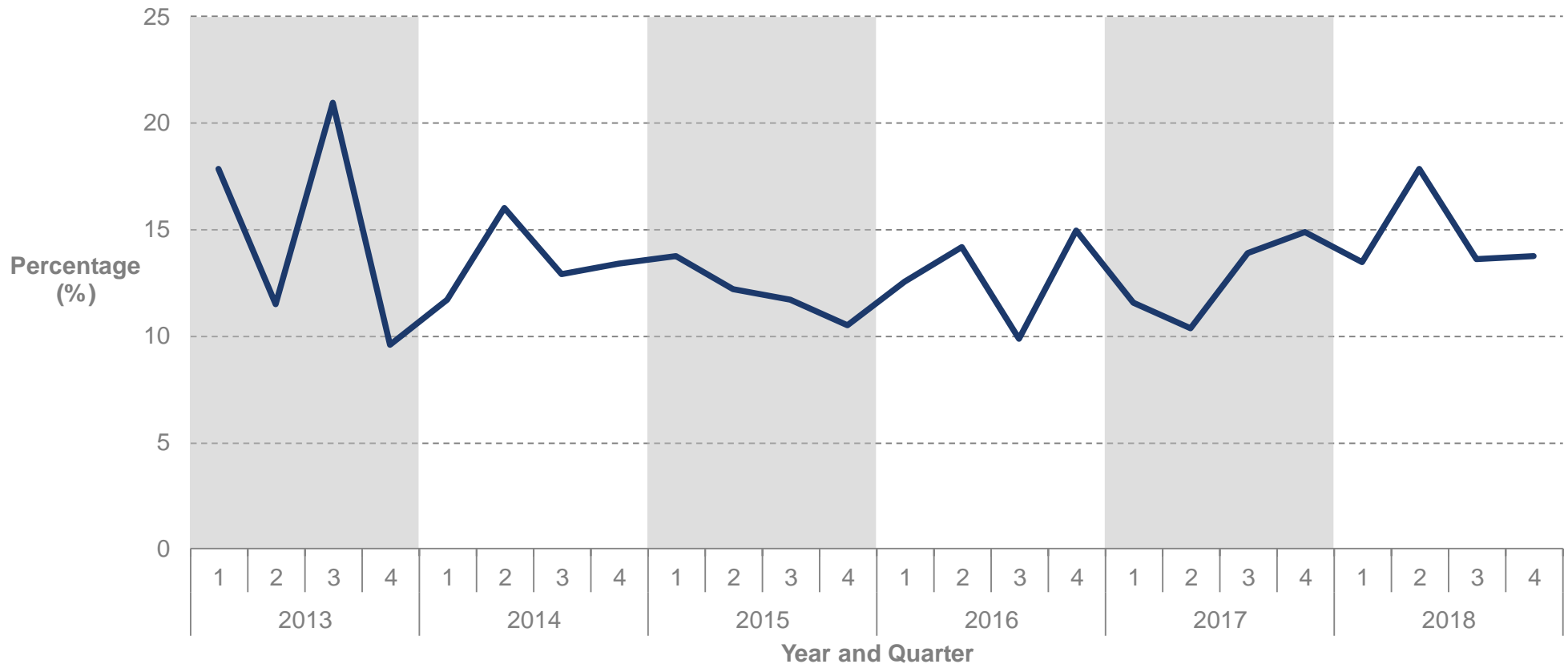


†Stroke facilities include: Grand River, Brantford General, Hamilton General, Stratford General, and as of December 2013, Guelph General.

Source: TabletPCR (May 27th, 2019)

Percentage of cardiac arrest patients with return of spontaneous circulation (ROSC), by quarter

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018



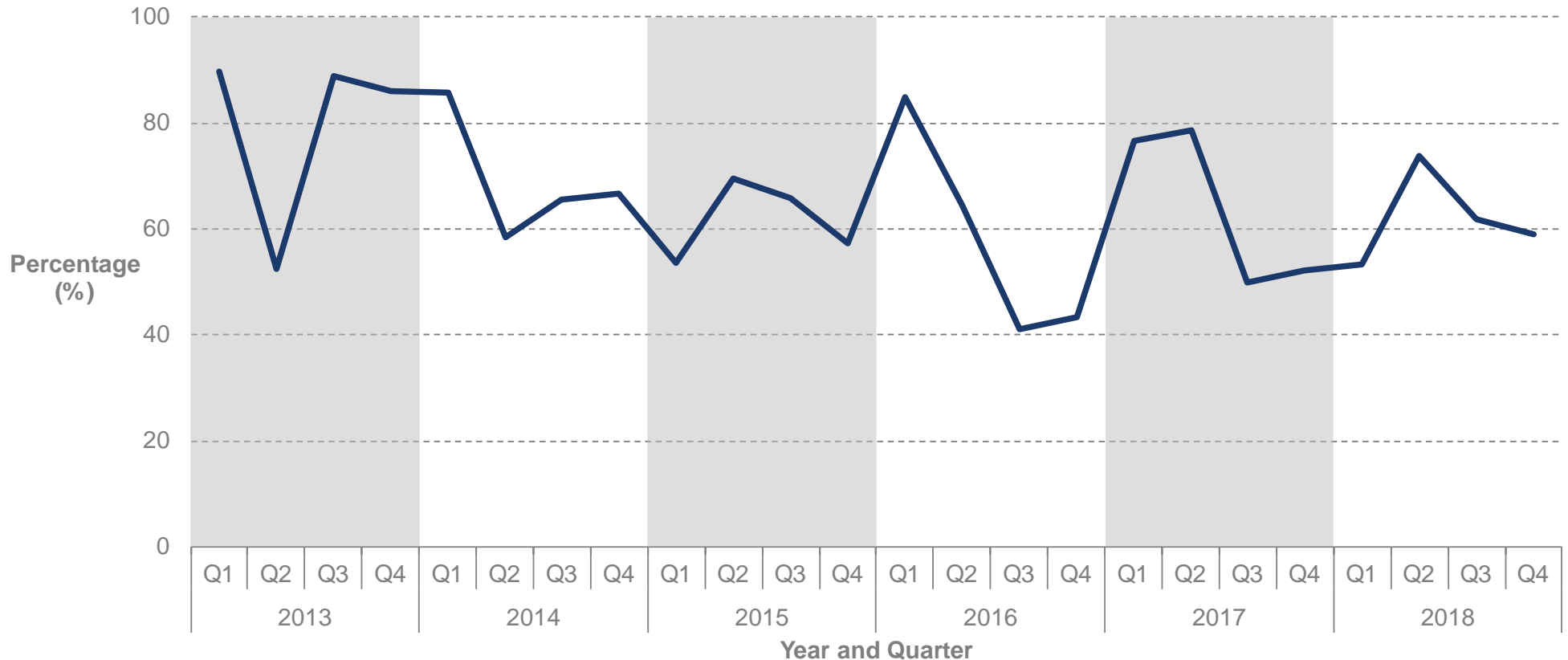
Source: TabletPCR (May 27th, 2019)



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Percentage of heart attack patients where care was provided in less than 90 minutes (STEMI protocol), by quarter

Region of Waterloo Paramedic Services, inside and outside of Waterloo Region, January 1st, 2013 to December 31st, 2018



Source: St. Mary's Hospital (May 27th, 2019)



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E. GLOSSARY

ADRS: Ambulance Dispatch Reporting System

CACC: Central Ambulance Communications Centre

Call density: A 1km x 1km grid was overlaid across Waterloo Region so each call could be assigned a grid square based on its location. The total number of calls and an average per month calculated for each grid square. Grid squares were then assigned one of three classes:

Urban - A grid square was classed as urban if there were more than two calls per month per square kilometer and at least half of its neighbouring grid squares were of the same density or higher.

Suburban - A grid square was classed as suburban if there were less than or equal to two calls and more than 0.5 calls per month per square kilometer and at least half of its neighbouring grid squares were of the same density or higher.

Rural - A grid square was classed as suburban if there were less than or equal to 0.5 calls and more than 0.08 calls per month per square kilometer and at least half of its neighbouring grid squares were of the same density or higher.

Cardiac Arrest: A sudden, sometimes temporary, cessation of the heart's functioning.ⁱ

Code 1 (Deferrable): A routine call that may be delayed without detriment to the patient (e.g. a non-scheduled transfer; a minor injury).ⁱⁱ

Code 2 (Scheduled): A call which must be done at a specific time, for example because of special treatment or diagnostic facility requirement (e.g. inter-hospital transfers or a scheduled meet with an air ambulance).ⁱⁱⁱ

Code 3 (Prompt): A call that should be performed without delay (e.g. serious injury or illness).^{iv}

Code 4 (Urgent): A call that must be performed immediately where the patients 'life or limb' may be at risk (e.g. Vital Signs Absent patient or unconscious head injury).^v

Code Red: When the Region of Waterloo Paramedic Services is at a level where no ambulances are available to respond to the next emergency call and no out of town services are immediately available to assist.^{vi}

Code Yellow: When the Region of Waterloo Paramedic Services is at minimum coverage of three vehicles or less.^{vii}

CTAS Level: The ‘Canadian Triage & Acuity Scale’ is used to assign a level of acuity to a patient. Acuity refers to the gravity of the situation – the potential for death and/or irreversible illness. CTAS is a tool that more accurately defines the patient’s need for care. Assignment of the CTAS level is to be based upon not only the presenting complaint identified on the initial assessment made by the paramedic, but also on their examination findings, and response to treatment.^{viii}

Defibrillator: An electronic device that applies an electric shock to restore the rhythm of a fibrillating heart.^{ix}

Dispatch Priority Code: The priority code number that is assigned to the call by the dispatcher. It identifies the priority under which the ambulance responds to the call location (e.g. an urgent response would be entered as Code 4).^x

Emergency Calls: Based on dispatch priority only. Emergency calls are categorized as Code 4 (Urgent).

Indicator: A defined part of a program/team/system that is deemed important to measure and provide “specific information on the state or condition of”, as it contributes to the efficient and effective achievement of an outcome.^{xi}

MBNCanada: Municipal Benchmarking Network Canada, formerly the Ontario Municipal Benchmarking Initiative (OMBI), is a partnership between Canadian municipalities for the purpose of fostering and supporting a culture of service excellence through the identification, creation, and collection of consistent and comparable performance data, and the sharing of operational best practices and collaboration on creative solutions to improve performance.

Offload Delay: Offload delay measures the offload of patients at local hospitals, which can impact the resources required and availability to respond to calls.^{xii}

Patient Transport(s): The total number of patients carried in the ambulance during a given call.^{xiii}

Performance Measurement: A method to monitor, observe and describe program implementation. It portrays information to tell that outputs are being delivered as planned, and gives an idea of whether outcomes are occurring. It provides information to be used for evaluation.^{xiv}

Response: See vehicle response.

Response Time: Response time means the time measured from the time a notice is received to the earlier of either the arrival on-scene of a person equipped to provide any type of defibrillation to sudden cardiac arrest patients or the arrival on-scene of the ambulance crew.^{xv}

Return of Spontaneous Circulation: Signs of the return of spontaneous circulation (ROSC) include breathing (more than an occasional gasp), coughing, or movement. For healthcare personnel, signs of ROSC also may include evidence of a palpable pulse or a measurable blood pressure.^{xvi}

Return Priority Code: The priority code number that is assigned to the call by the ambulance crew. It identifies the priority under which the patient is transported (e.g. a prompt return to a medical facility would be entered as a Code 3).^{xvii}

STEMI: A STEMI (ST-Segment Elevation Myocardial Infarction) is a specific type of myocardial infarction (MI), or in other words a type of heart attack, which demonstrates characteristic ECG (electrocardiogram; a tool to measure electrical activity of the heart) changes including marked elevation in the ST-segment in the cardiac cycle.^{xviii}

STEMI Facilities: A hospital that houses onsite Percutaneous Coronary Intervention (PCI) facilities with an experienced interventional team.^{xix}

Stroke Facilities: Stroke facilities are based on a collaborative model of 11 regional stroke networks. Each regional network is comprised of a Regional Stroke Centre (RSC), District Stroke Centres (DSCs) and community hospitals. The regional stroke networks are collaborative partnerships of care providers that span the care continuum from prevention to community re-engagement. The goal is to coordinate equitable access and improve outcomes for stroke survivors.^{xx}

T1: The time point when a call is entered in to the queue at the Central Ambulance Communications Centre and is available for dispatch.

T2: The time point when ambulance/response unit is notified by the Central Ambulance Communications Centre of a call.

T4: The time point when an ambulance/response unit arrives at the dispatched call's location/scene. This is not the time point when a paramedic is at the patient's side.

T6: The time point when an ambulance arrives at its destination (e.g. hospital).

TabletPCR: An internal tool used to track information and data relevant to calls and patient care reporting.

Unit Utilization: Percentage of staffed vehicles utilized during any unit of time.^{xxi} Note that when UU exceeds a value of 40 per cent, it becomes difficult to ensure an ambulance will be available for the next call in a reasonable time.



Region of Waterloo

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PERFORMANCE MEASUREMENT

Vehicle response: A vehicle response is generated when an ambulance or emergency response unit is dispatched to a call; there can be more than one vehicle response per call (multiple ambulances/emergency response units assigned to the same call; for example, multi-casualty incidents).

YTD: Year-to-date refers to the period extending from the beginning of the current reporting year (January 1st) to the end of the reporting period. The Mid-year report's end date is December 31st, and the mid-year report's end date is December 31st.



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PERFORMANCE MEASUREMENT

F. Contact Information

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Accessible formats of this document are available upon request. Please call the Coordinator, Health Communications at 519-575-4400 ext. 2244, (TTY 519-575-4608) to request an accessible format.

Notes

- ⁱ “Definition of cardiac arrest in English”. *Oxford Dictionaries*. Oxford University Press, 2013. Web. 13 August 2013.
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- ⁱⁱⁱ Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 9.
- ^{iv} Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 9.
- ^v Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 9.
- ^{vi} Region of Waterloo. Public Health. Emergency Medical Services. 2011 EMS System Performance. Report PH-12-017. File Code P 05-80. Waterloo: Region of Waterloo, May 8, 2010. Web. 14 August 2013.
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- ^{ix} “Defibrillator”. *Merriam-Webster*. Merriam Webster, Incorporated, 2013. Web. 13 August 2013.
- ^x Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 9.
- ^{xi} “Definition of indicator in English”. *Oxford Dictionaries*. Oxford University Press, 2013. Web. 14 August 2013.

- ^{xii} “What is Service?”. *OMBI Ontario Municipal CAO’s Benchmarking Initiative*. Ontario Municipal CAO’s Benchmarking Initiative, 2012. Web. 13 August 2013.
- ^{xiii} Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 11.
- ^{xiv} Schacter, Mark. Kronick, Murray. “Results-Based Management 101”. *Performance and Planning Exchange*. Performance and Planning Exchange, 2010-2011. Web. 14 August 2013.
- ^{xv} “Ambulance Act”. *ServiceOntario e-Laws*. Government of Ontario, 2013. Web. 14 August 2013.
- ^{xvi} “Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports”. *American Heart Association*. American Heart Association, Inc., 2013. Web. 13 August 2013.
- ^{xvii} Government of Ontario, Ministry of Health and Long-Term Care, Ambulance Call Report Completion Manual (Ontario: Government of Ontario, 2003) 10.
- ^{xviii} “Cardiac Care STEMI Program Frequently Asked Questions”. *Toronto EMS News & Video*. Toronto Emergency Medical Services, 1998-2013. Web. 13 August 2013.
- ^{xix} “CCN Documents Optimizing Access to Primary PCI for ST Elevation Myocardial Infarction”. *Cardiac Care Network*. Cardiac Care Network of Ontario, 2013. Web. 14 August 2013.
- ^{xx} “The Ontario Stroke System (OSS)”. *Ontario Stroke Network Advancing the Ontario Stroke System*. Ontario Stroke Network, 2010. Web. 13 August 2013.
- ^{xxi} Region of Waterloo. Public Health. Emergency Medical Services. Emergency Medical Services (EMS) Master Plan. Report PH-07-061. File Code P 05-01. Waterloo: Region of Waterloo, August 4, 2007. Web. 14 August 2013.