Ontario Health Teams Central Evaluation

Quantitative Evaluation

Total OHT Attributable Population Improvement Indicators at Baseline: Fiscal Year 2018 to 2020

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HSPN Health System Performance Network

About Us

The Health System Performance Network (HSPN) is a collaborative network of investigators, visiting scholars, post-doctoral fellows, graduate students and research staff working with health system leaders, and policymakers to improve the management and performance of our health system. Building on Ontario's established record of performance measurement created by the 1998 ground-breaking Hospital Report Research Collaborative, the HSPN was established in 2009 and has built a track record in performance measurement, research, evaluation and improvement in Ontario with expertise in multiple domains of health system performance including perspectives of patients, providers, population health, and cost. The HSPN receives funding from the Ontario Ministry of Health.

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About This Report

This report is part of the second phase of the Health System Performance Network (HSPN) central evaluation of Ontario Health Teams (OHTs). The first phase focused on analyses of OHT applications and included surveys and key informant interviews at the time of application to become OHTs. The second phase includes reporting across all OHTs using population-based administrative data. The purpose of the HSPN evaluation is to understand how OHTs are developing and implanting change to drive improvements in patient, provider and health system outcomes.

This report is largely based on data prior to the government's introduction of the OHT initiative, selection and approval, and, prior to OHT implementation of new models of care and therefore considered a baseline of OHT performance. Baseline information on health system indicator trends provides a useful frame of reference for OHT implementation activities and comparators for local measurement.

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Executive Summary

This report contains results on 10 health system indicators across 42 OHT candidates based on the most recent three years of data (2017/18-2019/20). The report also describes the extent of material deprivation within each OHT and the associations between deprivation and the 10 health system indicators. The information within this report identifies where OHTs have opportunities for improvement.

Background

Ontario Health Teams (OHTs) were introduced in 2019 by the Ontario Ministry of Health (MOH) as a new way of integrating care delivery. They were developed to enable patients, families, and cross-sectoral groups of providers and organizations work together to create a coordinated continuum of care that is better connected to patients in their local communities. At maturity, OHTs will be clinically and fiscally accountable for a defined population.

The objective of this work is to report on health outcomes and direct health care costs across OHT attributable populations using routinely collected health administrative data sources held at ICES. The HSPN and MOH have adopted the Quadruple Aim Framework inclusive of patient experience, provider experience, health outcomes, and cost. This report focuses on system level indicators that reflect patient experience, health outcomes, system efficiencies and cost. We contrast these indicators across measures of material deprivation and rurality.

Results in Brief

The data highlight that some OHTs have a much higher proportion of their attributable populations residing in the most deprived areas of Ontario, as high as 39%; in contrast one OHT has more than 50% of their population residing in the least deprived neighborhoods.

The highest levels of variability in indicator results across OHTs were found for premature mortality, alternate level of care days, hospitalizations for ambulatory care sensitive conditions (ACSC), and emergency department visits best managed elsewhere (Coefficients of Variation or CVs. of 28, 29, 33 and 89 respectively). Moderate levels of variation were found for total monthly system cost, total inpatient days, 7-day post-acute physician follow-up and virtual physician visits (CV=11, 14, 15, 16 respectively), and low levels of variability for acute 30-day readmissions and continuity of physician care (CV=6 and 4.5).

Most indicators had relatively stable average trends but there were notable movements among OHTs over time with both improvements and worsening scores. Some of the largest changes were for premature mortality and ACSC hospitalizations, possibly due in part to relatively low event rates.

We have also shown a notable correlation between material deprivation and rurality and several of our attributable population indicators: premature mortality, average monthly cost, ED visits best managed elsewhere, ambulatory care sensitive hospitalizations and physician visits after a hospitalization.

Conclusion

This report provides an overview of baseline performance across 42 OHT candidate teams. These baseline findings illustrate where there are opportunities for OHTs to focus their implementation activities to improve patient outcomes.

Abbreviations

ADP	Assisted Device Program database
CAPE	Client Agency Program Enrolment database
CI	95% confidence intervals
CCRS	Continuing Care Reporting System database
DAD	Discharge Abstract Database
DIN	Drugs List
ESTSOB	Estimated Schedule of Benefits (price associated with OHIP fee codes)
GAPP	GAPP Decision Support System (physician payments)
HCD	Home Care Database
OCCI	Ontario Case Costing Initiative database
OHCAS	Ontario Home Care Administrative System database
ODB	Ontario Drug Benefit claims database
OHIP	Ontario Health Insurance Plan claims database
OHTAM	Ontario Health Teams attribution database
OMHRS	Ontario Mental Health Reporting System database
ONMARG	Ontario Marginalization database
NACRS	National Ambulatory Care Reporting System database
NRS	National Rehabilitation Reporting System
RAICA	Resident Assessment Instrument - Contact Assessment
RAIHC	inter-Resident Assessment Instrument – Home Care
RPDB	Registered Persons Database
SDS	Dame Day Surgery database

Background

Ontario Health Teams (OHTs) were introduced in 2019 by the Ontario Ministry of Health (MOH) as a new way of integrating care delivery. They were developed to enable patients, families, and health care providers work together to create a coordinated continuum of care that is better connected to patients in their local communities. OHTs involve a cross-sectoral group of providers and organizations, and at maturity will be clinically and fiscally accountable for a defined population.[1]

HSPN and MOH have adopted the Quadruple Aim Framework inclusive of patient experience, provider experience, health outcomes, and cost.[2] This report focuses on system level metrics that reflect patient experience, health outcomes and cost.

Objectives

The objective of this work is to report on health outcomes and direct health care costs across OHT attributable populations using routinely collected health administrative data sources held at ICES. We sought to describe variation in these measures, cross-sectionally and over time, to identify where opportunities and challenges exist to better integrate care. Monitoring and evaluation of these measures facilitates evidence-based decision making and care improvements for Ontarians.

Methods

Data Sources

In January 2021, a database of Ontarians linked to an OHT was shared with ICES by the MOH. This database, the OHT Attribution Models database (OHTAM), links Ontarians to a single usual provider of primary care, and then assigns that provider's patients to a hospital and a larger network (i.e., an OHT) based on historical health care utilization patterns. Specialists are linked to networks based on hospital where they provided the most services. Nearly all Ontarians are assigned to a network using this methodology, which closely resembles the Ontario physician networks developed at ICES.[3] Importantly, the networks are based on health care utilization and physician-hospital referral patterns, and not where individuals live in Ontario. Administrative data from 2017 were used to attribute individuals to OHTs and create the dataset, which we herein refer to as the *OHT attributable population.* Each OHT in the dataset was anonymized for reporting.

Health administrative datasets used in this work included the Registered Persons Database (RPDB), Canadian Institute for Health Information's Discharge Abstract Database (DAD) and Same Day Surgery Database (SDS), National Ambulatory Care Reporting System (NACRS), Ontario Mental Health Reporting System (OMHRS), Ontario Health Insurance Plan claim database (OHIP), Client Agency Program Enrolment (CAPE), National Rehabilitation Reporting System (NRS), Continuing Care Reporting System (CCRS), Home Care Database (HCD), Ontario Drug Benefits claims database (ODB), Corporate Provider Database (CPDB), Ontario Marginalization (ONMARG) database, and the 2006 Canadian Census (Census). Detailed information on these data is available elsewhere (see: https://datadictionary.ices.on.ca/Applications/DataDictionary/Default.aspx). These datasets were linked using unique encoded identifiers and analyzed at ICES, an independent, non-profit research institute funded by an annual grant from the MOH. As a prescribed entity under Ontario's privacy legislation, ICES is authorized to collect and use healthcare data for the purposes of health system analysis, evaluation and decision support. Secure access to these data is governed by policies and procedures that are approved by the Information and Privacy Commissioner of Ontario. The use of these data in this project was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a Research Ethics Board.

Selection of Total Population Measures

A jurisdictional scan of Ontario health system reports and Ontario integrated care evaluations identified 18 indicators for consideration. This was followed by a modified delphi approach among the team to select eight indicators to report at the OHT attributable population level as measures of patient/population

outcomes of integrated care. An important criterion for selection included the indicator could be measured in administrative databases for all OHTs.

Table 1 lists and defines the selected indicators for the total population examined in this report as well as the Quadruple Aim domain most closely represented by the measure. Measures include global markers of health system performance (premature mortality and costs), markers specific to inpatient hospital care (days in acute inpatient care, alternate level of care (ALC) days, hospitalizations for ambulatory care sensitive conditions (ACSCs), 30-day readmissions and ED visits best managed elsewhere), and markers specific to community-based care (physician visits after hospital discharge, continuity of care and the proportion of OHT attributed patients with a virtual physician encounter). These measures have face validity with OHTs as almost all (7/8) were included by the MOH in the application packages and identified as priority measures in OHT full applications.

Table 1. Total population measures examined in this report

Indicator	Definition	Quadruple Aim
Premature mortality	Number of deaths among persons aged 0 to 74 years of age	Health Outcomes
Cost per month alive	Average attributable government health care spending per individual, per month alive	Cost
Days in acute inpatient care	Average days in acute inpatient care among persons that spent 1 or more days in acute inpatient care	Cost & Patient Experience
ALC days	Proportion of days in acute inpatient care that were spent in alternate level of care (ALC)	Patient Experience & Efficiency
Hospitalizations for ACSCs	Number of hospital admissions for ambulatory care sensitive conditions (including grand mal status and other epileptic convulsions, chronic obstructive pulmonary disease, asthma, congestive heart failure and pulmonary edema, hypertension, angina, diabetes, and lower respiratory illness) among persons aged 0 to 74 years of age	Health Outcomes
30-day readmissions	Proportion of hospital discharges for HBAM inpatient grouper conditions where the patient returned to hospital within 30 days for urgent/emergent care	Health Outcomes
ED visits best managed elsewhere	Number of low-acuity, unscheduled visits to emergency departments for conditions that could be treated in a primary care setting among persons aged 1 to 74 years of age	Patient Experience (access) & Efficiency
Physician visits after hospital discharge	Proportion of hospital discharges for HBAM inpatient grouper conditions where the patient was seen by a physician within 7 days of discharge	Patient Experience (access)
Continuity of care	Average proportion of an attributed person's physician visits that was with their most regularly seen doctor	Patient Experience
Proportion of OHT attributed patients with a virtual physician encounter	Proportion of attributed patients that had one or more virtual physician consults/ visits among those that had at least one physician consult/ visit	Patient Experience (access) & Efficiency

Reporting of Indicators

Although the attributable population includes all residents of Ontario, indicators are reported only for OHTs that submitted a full application to the MOH and were approved as Candidate OHTs. These 42 OHTs account for approximately 85% of the Ontario population. Full information of the calculation of each selected indicator – including data sources used, derivation of numerators and denominators, and other details – can be found in the accompanying *Appendix: Indicator Technical Specifications* section. We report each measure annually at the OHT-level using model-based risk adjusted methods. Risk adjustment is a statistical method that accounts for differences in the distribution of individual-level characteristics (and other risk factors) between different providers so that providers that care for older, more complex patients are not unfairly penalized (relative to providers that care for younger, healthier populations). Model based risk adjustment is ideal as it (1) allows for a consistent approach across all measures, whether the indicator is a risk (proportion) or rate (events over time), (2) is flexible in that different regression models can be applied to best fit the data, and (3) allows for control for multiple confounding factors. In this report, all estimates are risk adjusted for age and sex, unless otherwise stated (see hospital readmissions measure).

To quantify the degree of variability of risk adjusted results at the OHT-level in each reporting period (here, years), we calculated the coefficient of variation (CV), the ratio of the standard deviation to the mean. The higher the CV value, the greater the level of dispersion around the mean and possibly represents a measure where some OHTs are performing much better than others. We also described the minimum and maximum percent change in risk adjusted estimates in 2019/20 relative to prior reporting periods.

We used the ONMARG database to derive the material deprivation quintile for the attributable population using and individual's postal code. Material deprivation includes aspects of income, education, family structure and housing quality. These data are collected from the Canadian census and are at the neighbourhood level[1]. Material deprivation measures the ability or inability to access and attain basic needs. The concept is closely connected to poverty. We calculated the proportion of each OHTs attributable population living in each quintile of material deprivation and ranked OHTs according to the ratio of their population residing in the most to least deprived areas of Ontario (quintile 5 vs. quintile 1). Kendall's rank correlation statistic (T) was used to quantify associations between this material deprivation rank and risk adjusted indicator performance. The rank correlation coefficient varies between +1 and -1. Values between ±0.00 and 0.10 suggest a negligible association; values between ±0.10 and 0.39 suggest a weak association; values between ±0.40 and 0.69 suggest a moderate association; values between ±0.70 and 0.89 suggest a strong association; and values between ±0.90-1.00 suggest a very strong association. Correlations between the OHT ranks of risk adjusted performance versus level of rurality was also calculated. Here, urban versus rural was based on residing in a community of 10,000 persons or more. We also calculated the proportion of each OHTs attributable population residing in a rural community. We report our results through an equity lens rather than something to adjust away through risk-adjustment.

Understanding and interpreting the scatterplots:

Each panel represents OHT-level risk adjusted estimates calculated separately for each reporting period. OHTs were ordered from left to right according to their level of performance, from most to least desirable respectively, based on the most recent year of data (2019/20). The ordering of OHTs is consistent from panel to panel, so for example, the leftmost point in each panel always represents the same OHT, but in different reporting periods. Comparing each point to the dotted line shows the OHT performance relative to the total OHT attributable population in a given reporting period.

Each dot is colour-coded according to the OHT's ratio of the population in most vs. least deprived areas, so that correlations can be seen visually. Dark blue dots represent OHTs with a high proportion of their attributable population in the most deprived neighbourhoods as compared to the proportion of the attributed population in the least deprived neighbourhoods; light green represent OHTs where there is a higher proportion in the least as compared to the most deprived neighborhoods.

[1] Neighbourhoods (here, dissemination areas) represent areas of 400 to 700 people.

Key Findings

Characteristics of the OHT Attributable Population

Table 2 presents the characteristics of the OHT Attributable Population from 2017/18 to 2019/20. The population includes the attributable population alive and eligible for OHIP on April 1st of each reporting period. In 2017/18, 51% were women, and the mean age of the population was 40.5 years. 16.7% of the population was 65 years or older, which increased to 17.9% in 2019/20. The population increases in age each reporting period due to population aging, but also because this is a closed cohort. We lose individuals over time due to death and out-migration, but births and new migrants are not added into the cohort over this period. Other characteristics shown include area of residence (urban includes those living in a community size of 10,000 persons or more), distribution of material deprivation quintile, enrolment in a primary care model as well as the number of deaths that occurred in each reporting period. Twenty-three percent of the attributable population reside in the least deprived areas; followed by 21%, 19%, 18% to 18% in the most deprived areas. One in ten of the Ontario attributable population reside in rural areas but this varies from 0.6% to 94.4% across the 42 OHTs. Almost one-quarter of the attributed population are not enrolled in a primary care model (e.g., FHO, FHT or FHG), and roughly the same proportion across each of these models.

Figure 1 shows the distribution of material deprivation among individuals attributed to each OHT (2017/18 data). Each row represents and OHT and the colours correspond the proportion of their attributable population residing in each of the quintiles of material deprivation. The data highlight that some OHTs have a much higher proportion of their attributable populations residing in the most deprived areas of Ontario, as high as 39% (shown by the dark blue bar) to as low as 5%. One OHT has 50% of their population residing in the least deprived area (i.e. affluent area). Considerable research has shown that greater deprivation is associated with worse health outcomes and therefore some OHTs face different challenges than others in reaching optimal performance across the selected measures.

Figure 1. Distribution of area-based material deprivation (quintile) by OHT, 2017/18

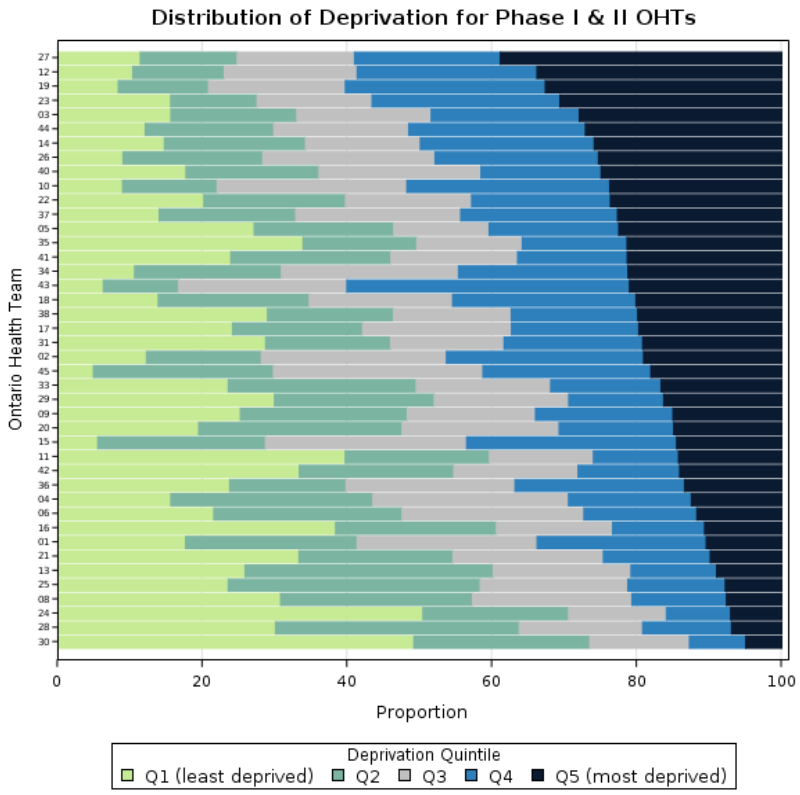


Table 2. Characteristics of the 2017 OHT Attributable Population, 2017/18 to 2019/20

Characteristic	Value	2017/18	2018/19	2019/20
		N=11,676,459	N=11,759,900	N=11,643,841
Male sex		6,817,536 (49.0%)	6,862,709 (48.9%)	6,789,131 (48.9%)
Age (years)	Mean ± SD	40.62 ± 22.68	40.92 ± 22.75	41.67 ± 22.60
	0-19	2,483,403 (21.3%)	2,470,418 (21.0%)	2,328,904 (20.0%)
	20-34	2,390,464 (20.5%)	2,384,821 (20.3%)	2,341,890 (20.1%)
	35-49	2,409,004 (20.6%)	2,418,781 (20.6%)	2,408,930 (20.7%)
	50-64	2,472,010 (21.2%)	2,493,596 (21.2%)	2,504,596 (21.5%)
	65-74	1,081,093 (9.3%)	1,123,025 (9.5%)	1,160,425 (10.0%)
	75+	840,485 (7.2%)	869,259 (7.4%)	899,096 (7.7%)
Residence	Urban	10,715,123 (91.8%)	10,786,636 (91.7%)	10,668,935 (91.6%)
	Rural/small town	932,175 (8.0%)	944,362 (8.0%)	946,106 (8.1%)
ONMARG Material Deprivation Index	Q1 (least deprived)	2,683,501 (23.0%)	2,728,806 (23.2%)	2,727,282 (23.4%)
	Q2	2,454,776 (21.0%)	2,479,041 (21.1%)	2,466,684 (21.2%)
	Q3	2,198,049 (18.8%)	2,209,874 (18.8%)	2,187,454 (18.8%)
	Q4	2,113,517 (18.1%)	2,116,880 (18.0%)	2,081,826 (17.9%)
	Q5 (most deprived)	2,131,281 (18.3%)	2,129,456 (18.1%)	2,085,174 (17.9%)
Primary Care Enrol-ment	FHG	2,898,549 (24.8%)	2,966,987 (25.2%)	2,931,472 (25.2%)
	FHO	2,991,366 (25.6%)	3,018,886 (25.7%)	3,036,911 (26.1%)
	FHT	2,631,310 (22.5%)	2,649,967 (22.5%)	2,646,919 (22.7%)
	Not enrolled	2,704,691 (23.2%)	2,673,130 (22.7%)	2,585,063 (22.2%)
	Other Model	450,543 (3.9%)	450,930 (3.8%)	443,476 (3.8%)
Died in reporting period		83,506 (0.7%)	83,836 (0.7%)	84,793 (0.7%)

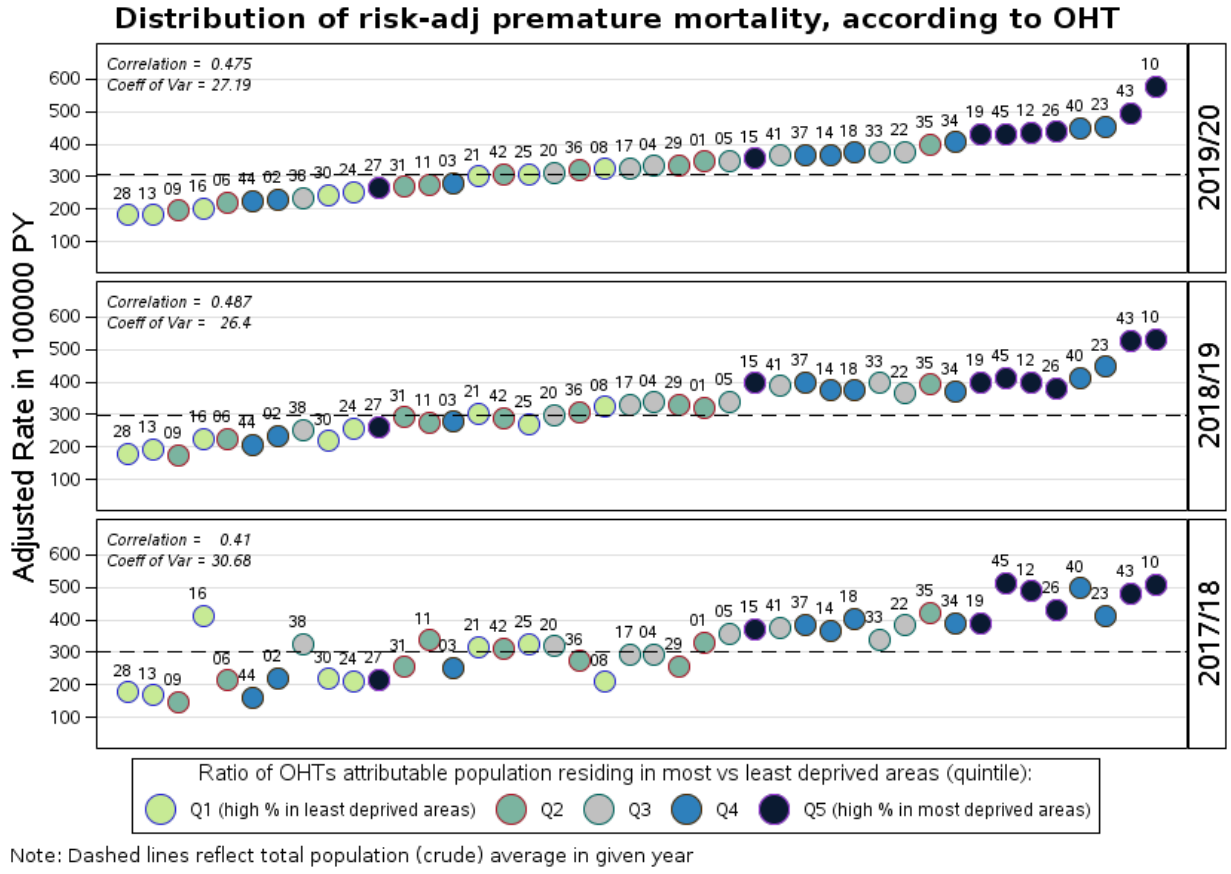
NOTES: ONMARG is the Ontario Marginalization database
Urban residence is based on residing in a community of 10,000 persons or more
FHG=Family Health Group; FHO=Family Health Organization; FHT=Family Health Team

Premature Mortality

Premature mortality is a marker of unfulfilled life expectancy, population health, and health system performance.

- In 2019/20, the rate per 100,000 population in the attributable population was 305, which remained relatively steady from prior reporting periods (298 in 2018/19 and 301 in 2017/18).
- The range in risk adjusted estimates at the OHT level in 2019/20 was from 181 to 577 per 100,000 population, and the coefficient of variation was 27, suggesting high variability across OHTs.
- The largest percent improvement in the rate from the prior reporting period was 10% (OHT 16, from 224 to 200), though the indicator rate worsened in other OHTs (by as much as 15% percent from the prior reporting period).
- Premature mortality moderately correlates (T=0.475) with area-level deprivation, suggesting that OHTs with a larger proportion of their attributable population living in the most deprived areas generally had higher premature mortality rates.
- Premature mortality moderately correlates (T=0.508) with the proportion of attributable population living in rural areas.

Figure 2. Rate of premature mortality per 100,000 by OHT, 2017/18 to 2019/20



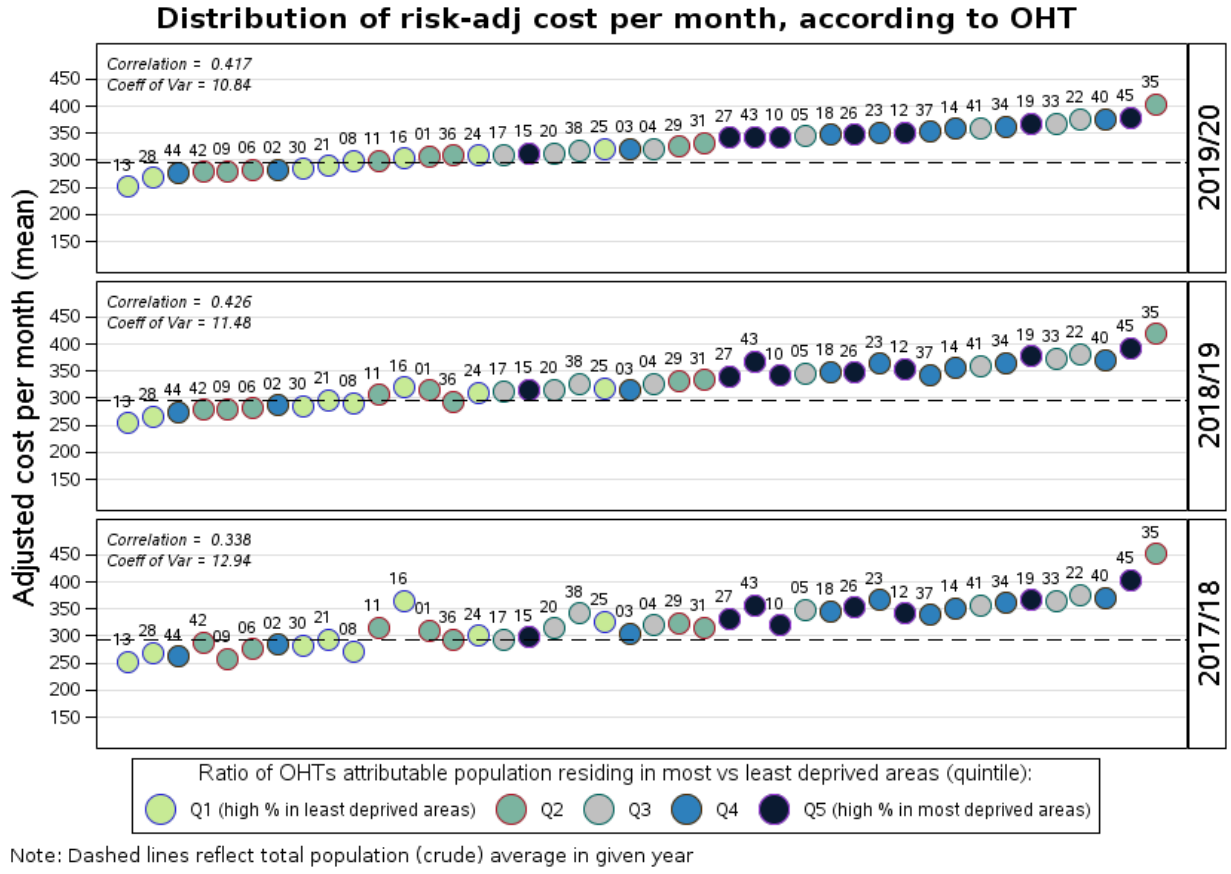
Note: Dashed lines reflect total population (crude) average in given year

Cost per Month Alive

Understanding average cost differences across OHTs is a first step to identify opportunities to for improved value through better management of healthcare resources**.**

- In 2019/20, the average cost per month alive (in $2018CAD) in the attributable population was $296, which was stable from the prior reporting periods ($296 in 2018/19 and $294 in 2017/18)
- The range in risk adjusted estimates at the OHT level in 2019/20 was from $251 to $404, and the coefficient of variation was 11, suggesting moderate variability across OHTs.
- The largest percent improvement in average monthly cost from the prior reporting period was 7% (OHT 43, from $369 to $342), though the indicator worsened in other OHTs (by as much as 5% percent from the prior reporting period).
- Average monthly health care cost moderately correlates (T=0.417) with area-level deprivation, suggesting that OHTs with a larger proportion of their attributable population living in the most deprived areas generally had higher monthly health care costs.
- Average monthly health care cost weakly correlates (T=0.236) with the proportion of attributable population living in rural areas.

Figure 3. Cost per month alive (in $2018CAD) by OHT, 2017/18 to 2019/20



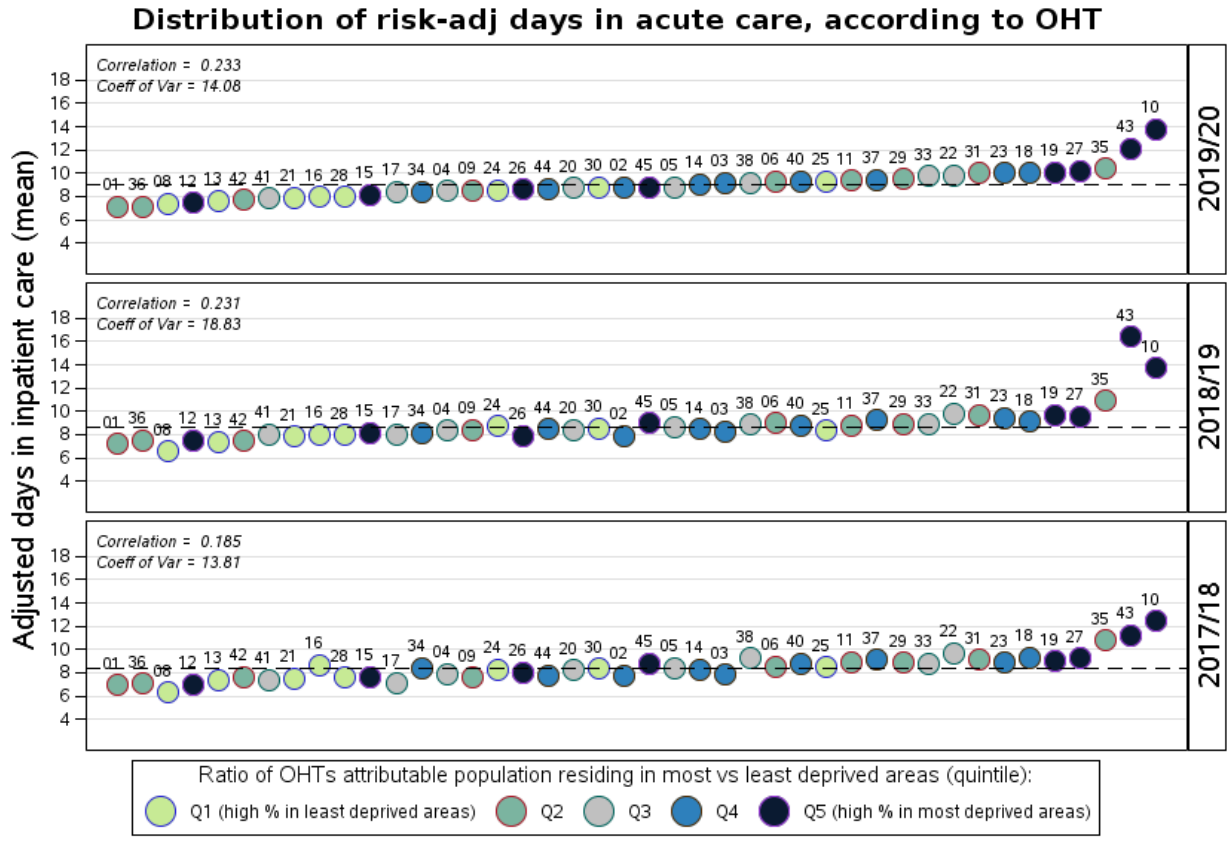
Note: Dashed lines reflect total population (crude) average in given year

Average Days in Acute Inpatient Care

A shorter inpatient stay will reduce cost per case by shifting care to (less costly) post-acute settings. Repeated hospital stays are also an indicator of patient health outcomes and experience. Both length of stay and repeat admissions are captured in this indicator.

- In 2019/20, the average number of days in acute inpatient care in the attributable population (that was hospitalized) was 9.0 days, up from 8.6 days in 2018/19 and 8.4 in 2017/18.
- The range in risk adjusted estimates at the OHT level in 2019/20 was from 7.1 days to 13.8 days, and the coefficient of variation was 14, suggesting moderate variability (due mostly to changes at the upper end of the distribution).
- Only 3 OHTs improved in each successive reporting period (OHTs 16, 35, 45). Average days in acute inpatient care worsened in other OHTs (by as much as 12% percent from the prior reporting period).
- Average days in acute inpatient care weakly correlates (T=0.233) with area-level deprivation and correlation with rurality is negligible (T=-0.010).

Figure 4. Average days in acute inpatient care by OHT, 2017/18 to 2019/20



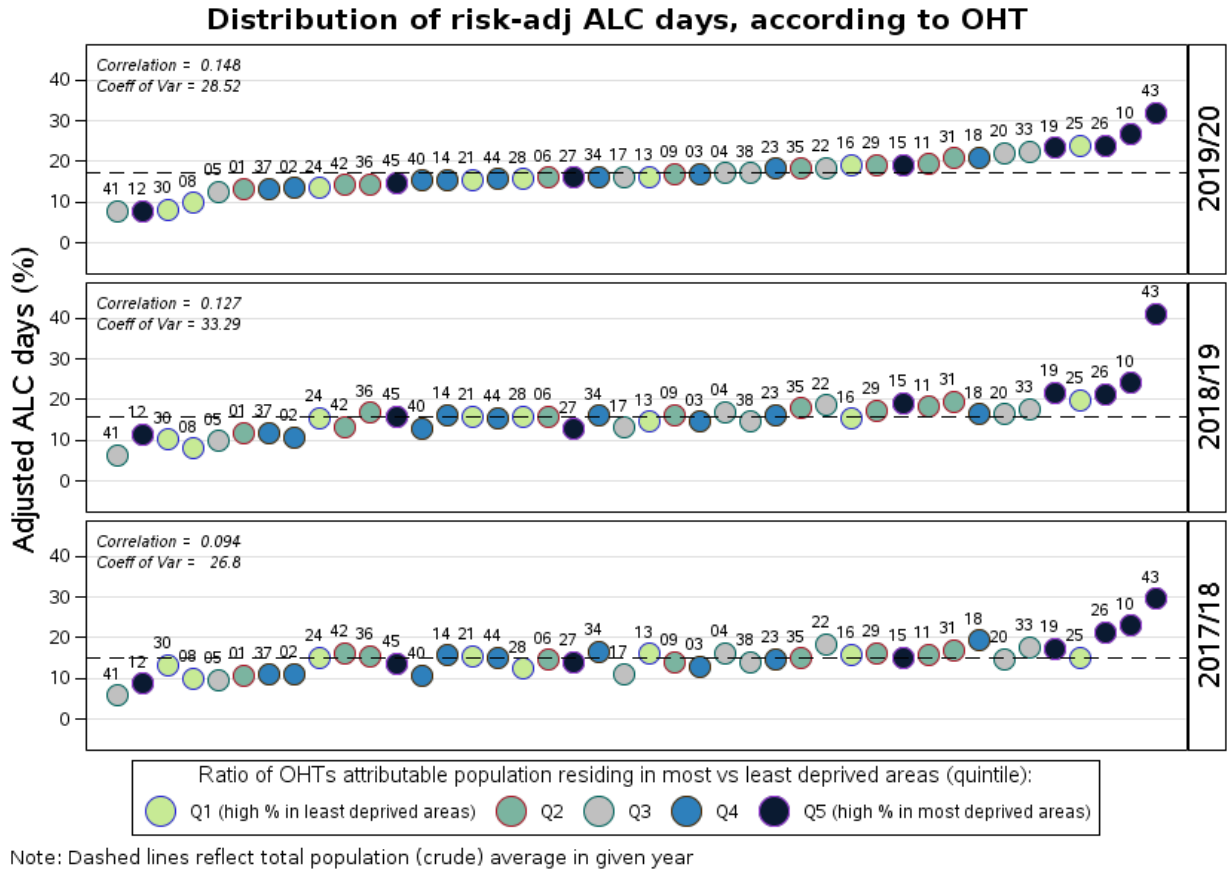
Note: Dashed lines reflect total population (crude) average in given year

ALC Days

Alternate Level of Care (ALC) describes hospitalized patients who have finished the acute care phase of treatment but remain in an acute hospital bed using costly resources while awaiting to be discharged to a more appropriate setting (for example, home care, inpatient rehabilitation, complex continuing care, assisted living or long-term care facility).

- In 2019/20, the proportion of ALC days in the attributable population was 17.2%, up from 15.7% in 2018/19 and 15.0% in 2017/18.
- The range in risk adjusted estimates at the OHT level in 2019/20 was from 7.7% to 31.9%, and the coefficient of variation was 29, suggesting high variability across OHTs.
- The largest percent improvement in the rate from the prior reporting period was 32% (OHT 12), and only one OHT improved in each successive year (OHT 30, from 13.3% to 10.2% to 8.1%). The indicator % worsened in most OHTs.
- Proportion of ALC days weakly correlates with area-level deprivation (T=0.148) and with rurality (T=0.143).

Figure 5. Average alternate level of care (ALC) days by OHT, 2017/18 to 2019/20

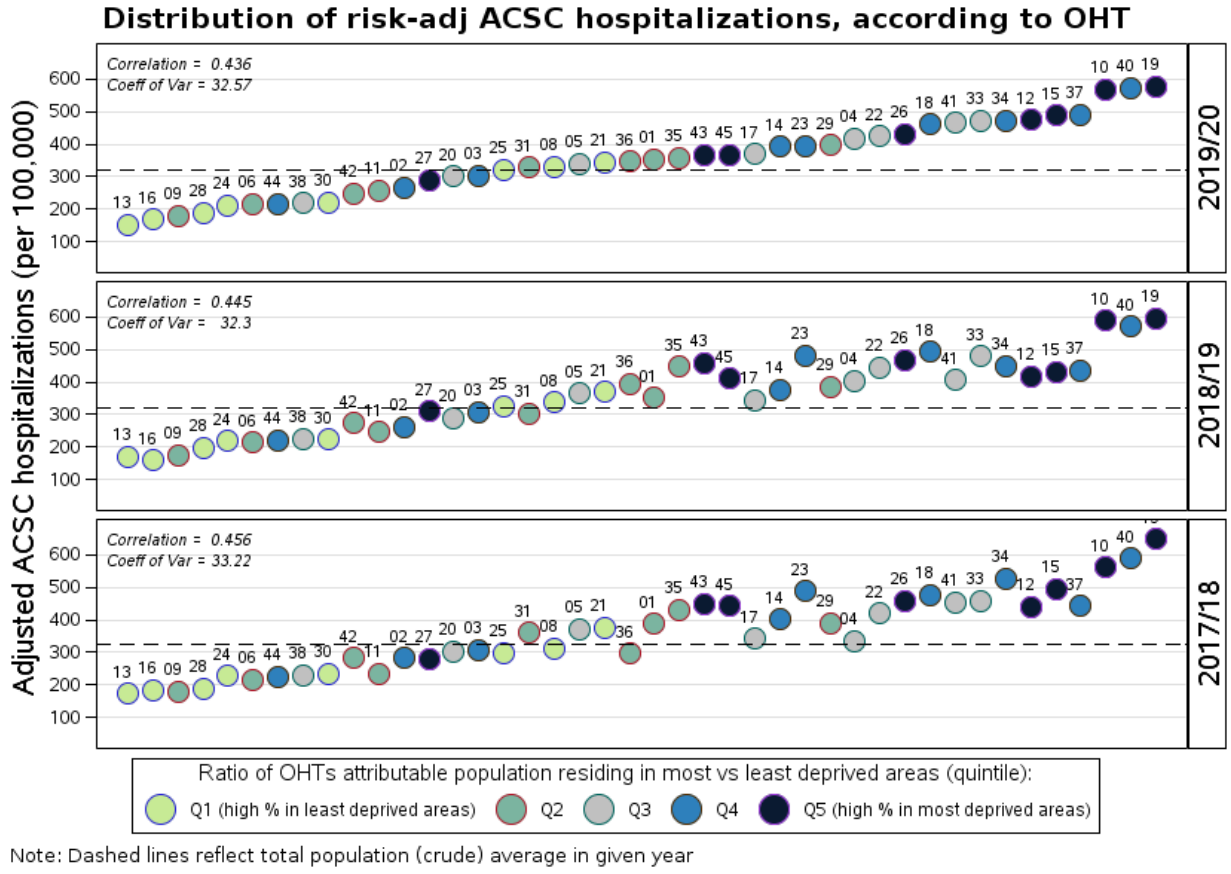


ACSC Hospitalizations

Ambulatory care sensitive conditions (ACSCs) reflect chronic conditions which, if treated and monitored effectively in the community, should reduce the likelihood for a hospital admission. ACSC hospitalizations may also reflect poor access to primary/specialist care.

- In 2019/20, the rate per 100,000 population of ACSC hospitalizations in the attributable population was 319, down from 321 and 326 in 2018/19 and 2017/18 respectively.
- The range in estimates at the OHT level in 2019/20 was from 153 to 576 per 100,000, and the coefficient of variation was 33, suggesting high variability.
- The largest percent improvement in the rate from the prior reporting period was 20% (OHT 43), though the indicator rate worsened in other OHTs (by as much as 15% percent).
- ACSC hospitalizations moderately correlate (T=0.436) with area-level deprivation, suggesting that OHTs with a larger proportion of their attributable population living in the most deprived areas generally have higher rates of ACSC hospitalizations.
- ACSC hospitalizations also moderately correlate (T=0.510) with the proportion of attributable population living in rural areas.

Figure 6. Rate of hospitalizations for ACSCs per 100,000 by OHT, 2017/18 to 2019/20



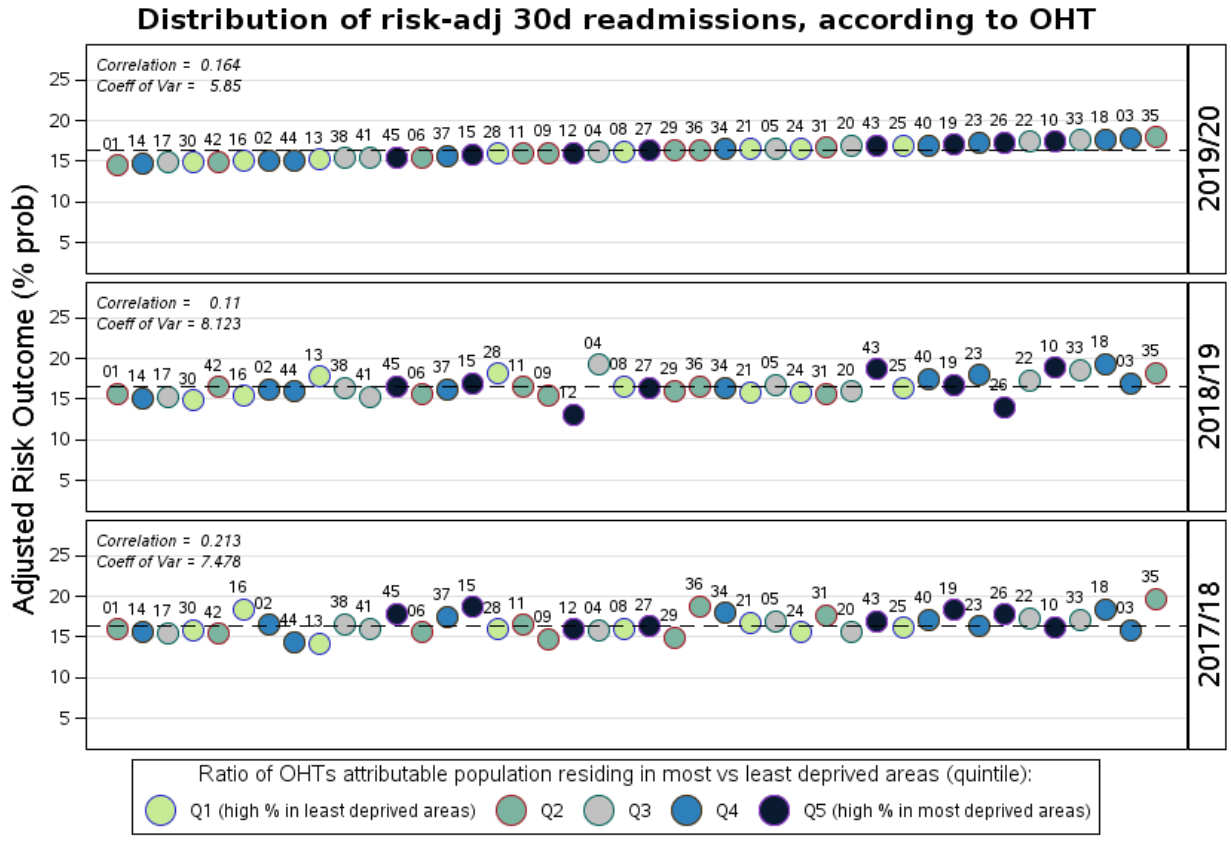
Note: Dashed lines reflect total population (crude) average in given year

30 Day Readmissions

Measuring hospital readmissions may provide insight to the quality of care of inpatient and post-discharge services provided to patients.

- In the overall attributable population, 30-day readmissions remained flat over time (16.3% in 2019/20).
- The range in estimates at the OHT level in 2019/20 was from 14.5% to 17.9%, and the coefficient of variation was 6, suggesting low variability.
- The largest percent improvement in the readmission rate from the prior reporting period was 16% (OHT 04), though others improved with each successive reporting period (most notably, OHT 16). The readmission rate worsened in other OHTs (by as much as 24 percent from the prior reporting period).
- Correlations were weak between 30-day readmissions and area-level deprivation (T=0.164) and with rurality (T=0.206).

Figure 7. Readmissions within 30 days for selected HIG conditions by OHT, 2017/18 to 2019/20



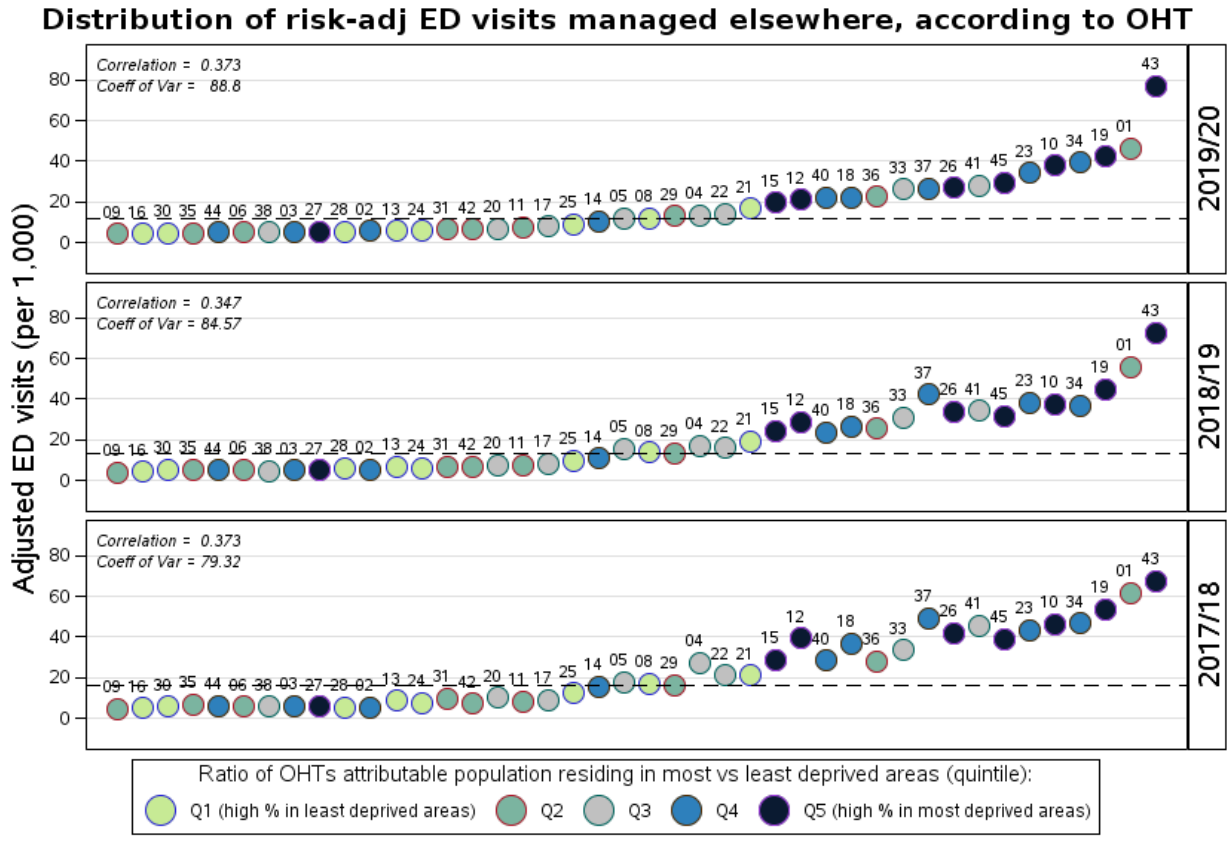
Note: Dashed lines reflect total population (crude) average in given year

ED Visits Best Managed Elsewhere

Higher rates of emergency visits for conditions that could be treated in alternative settings may reflect poor access to primary care services.

- In 2019/20, the rate of ED visits best managed elsewhere per 1,000 population in the attributable population was 12.0, down from 13.6 in 2018/19 and 16.1 in 2017/18.
- The range in estimates at the OHT level in 2019/20 was from 4.1 to 77.2, and the coefficient of variation was 89, suggesting very high variability across the OHTs.
- The largest percent improvement in the rate from the prior reporting period was 27% (OHT 12, which also improved by 46% from 2017/18). Few OHTs worsened over time.
- ED visits best managed elsewhere weakly/moderately correlate (T=0.373) with area-level deprivation, but correlation is moderate/strong (T=0.693) with the proportion of attributable population living in rural areas.

Figure 8. Rate of ED visits best managed elsewhere per 1,000 by OHT, 2017/18 to 2019/20

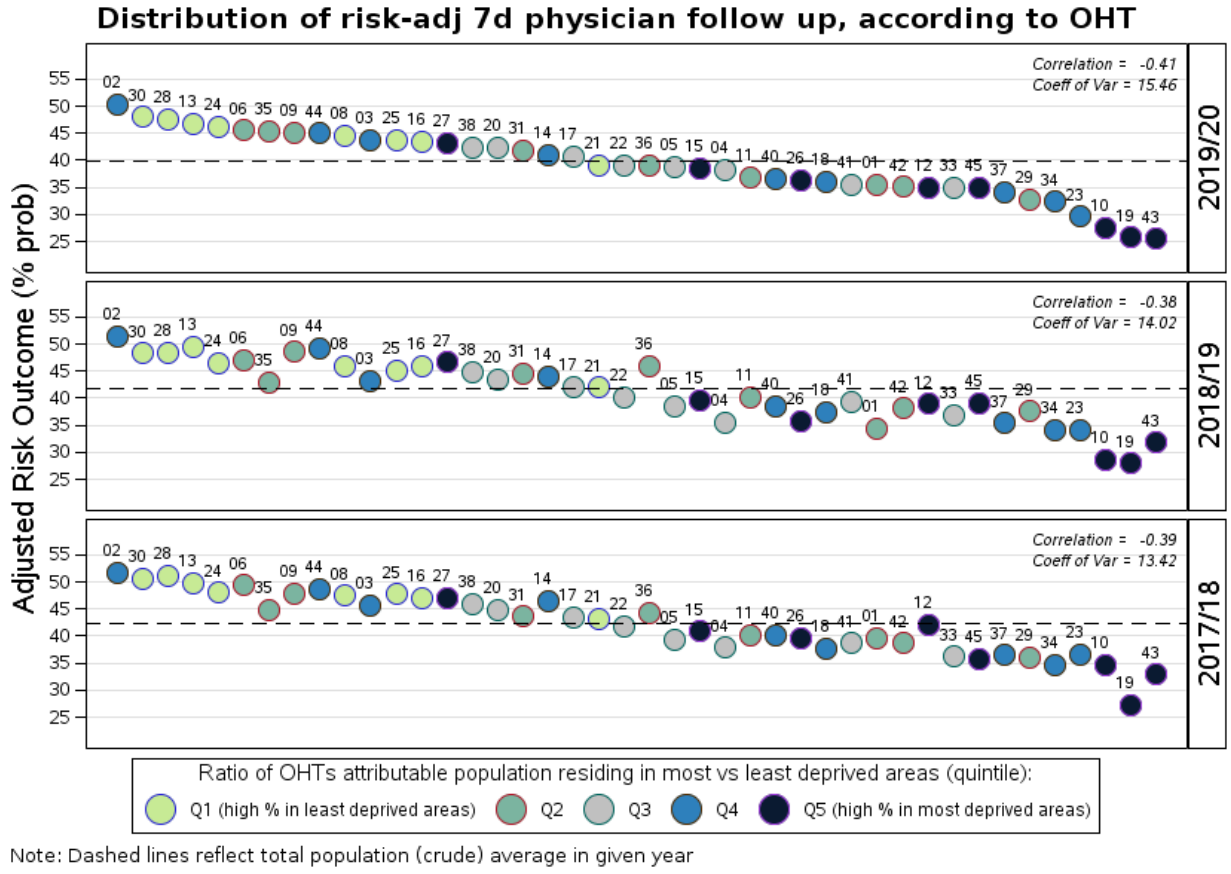


Physician Visits After Hospital Discharge

This indicator measures the transition of patient care from the acute to community settings. The days immediately following discharge can be high risk and a vulnerable transition period for many patients.

- In 2019/20, the proportion of discharges amongst the attributable population that had a physician follow-up visit was 39.7%, which declined in each reporting period (41.7% in 2018/19 and 42.4% in 2017/18).
- The range in estimates at the OHT level in 2019/20 was from 25.5% to 50.3%, and the coefficient of variation was 15, suggesting moderate variability.
- The largest percent improvement in the proportion with post-discharge follow-up from the prior reporting period was 8% (OHT 04), though across most OHTs the rate worsened over time (by as much as 20% percent from the prior reporting period).
- Physician follow-up visit after hospital moderately correlates with area-level deprivation (T=-0.410) and with rurality (T=-0.530), suggesting that OHTs with a larger proportion of their attributable population living in the most deprived areas or in rural areas generally are less likely to have physician follow-up after hospital discharge.

Figure 9. Physician visits after hospital discharge by OHT, 2017/18 to 2019/20

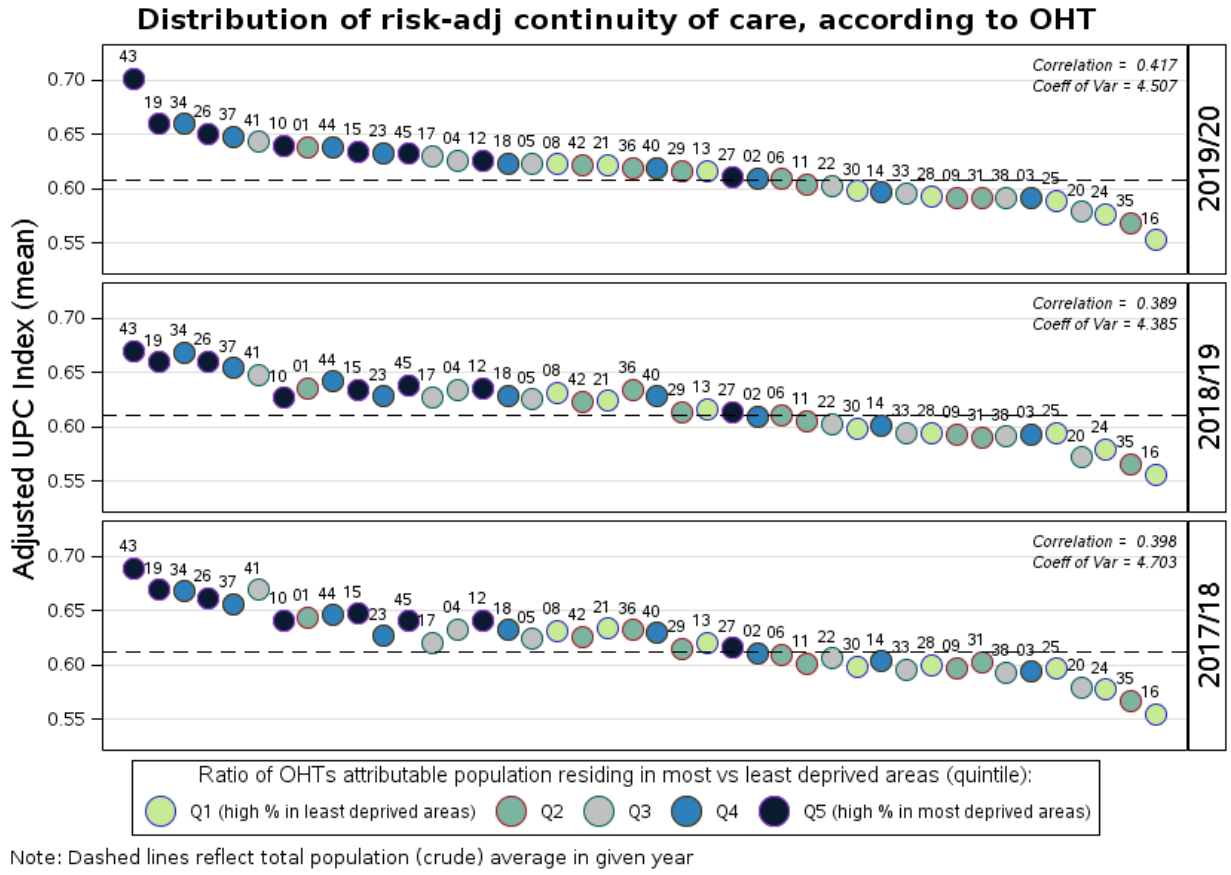


Continuity of Care

Continuity of care is a cornerstone of primary care and is associated with favourable outcomes including lower rates of hospitalization, improved adherence to treatment and greater patient satisfaction.

- In 2019/20, the average continuity of care usual provider of index score was 0.61 which was steady across reporting periods.
- The range in estimates at the OHT level in 2019/20 was from 0.55 to 0.70, and the coefficient of variation was 4.5, suggesting low variability.
- The largest percent improvement in the rate from the prior reporting period was 5% increase in UPC Index (OHT 43), though few OHTs improved in each successive reporting period.
- Average continuity of care/usual provider of index moderately correlates (T=0.417) with area-level deprivation, suggesting that OHTs with a larger proportion of their attributable population living in the most deprived areas generally had higher index score or better continuity. Indicator performance moderately correlates (T=0.491) with rurality, suggesting that OHTs with a larger proportion of their attributable population living in rural areas generally had greater continuity of provider care.

Figure 10. Continuity of care by OHT, 2017/18 to 2019/20



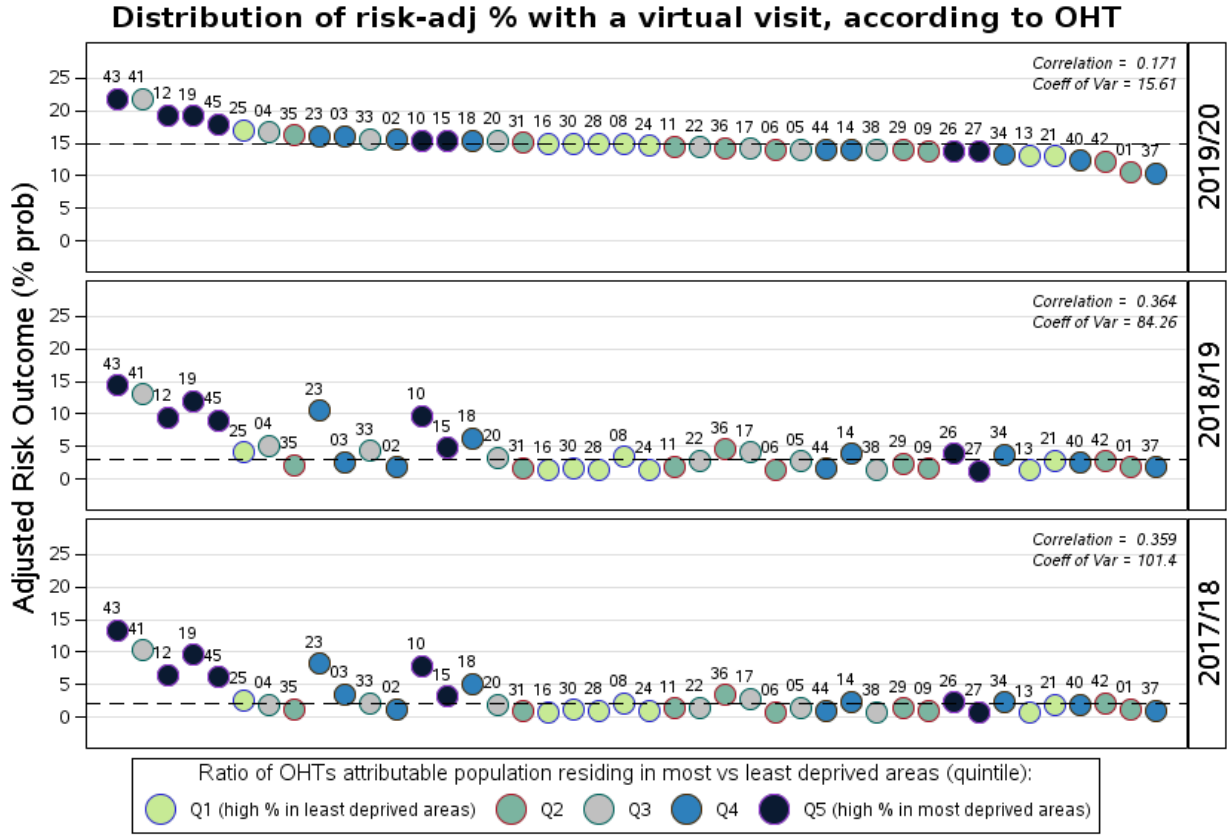
Note: Dashed lines reflect total population (crude) average in given year

Virtual Physician Encounters

Virtual encounters can improve patient access to services and support continuity of care. Since COVID-19, demand for virtual encounters has increased though they were already on the rise in 2019/20 prior to COVID-19.

- The proportion of the attributable population receiving virtual care increased from 2.1% in 2017/18, to 3.1% in 2018/19 to 14.8% in 2019/20.
- The range in estimates at the OHT level in 2019/20 was from 11.4% to 21.8%, and the coefficient of variation was 16, suggesting moderate variability.
- Nearly all OHTs improved from one reporting period to the next.
- Virtual care encounters weakly correlate (T=0.171) with area-level deprivation in 2019/20. In prior years, however, correlations were stronger (Tau=0.364 in 2018/19).
- Correlation of virtual care encounters and rurality was weak (Tau=0.096) in 2019/20, though correlations were stronger in prior years (T=0.512 in 2018/19).

Figure 11. Proportion of OHT attributed patients with a virtual physician encounter, 2017/18 to 2019/20



Note: Dashed lines reflect total population (crude) average in given year

Limitations

There are limitations of this work requiring comment. We quantified a series of indicators measurable with routinely collected health administrative data in Ontario, selected through a Modified Delphi approach. Other indicators specific to the quadruple aim framework and relevant to integrated care were not measured. Some OHTs may have measures specific to their local populations that are considered more sensitive to change. Individual-level socioeconomic status is not captured in health administrative data, and area-based measures (including ONMARG material deprivation index) are subject to ecological fallacy. The OHTAM dataset we analyzed encompassed the attributable population based on health care utilization patterns from 2017 but is a closed cohort. Because of this, without regular updates of the OHTAM data, results further from 2017/18 are subject to increasing bias. Last, we report on correlations between OHT-level deprivation and rurality and indicators of OHT attributable populations, which should not be interpreted as casual effects, but rather general associations.

Conclusions

This report has shown wide variation across OHTs in the proportion of their attributable populations residing in areas of high deprivation as measured by the Ontario Material Deprivation Index, from as high as 39% to as low as 5% suggesting some OHTs have attributable populations with higher needs for health and social care. We have also shown a notable correlation between material deprivation and rurality and several of our attributable population indicators: premature mortality, average monthly cost, ED visits best managed elsewhere, ambulatory care sensitive hospitalizations and physician visits after a hospitalization. Continuity of physician care was relatively stable over time and across OHTs and was also moderately negatively correlated with SES (individuals living in higher deprivation neighborhoods had higher continuity of care) even though continuity of care has been associated in Ontario with lower hospitalization rates.[4] It is possible that individuals living in areas with low deprivation are more likely to access a greater number and variety of physicians, the implications of which require further investigation.

These baseline findings illustrate where there are opportunities for OHTs to focus their implementation activities to improve patient outcomes. Although there is an association between material deprivation and higher rates of ACSC hospitalizations, ED visits better managed elsewhere, follow-up physician visits after hospitalization and costs, the approaches OHTs implement are likely to vary depending on geography, other demographics, and community resources available. Nonetheless lessons should be shared where improvements are being observed.

Given the relatively stable overall historical trend across many of these indicators, and the early stage in the OHT journey towards an integrated health care system, movement of these indicators at the level of the entire OHT attributable population, is not expected for most indicators within the near future (1-2 years). On the other hand, virtual care visits are expected to increase at least in the short term. For many of these indicators, the identification of targets or benchmarks needs to be considered in light of patient, caregiver and provider experience as well as patient outcomes. Evidence from Ontario's Integrated Funding Model pilot program showed that well-specified interventions focused on specific target populations were able to improve patient outcomes on measures including those reported here.

HSPN will release similar reports to this one that focus on specific indicators for common OHT priority populations including mental health, older adults, and end of life. HSPN will also produce future reports on the entire attributable populations to update and possibly expand on the results presented here. Meanwhile, OHTs will need to build capacity to be able to measure, monitor and report on most of these indicators in order to evaluate their new integrated care models to determine whether they are having an impact among their priority populations and eventually their attributable population.

References

1. Ontario Ministry of Health. Ontario Health Teams: Guidance for Health Care Providers and Organizations. Queen's printer of Ontario; 2019:http://health.gov.on.ca/en/pro/programs/connectedcare/oht/docs/guidance_doc_en.pdf.

2. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med*. 2014 Nov-Dec 2014;12(6):573-6. doi:10.1370/afm.1713

3. Stukel TA, Glazier RH, Schultz SE, et al. Multispecialty physician networks in Ontario. *Open Med*. 2013;7(2):e40-55.

4. Gruneir A, Bronskill SE, Maxwell CJ, et al. The association between multimorbidity and hospitalization is modified by individual demographics and physician continuity of care: a retrospective cohort study. *BMC Health Serv Res*. 2016;16(154):1-9. doi:10.1186/s12913-016-1415-5

Appendix: Indicator Technical Specifications

Premature mortality	
Rationale:	Premature mortality is a marker of unfulfilled life expectancy, population health, and health system performance
Indicator Reference:	n/a
Data Sources:	OHTAM, RPDB
Numerator (a subset of the denominator):	Number of deaths within the reporting period
Denominator:	Total population less than 75 years of age
Exclusions:	n/a
Standardization:	Model-based risk-adjusted via generalized regression (Poisson distribution, log link function and log of person time contribution offset term) using individual-level data, controlling for age (continuous) and sex. Results are expressed as a rate per 100,000 population.
Notes and Limitations:	• Cause of death is not recorded in the RPDB • A lower rate is desirable for this indicator

Cost per month alive	
Rationale:	Healthcare spending is highly skewed across the population. Understanding average cost differences across attributable population can facilitate allocation of resources including interventions to improve the management of high-cost individuals.
Indicator Reference:	n/a
Data Sources:	ADP, CAPE, CCRS, DAD, ESTSOB, GAPP, HCD, NACRS, NRS, OCCI, OHCAS, OHTAM, ODB, OHIP, OMHRS, RPDB, SDS
Numerator (a subset of the denominator):	Total attributable government health care spending per individual, divided by the number of months alive in the reporting period
Denominator:	Total population
Exclusions:	n/a
Standardization:	Model-based risk-adjusted via generalized regression (assuming a gamma distribution and log link function) using individual-level data, controlling for age (continuous) and sex.
Notes and Limitations:	• All costs are in $2018CAD and persons with $0.00 were assigned a value of $0.01 to be retained in the estimates. Costs for care not paid for by the MOH are not included. • A lower value is desirable for this indicator

Days in acute inpatient care	
Rationale:	An indicator of efficiency, a shorter inpatient stay will reduce costs and shift care to (less costly) post-acute settings
Indicator Reference:	n/a
Data Sources:	DAD, OHTAM, RPDB
Numerator (a subset of the denominator):	Total days spent in acute care in the reporting period
Denominator:	Total population with one or more days spent in acute care in the reporting period
Exclusions:	Persons without a hospitalization record in the reporting period (~95% of the total population)
Standardization:	Model-based risk-adjusted via generalized regression (assuming a gamma distribution and log link function) using individual-level data, controlling for age (continuous) and sex.
Notes and Limitations:	• Related indicators: Readmissions within 30 days for selected HBAM Inpatient Grouper (HIG) conditions and Alternate Level of Care (ALC) Days • A lower value is desirable for this indicator

Alternate level of care (ALC) days	
Rationale:	Alternate Level of Care (ALC) describes patients waiting for an appropriate level of care to meet their needs. Most often this refers to hospitalized patients who have finished the acute care phase of treatment but remain in an acute hospital bed using costly resources while awaiting to be discharged to a more appropriate setting (for example, home care, inpatient rehabilitation, complex continuing care, assisted living or long-term care facility).
Indicator Reference:	Ontario MOH: http://www.health.gov.on.ca/en/pro/programs/ris/docs/alternate_level_of_care_days_en.pdf [accessed Jan15, 2021]
Data Sources:	DAD, OHTAM, RPDB
Numerator (a subset of the denominator):	Total number of inpatient days designated as ALC in the reporting period
Denominator:	Total number of inpatient days in the reporting period
Exclusions:	Newborn and stillborn inpatient records
Standardization:	Model-based risk-adjusted via generalized regression (assuming a Poisson distribution and log link function, using the total number of inpatient days as an offset) using individual-level data, controlling for age (continuous) and sex. Output values are multiplied by 100.
Notes and Limitations:	• Related indicators: Days in acute inpatient care • A lower rate (%) is desirable for this indicator

Hospitalizations for ambulatory care sensitive conditions (ACSCs)	
Rationale:	Ambulatory care sensitive conditions (ACSCs) reflect chronic conditions which, if treated and monitored effectively in the community, should reduce the likelihood for a hospital admission. ACSC hospitalizations may also reflect poor access to primary/specialist care.
Indicator Reference:	Ontario MOH: http://www.health.gov.on.ca/en/pro/programs/ris/docs/hosp_for_ambulatory_care_en.pdf [accessed Jan15, 2021]
Data Sources:	DAD, OHTAM, RPDB
Numerator (a subset of the denominator):	Count of admissions from an acute care hospital in Ontario within the reporting period for any of: grand mal status and other epileptic convulsions (ICD-10 codes that begin with G40 or G41), chronic obstructive pulmonary disease (J41, J42, J43, J44, or J47), asthma (J45), congestive heart failure and pulmonary edema (I50 and J81, excluding cases with cardiac procedures* that are not coded as abandoned after onset); hypertension (I10.0, I10.1, or I11 excluding cases with cardiac procedures* that are not coded as abandoned after onset); angina (I20, I23.82, I24.0, I24.8, or I24.9 excluding cases with cardiac procedures* that are not coded as abandoned after onset), diabetes (E10.0, E10.1, E10.63, E10.9, E11.0, E11.1, E11.63, E11.9, E13.0, E13.1, E13.63, E13.9, E14.0, E14.1,E14.63, E14.9, E10.64, E11.64, E13.64, E14.64), and lower respiratory (J10.0, J11.0, J12-J16, J18, or J20-J22 only when a secondary diagnosis of J44 is also present).
Denominator:	Total population age 74 years and younger.
Exclusions:	Cardiac procedures* resulting in an exclusion include CCI codes beginning with: 1HA58, 1HA80, 1HA87, 1HB53, 1HB54, 1HB55, 1HB87, 1HD53, 1HD54, 1HD55, 1HH59, 1HH71, 1HJ76, 1HJ82, 1HM57, 1HM78, 1HM80, 1HN71, 1HN80, 1HN87, 1HP76, 1HP78, 1HP80, 1HP82, 1HP83, 1HP87, 1HR71, 1HR80, 1HR84, 1HR87, 1HS80, 1HS90, 1HT80, 1HT89, 1HT90, 1HU80, 1HU90, 1HV80, 1HV90, 1HW78, 1HW79, 1HX71, 1HX78, 1HX79, 1HX80, 1HX83, 1HX86, 1HX87, 1HY85, 1HZ53, 1HZ54, 1HZ55, 1HZ56, 1HZ57, 1HZ59, 1HZ80, 1HZ85, 1HZ87, 1IF83, 1IJ50, 1IJ55, 1IJ57, 1IJ76, 1IJ80, 1IK57, 1IK80, 1IK87, 1IN84, 1LA84, 1LC84, 1LD84, 1IJ86 and not equal to 1HZ53LAKP or 1HZ55LAKP. Records indicating an admission for newborn or stillborn were also excluded.
Standardization:	Model-based risk-adjusted via generalized regression (Poisson distribution, log link function and log of person time contribution offset term) using individual-level data, controlling for age (continuous) and sex. Results are expressed as a rate per 100,000 population.
Notes and Limitations:	• Related indicators: Physician visits after discharge from hospital and continuity of care • A lower rate is desirable for this indicator

Readmissions within 30 days for selected HBAM Inpatient Grouper (HIG) conditions	
Rationale:	Measuring hospital readmissions may provide insight to the quality of care of inpatient and post-discharge services provided to patients.
Indicator Reference:	Ontario MOH: http://www.health.gov.on.ca/en/pro/programs/ris/docs/readmission_30days_selected_higs_en.pdf [accessed Jan15, 2021]
Data Sources:	DAD, OHTAM, RPDB
Numerator (a subset of the denominator):	Hospital readmissions with the admission date within 30 days of the index (denominator) discharge, where the admission category is coded as urgent/ emergent and the admission is not coded as an acute transfer.
Denominator:	Patients discharged from an acute care hospital in Ontario within the reporting period with any of: Acute Myocardial Infarction (age 45+, HIG: 193a, 193b, 194a, 194b), cardiac conditions other than heart attack (age 40+, HIG: 202, 204a, 204b, 208a, 208b), congestive heart failure (age 45+, HIG: 196), chronic obstructive pulmonary disease (age 45+, HIG: 139c, 139d), pneumonia (all ages, HIG: 136, 138, 143), diabetes (all ages, HIG: 437a, 437b, 437c, 437d), stroke (age 45+, HIG: 025, 026, 028), or gastrointestinal disease (all ages, HIG: 231, 248, 251, 253, 254, 255, 256, 257, 258, 285, 286, 287, 288)
Exclusions:	Hospital records where the Inpatient HIG atypical code was not in: '00' (typical cases), '01' (transfer in cases), '09' (short stay outlier cases), '10' (long stay outlier cases), or '11' (transfer in long stay cases). Records coded as transfers to another acute inpatient hospital, deaths, or sign outs were also not considered.
Standardization:	Model-based risk-adjusted via logistic regression using individual-level data, controlling for age (continuous), sex, HIG group, Charlson comorbidity score and prior admissions (in last 1,2,3 months).
Notes and Limitations:	• The denominator for this measure is the same as in: Physician visits after discharge from hospital • Related indicators: Days in acute inpatient care, physician visits after discharge from hospital and continuity of care • A lower rate (%) is desirable for this indicator

Emergency visits for conditions that could be treated in alternative primary care setting	
Rationale:	Higher rates of emergency visits for conditions that could be treated in alternative settings may reflect poor access to primary care services.
Indicator Reference:	Ontario MOH: http://www.health.gov.on.ca/en/pro/programs/ris/docs/hosp_for_ambulatory_care_en.pdf [accessed Jan15, 2021]
Data Sources:	NACRS, OHTAM, RPDB
Numerator (a subset of the denominator):	Count of unscheduled visits to emergency departments where the main problem (ICD-10) was any of: A740, B309, H100, H101, H102, H103, H104, H105, H108, H109, H130, H131, H132, H133, N300, N301, N302, N303, N304, N308, N309, N330, N390, H650, H651, H652, H653, H654, H659, H660, H661, H662, H663, H664, H669, H670, H671, H678, J00, J010, J011, J012, J013, J014, J018, J019, J028, J029, J038, J039, J040, J041, J060, J068, J069, J310, J311, J312, J320, J321, J322, J323, J324, J328, J329, J350, J351, J352, J353, J358, J359, or J399, and the visit was assigned low acuity (CTAS level IV [less-urgent] or V [non-urgent])
Denominator:	Total population age 1 to 74 years
Exclusions:	Emergency visits where the patient was admitted to hospital, or not seen by a physician.
Standardization:	Model-based risk-adjusted via generalized regression (Poisson distribution, log link function and log of person time contribution offset term) using individual-level data, controlling for age (continuous) and sex. Results are expressed as a rate per 1,000 population.
Notes and Limitations:	• Related indicators: Continuity of care • A lower rate is desirable for this indicator

Physician visits after discharge from hospital	
Rationale:	This indicator measures the transition of continuity of patient care from the acute to community settings. The days immediately following discharge can be high risk and a vulnerable transition period for many patients.
Indicator Reference:	Ontario MOH: http://www.health.gov.on.ca/en/pro/programs/ris/docs/physician_visits_after_disch_hosp_en.pdf [accessed Jan15, 2021]
Data Sources:	DAD , OHIP, OHTAM, RPDB
Numerator (a subset of the denominator):	Physician consults/ visits occurring within 0 to 7 days from discharge taking place in an office, home or long-term care setting.
Denominator:	Patients discharged from an acute care hospital in Ontario within the reporting period with any of: Acute Myocardial Infarction (age 45+, HIG: 193a, 193b, 194a, 194b), cardiac conditions other than heart attack (age 40+, HIG: 202, 204a, 204b, 208a, 208b), congestive heart failure (age 45+, HIG: 196), chronic obstructive pulmonary disease (age 45+, HIG: 139c, 139d), pneumonia (all ages, HIG: 136, 138, 143), diabetes (all ages, HIG: 437a, 437b, 437c, 437d), stroke (age 45+, HIG: 025, 026, 028), or gastrointestinal disease (all ages, HIG: 231, 248, 251, 253, 254, 255, 256, 257, 258, 285, 286, 287, 288)
Exclusions:	Hospital records where the Inpatient HIG atypical code was not in: '00' (typical cases), '01' (transfer in cases), '09' (short stay outlier cases), '10' (long stay outlier cases), or '11' (transfer in long stay cases). Records coded as transfers to another acute inpatient hospital, deaths, or sign outs were also not considered.
Standardization:	Model-based risk-adjusted via logistic regression using individual-level data, controlling for age (continuous) and sex.
Notes and Limitations:	• The denominator for this measure is the same as in: Readmissions within 30 days for selected HBAM Inpatient Grouper (HIG) conditions • Related indicators: Continuity of care and Readmissions within 30 days for selected HBAM Inpatient Grouper (HIG) conditions • A higher rate (%) is desirable for this indicator

Continuity of Care – Usual Provider of Care (UPC) Index	
Rationale:	Continuity of care is a cornerstone of primary care and is associated with favourable outcomes including lower rates of hospitalization, improved adherence to treatment and greater patient satisfaction.
Indicator Reference:	n/a
Data Sources:	OHIP, OHTAM¸ RPDB
Numerator (a subset of the denominator):	Total number of physician consults/ visits to an individual's most regularly seen doctor
Denominator:	Total number of physician consults/ visits (across all physician specialties)
Exclusions:	All persons with fewer than two physician consults/ visits from 2 years prior to the end of the reporting period to the end of the reporting period. Repeat consults/ visits to the same physician on the same day by the same person were excluded from estimation.
Standardization:	Model-based risk-adjusted via generalized regression (assuming a normal distribution and identity link function) using individual-level data, controlling for age (continuous) and sex.
Notes and Limitations:	• The UPC is interpreted as the average proportion of an attributed person's contacts that was with their most regularly seen doctor. For example, if an individual had 10 physician visits, 8 of which were with the same physician, then their UPC would be 0.8 • A minimum number of visits and 2-year observation period is used in the denominator to increase the stability in estimates • Related indicators: Readmissions within 30 days for selected HBAM Inpatient Grouper (HIG) conditions, physician visits after discharge from hospital, emergency visits for conditions that could be treated in alternative primary care setting, ACSC hospitalizations • A higher value is desirable for this indicator, indicating greater (relational) continuity

Proportion of OHT attributed patients with a virtual physician encounter	
Rationale:	Virtual encounters can improve patient access to services and supports continuity of care. Since COVID-19, demand for virtual encounters has increased.
Indicator Reference:	n/a
Data Sources:	OHIP, OHTAM, RPDB
Numerator (a subset of the denominator):	All persons with one or more physician consults/ visits in the reporting period with a corresponding phone/ virtual code: location=P, or codes B103A, B203A, B209, K080-K083, or pre-April 2020: B100A, B101A, B102A, B200A, B201A, B202A, B099A
Denominator:	All persons with one or more physician consults/ visits in the reporting period
Exclusions:	n/a
Standardization:	Model-based risk-adjusted via logistic regression using individual-level data, controlling for age (continuous) and sex.
Notes and Limitations:	• A higher rate (%) is desirable for this indicator