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ICES

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About the Institute for Clinical Evaluative Sciences

The Institute for Clinical Evaluative Sciences (ICES) is an independent, nonprofit organization that uses population-based health information to produce knowledge on a broad range of health care issues. ICES' unbiased evidence provides measures of health system performance, a clearer understanding of the shifting health care needs of Ontarians, and a stimulus for discussion of practical solutions to optimize scarce resources.

Key to ICES' work is its ability to link population based health information, at the patient level, in a way that ensures the privacy and confidentiality of personal health information. Linked databases reflecting 13 million of 34 million Canadians allow researchers to follow patient populations through diagnosis and treatment, and to evaluate outcomes.

ICES receives core funding from the Ontario Ministry of Health and Long-Term Care. In addition, ICES scientists and staff compete for peer-reviewed grants from federal funding agencies, such as the Canadian Institutes of Health Research, and project-specific funds from provincial and national organizations. ICES' knowledge is highly regarded in Canada and abroad, and is widely used by government, hospitals, planners, and practitioners to make decisions about health care delivery and to develop policy.

List of Exhibits

About This Report

Dr. Donald Berwick, former President and Chief Executive Officer of the Institute for Healthcare Improvement, coined the term *Triple Aim* to describe the guiding principle for improving performance and promoting high-quality health care systems. The Triple Aim seeks to improve the health of populations, reduce per capita health care costs, and enhance the patient experience of care.[1] To achieve these three goals, one must begin by measuring the current performance of the health care system.

By measuring and reporting quality indicators and the variations in their rates across regions or provider clusters, we can identify areas where high-quality care is already consistently provided, areas where improvement is needed, and, in the case of large variations across regions or providers, opportunities to improve care by learning from the best performers. Measuring quality is thus the starting point of efforts to determine what resources, education, incentives, interventions and policy changes are needed to guide the improvement of the quality of patient care.

While formal integrated physician networks are uncommon in Ontario, health care providers tend to form informal networks that are based on the sharing of patients and information derived from existing patient flow.[2] These informal networks consist of clusters of physicians who work together, through referrals from primary care to specialists and admissions to local hospitals, to care for a population of patients. Using Ontario health administrative data, we identified 78 informal multispecialty physician networks by linking individuals to the physicians and hospitals that provided most of their care. The networks were reasonably self-contained in that individuals received most of their care from providers in their network. Directly informed by these conceptual ideas, the Ontario Ministry of Health and Long-Term Care adopted Health Links, an initiative to create integrated systems to improve care for high-need, high-cost patients.[3] Health Links are variably structured, and while they are geographically based and not identical to our physician networks, they align closely, especially in non-urban areas. At the present time, we do not have information on the populations served by individual Health Links. However, because it is important to measure quality at the level that is most responsible for the delivery of care,

physician networks — and in the future, Health Links — are the appropriate level at which to measure indicators of care.

The overarching goal of increasing value in the health care system requires balancing the two components of the value equation: quality and cost.[4] We have selected a set of previously validated quality indicators based on agreed-upon definitions that could be measured using health administrative data. While not exhaustive, the indicators cover a range of types of care (preventive, acute, chronic), services (screening, treatment, follow-up), sectors (hospital, physician, emergency department, long-term care), and costs for publicly insured health care services. The indicators are measured for the patients in each physician network, and the variations in their rates are displayed both graphically and numerically.

We hope the information presented will encourage continued discussion and research into ways to achieve the Triple Aim, including research into the policies, incentives, training and resources that are most likely to improve care as well as the level of care at which accountability and resources should be directed. We hope this information will also inform the development, implementation and evaluation of innovative models of care that will improve the patient experience and population health, while increasing the efficiency of health care delivery.

Data Sources and Methods

Study population

The target population for all indicators was Ontario residents alive on April 1, 2010. Unless otherwise indicated, events were identified during the two-year period from April 1, 2010, to March 31, 2012.

Quality indicators

The quality indicators presented in this report are based on previously validated indicators used by national reporting agencies. The indicators have been restricted to those deemed amenable to intervention and improvement in the public health and health care sectors, and having validated definitions derived from Ontario health administrative databases. They were assembled from indicators currently used by Health Quality Ontario (stroke, AMI, CHF, mental health, evidence-based medications, diabetes, primary care, ambulatory care–sensitive conditions, and indicators on multiple chronic conditions), the Project for an Ontario Women's Health Evidence-Based Report (screening indicators, mental health indicators, avoidable falls), the Canadian Cardiovascular Outcomes Research Team in conjunction with the Canadian Cardiovascular Society (cardiac indicators), Cancer Care Ontario (cancer screening guidelines, patterns of cancer end-of-life care), the U.S. Agency for Healthcare Research and Quality (drug safety indicator) and the Choosing Wisely initiative (imaging for back pain).[5-13] These indicators measure performance across the continuum of care — from population health to primary care to tertiary care. They are listed in the Appendices, which include clinical guidelines and references (**Appendix A**), numerator and denominator definitions with specific data sources used (**Appendix B**), and diagnostic, procedure and billing codes (**Appendix C**).

Each quality indicator was computed as a rate consisting of the number of events divided by the target population. Rates were calculated for each network and, where appropriate, were indirectly standardized for age and sex. Bar graphs display the indicator rates for each network, arranged in ascending order. A horizontal red reference line represents the weighted median. We also report quality indicator rates in terms of the median and the 10th, 25th, 75th and 90th percentiles, weighted by target network population. We considered an indicator to have low variability across networks if the ratio of the weighted 90th to 10th percentile was less than 1.25, moderate variability if this ratio was between 1.25 and 2.0, and high variability if this ratio was greater than 2.0. The actual percentiles are reported in the tables accompanying the bar graphs so that readers can directly examine relative variability in the context of the actual measures. Quality improvement interventions seek to both increase overall performance and reduce differences in quality across systems of care. Measures with low variability may still have meaningful differences across networks, and represent an opportunity for intervention and improvement. Thus, both absolute and relative differences across networks are important.

Physician networks

Indicators were reported for the multispecialty physician networks — groups of primary care and specialist physicians associated by virtue of sharing care for a common set of patients and admitting patients to the same hospital. Physician networks were identified using health administrative databases from fiscal years 2008/09 to 2010/11. Each Ontario resident was linked to the primary care physician to whom he or she was rostered; each non-rostered resident was linked to the primary care physician who provided most of his or her core primary care services. Each primary care physician was, in turn, linked to the hospital where most of his or her patients were admitted. Each specialist physician was linked to the acute care hospital where he or she provided the highest volume of inpatient services. A provider cluster comprised the residents and physicians linked to a particular hospital; small clusters were aggregated up to multispecialty physician networks with a minimum population of 50,000 where possible.[2]

These networks are ideally suited to examine quality metrics because they include all the physicians who contribute to the majority of the care of the patients associated with them, regardless of geographic borders, an important advantage in urban areas where patients often cross municipal boundaries to receive care. As well, the networks are small enough that meaningful variations in quality indicators and outcome rates may be detected, but large enough that rates remain relatively stable over time.

Seventy-four of the 78 networks, serving 98.5% of the population, were included in all analyses. Individuals in the following networks were excluded: Weeneebayko was excluded from all indicators due to its very small population producing unstable rates; the Hospital for Sick Children and the Children's Hospital of Eastern Ontario were excluded from the non-pediatric indicators; and the Centre for Addiction and Mental Health was excluded from the non-mental health indicators.

Costs

We computed the costs of health care services provided by Ontario's Ministry of Health and Long-Term Care to residents between April 1, 2010, and March 31, 2012. These costs were based on standardized provincial prices to reflect resources used independent of differences in the local costs of providing care. Average per capita annual costs were calculated for each network and expressed in 2011 Canadian dollars. Hospital costs include inpatient and same-day surgery care and emergency department visits. Other costs include overall, primary care and specialist physician services, prescription drugs, and long-term care and home care costs. High-cost patients were defined as individuals whose health care costs placed them in the top 1st, 5th or 10th percentile for the province during fiscal year 2010/11.

Data sources

The Ontario health administrative databases include information on all inpatient hospital admissions, same-day surgeries and emergency department visits to Ontario facilities; all physician visits; and prescriptions filled by individuals aged 65 and older. With few exceptions, the databases include information on the services obtained from all physicians; however, they do not include information on diagnostic and laboratory tests ordered for hospitalized patients as these are covered by global hospital budgets.

Using unique, anonymized, encrypted identifiers, individual residents' records were linked across multiple databases containing information on all publicly insured, medically necessary hospital and physician services. The following anonymized databases contain individual-level information and were used in this report.

DEMOGRAPHICS DATABASE

- The Registered Persons Database (RPDB) provides demographic information on all insured individuals; includes dates of birth and death.

HEALTH SERVICES DATABASES

- The Ontario Health Insurance Plan (OHIP) for physician billings; includes diagnostic codes and procedures, location of visit, and out-of-hospital laboratory tests.

- The Discharge Abstract Database (DAD) for non–mental health hospital admissions, procedures and transfers; includes the most

responsible diagnosis (MRD) for length of stay, secondary diagnosis codes, comorbidities present upon admission, complications occurring during the hospital stay, and attending physician identifier.

- The Ontario Mental Health Reporting System (OHMRS) database for admissions to mental health–designated hospital beds; includes the most responsible diagnosis.

- The National Rehabilitation Reporting System (NRS) database for adult inpatient rehabilitation facilities and programs; includes patient diagnostic information.

- The National Ambulatory Care Reporting System (NACRS) database documents emergency department visits and same-day surgery; includes the chief complaint (reason for visit).

- The Ontario Drug Benefit (ODB) Program database for outpatient drug prescriptions for those over age 65; identifies the drug, the dose and the date the prescription was filled.

- The Home Care Database records the dates and types of services received by home care recipients.

- The Ontario Breast Screening Program (OBSP) database, in addition to the OHIP database, to determine the dates of mammograms.

ACQUIRED AND DERIVED COHORTS

- The Ontario Cancer Registry, from Cancer Care Ontario, contains information on all residents newly diagnosed with cancer (except non-melanoma skin cancer) or who died of cancer.

- Derived cohorts include individuals with a specified physician-diagnosed chronic disease as determined from inpatient, emergency department, and physician billing records using validated and published algorithms. Derived cohort databases were used to identify individuals with chronic obstructive pulmonary disease, congestive heart failure, diabetes and asthma.

Data limitations

While health administrative data provide researchers with an opportunity to assess quality, performance and effectiveness of interventions, they are not collected for research purposes. They do not contain the rich clinical information available from medical charts; therefore, it is not possible to accurately identify which patients are appropriate or contraindicated for specific medications.

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Quality Indicator Domains

The quality indicators were grouped into eight domains that reflect care across the continuum and relate to the ability of the system to maintain and improve health. These domains are similar to aggregated quality domains used by others.[1,2] They are as follows:

- Evidence-based screening and prevention
- Evidence-based medications
- Drug safety
- Hospital–community transitions
- Adverse outcomes, reported separately as potentially avoidable hospitalizations and ED visits and as 30-day readmissions and ED visits
- Potentially unnecessary care (i.e., lower back imaging)
- End-of-life care for cancer patients
- Health care spending

Exhibit 1.0 lists the individual quality indicators that were grouped within each domain; it specifies if an indicator was age- and sex-standardized and provides summary statistics for each indicator, including the median, 10th and 90th percentiles, and the ratio of the 90th to the 10th percentiles that indicates the extent of overall variation in the indicator. Network-specific rates and variations among the individual indicators are provided in the sections following.

EXHIBIT 1.0 Quality indicators by domain , indication of age- and sex-standardization, median value, 10th and 90th percentiles and ratio of 90th to 10th percentiles

Quality Indicator	Age- and Sex-Standardized	Median‡	90th to 10th Percentiles‡	Ratio of 90th to 10th Percentiles§
Screening and prevention, %				
Eye examination for individuals with diabetes	no	69.5	66.1–74.7	1.13
Cholesterol testing for individuals with diabetes	no	87.9	84.2–90.0	1.07
HbA1c testing for individuals with diabetes	no	41.7	36.1–50.6	1.40
Optimal screening (eye examination, cholesterol test, HbA1c test) for individuals with diabetes	no	34.1	30.0–42.5	1.42
Bone mineral density test, eligible females	no	83.9	74.2–90.3	1.22
Bone mineral density test after a fracture, males	yes	11.7	6.0–16.9	2.82
Bone mineral density test after a fracture, females	yes	20.4	12.9–25.8	2.00
Mammogram, eligible females	no	66.9	62.4–71.1	1.14
Pap test, eligible females	no	72.1	68.4–77.0	1.13
Colorectal cancer screening, eligible individuals	no	61.2	55.8–67.4	1.21
Post-stroke therapy provided as a part of home care	yes	65.0	43.4–79.1	1.82
Evidence-based medications, %				
ACE inhibitor or ARB after AMI hospitalization	yes	79.4	72.9–84.5	1.16
Beta blocker after AMI hospitalization	yes	79.5	71.8–84.3	1.17
Statin after AMI hospitalization	yes	89.4	84.9–93.9	1.11
ACE inhibitor or ARB after CHF hospitalization	yes	69.8	61.9–74.9	1.21
Beta blocker after CHF hospitalization	yes	69.5	61.5–76.1	1.24
Statin after CHF hospitalization	yes	63.7	55.9–69.4	1.24
Antihypertensive after stroke hospitalization	yes	84.9	77.2–90.3	1.17
Statin after stroke hospitalization	yes	76.7	70.0–84.7	1.21
ACE inhibitor or ARB for individuals with diabetes	yes	72.0	69.9–75.3	1.08
Antihypertensive for individuals with diabetes	yes	84.5	82.4–86.8	1.05
Statin for individuals with diabetes	yes	69.6	65.9–72.4	1.10
Adverse outcomes: drug safety, %				
Antipsychotic prescription for long-term care residents with dementia	no	37.6	30.2–44.6	1.48
Antipsychotic prescription for long-term care residents without dementia	no	11.9	7.3–18.8	2.58
Inappropriate prescribing for individuals with dementia, hip or pelvic fracture, or chronic renal failure	no	12.8	11.2–15.2	1.36

EXHIBIT 1.0 Quality indicators by domain , indication of age- and sex-standardization, median value, 10th and 90th percentiles and ratio of 90th to 10th percentiles (continued)

Quality Indicator	Age- and Sex-Standardized	Median‡	90th to 10th Percentiles‡	Ratio of 90th to 10th Percentiles§
Hospital–community transitions, %				
Office visit* within 7 days after discharge for AMI	yes	45.5	35.4–54.7	1.55
Office visit* within 7 days after discharge for CHF	yes	46.4	33.3–53.9	1.62
Office visit* within 7 days after discharge for psychiatric care	yes	32.0	19.2–39.6	2.06
Office visit* within 7 days after discharge for COPD, diabetes, asthma, pneumonia or unstable angina	yes	35.8	26.9–46.7	1.74
Office visit,* newborn, within 7 days after discharge	no	80.2	55.7–87.1	1.56
Office visit,* pediatric, within 7 days after discharge for asthma	yes	46.4	24.3–59.3	2.44
Office visit,* pediatric, within 7 days after high-triage ED visit for asthma	yes	24.3	13.5–31.3	2.32
Shared care,† pediatric, within 30 days after discharge for asthma	yes	8.5	3.8–18.7	4.92
Shared care,† pediatric, within 30 days after high-triage ED visit for asthma	yes	3.9	1.9–5.6	2.95
Shared care† within 30 days after discharge for AMI	yes	24.2	13.9–35.8	2.58
Shared care† within 30 days after discharge for CHF	yes	27.1	12.9–36.4	2.82
Shared care† within 30 days after discharge for psychiatric care	yes	19.2	9.1–24.1	2.65
Office visit* within 7 days after high-triage ED visit for atrial fibrillation, angina, CHF or asthma	yes	39.7	28.9–48.3	1.67
Adverse outcomes: potentially avoidable admissions and ED visits				
Individuals with diabetes hospitalized for acute complication of diabetes, %	yes	0.5	0.3–0.7	2.47
Individuals with diabetes hospitalized for chronic complication of diabetes, %	yes	4.0	3.1–4.9	1.58
Hospital admissions for asthma, per 1,000 individuals with asthma	yes	1.3	0.9–2.2	2.53
Hospital admissions for diabetes, per 1,000 individuals with diabetes	yes	5.1	2.9–7.8	2.69
Hospital admissions for CHF, per 1,000 individuals with CHF	yes	48.9	39.3–65.5	1.67
Hospital admissions for COPD, per 1,000 individuals with COPD	yes	72.0	53.0–89.0	1.68
ED visits for acute complication of diabetes, per 1,000 individuals with diabetes	yes	30.1	18.3–48.2	2.63
ED visits for chronic complication of diabetes, per 1,000 individuals with diabetes	yes	12.5	10.1–17.3	1.71
Older adults hospitalized for a fall, %	no	2.7	2.3–3.2	1.39

EXHIBIT 1.0 Quality indicators by domain , indication of age- and sex-standardization, median value, 10th and 90th percentiles and ratio of 90th to 10th percentiles (continued)

Quality Indicator	Age- and Sex-Standardized	Median‡	90th to 10th Percentiles‡	Ratio of 90th to 10th Percentiles§
Adverse outcomes: potentially avoidable readmissions and ED visits, %				
Readmission within 30 days after discharge for AMI	yes	12.1	9.1–14.1	1.55
Readmission within 30 days after discharge for CHF	yes	19.8	16.2–24.5	1.51
Readmission within 30 days after discharge for stroke	yes	9.5	6.8–11.7	1.72
Readmission within 30 days after discharge for psychiatric care	yes	12.9	11.0–16.1	1.46
ED visit within 30 days after discharge for AMI	yes	23.3	20.1–29.9	1.49
ED visit within 30 days after discharge for CHF	yes	29.7	24.8–35.9	1.45
ED visit within 30 days after discharge for stroke	yes	17.0	13.7–20.3	1.48
ED visit within 30 days after discharge for psychiatric care	yes	21.4	18.0–25.9	1.43
Imaging, %				
Spinal CT scan	yes	0.6	0.4–1.4	3.50
Spinal MRI scan	yes	1.6	1.3–1.9	1.46
Lower back X-ray	yes	3.6	3.0–4.2	1.40
Cancer end-of-life care, %				
Died in hospital (excluding recipients of palliative care)	no	36.9	24.5–52.6	2.15
Home care visit in last 6 months of life	no	78.7	72.4–83.8	1.16
Palliative care in last 6 months of life	no	61.9	43.5–74.0	1.70
ICU stay in last 2 weeks of life	no	7.3	5.4–9.5	1.76
ED visit in last 2 weeks of life	no	33.9	29.6–41.8	1.41
Chemotherapy in last 2 weeks of life	no	3.0	1.5–4.6	3.07
House call in last 2 weeks of life	no	21.8	15.1–32.9	2.18

EXHIBIT 1.0 Quality indicators by domain , indication of age- and sex-standardization, median value, 10th and 90th percentiles and ratio of 90th to 10th percentiles (continued)

Quality Indicator	Age- and Sex-Standardized	Median‡	90th to 10th Percentiles‡	Ratio of 90th to 10th Percentiles§
Spending				
Total costs per capita, $	yes	5,079	4,515–5,739	1.27
Hospital costs per capita, $	yes	1,973	1,648–2,469	1.50
Total physician costs per capita, $	yes	1,085	953–1,226	1.29
Primary care physician costs per capita, $	yes	407	317–479	1.51
Specialist costs per capita, $	yes	694	579–793	1.37
Ontario Drug Benefit costs per capita, $	yes	639	525–737	1.40
Home care costs per capita, $	yes	282	229–337	1.47
Long-term care costs per capita, $	yes	499	374–572	1.53
Network residents in top 1% of provincial costs, %	no	1	0.7–1.3	1.86
Network residents in top 5% of provincial costs, %	no	5	3.5–6.7	1.91
Network residents in top 10% of provincial costs, %	no	10	7.5–13.2	1.76

‡Indicator values for the individual networks were weighted by the network denominators.

§The ratio of the 90th to the 10th percentile was classified as: ratio less than 1.25 = minimal variation; ratio between 1.25 and 2.0 = moderate variation; and ratio greater than 2.0 = high variation.

*Office visit: at least one office visit with a primary care provider or appropriate specialist. Includes visits by a physician to a patient's home or long-term care facility, or telephone calls to a patient.

†Shared care: at least one office visit with each of a primary care provider and an appropriate specialist. Includes visits by a physician to a patient's home or long-term care facility, or telephone calls to a patient.

ACE: angiotensin converting enzyme; ARB: angiotensin receptor blocker; AMI: acute myocardial infarction; CHF: congestive heart failure; COPD: chronic obstructive pulmonary disease; CT: computed tomography; ED: emergency department; ICU: intensive care unit; MRI: magnetic resonance imaging.

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Screening and Prevention

Regular screening is important to prevent disease morbidity and mortality. Breast, colorectal and cervical cancer screenings are valuable and recommended as many of these cancers are preventable or more easily treated with early detection.[1-3] Bone mineral density tests are critical in detecting and assessing low bone mass (osteoporosis), which is associated with fractures.[4] Currently, osteoporosis screening is recommended for women at risk of fractures. Unless they have been previously screened or diagnosed, both women and men should undergo testing for osteoporosis after a fragility fracture (a fracture that may be caused by a weakened bone structure). Osteoporosis-related fractures are increasing in Ontario due to the aging population; however, the gap in osteoporosis care is wide, and greater in men than in women.[4] Screening is also necessary for chronic disease prevention and management. Regular eye examinations, cholesterol tests and HbA1c tests (to assess blood sugar levels) are required to prevent and manage diabetes complications, including long-term complications affecting the nerves, kidneys and eyes, and decrease the risk of cardiovascular disease.[5] Finally, home care services, such as physiotherapy, occupational therapy, speech-language therapy and social work, are integral components of recovery for stroke patients discharged from hospital because optimal care and support are required for proper rehabilitation and the prevention of further functional decline.[6]

We evaluated rates of screening for breast, colorectal and cervical cancer across physician networks. For breast cancer, we assessed the percentage of women aged 50 to 74 who received a mammography in the previous 30 months. For colorectal cancer, we assessed the percentage of individuals aged 50 to 74 who received at least one barium enema or sigmoidoscopy in the previous five years, a colonoscopy in the previous 10 years or a fecal occult blood test in the previous two years, or who had a family physician billing record indicating that they were up-to-date with colorectal screening. For cervical cancer, we determined the percentage of women aged 21 to 69 with at least one Pap test in the previous 42 months. We assessed optimal diabetes care in individuals aged 40 and older by determining the percentage who received an eye examination from an ophthalmologist or optometrist, at least one

set of cholesterol tests (triglycerides, total cholesterol, high-density lipoprotein cholesterol) and at least three HbA1c tests in a two-year period. We reported the rates of bone mineral density (BMD) testing in the previous 10 years for women aged 65 and older, as well as BMD testing among adults aged 66 and older in the year following a fracture. We also assessed the percentage of stroke patients who had received a physiotherapy, occupational therapy, speech-language therapy or social work visit during a home care visit within 60 days after discharge.

Key Findings

Screening for cancer

- The percentage of women aged 50 to 74 who were up-to-date with mammography was 66.9% and displayed low variability across networks (10th percentile = 62.4%, 90th percentile = 71.1%).
- Among adults aged 50 to 74, 61.2% were up-to-date with colorectal screening, with low variability observed across networks (10th percentile = 55.8%, 90th percentile = 67.4%).
- A similar proportion (median = 72.1%) of women aged 21 to 69 received a Pap test, with low variability across networks (10th percentile = 68.4%, 90th percentile = 77.0%).

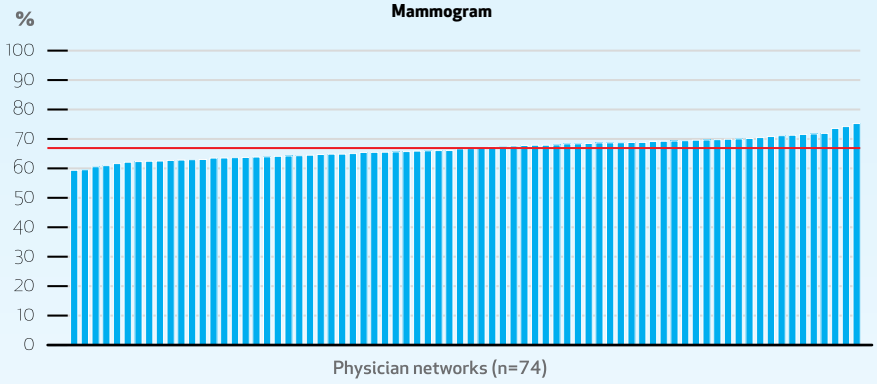
Chronic disease management

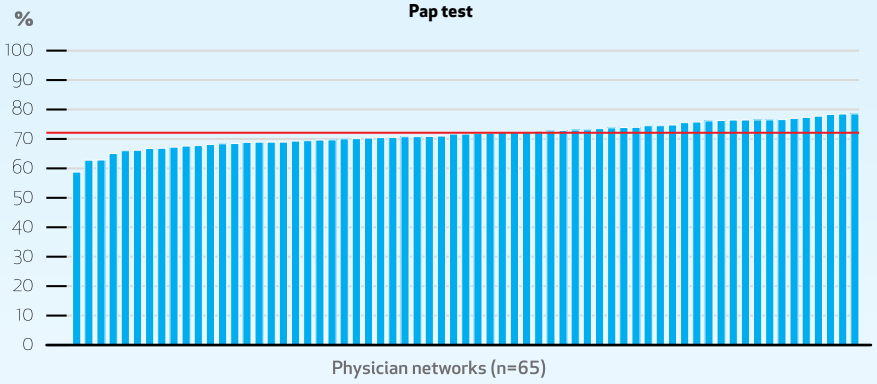
- Although 87.9% of diabetes patients received at least one set of cholesterol tests (triglycerides, total cholesterol, high-density lipoprotein cholesterol) during a two-year period (10th percentile = 84.2%, 90th percentile = 90.0%), 69.5% received at least one eye examination in a two-year period (10th percentile = 66.1%, 90th percentile = 74.7%), and only 41.7% received at least three HbA1c tests in a two-year period (10th percentile = 36.1%, 90th percentile = 50.6%).
- Optimal diabetes care, defined as having all three screening tests — eye examination, cholesterol test and HbA1c tests — within the recommended time periods, was received by 34.1% (10th percentile = 30.0%, 90th percentile = 42.5%) of individuals, and there was moderate variability across networks.
- Of stroke patients who received home care following their discharge from hospital, 65.0% (10th percentile = 43.4%, 90th percentile = 79.1%) had one or more visits for physiotherapy, occupational therapy, speech-language therapy or social work within 60 days after discharge; there was moderate variability across networks.

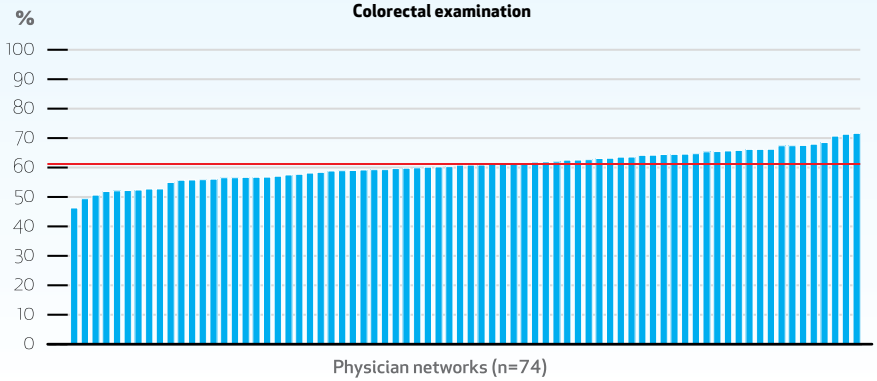
Bone mineral density testing

- Among women aged 65 and older, 83.9% received a BMD test over a 10-year period.
- Rates of BMD testing of adults aged 66 and older after a fracture were low and displayed high variability: 20.4% of women (10th percentile = 12.9%, 90th percentile = 25.8%) and 11.7% of men (10th percentile = 6.0%, 90th percentile = 16.9%) received a BMD test after a fracture.

EXHIBIT 2.1 Percentage of eligible adults up-to-date with breast, cervical and colorectal cancer screening

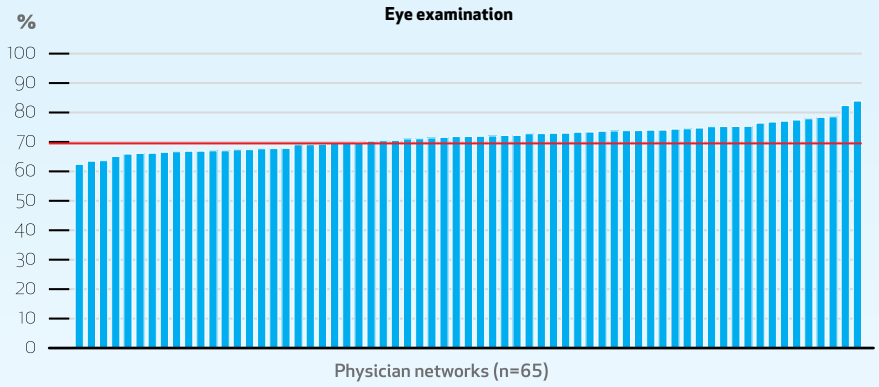


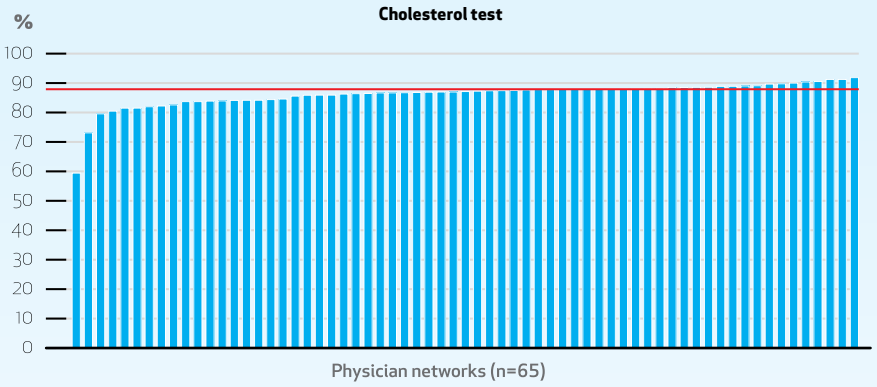


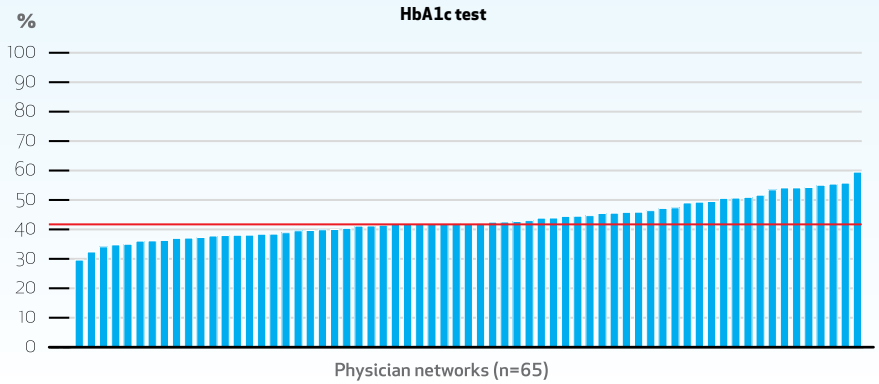


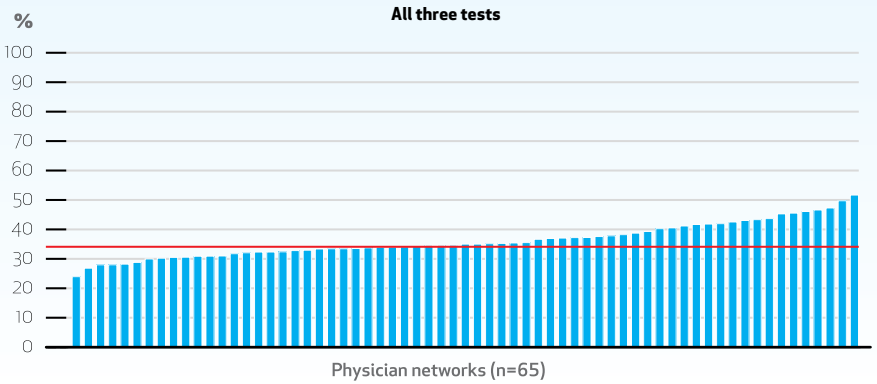
Indicator	Percentage screened				
	10th	25th	50th	75th	90th
Mammogram	62.4	64.3	66.9	69.6	71.1
Pap test	68.4	69.6	72.1	76.1	77.0
Colorectal examination	55.8	57.5	61.2	64.5	67.4

EXHIBIT 2.2 Percentage of individuals with diabetes who received an eye examination, a cholesterol test, an HbA1c test or optimal care (all three tests)



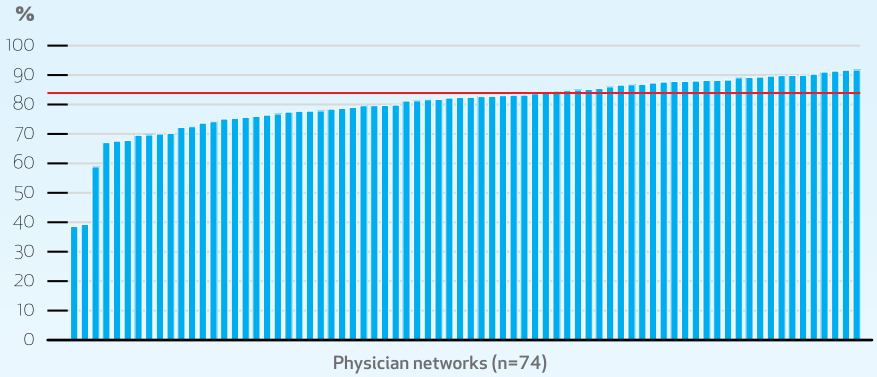






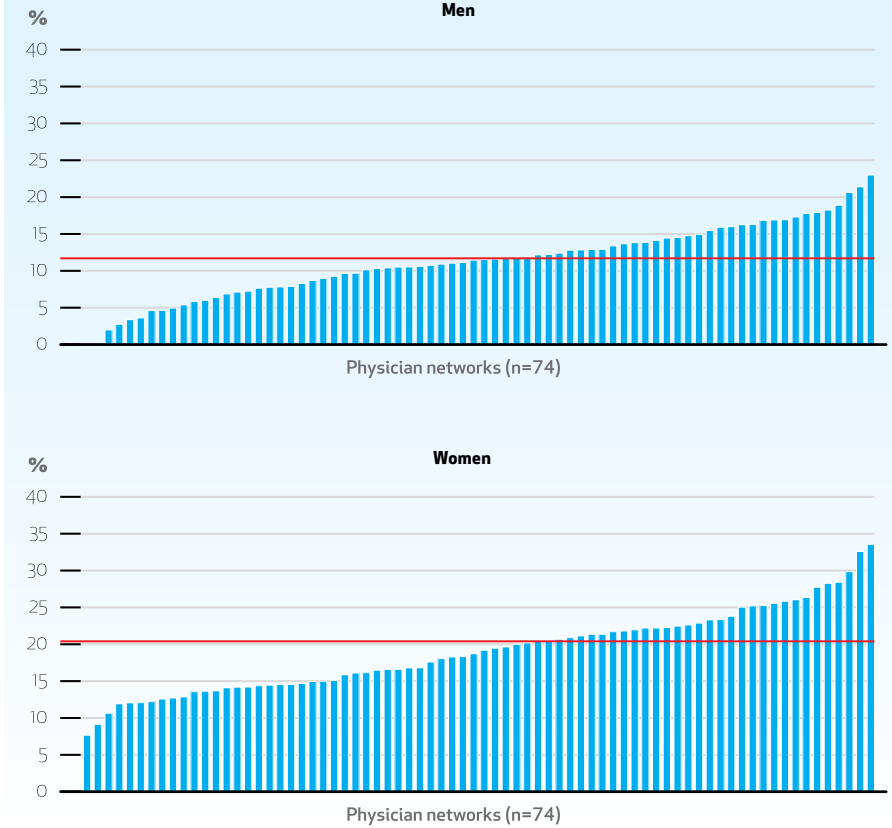
Indicator	Percentage tested				
	10th	25th	50th	75th	90th
Eye examination	66.1	66.9	69.5	72.9	74.7
Cholesterol test	84.2	86.7	87.9	88.9	90.0
HbA1c test	36.1	38.0	41.7	43.8	50.6
Optimal care	30.0	32.1	34.1	37.1	42.5

EXHIBIT 2.3 Percentage of eligible women aged 65 and older who received a bone mineral density test



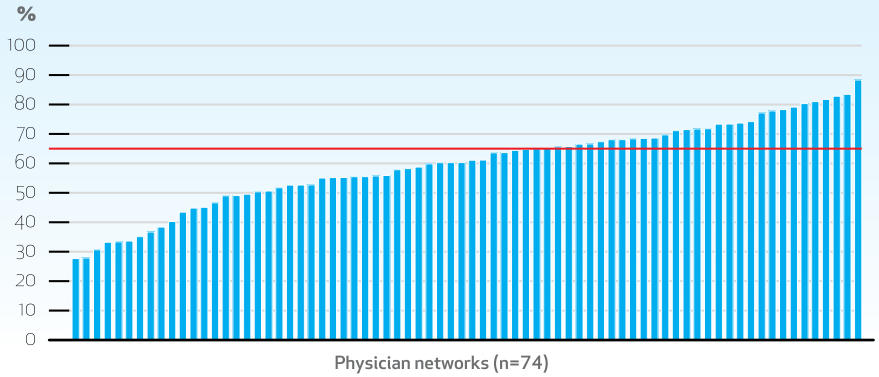
Indicator	Percentage tested				
	10th	25th	50th	75th	90th
BMD test, older females	74.2	78.7	83.9	88.0	90.3

EXHIBIT 2.4 Percentage of eligible men and women aged 66 and older who received a bone mineral density test after a fracture



Indicator	Percentage tested				
	10th	25th	50th	75th	90th
BMD: Females	12.9	15.1	20.4	22.6	25.8
BMD: Males	6.0	9.2	11.7	14.5	16.9

EXHIBIT 2.5 Percentage of patients discharged from hospital for stroke who received therapy (physiotherapy, occupational therapy, speech-language therapy or social work) as part of a home care visit



Indicator	Percentage receiving				
	10th	25th	50th	75th	90th
Therapy at home	43.4	55.2	65.0	71.7	79.1

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Evidence-Based Medications

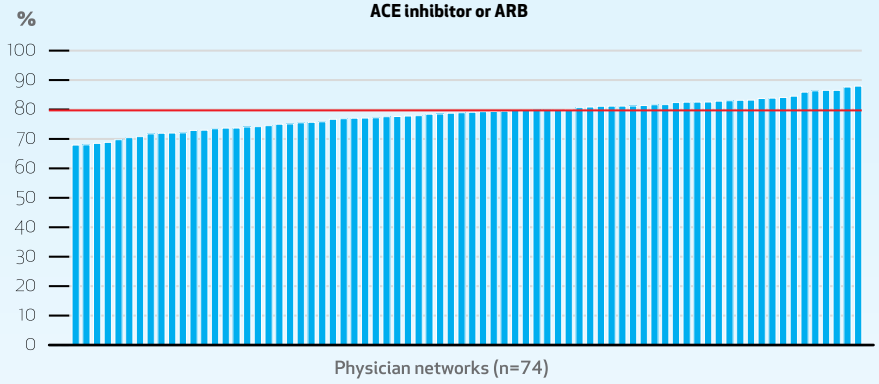
Chronic diseases such as acute myocardial infarction (AMI), congestive heart failure (CHF) and diabetes require treatment with recommended medications in conjunction with both routine check-ups and chronic disease management programs that promote increased physical activity and a proper diet to maintain a healthy lifestyle and reduce complications that can lead to hospitalizations, heart attacks, strokes and even death.[1] Standard pharmacological therapies for AMI and CHF include angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), beta blockers and statins.[2,3] ACE inhibitors, ARBs and statins are key to reducing cardiovascular disease risk factors in diabetes patients, while antihypertensive drugs are recommended as one means to prevent complications of high blood pressure, including stroke, hypertension, and heart disease.[4,5] These drugs can help manage adverse symptoms and improve quality of life.

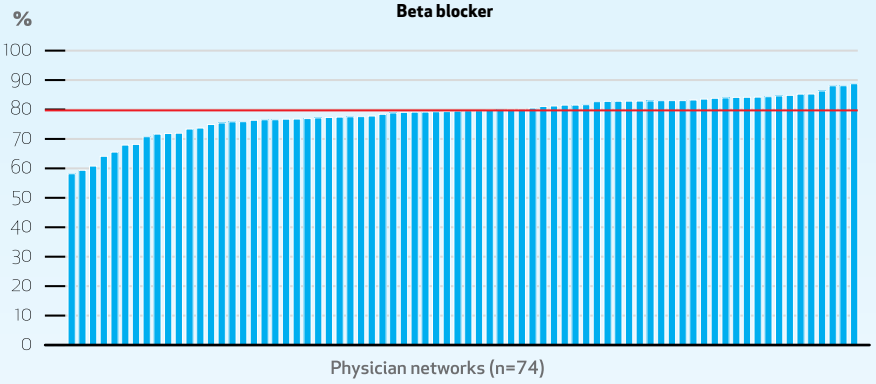
The indicators within this domain report the percentage of AMI, CHF and stroke patients aged 65 and older that filled a prescription for an ACE inhibitor, ARB, beta blocker or statin (cardiac patients) or an antihypertensive (stroke patients) within 90 days after hospital discharge. The domain also includes the percentage of individuals with diabetes who filled a prescription for recommended medications in a one-year period. Administrative data do not capture when a medication is prescribed but not filled nor do they include the information needed to exclude people with contraindications to these medications. For example, currently ACE inhibitors and ARBs are not routinely recommended for individuals with CHF who have a preserved ejection fraction. Therefore, all individuals with the relevant disease were included in the denominator of each indicator. Because there may be appropriate reasons in some cases to not receive a medication, we would not expect these rates to reach 100%.

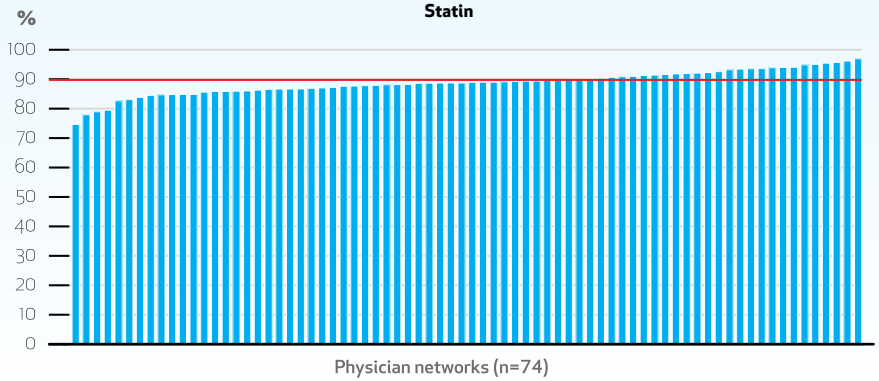
Key Findings

- Within 90 days after discharge, most patients with AMI, CHF or stroke had filled at least one prescription for recommended medications, with little variation across networks.
  - Among AMI patients, 79.4% had filled a prescription for an ACE inhibitor or ARB, 79.5% received a beta blocker and 89.4% received a statin.
  - Among CHF patients, 69.8% had filled a prescription for an ACE inhibitor or ARB, 69.5% received a beta blocker and 63.7% received a statin.
  - Among stroke patients, 76.7% had filled a prescription for a statin and 84.9% of stroke patients received an antihypertensive medication.
- Within one-year period after discharge, most individuals with diabetes had filled at least one prescription for each recommended medication, and there was little variation across networks.
  - Among patients with diabetes, 72.0% had filled a prescription for an ACE inhibitor or ARB, 84.5% had received an antihypertensive and 69.6% had filled a prescription for a statin.

EXHIBIT 3.1 Percentage of patients with acute myocardial infarction who were prescribed an ACE inhibitor or ARB, beta blocker or statin within 90 days after hospital discharge

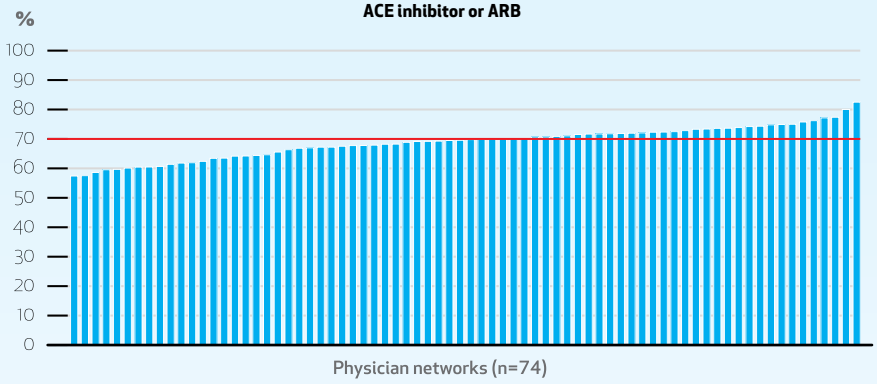


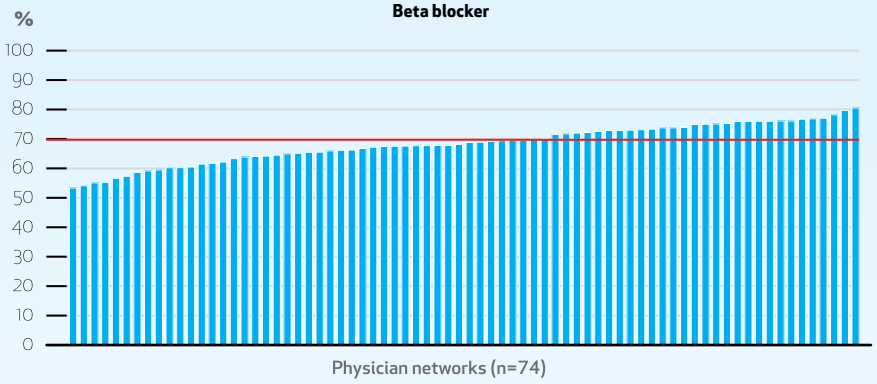


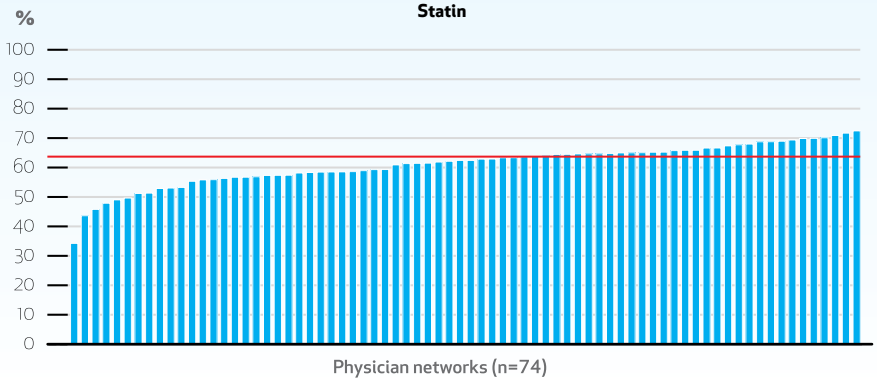


Indicator	Percentage prescribed				
	10th	25th	50th	75th	90th
ACE inhibitor or ARB	72.9	75.7	79.4	82.5	84.5
Beta blocker	71.8	76.5	79.5	82.9	84.3
Statin	84.9	87.1	89.4	92.0	93.9

EXHIBIT 3.2 Percentage of patients with congestive heart failure who were prescribed an ACE inhibitor or ARB, beta blocker or statin within 90 days after hospital discharge

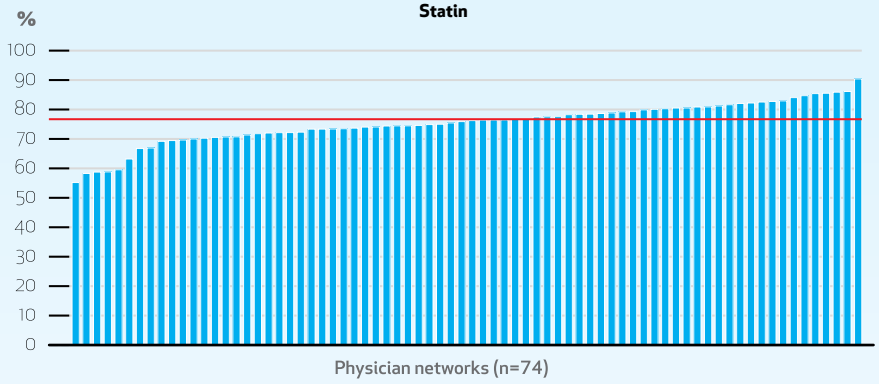


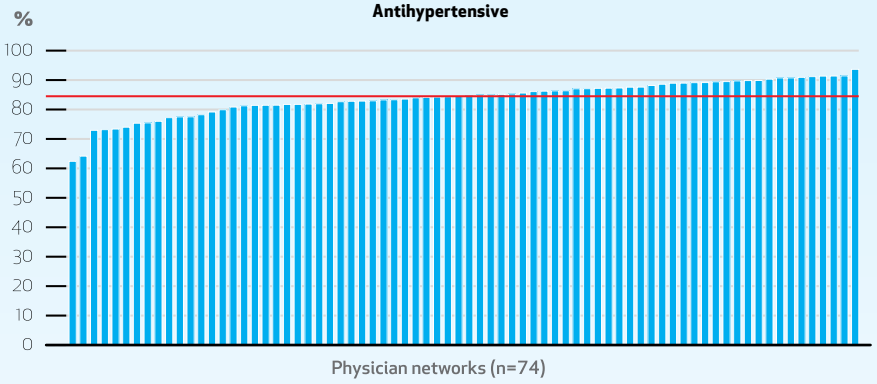




Indicator	Percentage prescribed				
	10th	25th	50th	75th	90th
ACE inhibitor or ARB	61.9	66.3	69.8	72.3	74.9
Beta blocker	61.5	64.9	69.5	73.9	76.1
Statin	55.9	58.5	63.7	66.6	69.4

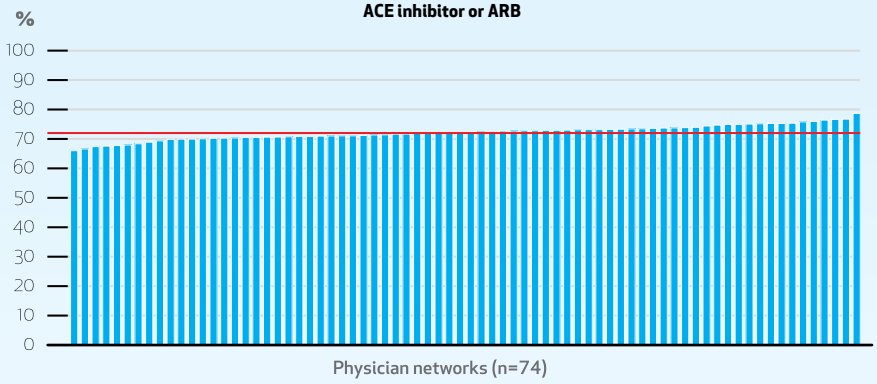
EXHIBIT 3.3 Percentage of patients with stroke who were prescribed a statin or antihypertensive medication within 90 days after hospital discharge

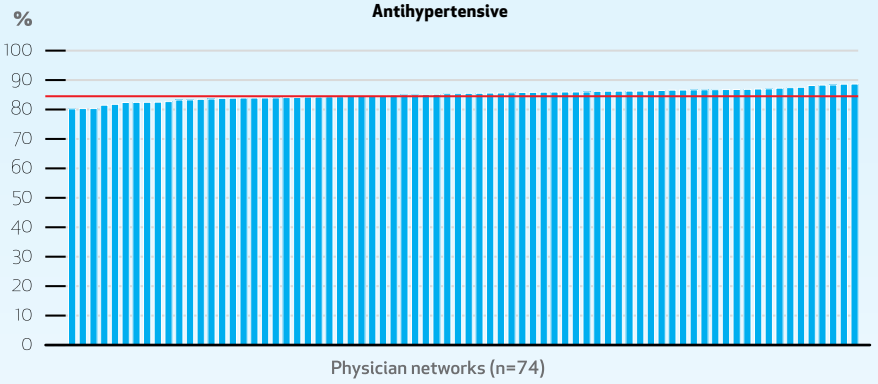


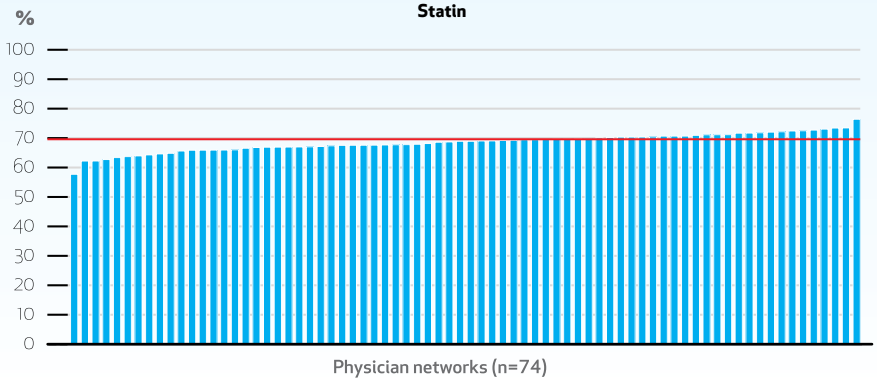


Indicator	Percentage prescribed				
	10th	25th	50th	75th	90th
Statin	70.0	73.3	76.7	80.9	84.7
Antihypertensive	77.2	81.5	84.9	88.6	90.3

EXHIBIT 3.4 Percentage of individuals with diabetes who were prescribed an ACE inhibitor or ARB, antihypertensive or statin







Indicator	Percentage prescribed				
	10th	25th	50th	75th	90th
ACE inhibitor or ARB	69.9	70.6	72.0	73.4	75.3
Antihypertensive	82.4	83.5	84.5	86.0	86.8
Statin	65.9	67.5	69.6	70.7	72.4

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Drug Safety

Prescription medications are essential to proper medical treatment, but have risks for adverse events when inappropriately prescribed. Optimal medication management requires assessing both the benefits and harms of medication use in a specific context. When the potential harms of a medication outweigh its benefits, its use is potentially inappropriate. Use of potentially inappropriate medications can be associated with adverse drug reactions and other serious preventable events, such as gastrointestinal bleeding, delirium, fractures and falls, and can exacerbate pre-existing conditions.[1-3] In addition, potentially harmful drug-disease interactions can place patients at risk. Examples of potentially harmful drug disease interactions include anticholinergics and tricyclic antidepressants for those with dementia; antipsychotics, tricyclic antidepressants and sleep agents for those with a history of falls or hip fracture; and nonsteroidal anti-inflammatory agents for those with chronic renal failure.[3] Adults aged 65 and older are at increased risk from some medications because of physiologic changes of aging and for drug-disease and drug-drug interactions. They are also more likely to have coexisting medical conditions and take at least one other medication.[4,5]

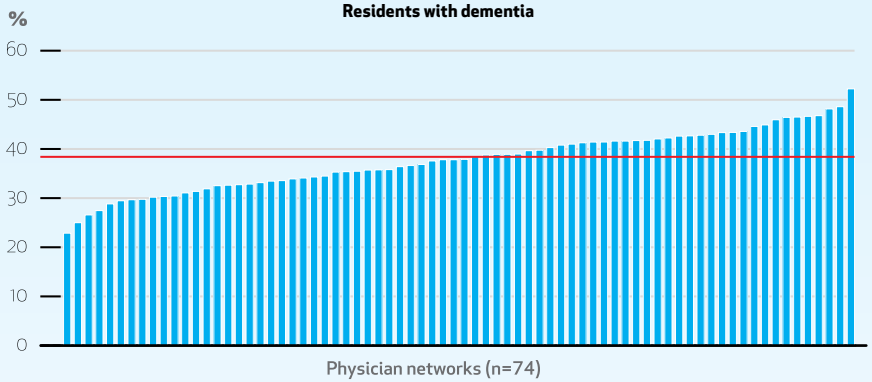
Antipsychotic medications are useful for treating schizophrenia and bipolar disorder. However, research shows that their use is also associated with an increased risk of death among patients with dementia.[6] Despite this concern, long-term care homes in Ontario often exhibit higher than warranted antipsychotic prescription rates, in particular for patients with dementia.[7] While antipsychotics may sometimes be used to manage psychosis in persons with dementia, use of most of these agents in dementia patients is inappropriate.[3,6]

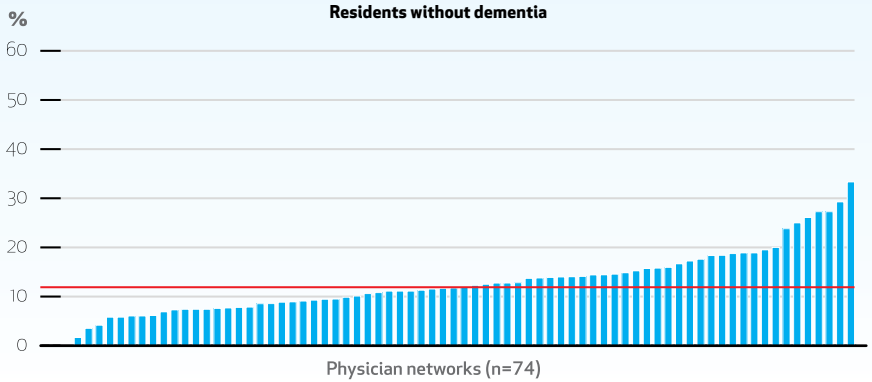
We evaluated the rates of antipsychotic prescriptions received by older adults in long-term care facilities, and rates of medications associated with drug-disease interactions prescribed to older adults with dementia, chronic renal failure, falls or hip fractures residing in the community.

Key Findings

- While rates of antipsychotic prescribing for those with a diagnosis of dementia were high, many residents without dementia were also receiving these drugs.
  - The median antipsychotic prescribing rate for long-term care residents with dementia was 37.6% (10th percentile = 30.2%, 90th percentile = 44.6%), and rates displayed moderate variability across networks.
  - The median antipsychotic prescribing rate for long-term care residents without dementia was 11.9%, but rates displayed high relative variability (10th percentile = 7.3%, 90th percentile = 18.8%) across networks.
- Among older adults living in the community, the median prescribing rate for medications associated with drug disease interactions for patients with dementia, chronic renal failure, falls or hip fractures was 12.8%, with moderate variation across networks.

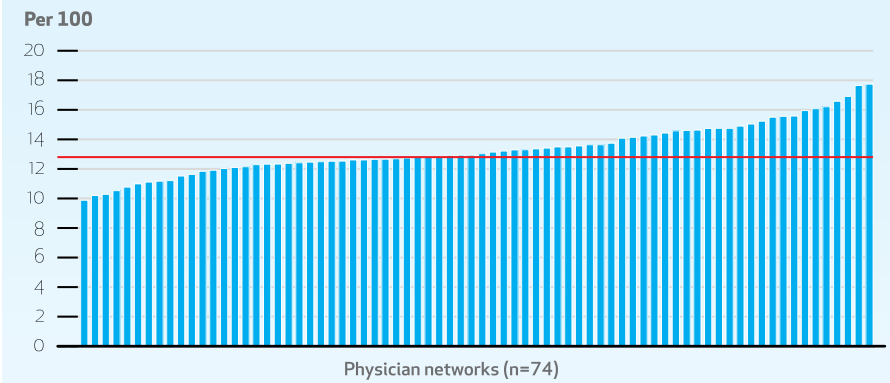
EXHIBIT 4.1 Percentage of long-term care residents with and without dementia who were prescribed an antipsychotic





Indicator	Percentage prescribed				
	10th	25th	50th	75th	90th
With dementia	30.2	33.5	37.6	41.7	44.6
Without dementia	7.3	8.8	11.9	14.8	18.8

EXHIBIT 4.2 Rate of inappropriate prescribing for contraindicated medications per 100 occurrences of a target condition (a diagnosis of dementia, a fall or a hip or pelvic fracture, or chronic renal failure)



Indicator	Rate per 100 occurrences				
	10th	25th	50th	75th	90th
Inappropriate prescribing	11.2	12.3	12.8	14.1	15.2

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Hospital–Community Transitions

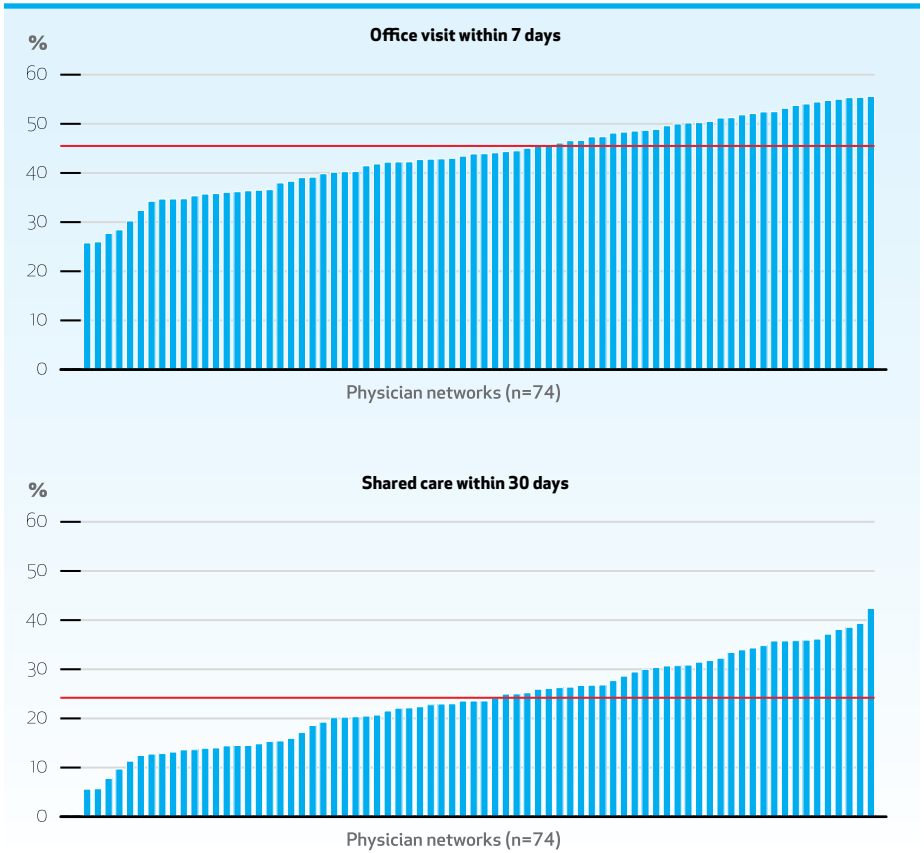
Good hospital-community transitions are those where patients are safely and effectively transferred from the hospital to the community setting after discharge, with good access to primary care support and other necessary services such as home care, specialty care, medications and diagnostics. Good transitions are important to improving health and reducing readmissions, and rely on the implementation of timely and appropriate coordinated and integrated care across the care continuum. Strong communication between providers, timely follow-up visits, and ensuring that care plans and medication regimens are adhered to aid in preventing poor outcomes such as repeat hospitalizations and emergency department (ED) visits and improve continuity of care.[1] Studies of patients with acute myocardial infarction (AMI) or congestive heart failure (CHF) have shown that shared care (early follow-up with both a primary care physician and a relevant specialist) compared to care from a primary care physician alone or no physician follow-up is associated with decreased mortality and readmissions[2-3] (also P. Kurdyak, unpublished data, 2015). Children can also be expected to benefit from appropriate follow-up care, yet most children treated in an ED for asthma do not receive early follow-up care.[4] Recent attempts to improve health care delivery in Ontario have focused on hospital discharge planning and transitions from acute care to the community.[5]

The indicators within this domain examine the percentage of patients with a follow-up visit within seven days to a physician (primary care physician or relevant specialist) or within 30 days to both a primary care physician and a relevant specialist. Follow-up visit rates are evaluated for patients hospitalized for AMI, CHF or a psychiatric condition (schizophrenia, depression or bipolar disease). Rates are also reported for adults hospitalized for one of chronic obstructive pulmonary disease (COPD), diabetes, asthma, pneumonia or angina; and for adults following a high-acuity ED visit for any of atrial fibrillation, angina, CHF or asthma. We assessed rates of follow-up visits within seven days and rates of shared-care within 30 days for pediatric patients hospitalized with asthma and for pediatric patients who experienced a high-acuity ED visit for asthma. Finally, follow-up care was examined for newborns.

Key Findings

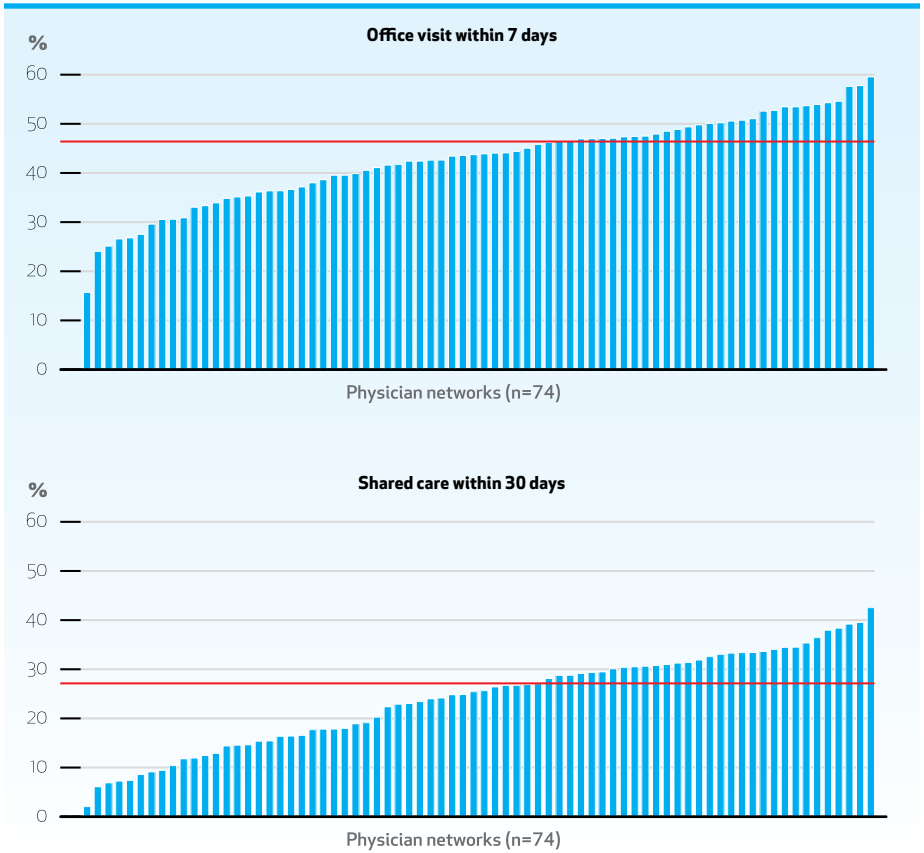
- Slightly less than half of the patients discharged from a hospital with a diagnosis of AMI or CHF had a follow-up office visit with a physician within seven days.
  - The seven-day follow-up rate for AMI patients (median = 45.5%, 10th percentile = 35.4%, 90th percentile = 54.7%) was similar to that for CHF patients (median = 46.4%, 10th percentile = 33.3%, 90th percentile = 53.9%). There was moderate variability across networks in follow-up rates for these cardiac patients.
  - The 30-day follow-up rates for AMI and CHF with a primary care physician and a cardiologist were lower, exhibiting high inter-network variability (median = 24.2%, 10th percentile = 13.9%, 90th percentile = 35.8%; and median = 27.1%, 10th percentile = 12.9%, 90th percentile = 36.4% respectively).
- About one-third of the patients discharged from hospital with a psychiatric diagnosis had a follow-up office visit with a physician within seven days.
  - The seven-day follow-up rate for psychiatric patients was low (median = 32.0%) and demonstrated high variability across networks (10th percentile = 19.2%, 90th percentile = 39.6%).
  - The 30-day shared care follow-up rate for psychiatric patients was similarly low (median = 19.2%) and exhibited high inter-network variability (10th percentile = 9.1%, 90th percentile = 24.1%).
- Follow-up rates among adults discharged from an acute care hospital or ED for one of multiple chronic conditions varied across networks, specifically:
  - The seven-day follow-up rate was 35.8% for adults discharged with a diagnosis of COPD, diabetes, asthma, pneumonia or angina, with moderate variability across networks. Similar follow-up rates and variability were observed among adults with a high-acuity ED visit for atrial fibrillation, angina, CHF or asthma (median = 39.7%).
- Follow-up rates for children hospitalized for asthma or with a high-acuity ED visit for asthma were low and displayed consistently high inter-network variability.
  - The seven-day follow-up rate for children hospitalized for asthma was 46.4% (10th percentile = 24.3%, 90th percentile = 59.3%). The follow-up rate was lower for children with a high-acuity ED visit for asthma (median = 24.3%, 10th percentile = 13.5%, 90th percentile = 31.3%).
  - The 30-day shared care follow-up rate for children hospitalized for asthma was 8.5% (10th percentile = 3.8%, 90th percentile = 18.7%) and was lower for children with a high-acuity ED visit for asthma (median = 3.9%, 10th percentile = 1.9%, 90th percentile = 5.6%).
- The seven-day follow-up rate for newborns leaving hospital was 80.2%, with moderate variability across networks.

EXHIBIT 5.1 Percentage of patients with acute myocardial infarction who had a follow-up office visit within seven days or shared care within 30 days after hospital discharge



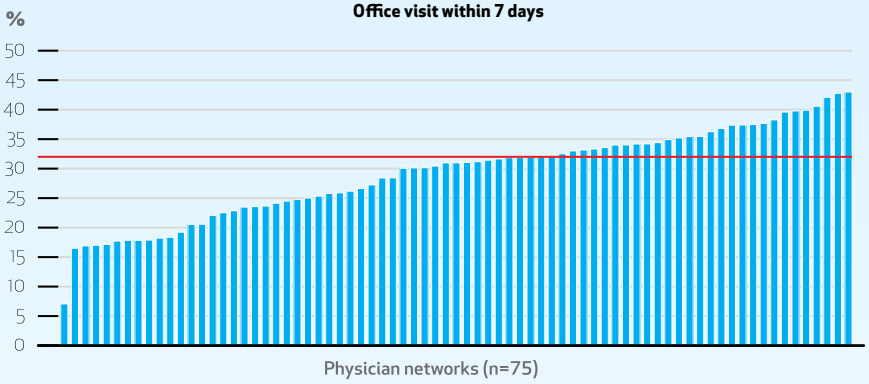
Indicator	Percentage of discharges				
	10th	25th	50th	75th	90th
Office visit	35.4	39.8	45.5	51.2	54.7
Shared care	13.9	18.6	24.2	30.9	35.8

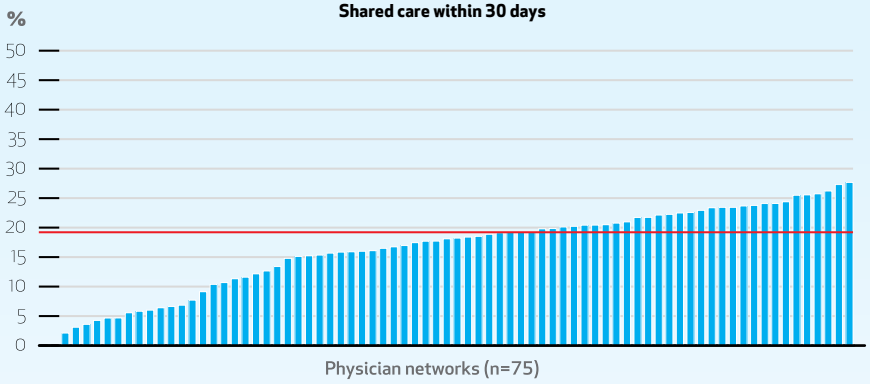
EXHIBIT 5.2 Percentage of patients with congestive heart failure who had a follow-up office visit within seven days or shared care within 30 days after hospital discharge



Indicator	Percentage of discharges				
	10th	25th	50th	75th	90th
Office visit	33.3	39.9	46.4	50.2	53.9
Shared care	12.9	19.1	27.1	32.6	36.4

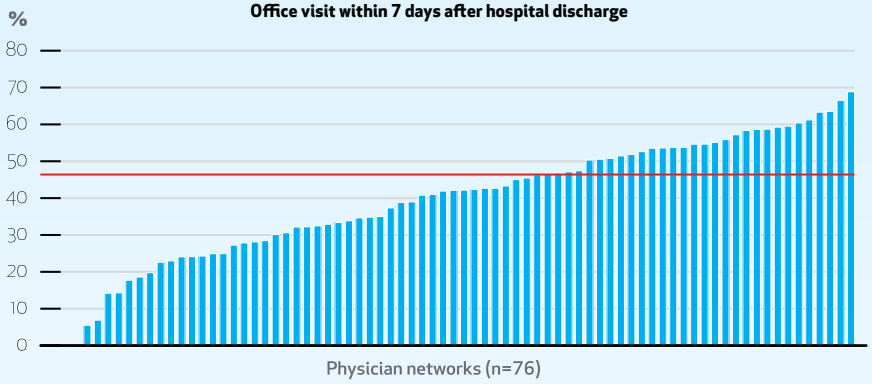
EXHIBIT 5.3 Percentage of patients with psychiatric conditions who had a follow-up office visit within seven days or shared care within 30 days after hospital discharge

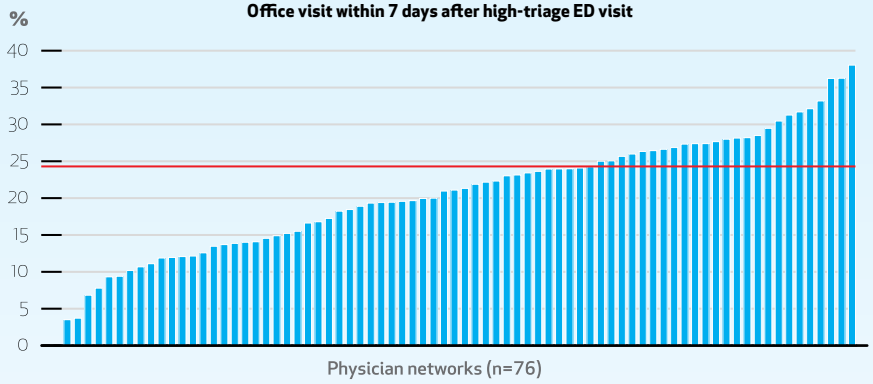


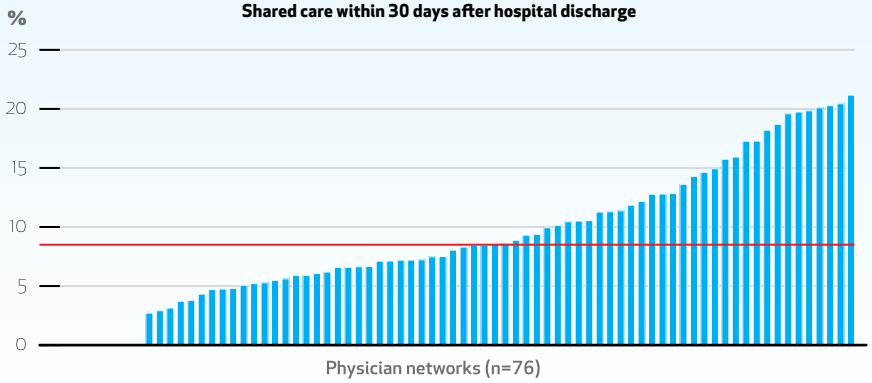


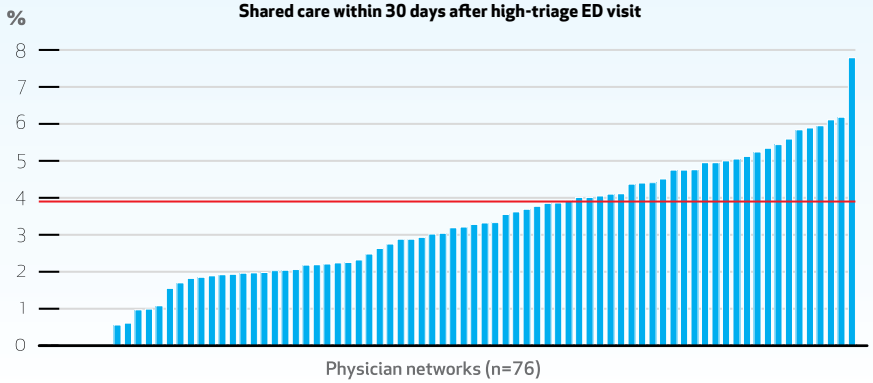
Indicator	Percentage of discharges				
	10th	25th	50th	75th	90th
Office visit	19.2	26.6	32.0	34.9	39.6
Shared care	9.1	16.5	19.2	22.5	24.1

EXHIBIT 5.4 Percentage of children with asthma who had a follow-up office visit within seven days or shared care within 30 days after a hospital discharge or high-triage emergency department visit for asthma





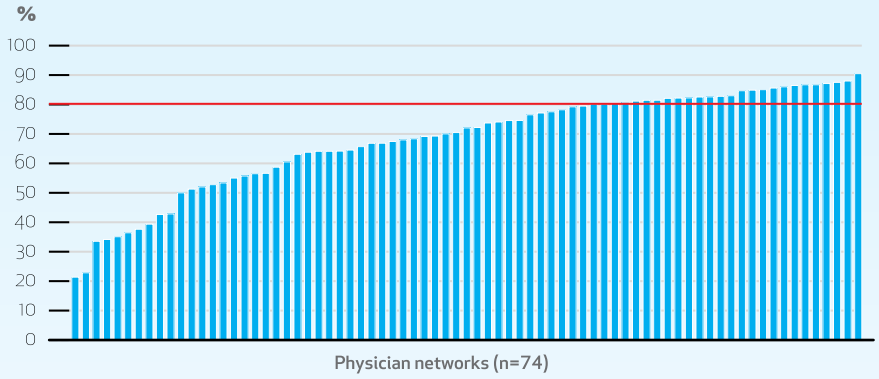




Indicator	Percentage with follow-up visit				
	10th	25th	50th	75th	90th
After hospital discharge					
Office visit in 7 days	24.3	39.0	46.4	53.5	59.3
Shared care in 30 days	3.8	5.9	8.5	11.3	18.7

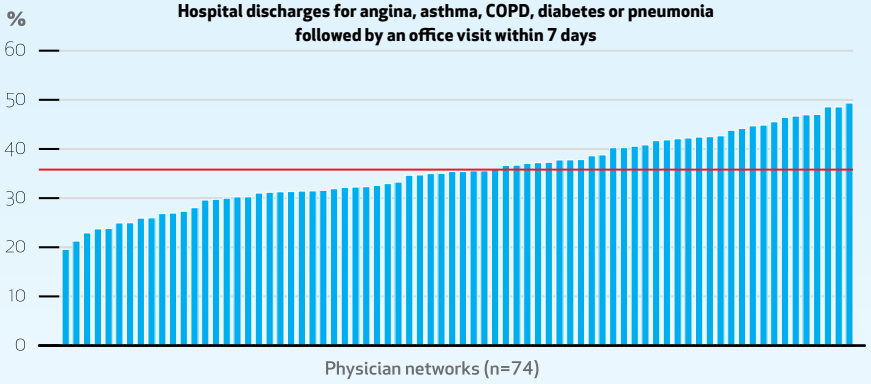
Indicator	Percentage with follow-up visit				
	10th	25th	50th	75th	90th
After high-triage ED visit					
Office visit in 7 days	13.5	19.3	24.3	28.0	31.3
Shared care in 30 days	1.9	2.5	3.9	4.8	5.6

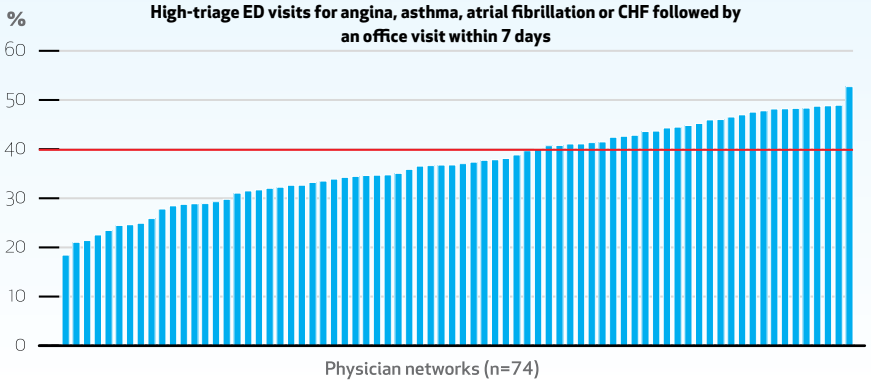
EXHIBIT 5.5 Percentage of newborns who had a follow-up office visit within seven days after leaving hospital



Indicator	Percentage with office visit				
	10th	25th	50th	75th	90th
Newborns	55.7	68.3	80.2	85.6	87.1

EXHIBIT 5.6 Percentage of adult patients with multiple conditions who had a follow-up office visit within seven days after a hospital discharge or high-triage emergency department visit





Indicator	Percentage with office visit				
	10th	25th	50th	75th	90th
After hospital discharge	26.9	31.5	35.8	41.9	46.7
After high-triage ED visit	28.9	34.2	39.7	45.9	48.3

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Adverse Outcomes: Potentially Avoidable Admissions and Emergency Department Visits

Although a hospitalization may be necessary for people who suffer from chronic diseases, many of these hospitalizations could be avoided with more timely ambulatory care in the community. For ambulatory care–sensitive conditions (ACSCs), such as asthma, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and diabetes, the need for hospitalization can be greatly reduced with access to high-quality outpatient care.[1-3] Chronic diseases, such as diabetes, are common and require proper care to reduce complications, such as stroke, heart attack, hospitalization and death.[4] Falls continue to be the leading cause of injury-related hospitalizations among Ontarians aged 65 and older, and those with poorer health and functional status are at greater risk.[5] There are evidence-based guidelines for preventing falls among older adults.

The indicators in this domain report unplanned hospital admission rates for acute and chronic complications of diabetes, ACSCs and seniors hospitalized for a fall, as well as emergency department (ED) visit rates for acute and chronic complications of diabetes. Acute complications of diabetes include hyperglycemia, hypoglycemia and soft tissue infection. Chronic complications include cardiovascular disease (stroke, AMI, or a CABG or PCI procedure); major or minor amputation not due to cancer; injury or accident; chronic renal disease and death. Admission rates for ACSCs include the rates for asthma, CHF, COPD and diabetes. The percentage of older adults hospitalized for a fall was based on the number of individuals who had at least one fall resulting in a hospitalization. All rates were based on a two-year period and annualized. Some of the variation in ACSCs could potentially be due to variations in the prevalence of the underlying conditions across networks.

Key Findings

- The annualized rate for asthma hospitalizations was 1.3 per 1,000 individuals (10th percentile = 0.9, 90th percentile = 2.2). For individuals with diabetes, the hospitalization rate was 5.1 per 1,000 (10th percentile = 2.9, 90th percentile = 6.9). In contrast, the rate of CHF hospitalizations was 48.9 per 1,000 (10th percentile = 39.3, 90th percentile = 65.5) and 72.0 per 1,000 for COPD hospitalizations (10th percentile = 53.0, 90th percentile = 89.0). All four indicators displayed moderate to high variability across networks.

- Among individuals with diabetes, complications of diabetes were divided into those for chronic and acute conditions.

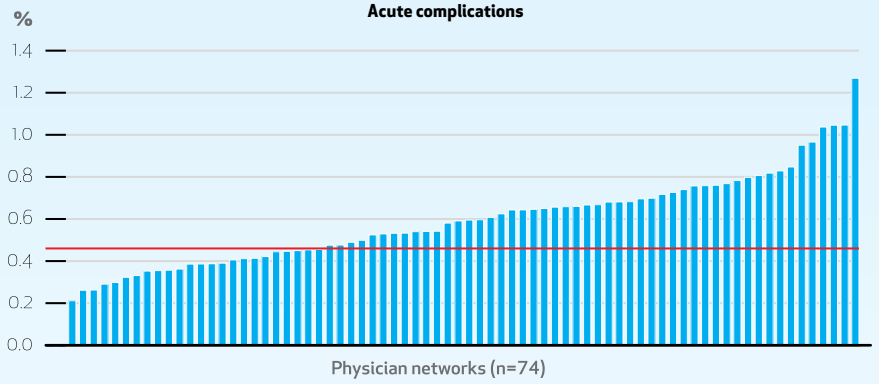
  - The median percentage of individuals with a hospital visit or death related to chronic complications of diabetes was 4.0%, with moderate variation across networks (10th percentile = 3.1%, 90th percentile = 4.9%); this rate included the 2.3% of individuals who died without being hospitalized and is consistent with the rate of 4.1% reported by Health Quality Ontario.[6]

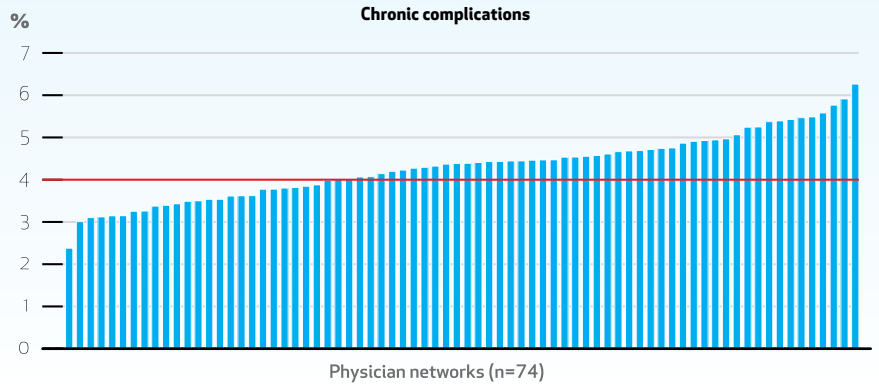
  - While the median percentage with acute complications was lower (median = 0.5%), inter-network variation was high (10th percentile = 0.3%, 90th percentile = 0.7%).

  - Most ED visits for diabetes were associated with acute complications, which showed high variability across networks (median = 30.1 per 1,000 people with diabetes, 10th percentile = 18.3, 90th percentile = 48.2). Rates of ED visits due to chronic complications were lower and showed moderate variability (median = 12.5 per 1,000 people with diabetes, 10th percentile = 10.1, 90th percentile = 17.3).

- Overall, the percentage of adults aged 65 and older who were hospitalized for at least one fall was 2.7% (10th percentile = 2.3%, 90th percentile = 3.2%). There was little difference between serious fall rates for older adults living in the community and those living in long-term care facilities (median = 2.7% and 2.5%, respectively).

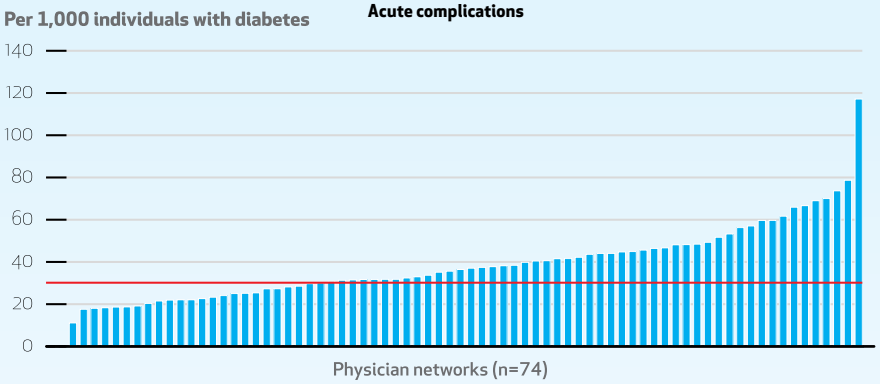
EXHIBIT 6.1 Percentage of patients with diabetes hospitalized for acute or chronic complications of diabetes

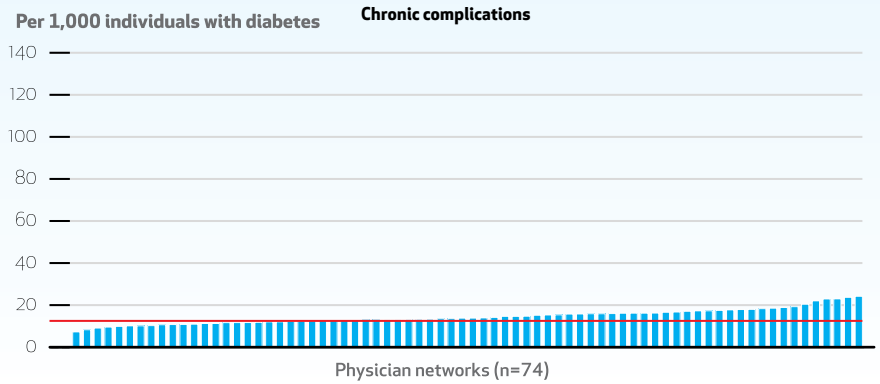




Indicator	Percentage hospitalized				
	10th	25th	50th	75th	90th
Acute complications	0.3	0.4	0.5	0.6	0.7
Chronic complications or death	3.1	3.4	4.0	4.4	4.9

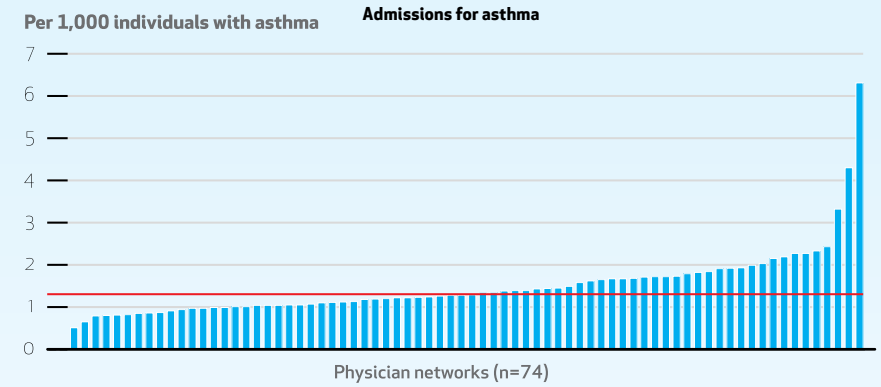
EXHIBIT 6.2 Number of emergency department visits for acute and chronic complications of diabetes per 1,000 individuals with diabetes

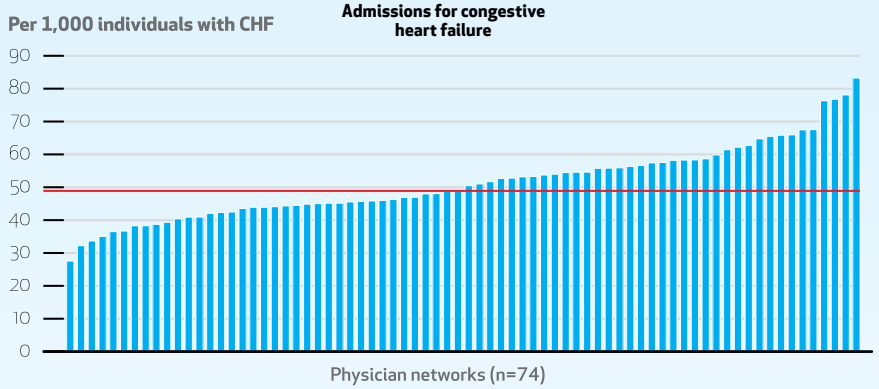


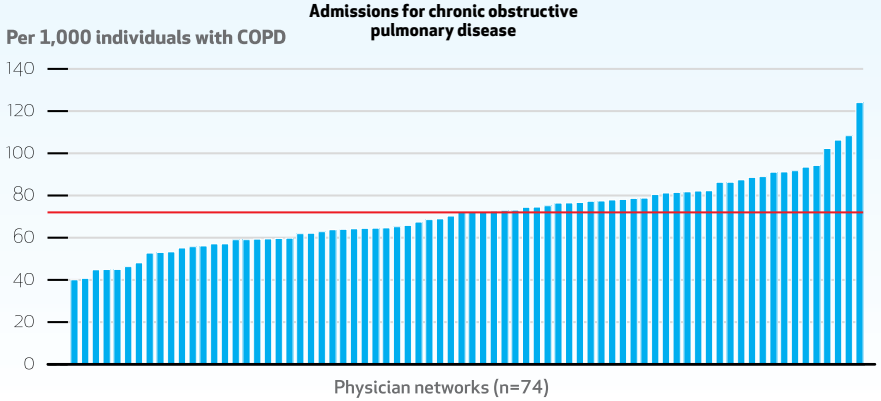


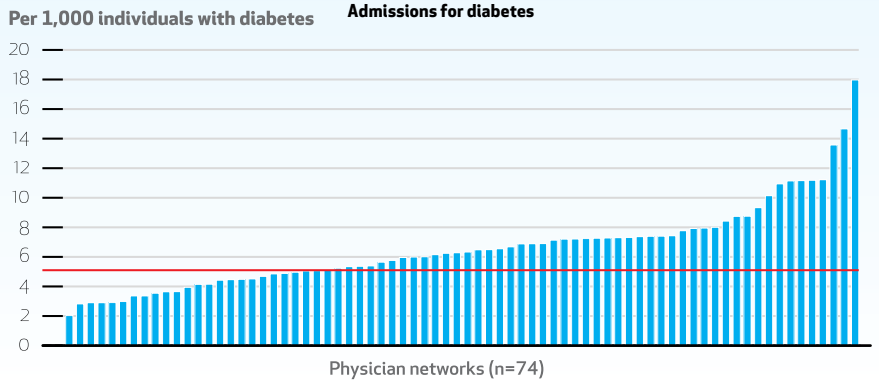
Indicator	ED visits per 1,000 with diabetes				
	10th	25th	50th	75th	90th
Acute complications	18.3	22.1	30.1	38.4	48.2
Chronic conmplications	10.1	10.8	12.5	14.6	17.3

EXHIBIT 6.3 Number of hospital admissions for ambulatory care–sensitive conditions per 1,000 individuals with asthma, congestive heart failure, chronic obstructive pulmonary disease or diabetes



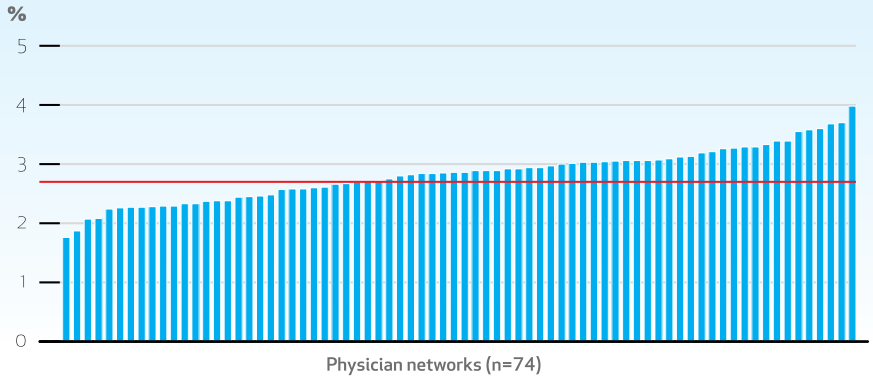






Indicator	Hospital admissions per 1,000				
	10th	25th	50th	75th	90th
Asthma	0.9	1.1	1.3	1.7	2.2
CHF	39.3	44.3	48.9	56.4	65.5
COPD	53.0	59.1	72.0	80.5	89.0
Diabetes	2.9	3.7	5.1	6.9	7.8

EXHIBIT 6.4 Percentage of individuals aged 65 and older hospitalized for a fall



Indicator	Percentage				
	10th	25th	50th	75th	90th
Older adults hospitalized for a fall	2.3	2.4	2.7	2.9	3.2

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Adverse Outcomes: Potentially Avoidable Readmissions and Emergency Department Visits

Hospital readmissions and emergency department (ED) visits within 30 days of hospitalization are frequent and costly and potentially avoidable with early follow-up care in the community.[1,2] The U.S. Centers for Medicare and Medicaid Services publicly report hospital-specific, risk-standardized, 30-day mortality and readmission rates for acute myocardial infarction (AMI) and congestive heart failure (CHF) and since 2012 have levied penalties against hospitals whose readmission rates for these conditions are deemed excessive.[3] Readmission rates for stroke and psychiatric conditions are also high and potentially avoidable[1,4-6] (also P. Kurdyak, unpublished data, 2015).

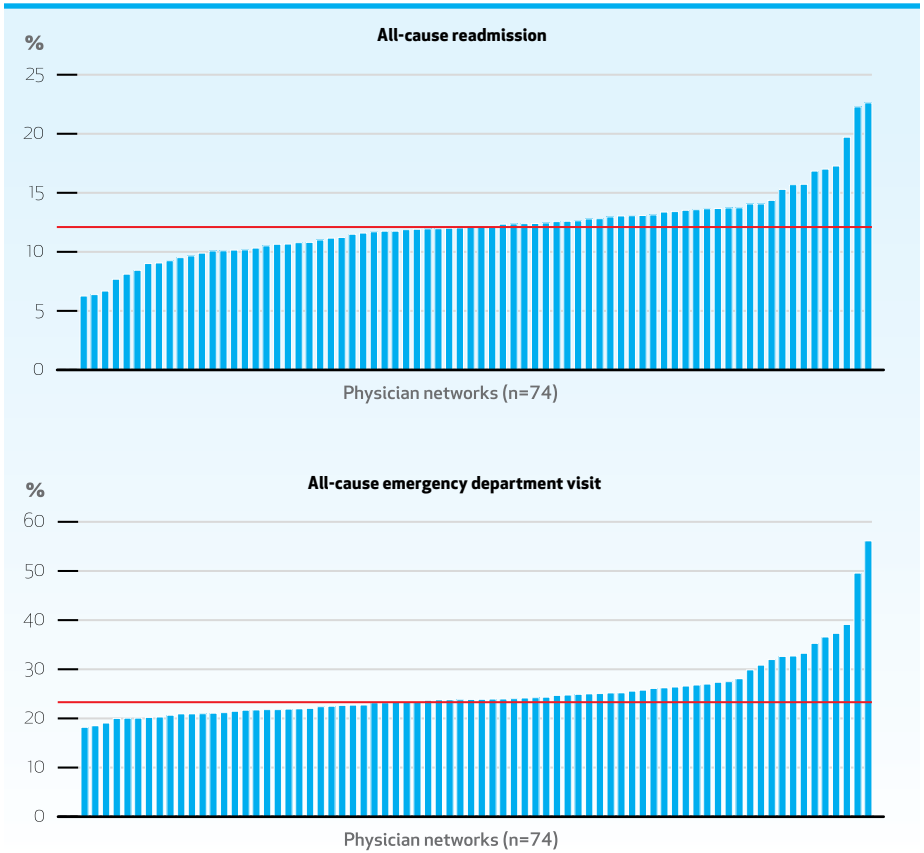
The indicators in this domain examine rates of unplanned all-cause inpatient readmissions or ED visits within 30 days after AMI, CHF, stroke or psychiatric discharge (schizophrenia, depression or bipolar disease). ED visit rates include those for patients who were readmitted. Among these conditions, median 30-day readmission and ED visit rates were highest after a CHF discharge and lowest after a stroke discharge.

Key Findings

- The readmission rate within 30 days after a CHF discharge was 19.8% (10th percentile = 16.2%, 90th percentile = 24.5%), followed by 12.9% after a psychiatric discharge (10th percentile = 11.0%, 90th percentile = 16.1%), 12.1% after an AMI discharge (10th percentile = 9.1%, 90th percentile = 14.1%) and 9.5% after a stroke discharge (10th percentile = 6.8%, 90th percentile = 11.7%). Moderate variability was observed across networks for these quality indicators.

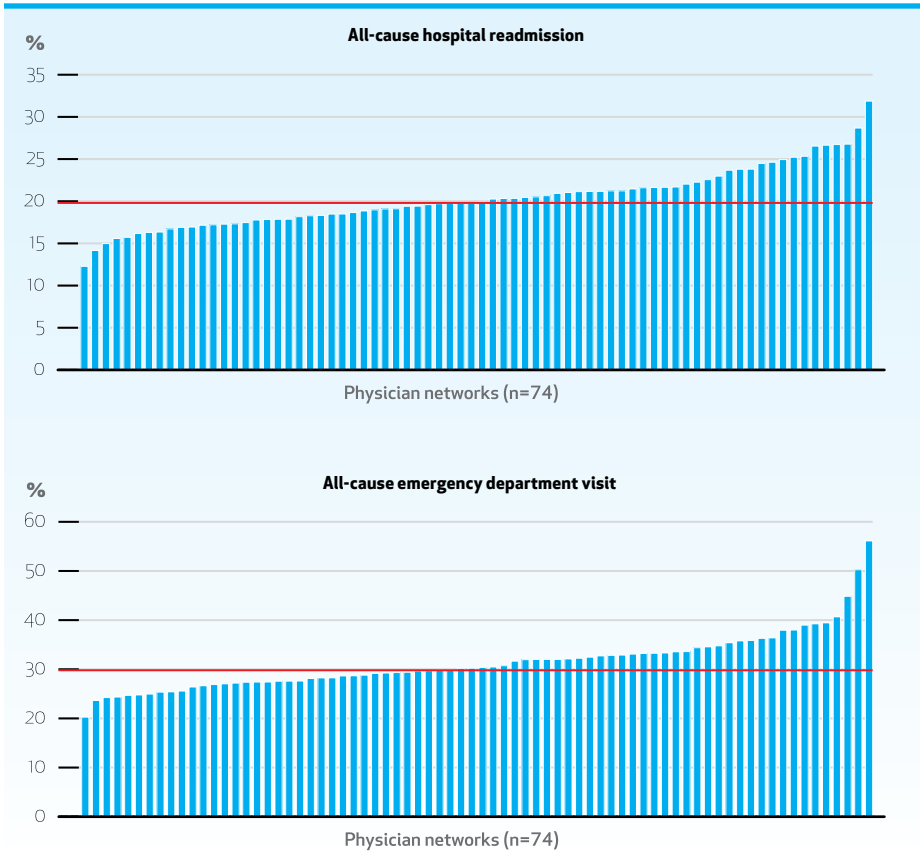
- The ED visit rate within 30 days of a hospitalization was 29.7% after a CHF discharge (10th percentile = 24.8%, 90th percentile = 35.9%), followed by AMI discharges (median = 23.3%, 10th percentile = 20.1%, 90th percentile = 29.9%), psychiatric discharges (median = 21.4%, 10th percentile = 18.0%, 90th percentile = 25.9%), and stroke discharges (median = 17.0%, 10th percentile = 13.7%, 90th percentile = 20.3%); moderate variability was observed across networks.

EXHIBIT 7.1 Percentage of hospital discharges among patients with acute myocardial infarction that were followed by an all-cause readmission or emergency department visit within 30 days



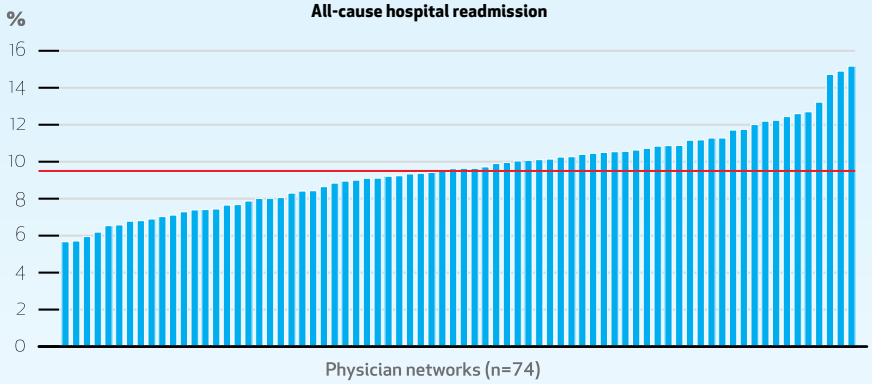
Indicator	Percentage of AMI discharges				
	10th	25th	50th	75th	90th
With all-cause readmission	9.1	10.6	12.1	13.1	14.1
With all-cause ED visit	20.1	21.4	23.3	25.1	29.9

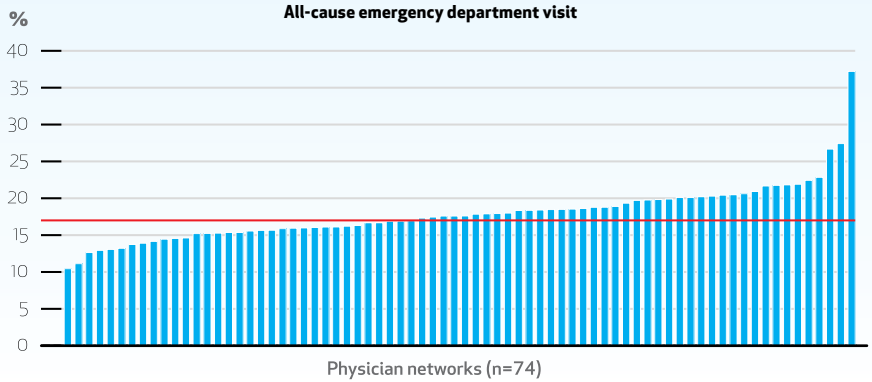
EXHIBIT 7.2 Percentage of hospital discharges among patients with congestive heart failure that were followed by an all-cause readmission or emergency department visit within 30 days



Indicator	Percentage of CHF discharges				
	10th	25th	50th	75th	90th
With all-cause readmission	16.2	17.8	19.8	21.6	24.5
With all-cause ED visit	24.8	27.4	29.7	33.1	35.9

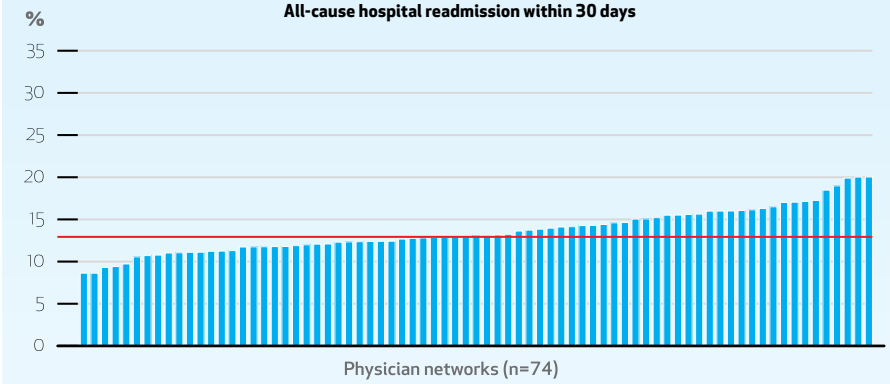
EXHIBIT 7.3 Percentage of hospital discharges among patients with stroke that were followed by an all-cause readmission or emergency department visit within 30 days

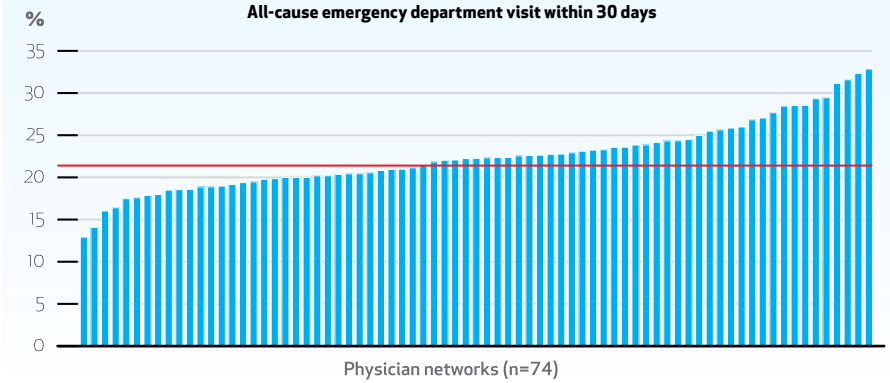




Indicator	Percentage of stroke discharges				
	10th	25th	50th	75th	90th
With all-cause readmission	6.8	8.0	9.5	10.6	11.7
With all-cause ED visit	13.7	15.4	17.0	18.5	20.3

EXHIBIT 7.4 Percentage of hospital discharges among patients with psychiatric conditions that were followed by an all-cause readmission or emergency department visit within 30 days





Indicator	Percentage of psychiatric discharges				
	10th	25th	50th	75th	90th
With all-cause readmission	11.0	11.8	12.9	14.6	16.1
With all-cause ED visit	18.0	19.5	21.4	23.6	25.9

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Imaging: Lower Back Scan

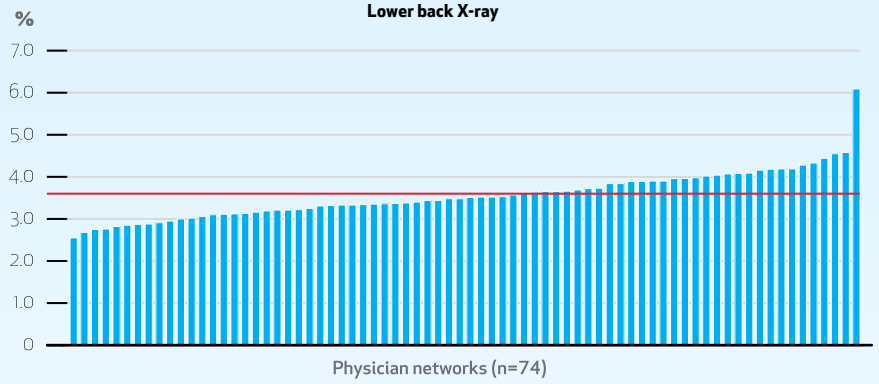
Although diagnostic testing is essential to help diagnose disease, some symptoms may not require imaging.[1] Lower back pain is highly prevalent in the adult population, but its underlying cause is often unknown.[2,3] The use of computed tomography (CT) scans and magnetic resonance imaging (MRI) to diagnose lower back pain has increased markedly over the years; however, these tests are often clinically unnecessary and costly, and can lead to potentially unwarranted medical interventions.[2,3] Research shows that individuals who received an X-ray, CT scan or MRI soon after reporting pain did not fare better and often did worse than those who took over-the-counter medication, stayed active or applied heat to the problem area.[1] Similarly, individuals who received an MRI within the first month of experiencing pain were more likely to get surgery; however, they did not recover faster from their pain.[1] These diagnostic tests can expose the individual to radiation, thereby increasing cancer risk.[1] The Ontario Choosing Wisely Guidelines Advisory Committee has suggested that diagnostic tests should not be taken in the absence of red-flag symptoms (fractures, infections or tumours) unless the symptoms persist for four to six weeks.[2,3]

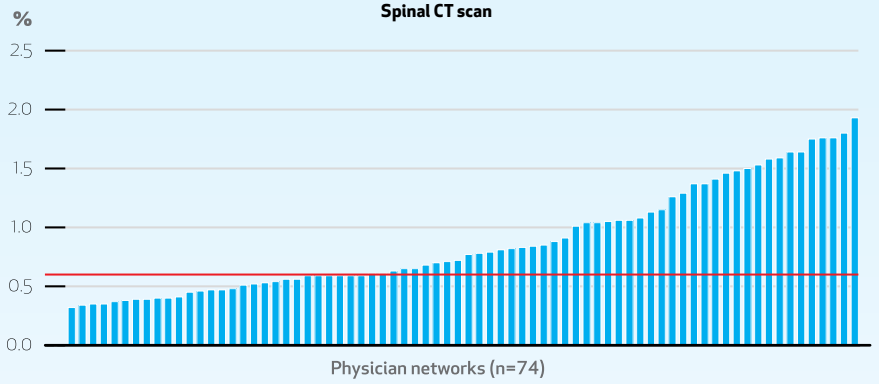
The indicators within this domain evaluate the percentage of adults aged 20 years and older who received lower back imaging (X-ray, CT and MRI). We report on CT and MRI scans to the spine ratherthan the lower back because Ontario billing codes do not permit this distinction. The data do not include the information required to exclude people for whom lower back imaging is appropriate; since there may be appropriate reasons for imaging, we would not expect these rates to fall to zero percent. It is therefore possible that differences in appropriate imaging rates across the networks also contribute to the inter-network variation. Some of the variation may be due to variations in the prevalence of back pain across networks. Rates were computed over a two-year period and annualized.

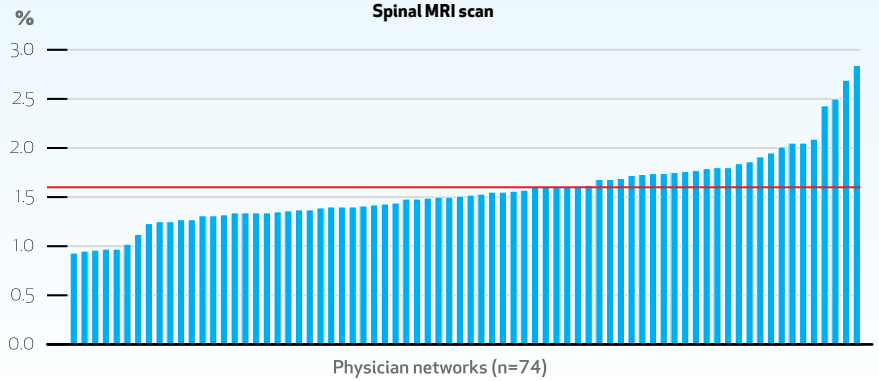
Key Findings

- The annualized percentage of adults who received at least one lower back X-ray was 3.6% (10th percentile = 3.0%, 90th percentile = 4.2%) and demonstrated moderate inter-network variability.
- Lower rates were observed for spinal MRIs (median, 1.6%) with moderate variation across networks.
- The lowest rates were observed for spinal CT scans (median = 0.6%, 10th percentile = 0.4%, 90th percentile = 1.4%), which exhibited high variability.

EXHIBIT 8.0 Annualized percentage of individuals who received at least one lower back X-ray, spinal CT scan or spinal MRI scan







Indicator	Percentage with lower back scan				
	10th	25th	50th	75th	90th
X-ray	3.0	3.2	3.6	4.0	4.2
CT scan	0.4	0.5	0.6	0.8	1.4
MRI scan	1.3	1.4	1.6	1.7	1.9

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Cancer End-of-Life Care

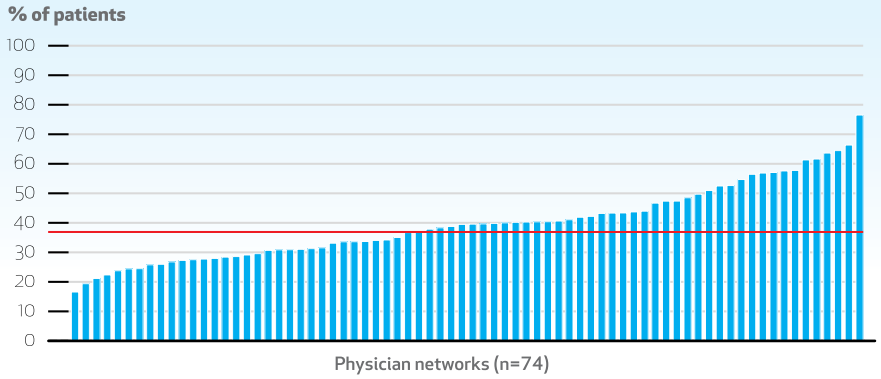
Cancer is one of the leading causes of death in Canada, and its incidence is expected to increase as a result of the aging population.[1] Many people prefer to die at home because acute care settings are not typically designed to provide supportive care for terminally ill patients.[2,3] Several studies have shown that palliative home care improves patient satisfaction, decreases use of acute care services and reduces in-hospital deaths, although there are situations where palliative care in a hospital or long-term care setting may be desirable.[4,5] With palliative home care, patients receive fewer or no life-prolonging services at the end of life such as intensive care unit (ICU) stays and provision of inpatient chemotherapy during the last two weeks of life — potentially aggressive treatments that may indicate overuse.[6] The availability and support of informal caregivers and the provision of integrated care as well as high-quality palliative and end-of-life care can help reduce avoidable hospital admissions and emergency department (ED) visits for cancer end-of-life patients.[6] Studies also suggest that physician home visits can reduce ED visits and hospital admissions.[2]

The indicators in this domain evaluate the percentage of individuals with cancer who had an ICU stay, one or more ED visits, any chemotherapy, or a physician house call during the last two weeks of life. The percentage of deaths in an acute care hospital ward outside the hospital's palliative care unit, and the percentage of individuals with cancer who received at least one home care visit in the last two weeks of life or palliative care in any setting during the last six months of life are also reported. The population studied includes adults with cancer, excluding those who had major cancer surgery within 30 days prior to death.

Key Findings

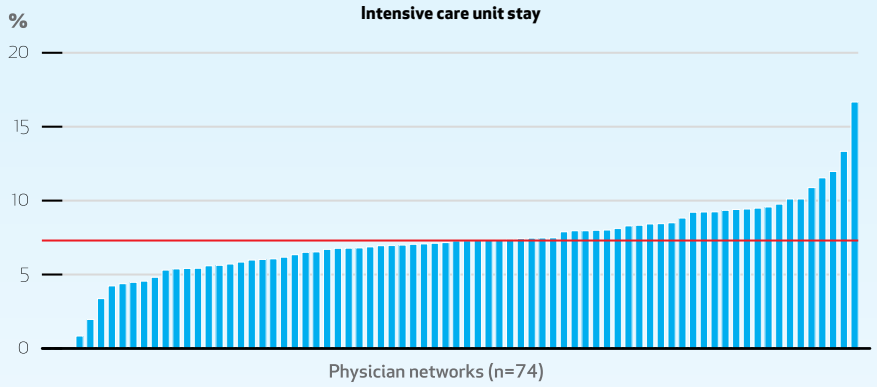
- Although many Ontarians prefer to die at home, many individuals with cancer spent at least part of their final two weeks in the hospital.
  - The percentage of cancer patients dying in an acute care hospital ward (other than the palliative care unit) was 36.9%. However, across networks there was a strikingly large variability in the percentage of patients dying in a hospital ward, ranging from 24.5% (the 10th percentile) to 52.6% (the 90th percentile).
  - A significant percentage of individuals with cancer had an ICU stay during their last two weeks of life (median = 7.3%) with high variability observed.
  - The percentage of individuals with cancer who received chemotherapy during the last two weeks of life was low (median = 3.0%) with high variability across networks.
  - Among individuals with cancer, 33.9% visited the ED during the last two weeks of life, with moderate variability across networks (10th percentile = 29.6%, 90th percentile = 41.8%).
- Many individuals with cancer received some form of home care near the end of their lives. This indicator, which includes physician house calls or other types of home care services received from any member of a multidisciplinary team, is considered to be a marker of high-quality cancer care.[7,8]
  - The percentage of individuals with cancer who received at least one home care visit during the last six months of life was consistently high (median = 78.7%).
  - The percentage of individuals with cancer receiving at least one visit for palliative care during the last six months of life was high (median = 61.9%), with moderate variation across networks (10th percentile = 43.5%, 90th percentile = 74.0%).
  - House calls to individuals with cancer within the last two weeks of life were less common (median = 21.8%), with high variability across networks.

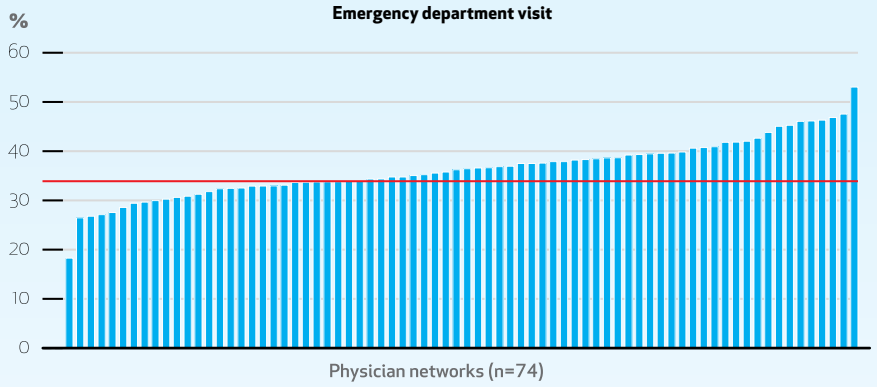
EXHIBIT 9.1 Percentage of patients with cancer who died in an acute care hospital, excluding those receiving palliative care

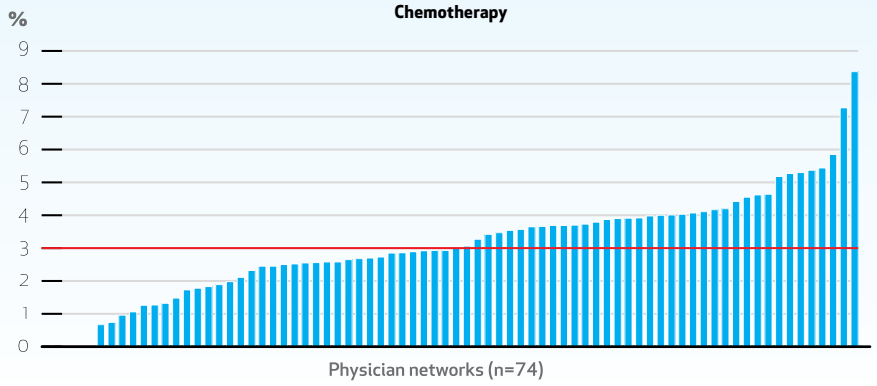


Indicator	Percentage of patients with cancer				
	10th	25th	50th	75th	90th
Died in hospital (excl. palliative care)	24.5	29.6	36.9	41.0	52.6

EXHIBIT 9.2 Percentage of individuals with cancer who had an intensive care unit stay, visited an emergency department or received chemotherapy in the last two weeks of life

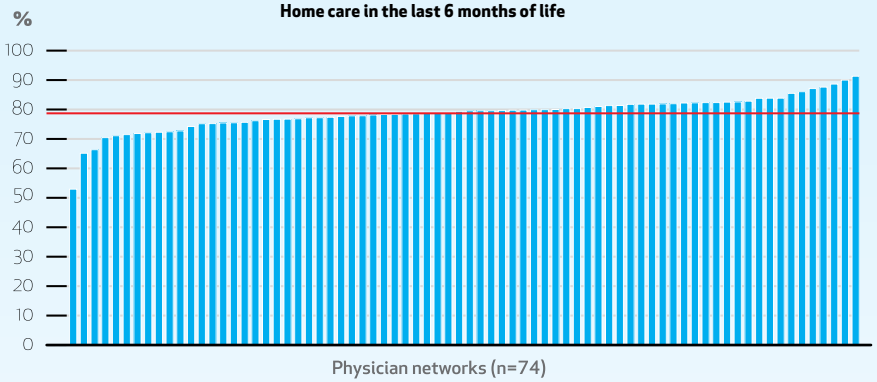


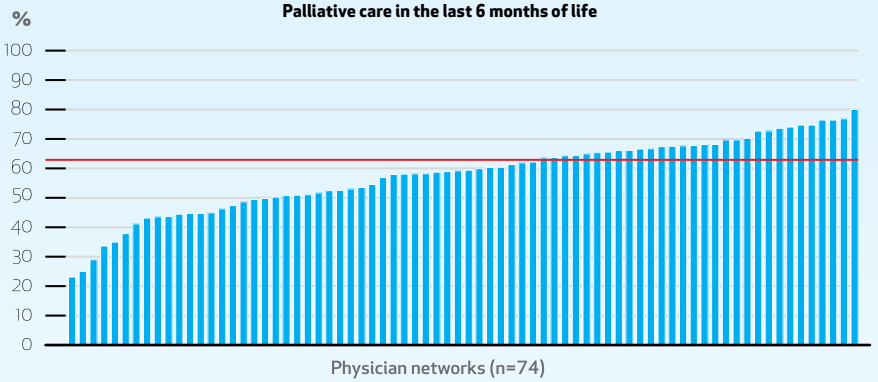


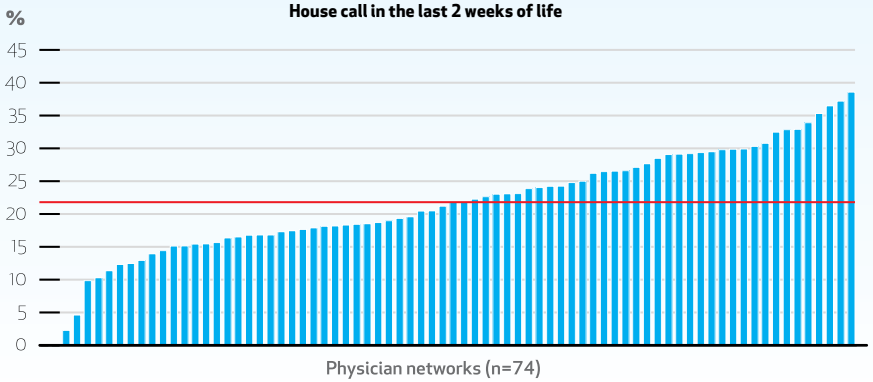


Indicator	Percentage of individuals with cancer				
	10th	25th	50th	75th	90th
ICU stay, last 2 weeks	5.4	6.2	7.3	8.1	9.5
ED visit, last 2 weeks	29.6	32.4	33.9	38.3	41.8
Chemotherapy, last 2 weeks	1.5	2.5	3.0	3.9	4.6

EXHIBIT 9.3 Percentage of individuals with cancer who received home care or palliative care in the last six months of life or a house call in the last two weeks of life







Indicator	Percentage of individuals with cancer				
	10th	25th	50th	75th	90th
Home care, last 6 months	72.4	76.7	78.7	81.8	83.8
Palliative care, last 6 months	43.5	50.3	61.9	66.7	74.0
House call, last 2 weeks	15.1	17.3	21.8	29.1	32.9

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Health Care Spending

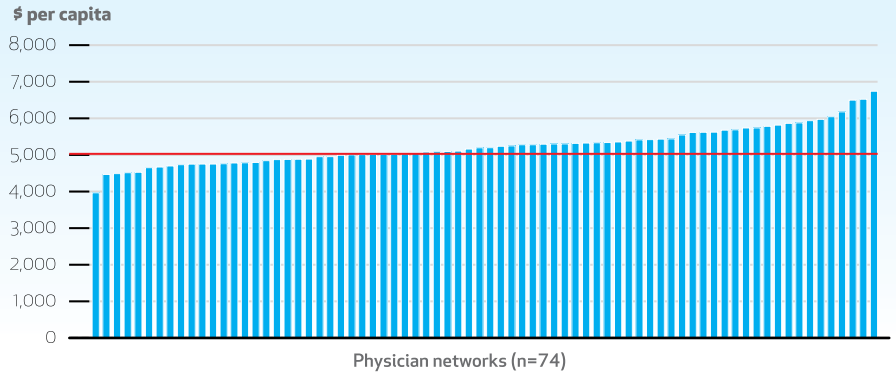
The Canadian health care system is costly with expenditures of approximately $207 billion in 2012, an average of $5,948 per person.[1] During 2013, provincial and territorial health expenditures were forecasted to account for 65.5% of total health expenditures in Canada with the remaining 34.5% spent by federal direct expenditures, municipal governments, social security funds and the private sector.[2] A 2010 Commonwealth Fund report showed that Canada ranked second-to-last in health care system quality and efficiency and last in timeliness of care.[3] Hospital, drug and physician services continue to account for the largest shares of health dollars.[1] Although the growth in health care spending is slowing, Canadians are concerned that the system is unsustainable but believe that it should be fixed by improving efficiency and accountability rather than by a simple injection of funds.[4] This requires substantial improvements in health care performance, quality and timely access to care.[5] Thus, the current system needs to be transformed into one that is integrated, patient-centred, addresses the needs of high-need patients, and focuses on chronic disease prevention and management.[6] Understanding high-cost, high-need patients is important as there may be opportunities to improve care and reduce overall spending.[7,8]

We report age- and sex-standardized per capita health care spending in Ontario for hospitals, physicians, home care, long-term care and medications. Some of the variation in costs may be due to variations in the prevalence of higher needs patients across networks. Dollar amounts reflect health care costs in 2011. We also report the variability in the percentage of individuals served by each network who are in the top 1%, 5% and 10% of provincial health care users by cost.

Key Findings

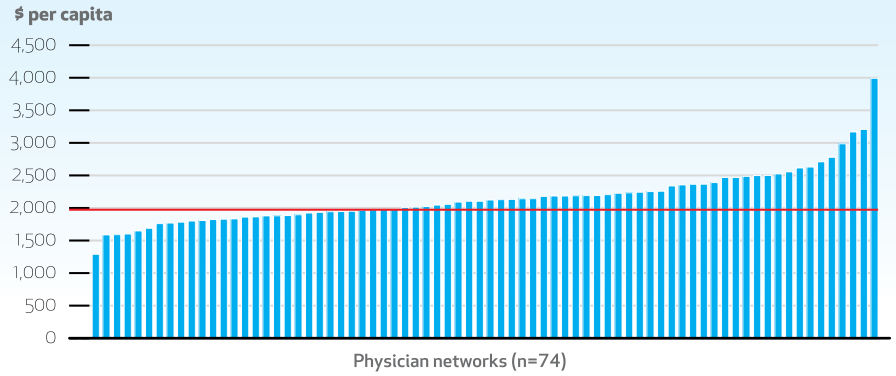
- The total age- and sex-standardized per capita health care spending for Ontario residents was $5,079, with moderate variation across networks (10th percentile = $4,515, 90th percentile = $5,739).
- Hospital costs accounted for the largest portion of total costs (median = $1,973, 10th percentile = $1,648, 90th percentile = $2,469).
- Per capita physician costs were $1,085 (10th percentile = $953, 90th percentile = $1,226) of which $407 was for primary care physicians (10th percentile = $317, 90th percentile = $479) and $694 for specialists (10th percentile = $579, 90th percentile = $793).
- Age-standardized per capita home care costs were $282 (10th percentile = $229, 90th percentile = $337) and age-standardized long-term care costs were $499 (10th percentile = $374, 90th percentile = $572).
- Prescription drug costs covered by the Ontario Drug Benefit Program were $639 per capita (10th percentile = $525, 90th percentile = $737) among adults aged 65 and older.
- The percentage of network residents in the top 1%, 5% and 10% of provincial health care users by cost varied moderately across networks, meaning that some networks had a higher or lower share of high-cost patients.

EXHIBIT 10.1 Age- and sex-standardized per capita total health care costs



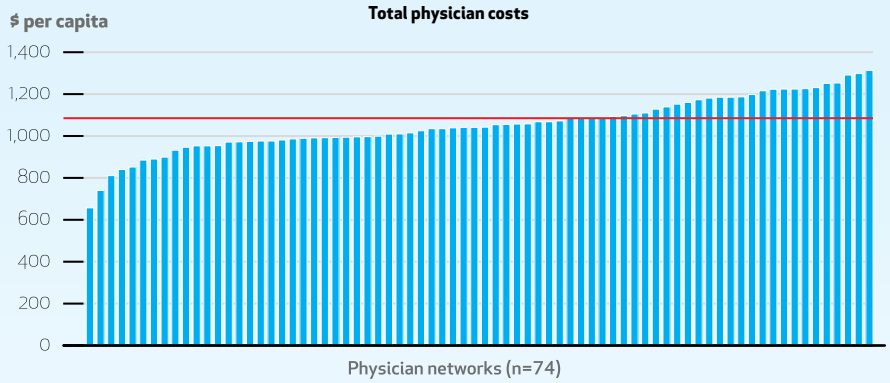
Indicator	$ per capita				
	10th	25th	50th	75th	90th
Total health care costs	4,515	4,760	5,079	5,355	5,739

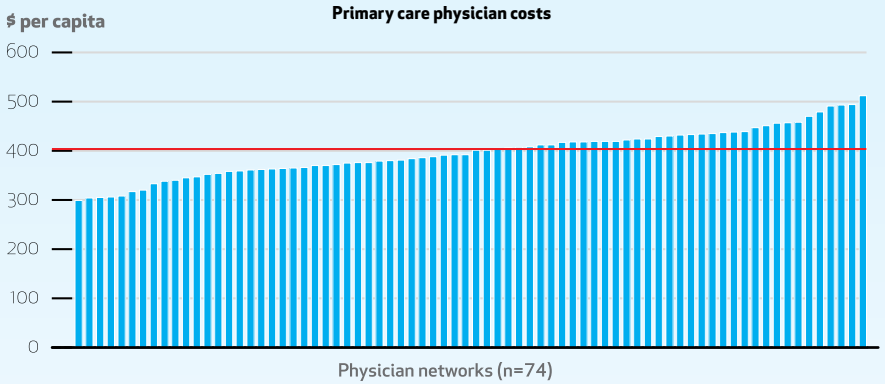
EXHIBIT 10.2 Age- and sex-standardized per capita hospital costs

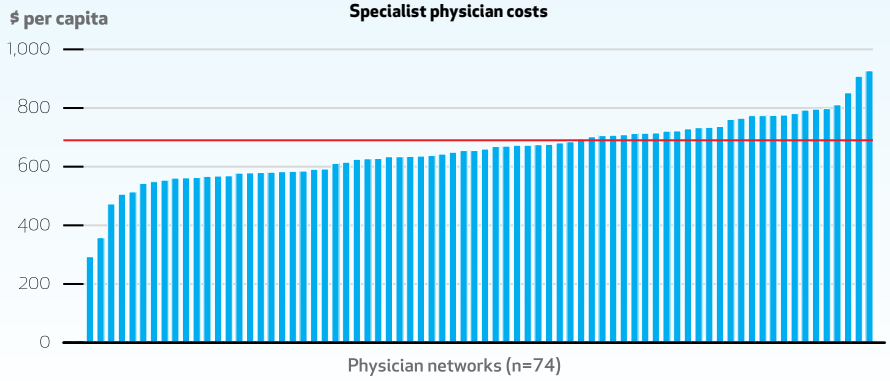


Indicator	$ per capita				
	10th	25th	50th	75th	90th
Hospital costs	1,648	1,800	1,973	2,188	2,469

EXHIBIT 10.3 Age- and sex-standardized per capita total physician costs, primary care physician costs and specialist physician costs

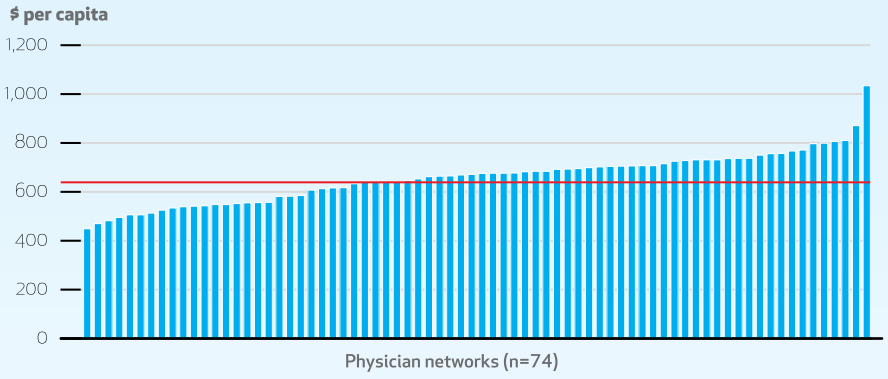






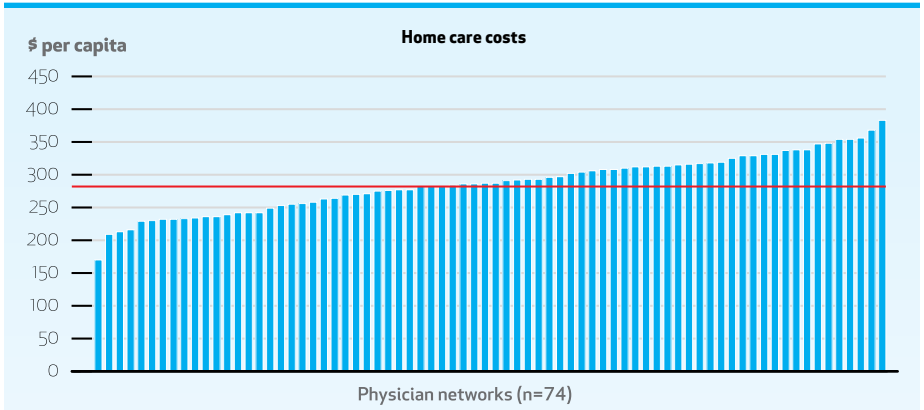
Indicator	$ per capita				
	10th	25th	50th	75th	90th
Total physician costs	953	1,025	1,085	1,185	1,226
Primary care costs	317	370	407	433	479
Specialist costs	579	635	694	761	793

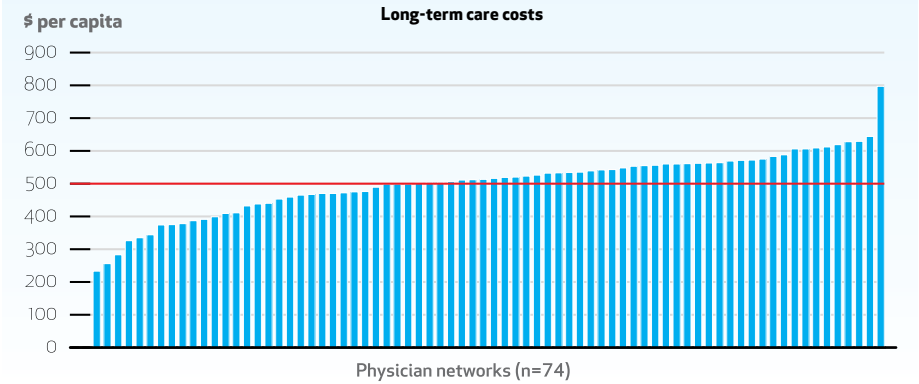
EXHIBIT 10.4 Age- and sex-standardized per capita drug costs for adults aged 65 and older using the Ontario Drug Benefit Plan



Indicator	$ per capita				
	10th	25th	50th	75th	90th
Drug costs	525	548	639	704	737

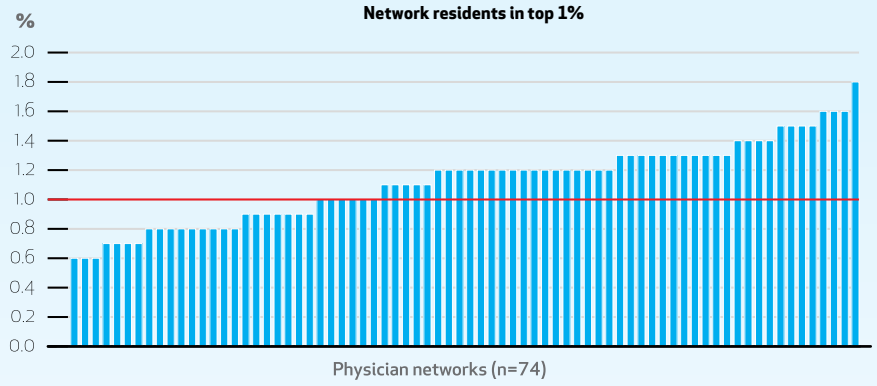
EXHIBIT 10.5 Age- and sex-standardized per capita home care costs and long-term care costs

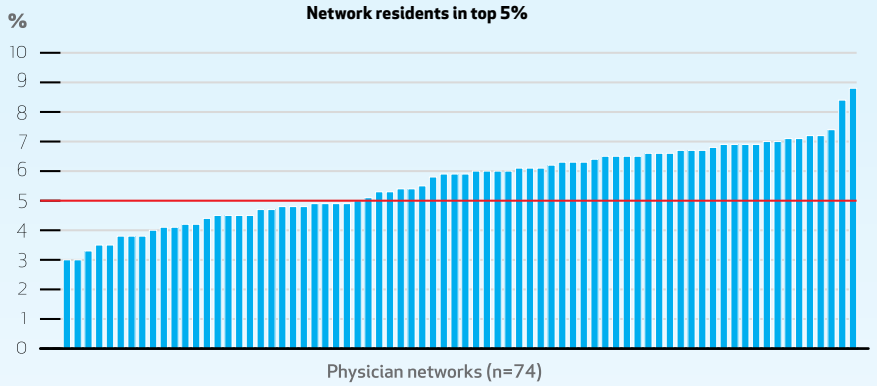


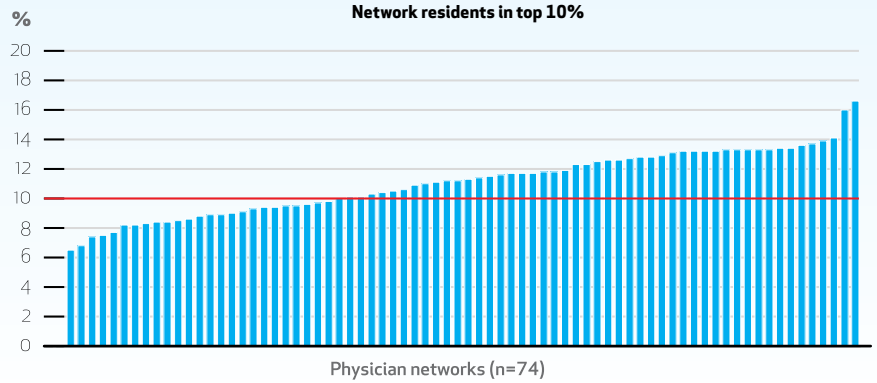


Indicator	$ per capita				
	10th	25th	50th	75th	90th
Home care costs	229	242	282	308	337
Long-term care costs	374	409	499	539	572

EXHIBIT 10.6 Percentage of network residents in the top 1%, 5% and 10% of provincial health care costs







Indicator	Percentage of network residents				
	10th	25th	50th	75th	90th
Top 1%	0.7	0.8	1.0	1.2	1.3
Top 5%	3.5	4.1	5.0	6.0	6.7
Top 10%	7.5	8.5	10.0	11.6	13.2

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Overview of Findings

Screening and Prevention

- Between 60% and 70% of adults were up-to-date with mammography and cervical and colorectal cancer screening. Most diabetes patients received cholesterol tests, but less than half received recommended HbA1c tests or optimal care, defined as all three screening tests in a timely fashion. There was little variability in these screening rates across physician networks. Most women received a bone mineral density test within a 10-year period, but very few women or men received the test after a fracture.

Evidence-Based Medications

- Rates of prescriptions for evidence-based medications following hospital discharge were uniformly good to excellent for all conditions examined, with little variation across physician networks.
- Most patients treated for acute myocardial infarction (AMI), congestive heart failure (CHF) or stroke filled at least one prescription for recommended medications within 90 days after hospitalization, with minimal variability across networks. Most patients with diabetes filled at least one prescription for recommended medications in a one-year period, with little variability across networks.

Drug Safety

- Over one in three adults with dementia aged 65 and older and living in a long-term care facility received an antipsychotic medication. Among those without dementia over one in 10 received these medications. Prescription rates for

potentially avoidable medications were fairly high (13%) across physician networks.

Hospital–Community Transitions

- Approximately half of adults discharged from hospital with a diagnosis of AMI or CHF and one-third of those with a psychiatric diagnosis had a follow-up office visit with a physician within seven days. The percentages of adults with a follow-up visit within 30 days with a primary care physician and a relevant specialist were much lower. Follow-up rates for children hospitalized for asthma or with a high-acuity emergency department visit for asthma were similar to those for adults. The seven-day follow-up rate for newborns leaving hospital was high, albeit with moderate inter-network variability.

Adverse Outcomes: Potentially Avoidable Admissions and Readmissions

- The highest rates of hospitalization for a chronic condition were for COPD and CHF.
- The 30-day readmission rate for CHF was 20%; for psychiatric conditions, 13%; and for AMI and stroke, about 11%; with moderate variability across physician networks.

Imaging: Lower Back Scan

- The annualized percentage of adults receiving a lower back scan by X-ray was 3.6%; by spinal MRI, 1.6%; and by spinal CT, 0.6%; with moderate to high variation across physician networks.

Cancer End-of-Life Care

- Most people prefer to die at home, yet about 37% of cancer patients died in a hospital (in other than a palliative care unit); there was large variability across physician networks.
- One-third of these cancer patients had at least one visit to an emergency department in the last two weeks of life.
- Variation in rates of end-of-life chemotherapy was high; there was also substantial variation in end-of-life ICU stays and emergency department visits.
- On the positive side, provision of end-of-life home care to cancer patients in the last six months of life was high, with little variation across networks. Rates of palliative care, whether in the hospital or at home, were moderate but highly variable.

Health Care Spending

- There was moderate variation in overall per capita total costs among the networks, but the variation in total costs masks the somewhat larger variations in sector-specific costs. Hospital costs accounted for the largest portion of total costs.

Discussion

In this report, we describe a comprehensive set of quality indicators that assess the performance of physician networks across multiple domains of care. These networks reflect health care delivery across diverse settings of care including primary and specialty care, acute care and long-term care, as well as shared care and transitions across these settings.

Quality measures are used for a number of different purposes including quality improvement, public reporting, accountability and the promotion of equity. They can assess underuse, overuse and misuse of services. Examples include assessment of underuse of bone density testing among at-risk individuals with fractures, potential overuse of imaging for low back pain, and potential misuse of antipsychotic medications in long-term care settings. As each of the indicators is modifiable, our findings can inform priority setting for quality improvement activities as well as efforts for health system redesign to support delivery of high-quality, high-value care.

No one network demonstrated strong performance on all indicators. While we identified areas where the system is performing well, we also recognized opportunities for intervention and improvement. We found important variations in performance across networks, providing information that can be used for benchmarking and opportunities to learn from high performers and target support to lower performing networks.

In moving to patient-centred care and population health, provider feedback needs to be targeted at the appropriate locus of accountability that reflects the multiple settings where people receive most of their care as well as the strength of integration and coordination of care across these settings. These measures assessed at the level of the physician networks provide essential information needed to guide health system transformation. Performance reporting targeted at physician networks fosters communication around shared patients. While these networks are virtual, they correspond well to how patients seek care (see **Appendices D and E**). In the absence of population information for the Health Links or the proposed smaller within-LHIN subregions to be identified as the focal point for local planning and service management and delivery,[1] we have used the networks as the logical, functional and organizational structure for chronic disease care as they comprise

large physician groups that actually work together to manage these patients, and are therefore more conducive to evaluation, system interventions and physician accountability frameworks. The *Patients First* discussion paper notes that primary care should act as a patient's "medical home" and that existing relationships between patients and their care providers would continue. The physician networks described in this paper are a close approximation to the populations envisioned for these smaller subregions as they reflect existing doctor-patient relationships. That makes these networks an ideal basis for measurement, quality improvement and accountability in the approach described in *Patients First*.

Primary care is central to achieving the Triple Aim of improving the patient experience of care (including quality and satisfaction), improving the health of populations, and reducing the cost of health care. In Ontario, the Ministry of Health and Long-Term Care has made a large investment in primary care reform aimed at meeting these objectives. Primary care physicians provide patient-centred care that includes prevention, chronic disease management and treatment of acute illnesses. When speciality care is needed, shared or collaborative care models with primary care have been effective in improving outcomes. Primary care practices are also responsible for integrating and coordinating care across other health care settings and are increasingly being tasked to link to social and community services and public health agencies. Many of the indicators in this report reflect these different aspects of primary care.

The findings for primary care indicators were mixed but mostly positive. Most adults routinely receive recommended cancer screening and preventive care. Nevertheless, there is room for improvement, and the variation across networks, though modest, is meaningful, indicating that not all Ontarians are benefiting from recommended screening services. Adults with diabetes received less than optimal care to manage their condition, primarily due to low rates of routine HbA1c monitoring. Rates of bone mineral density testing after fragility fractures were also very low. In contrast, rates of prescribing of evidence-based medications after hospitalization for a serious cardiac illness were uniformly excellent across networks.

There were large variations in hospital admission rates across networks for ambulatory care–sensitive conditions, asthma, diabetes, chronic obstructive pulmonary disease and heart failure. These hospitalizations are potentially avoidable with improved chronic disease management in the outpatient setting as well as through primary prevention.

Half of patients hospitalized for a serious cardiac condition and a third of those with a psychiatric admission were seen by a primary care physician or relevant specialist within seven days of discharge. Many fewer patients, however, were seen by both a primary care physician and a specialist within 30 days of discharge. Post-discharge readmissions and emergency department visits point to possible problems with discharge planning and to suboptimal care coordination across settings. The wide variation in these rates indicates there is potential for improvement through interventions aimed at implementing integrated models of care for chronic conditions and their risk factors.

Some medications, while safe and effective for some patients, pose a risk to others, especially the elderly. We found high rates of potentially inappropriate and harmful antipsychotic drug use among long-term care residents, particularly those with a diagnosis of dementia. We also found high rates of prescriptions for medications that should be avoided among individuals in the community with chronic conditions that placed them at increased risk for harmful side effects and drug-disease interactions. Evidence of the harms and overuse of these medications in these circumstances has been known for some time, indicating the need for targeted interventions to improve medication management among older adults in the community and in long-term care.

Imaging rates for low back pain were relatively low on an annual basis, but cumulative levels over 5 to 10 years could be high because low back pain is often a recurring condition. The moderate variability seen for this measure suggests that attention to networks with higher rates may be warranted.

At the end of life, many cancer patients receive home care, which is an important component of supportive care. However, receipt of palliative care was variable, and receipt of chemotherapy or an ICU stay in the last two weeks of life was relatively high. Responsibility for end-of-life care for cancer patients is shared among many health care providers, including primary care physicians and oncologists, in outpatient, inpatient and home care settings. The high variability for palliative care and physician house calls suggests that better organized end-of-life care is needed, and this has been recognized and targeted for improvement by Cancer Care Ontario.

Limitations of this study include lack of risk adjustment, beyond patient age and sex, for hospitalization and readmission rates since some

networks may have sicker patients. Health administrative data, created for billing purposes, do not have the rich clinical information required to further refine the indicators. These analyses are cross-sectional, so they do not capture trajectories in performance over time nor can they be used to establish causal relationships. Administrative data do not reflect the patient experience of care — a key component of the Triple Aim — indicating that additional patient-generated data sources are necessary to inform health planning, performance measurement, quality improvement and accountability. While we examined variation across networks, we did not examine variation within networks. Therefore, we do not assess differences in performance or health inequities for different populations within a network, another important target for improvement.

Improved performance on these indicators would lead to improved patient outcomes and a reduction in avoidable mortality; it would also increase the efficiency of services provided and be potentially cost saving. These indicators could be tied to accountability agreements or financial incentives. Importantly, networks could use these indicators to set priorities, design and target improvement interventions, and monitor progress.

Reference

1. *Patients First: A Proposal To Strengthen Patient-Centred Health Care In Ontario*. December 17, 2015. [Toronto]: Ontario Ministry of Health and Long-Term Care; 2015. Accessed February 21, 2016 at: **http://www.health.gov.on.ca/en/news/bulletin/2015/docs/discussion_paper_20151217.pdf**.

Conclusion

Ontario physician networks, which reflect local, informal relationships between doctors, patients and hospitals, are ideally suited for performance measurement as they identify the locus of care for most patients. They are small enough to consider local conditions and identify variation across the province and large enough for stable measurement, making them ideal units of intervention to improve care. A distinct advantage of the physician networks is that they are not restricted by LHIN or municipal boundaries. Therefore, they capture the substantial flow of patients across geographic boundaries, as is seen within large urban centres such as the Greater Toronto Area. Because the networks use existing doctor-patient relationships, they are an excellent starting point for identifying population denominators for the smaller subregions envisioned in *Patients First*.[1] In our report, Ontario physician networks have been used to identify key areas for health system improvement, and they can also be used to determine if interventions have improved health care and health outcomes.

Reference

1. *Patients First: A Proposal To Strengthen Patient-Centred Health Care In Ontario*. December 17, 2015. [Toronto]: Ontario Ministry of Health and Long-Term Care; 2015. Accessed February 21, 2016 at: **http://www.health.gov.on.ca/en/news/bulletin/2015/docs/discussion_paper_20151217.pdf**.

Appendices

APPENDIX A Quality Indicators by Definition and Source of Clinical Guideline

Quality Indicator*	Source
Screening and Prevention	
Stroke: Percentage of patients hospitalized for stroke between April 1, 2010, and December 31, 2011, who received at least one home care visit within 30 days after discharge from their stroke episode of care	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf. *Access to Stroke Care: The Critical First Hours.* 2015 Stroke Report. [Ottawa]: Heart and Stroke Foundation; 2015. Accessed July 6, 2015 at http://www.heartandstroke.com/atf/cf/%7B99452d8b-e7f1-4bd6-a57d-b136ce6c95bf%7D/HSF_2015_STROKE_REPORT_FINAL.PDF.
Diabetes: Of individuals assigned to a physician with an average number of laboratory claims per patient of seven or more, the percentage who had: (a) at least one eye examination in a two-year period (b) at least one set of cholesterol tests in a two-year period (c) at least three HbA1c tests within a two-year period (d) all three tests within a two-year period	Canadians Diabetes Association Clinical Practice Guidelines: • Retinopathy. *Can J Diabetes.* 2013; 37(2013):S137–S141. Accessed July 6, 2015 at http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00039-7/pdf. • Monitoring glycemic control. *Can J Diabetes.* 2013; 37(2013):S35–S39. Accessed July 6, 2015 at http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00018-X/pdf. • Dyslipidemia. *Can J Diabetes.* 2013; 37(2013):S110–S116. Accessed July 6, 2015 at http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00033-6/pdf. Nicolucci A, Greenfield S, Mattke S. Selecting indicators for the quality of diabetes care at the health systems level in OECD countries. *Int J Qual Health Care.* 2006; 18 (Suppl 1): 26–30.
Screening: Percentage of eligible women who received a mammogram	Cancer Care Ontario. Screening Guidelines and Program Eligibility – Breast Cancer. Accessed December 23, 2015 at https://www.cancercare.on.ca/pcs/screening/breastscreening/breasthealth/.
Screening: Percentage of eligible individuals who were up-to-date in colorectal cancer screening	Cancer Care Ontario. Colorectal Cancer Screening. Accessed May 6, 2014 at https://www.cancercare.on.ca/pcs/screening/coloscreening/?WT.mc_id=/colorectalscreening. Krzyzanowska MK, Barbera L, Elit L, Kwon J, Lofters A, Saskin R, et al. Cancer. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence Based Report,* Vol. 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2009. Accessed April 24, 2015 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter4-Cancer.pdf.
Screening: Percentage of eligible women who were up-to-date in cervical cancer screening	Cancer Care Ontario. Cervical Cancer Screening. Accessed May 6, 2014 at https://www.cancercare.on.ca/cms/one.aspx?objectId=9528&contextId=1377.
Screening: Percentage of eligible individuals aged 65 who had a bone mineral density test	LeMessurier J, O'Donnell S, Walsh P, McRae L, Bancej C; Osteoporosis Surveillance Expert Working Group. The development of national indicators for the surveillance of osteoporosis in Canada. *Chron Dis Inj Can.* 2012; 32(2):101–07. Accessed December 23, 2015 at http://www.phac-aspc.gc.ca/publicat/hpcdp-pspmc/32-2/ar-06-eng.php. Hawker GA, Badley EM, Jaglal S, Dunn S, Croxford R, Ko B, et al. Musculoskeletal conditions. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report,* Vol. 2. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2010. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter8-MusculoskeletalConditions.pdf.
Percentage of individuals aged 66 and older who received a bone mineral density test within one year after a fracture	LeMessurier J, O'Donnell S, Walsh P, McRae L, Bancej C; Osteoporosis Surveillance Expert Working Group. The development of national indicators for the surveillance of osteoporosis in Canada. *Chron Dis Inj Can.* 2012; 32(2):101–07. Accessed December 23, 2015 at http://www.phac-aspc.gc.ca/publicat/hpcdp-pspmc/32-2/ar-06-eng.php. Hawker GA, Badley EM, Jaglal S, Dunn S, Croxford R, Ko B, et al. Musculoskeletal conditions. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report,* Vol. 2. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2010. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter8-MusculoskeletalConditions.pdf.

Quality Indicator*	Source
Evidence-Based Medications	
AMI: Percentage of patients hospitalized for AMI who filled a prescription for recommended medications within 90 days after discharge	Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Acute Myocardial Infarction (AMI) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSAMIabridged.aspx. Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
CHF: Percentage of patients hospitalized for CHF who filled a prescription for recommended medications within 90 days after discharge	Ontario Guidelines Advisory Committee. Summary of Recommended Guideline. CHF: Standard Drug Therapy Reference # 217. Toronto: Ontario Guidelines Advisory Committee; May 2007. Accessed April 24, 2014 at http://www.gacguidelines.ca/site/GAC_Guidelines/assets/pdf/CHF07_Standard_Drug_Therapy_Summary.pdf. Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Congestive Heart Failure (CHF) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSCHFabridged.aspx. Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Stroke: Percentage of patients hospitalized for stroke between April 1, 2010, and December 31, 2011, who filled a prescription for recommended medications within 90 days after discharge	*Access to Stroke Care: The Critical First Hours. The Heart and Stroke Foundation 2015 Stroke Report*. Toronto: Heart and Stroke Foundation; 2015. Accessed May 6, 2015 at http://www.heartandstroke.com/atf/cf/%7B99452d8b-e7f1-4bd6-a57d-b136ce6c95bf%7D/HSF-2015-STROKE%20REPORT_FINAL.PDF.
Diabetes: Percentage of individuals with diabetes who filled a prescription for recommended medications in a one-year period	*ACE inhibitors, ARBs and statins:* Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Vascular protection in people with diabetes. *Can J Diabetes*. 37(2013):S100–04. Accessed April 24, 2014 at http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00031-2/pdf. *Antihypertensives:* Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Treatment of hypertension. *Can J Diabetes*. 37(2013):S117–18. Accessed April 24, 2014 at http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00034-8/pdf. Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Drug Safety	
Drug safety: Percentage of individuals in long-term care who received a prescription for an antipsychotic in a one-year period	Rochon PA, Stukel TA, Bronskill SE, Gomes T, Sykora K, Wodchis P. Variation in nursing home antipsychotic prescribing rates. *Arch Intern Med*. 2007; 167(7):676–83. Accessed December 23, 2015 at http://archinte.jamanetwork.com/article.aspx?articleid=412144.
Drug safety: Rate of prescribing medications contraindicated for specified conditions	National Quality Measures Clearinghouse. Potentially harmful drug-disease interactions in the elderly: percentage of Medicare members 65 years of age and older who have evidence of an underlying disease, condition or health concern and who were dispensed an ambulatory prescription for a potentially harmful medication, concurrent with or after the diagnosis. Accessed December 15, 2015 at http://www.qualitymeasures.ahrq.gov/content.aspx?id=48654. Pugh MJ, Starner CI, Amuan ME, Berlowitz DR, Horton M, Marcum ZA, et al. Exposure to potentially harmful drug-disease interactions in older community-dwelling veterans based on the Healthcare Effectiveness Data and Information Set quality measure: who is at risk? *J Am Geriatr Soc*. 2011; 59(9):1673–78. Accessed April 24, 2014 at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3390785/. Munson JC, Morden NE, Goodman DC, Valle LF, Wennberg JE. *The Dartmouth Atlas of Medicare Prescription Drug Use*. Lebanon, NH: The Dartmouth Institute for Health Policy and Clinical Practice; 2013. Accessed April 24, 2015 at http://www.dartmouthatlas.org/downloads/reports/Prescription_Drug_Atlas_101513.pdf.

Quality Indicator*	Source
Hospital-Community Transitions	
AMI: Percentage of patients hospitalized for AMI who had an office visit within seven days after discharge and who had shared care within 30 days after discharge	Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Acute Myocardial Infarction (AMI) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSAMIabridged.aspx.
CHF: Percentage of patients hospitalized for CHF who had an office visit within seven days after discharge, and who had shared care within 30 days after discharge	Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Congestive Heart Failure (CHF) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSCHFabridged.aspx.
Mental health: Percentage of patients hospitalized for serious mental health reasons who had an office visit within seven days after discharge, and who had shared care within 30 days after discharge	Hermann RC, Mattke S, Somekh D, Silfverhielm H, Goldner E, Glover G, et al. Quality indicators for international benchmarking of mental health care. *Int J Qual Health Care*. 2006; 18(Suppl 1):31–38. Lin E, Diaz-Granados N, Stewart DE, Rhodes AE, Yeritsyan N, Johns A, et al. Depression. In: Bierman AS, editor. Project for an *Ontario Women's Health Evidence-Based Report,* Vol. 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2009. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter5-Depression.pdf. Brien S, Grenier L, Kapral ME, Kurdyak P, Vigod S. *Taking Stock: A Report on the Quality of Mental Health and Addictions Services in Ontario.* Toronto: Health Quality Ontario and the Institute for Clinical Evaluative Sciences; 2015. Accessed December 23, 2015 at http://www.hqontario.ca/Portals/0/Documents/pr/theme-report-taking-stock-en.pdf. Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Newborns: Percentage of newborns who had a follow-up visit with a comprehensive care physician or pediatrician within seven days after discharge	Guttmann A, Shipman SA, Lam K, Goodman DC, Stukel TA. Primary care physician supply and children's health care use, access, and outcomes: findings from Canada. *Pediatrics*. 2010; 125(6):1119–26. Accessed April 24, 2014 at http://pediatrics.aappublications.org/content/125/6/1119.full.pdf. Health Quality Ontario. *Quality Monitor 2011*. Toronto: Queen's Printer for Ontario; 2011. Accessed December 23, 2015 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2011-en.pdf.
Asthma, pediatric: Percentage of children with a high-triage ED visit for asthma who had an office visit within seven days of leaving the ED	Li P, To T, Guttmann A. Follow-up care after an emergency department visit for asthma and subsequent healthcare utilization in a universal-access healthcare system. *J Pediatrics*. 2012; 161(2):208–13.e1.
Asthma, pediatric: Percentage of children hospitalized for asthma who had an office visit within seven days after discharge	Li P, To T, Guttmann A. Follow-up care after an emergency department visit for asthma and subsequent healthcare utilization in a universal-access healthcare system. *J Pediatrics*. 2012; 161(2):208–13.e1.
Multiple conditions: Percentage of patients hospitalized for COPD, diabetes, asthma, pneumonia or unstable angina (only asthma or pneumonia for children) who had an office visit within seven days after discharge and who had shared care within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Multiple conditions: Percentage of patients with a high-triage ED visit for atrial fibrillation, angina, CHF or asthma who had an office visit within seven days after leaving the ED and who had shared care within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.

Quality Indicator*	Source
Potentially Avoidable Admissions and ED Visits	
Falls: Annualized number of falls requiring hospitalization among older adults	Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of illness. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report,* Vol. 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2009. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2013/01/Chapter3-BurdenofIllness.pdf.
Diabetes: Percentage of people with diabetes who were hospitalized due to an acute complication of diabetes, annualized	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Diabetes: Percentage of people with diabetes who had a serious complication (hospitalization for a chronic condition or death), annualized	Health Quality Ontario. *Quality in Primary Care: Setting a Foundation for Monitoring and Reporting in Ontario*. Toronto: Queen's Printer for Ontario; 2015. Accessed November 30, 2015 at http://www.hqontario.ca/Portals/0/Documents/pr/theme-report-quality-in-primary-care-en.pdf.
Diabetes: Annualized number of ED visits due to complications of diabetes	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Ambulatory care–sensitive conditions: Annualized number of hospital admissions due to each of asthma, COPD, diabetes or heart failure	Marshall M, Klazina N, Leatherman S, Hardy C, Bergmann E, Pisco L, et al. OECD Health Care Quality Indicator Project. The expert panel on primary care prevention and health promotion. *Int J Qual Health Care.* 2006; 18(Suppl 1):21–25. Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Potentially Avoidable Readmissions and ED Visits	
Mental health: Percentage of patients hospitalized for serious mental health reasons who were readmitted for any reason within 30 days after discharge	Hermann RC, Mattke S, Somekh D, Silfverhielm H, Goldner E, Glover G, et al. Quality indicators for international benchmarking of mental health care. *Int J Qual Health Care.* 2006; 18(Suppl 1):31–38. Lin E, Diaz-Granados N, Stewart DE, Rhodes AE, Yeritsyan N, Johns A, et al. Depression. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report.* Vol. 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2009. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter5-Depression.pdf.
Mental health: Percentage of patients hospitalized for serious mental health reasons who visited an ED for any reason within 30 days after discharge	Brien S, Grenier L, Kapral ME, Kurdyak P, Vigod S. *Taking Stock: A Report on the Quality of Mental Health and Addictions Services in Ontario.* Toronto: Health Quality Ontario and the Institute for Clinical Evaluative Sciences; 2015. Accessed December 23, 2015 at http://www.hqontario.ca/Portals/0/Documents/pr/theme-report-taking-stock-en.pdf. Lin E, Diaz-Granados N, Stewart DE, Rhodes AE, Yeritsyan N, Johns A, et al. Depression. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report.* Vol. 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2009. Accessed April 24, 2014 at http://powerstudy.ca/wp-content/uploads/downloads/2012/10/Chapter5-Depression.pdf.
AMI: Percentage of patients hospitalized for an AMI who were readmitted for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf. Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Acute Myocardial Infarction (AMI) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSAMIabridged.aspx.
AMI: Percentage of patients hospitalized for AMI who visited an ED for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf. Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Acute Myocardial Infarction (AMI) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSAMIabridged.aspx.
CHF: Percentage of patients hospitalized for CHF who were readmitted for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012.* Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf. Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Congestive Heart Failure (CHF) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSCHFabridged.aspx.

Quality Indicator*	Source
Potentially Avoidable Readmissions and ED Visits	
CHF: Percentage of patients hospitalized for CHF who visited an ED for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed April 24, 2014 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf. Canadian Cardiovascular Outcomes Research Team. CCORT/CCS Quality Indicators for Congestive Heart Failure (CHF) Care. Accessed April 24, 2014 at http://www.ccort.ca/CCORTCCSCHFabridged.aspx.
Stroke: Percentage of patients hospitalized for ischemic stroke who were readmitted for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed December 12, 2015 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Stroke: Percentage of patients hospitalized for ischemic stroke who visited an ED for any reason within 30 days after discharge	Health Quality Ontario. *Quality Monitor 2012*. Toronto: Queen's Printer for Ontario; 2012. Accessed December 12, 2015 at http://www.hqontario.ca/portals/0/Documents/pr/qmonitor-full-report-2012-en.pdf.
Imaging	
Number of scans (MRI, CT or X-ray) of the lower back	You JJ, Alter DA, Iron K, Slaughter PM, Kopp A, Przybysz R, et al. *Diagnostic Services in Ontario: Descriptive Analysis and Jurisdictional Review*. Toronto: Institute for Clinical Evaluative Sciences; 2007. Accessed July 9, 2015 at http://www.ices.on.ca/Publications/Atlases-and-Reports/2007/Diagnostic-services-in-Ontario.
Cancer End-of-Life Care†	
Percentage of non-palliative-care cancer patients who died in an acute care hospital	Cancer Care Ontario. Patterns of End-of-Life Care. Accessed July 9, 2015 at www.cancercare.on.ca/qualityindex2007_old/access/eol/index.html.
Percentage of cancer patients who had an ICU stay in the last two weeks of life	
Percentage of cancer patients who had an ED visit in the last two weeks of life	
Percentage of cancer patients who received chemotherapy in the last two weeks of life	
Percentage of cancer patients who received home care services in the last six months of life	
Percentage of cancer patients who received palliative care in any setting in the last six months of life	
Percentage of cancer patients who received a physician house call in the last two weeks of life	

*All indicators were identified in the two-year period from April 1, 2010, to March 31, 2012, unless otherwise stated.

†These indicators refer to people who died in calendar year 2009.

AMI: acute myocardial infarction; CCORT: Canadian Cardiovascular Outcomes Research Team; CCS: Canadian Cardiovascular Society; CHF: congestive heart failure; COPD: chronic obstructive pulmonary disease; CT: computed tomography; ED: emergency department; HQO: Health Quality Ontario; ICU: intensive care unit; MRI: magnetic resonance imaging

APPENDIX B Quality Indicators, by Definition, Numerator, Denominator and Data Source

Indicator*	Numerator	Denominator*	Data Source
Screening and Prevention			
Stroke: Of individuals who had at least one home care visit within 60 days after hospital discharge for ischemic stroke, the percentage who had at least one therapy visit in those 60 days	Individuals who received at least one home care visit for therapy (physiotherapy, occupational therapy, speech-language therapy or social work) during the 60-day period.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of ischemic stroke between April 1, 2010, and December 31, 2011, who were aged 40–105 at the time of discharge, and alive and discharged home at the end of the episode of care. The episode of care included time spent in a rehabilitation facility (if any) immediately following discharge from the acute care facility. Only the first admission for a given individual was retained. Individuals were included in the denominator if they received at least one home care visit within the 60 days following the end of their stroke episode of care. The period examined is restricted by the availability of home care data.	DAD, HCD, NRS
Diabetes preventive care: Percentage of individuals with diabetes who had: • at least one eye examination in a two-year period • at least one set of cholesterol tests in a two-year period • at least four HbA1c tests in a two-year period • all three tests	Individuals who had received an eye examination from an ophthalmologist or optometrist in the two-year period beginning April 1, 2010. Individuals who had received at least one set of cholesterol tests (triglycerides, total cholesterol, high-density lipoprotein cholesterol) in the two-year period beginning April 1, 2010. Individuals who had received at least four HbA1c tests in the two-year period beginning April 1, 2010. Individuals who met all three of the above criteria.	Individuals aged 40–105 and living in the community on April 1, 2010, who were identified as having diabetes in the ODD with a diagnosis date prior to April 1, 2010. Individuals assigned to networks in which most laboratory tests were performed in hospital labs were excluded, as were individuals from other networks who were assigned to physicians whose lab tests were performed in hospital labs.	ODD, OHIP
Screening: Percentage of eligible women who received a mammogram	Women who had received at least one mammogram in the 30 months between October 1, 2009, and March 31, 2012.	Women aged 50–74 on March 31, 2012, and alive on March 31, 2012, without a history of breast cancer as of October 1, 2009. The age range and look-back period were chosen to align with MOHLTC criteria for incentive payments for having up-to-date patients. The end date is due to availability of Ontario Breast Screening Program data to detect mammograms.	OCR, Ontario Breast Screening Program database, OHIP
Screening: Percentage of eligible individuals who were up-to-date in their screening for colorectal cancer	Individuals who by April 1, 2012, had received at least one barium enema or sigmoidoscopy in the previous five years, at least one colonoscopy in the previous 10 years, at least one fecal occult blood test in the previous two years, or had an OHIP record containing fee code Q142 between April 1, 2011, and March 31, 2012, indicating that they did not require a colonoscopy.	Individuals aged 50–74 on April 1, 2010, alive on March 31, 2012, with no history of colorectal cancer and no history of hospitalization with a diagnosis of Crohn's disease or ulcerative colitis in the five years prior to April 1, 2010.	DAD, OCR, OHIP

Indicator*	Numerator	Denominator*	Data Source
Screening and Prevention			
Screening: Percentage of eligible individuals who were up-to-date in their screening for cervical cancer (Pap test)	Women who received at last one Pap test in the previous 42 months (from October 1, 2009, to March 31, 2013).	Women aged 21–69 on April 1, 2013, and alive on April 1, 2013, with no history of a hysterectomy or of cervical, endometrial or ovarian cancer as of October 1, 2009. Individuals assigned to networks in which most laboratory tests were performed in hospitals were excluded, as were individuals from other networks who were assigned to physicians whose laboratory tests were performed in hospitals. The age range and look-back period were chosen to align with MOHLTC criteria for incentive payments for having up-to-date patients.	OHIP
Screening: Percentage of eligible women aged 65 who had a bone mineral density (BMD) test	Women who received at least one BMD test in the previous 10 years or at least one BMD test in the following year.	Women aged 65 on April 1, 2010, who were eligible for OHIP in the previous 10 years and alive on March 31, 2011.	OHIP
Bone mineral density (BMD) testing after a fracture possibly due to osteoporosis. (This indicator was evaluated separately for females and males.)	Individuals who received a BMD test in the year following the fracture.	Individuals aged 66 and older who were treated for a fracture of the hip, pelvis, spine, shoulder or wrist and had not received a BMD test or filled a prescription for osteoporosis medication in the previous year and who lived for at least one year after their fracture. Only the first fracture between April 1, 2010, and March 31, 2012, was used.	DAD, ODB, OHIP
Evidence-Based Medications			
AMI: Percentage of patients hospitalized for AMI who filled a prescription for a recommended medication within 90 days after discharge	Individuals who within 90 days after discharge from the episode of care had filled at least one prescription for an ACE inhibitor or ARB, a beta blocker or a statin.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of AMI, aged 65 and older at the time of discharge, discharged home at the end of the episode of care, and alive 90 days after discharge. Only the first admission for a given individual was used.	DAD, ODB
CHF: Percentage of patients hospitalized for CHF who filled a prescription for a recommended medication within 90 days after discharge	Individuals who within 90 days after discharge from the episode of care had filled at least one prescription for an ACE inhibitor or ARB, a beta blocker or a statin.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of CHF, aged 65 and older at the time of discharge, discharged home at the end of the episode of care, and alive 90 days after discharge. Only the first admission for a given individual was used.	DAD, ODB
Stroke: Percentage of patients hospitalized for stroke who filled a prescription for a recommended medication within 90 days after discharge	Individuals who within 90 days after discharge from the episode of care had filled at least one prescription for an antihypertensive or a statin.	Individuals discharged from an acute care hospital inpatient stay with a most responsible diagnosis (pre-admission) of stroke between April 1, 2010, and December 31, 2011, aged 65 and older at the time of discharge, discharged home at the end of the episode of care, and alive 90 days after discharge. The episode of care includes time spent in a rehabilitation facility (if any) immediately following discharge from the acute care facility. Only the first admission for a given individual was retained. The period examined was restricted because the cohort developed for indicator P07 was used for P08.	DAD, NRS, ODB
Diabetes preventive care: Percentage of people with diabetes who filled a prescription for a recommended medication	Individuals who in the following year had filled at least one prescription for an ACE inhibitor or angiotensin II agonist, an antihypertensive (list includes ACE inhibitors and ARBs) or a statin.	Individuals identified as having diabetes in the ODD with a diagnosis date prior to April 1, 2010, and who were aged 65 and older on April 1, 2010.	ODB, ODD

Indicator*	Numerator	Denominator*	Data Source
Drug Safety			
Prescriptions for antipsychotics	Individuals who had filled a prescription for an antipsychotic during the following year.	Individuals aged 66 and older and living in long-term care on April 1, 2010, excluding those receiving palliative care, those with a diagnosis of Huntington's chorea or tics, and those with a diagnosis of psychosis.	CCRS-LTC, DAD, NACRS, ODB,OMHRS
Prescriptions for contraindicated medications	Individuals who had filled a prescription for a medication that was contraindicated for the condition(s) noted during the observation period at any time between the date of the diagnosis and March 31, 2012 (the measurement period). Contraindicated medications included: • Anticholinergics and tricyclic antidepressants for those with dementia. • Antipsychotics, tricyclic antidepressants and sleep agents for those with a history of falls or hip fracture. • Nonsteroidal anti-inflammatory agents for those with chronic renal failure.	Individuals aged 65 and older and living in the community (i.e., not in long-term care) on April 1, 2010, with no history of psychosis and who received a diagnosis of dementia, a fall or a hip or pelvic fracture (excluding those associated with transportation accidents) or chronic renal failure between April 1, 2010, and February 29, 2012 (the observation period).	DAD, NACRS, ODB, OMHRS
Hospital–Community Transitions			
AMI: (a) Any follow-up within seven days. Percentage of patients hospitalized for AMI who had a follow-up office visit within seven days after discharge (b) Shared care within 30 days. Percentage of patients hospitalized for AMI who had at least one follow-up office visit with a comprehensive primary care physician and at least one follow-up office visit with a cardiologist or internist within 30 days after discharge	(a) Individuals who within seven days after their discharge from the episode of care received an office visit[ϕ] from a comprehensive primary care physician, cardiologist or internist. (b) Individuals who within 30 days after their discharge received at least one office visit[ϕ] from a comprehensive primary care physician plus at least one office visit from a cardiologist or internist. [ϕ]Defined as a visit by the patient to the physician's office, a visit by the physician to the patient in a long-term care facility or the patient's home, or a telephone call from the physician.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of AMI, aged 40–105 at the time of discharge, and alive and discharged home at the end of the episode of care. Only the first admission for a given individual was retained.	DAD, IPDB, OHIP
CHF: (a) Any follow-up within seven days. Percentage of patients hospitalized for CHF who had a follow-up office visit within seven days after discharge (b) Shared care within 30 days. Percentage of patients hospitalized for CHF who had at least one follow-up office visit with a comprehensive primary care physician and at least one follow-up office visit with a cardiologist or internist within 30 days after discharge	(a) Individuals who within seven days after their discharge from the episode of care received an office visit[ϕ] from a comprehensive primary care physician, cardiologist or internist. (b) Individuals who within 30 days after their discharge received at least one office visit[ϕ] from a comprehensive primary care physician plus at least one office visit from a cardiologist or internist. [ϕ]Defined as a visit by the patient to the physician's office, a visit by the physician to the patient in a long-term care facility or the patient's home, or a telephone call from the physician.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of CHF, aged 40–105 at the time of discharge, and alive and discharged home at the end of the episode of care. Only the first admission for a given individual was retained.	DAD, IPDB, OHIP

Indicator*	Numerator	Denominator*	Data Source
Hospital–Community Transitions			
Mental health: (a) Any follow-up within seven days. Percentage of patients hospitalized for a serious mental health reason who had a follow-up office visit within seven days after discharge (b) Shared care within 30 days. Percentage of patients hospitalized for a serious mental health reason who had at least one follow-up office visit with a comprehensive primary care physician and at least one follow-up office visit with a psychiatrist within 30 days after discharge	a) Individuals who within seven days after their discharge from the episode of care received an office visit† from a comprehensive primary care physician or psychiatrist. (b) Individuals who within 30 days after their discharge received at least one office visit† from a comprehensive primary care physician plus at least one office visit from a psychiatrist. †Defined as a visit by the patient to the physician's office, a visit by the physician to the patient in a long-term care facility or the patient's home, or a telephone call from the physician.	Individuals discharged from an acute care hospital or a psychiatric hospital inpatient stay with a diagnosis of schizophrenia, depression or bipolar disease; aged 20–105 at the time of discharge; with an episode of care not exceeding 90 days; and alive on the day of discharge from the episode of care. Only the first admission for a given individual was retained.	DAD, IPDB, OHIP, OMHRS
Newborns: Percentage of newborns with a follow-up office visit within seven days	Babies who within seven days after discharge from hospital received an office† or in-home visit from a comprehensive primary care physician or comprehensive care pediatrician. †For this indicator, office visits did not include telephone calls.	Healthy newborn singletons born to a mother who was aged 18 or older at the time of hospital discharge and who had an uncomplicated vaginal delivery with no intervention. Healthy newborns had a gestational age > 37 weeks and a birth weight of at least 2,500 grams. Babies whose mother received prenatal or delivery care from a midwife were excluded (because we may not capture post-natal care from midwives).	DAD, OHIP
Asthma, pediatric: (a) Any follow-up within seven days. Percentage of children with a high-triage visit to the ED for asthma who had a follow-up office visit within seven days after discharge (b) Shared care within 30 days. Percentage of children with a high-triage visit to the ED for asthma who had at least one follow-up office visit with a comprehensive primary care physician and at least one follow-up office visit with a specialist within 30 days after discharge	(a) Individuals who within seven days after discharge from the episode of care received an office visit† from a comprehensive primary care physician (GP/FP or pediatrician), another pediatrician, respirologist, pediatric respirologist, clinical immunologist, pediatric clinical immunologist or internist. (b) Individuals who within 30 days after discharge from the episode of care received an office visit† from a comprehensive primary care physician (GP/FP or pediatrician) plus at least one office visit from a pediatrician not included as a comprehensive care pediatrician, respirologist, pediatric respirologist, clinical immunologist, pediatric clinical immunologist or internist. †Defined as a visit by the patient to the physician's office, a visit by the physician to the patient's home, or a telephone call from the physician.	Children aged 0–19 years who visited an ED for asthma, were assigned a high triage score, and were not admitted to hospital. Only the first ED visit for a given individual was retained.	NACRS, OHIP
Asthma, pediatric: (a) Any follow-up within seven days. Percentage of children hospitalized for asthma who had a follow-up office visit within seven days after discharge (b) Shared care within 30 days. Percentage of children hospitalized for asthma who had at least one follow-up office visit with a comprehensive primary care physician and at least one follow-up office visit with a specialist within 30 days after discharge	(a) Individuals who within seven days after discharge from the episode of care received an office visit† from a comprehensive primary care physician (GP/FP or pediatrician), other pediatrician, respirologist, pediatric respirologist, clinical immunologist, pediatric clinical immunologist or internist. (b) Individuals who within 30 days after discharge received an office visit† from a comprehensive primary care physician (GP/FP or pediatrician) plus at least one office visit from a pediatrician not included as a comprehensive care pediatrician, respirologist, pediatric respirologist, clinical immunologist, pediatric clinical immunologist or internist. †Defined as a visit by the patient to the physician's office, a visit by the physician to the patient's home, or a telephone call from the physician.	Children aged 0–19 years who were discharged home from an acute care hospital inpatient stay with a most responsible pre-admission diagnosis of asthma. Only the first admission for a given individual was retained.	DAD, OHIP

Indicator*	Numerator	Denominator*	Data Source
Hospital–Community Transitions			
Multiple conditions: Any follow-up within seven days. Percentage of patients hospitalized for specified conditions who had a follow-up office visit within seven days after discharge	Individuals who within seven days after their discharge from the episode of care received an office visit‡ from a comprehensive primary care physician or a relevant specialist.§ ‡Defined as a visit by the patient to the physician's office, a visit by the physician to the patient in a long-term care facility or the patient's home, or a telephone call from the physician. §An internist or cardiologist for patients with angina; an internist or respirologist for patients with asthma, COPD or pneumonia; an internist, endocrinologist, nephrologist or cardiologist for patients with diabetes.	Individuals discharged from an acute care hospital inpatient stay with a pre-admission most responsible diagnosis of COPD, diabetes, asthma, pneumonia or unstable angina, aged 40–105 years at the time of discharge, and alive and discharged home at the end of the episode of care. Only the first admission for a given individual was retained.	DAD, OHIP
Multiple conditions: Any follow-up within seven days. Percentage of patients with a high-triage ED visit for specified conditions who had a follow-up office visit with a comprehensive primary care physician or a relevant specialist within seven days after leaving the ED	Individuals who within seven days after leaving the ED received an office visit‡ from a comprehensive primary care physician or a relevant specialist.§ ‡Defined as a visit by the patient to the physician's office, a visit by the physician to the patient in a long-term care facility or the patient's home, or a telephone call from the physician. §An internist or cardiologist for patients with atrial fibrillation, angina or CHF; an internist or respirologist for patients with asthma.	Individuals aged 40–105 who visited an ED for atrial fibrillation, chest pain (angina), CHF or asthma; were assigned a high triage score; and were not admitted to hospital.	IPDB, NACRS, OHIP
Potentially Avoidable Admissions and ED Visits			
Falls: Percentage of older adults who were hospitalized at least once for a fall	Individuals who had at least one fall during the two-year period resulting in a hospitalization with a diagnosis (any diagnosis type other than post-admission) of a fall.	Individuals aged 65 and older on April 1, 2010, stratified into those living in long-term care on April 1, 2010, and those living in the community on that date.	CCRS–LTC, DAD, ODB, OHIP
Diabetes: Percentage of individuals with diabetes who were hospitalized with an acute complication of diabetes; or percentage of people with diabetes who were hospitalized with a chronic complication of diabetes or died, annualized	Annualized number of individuals who were admitted to hospital with a most responsible diagnosis of an acute complication of diabetes; annualized number of individuals who were either admitted to a hospital with a most responsible diagnosis of a chronic complication of diabetes or died. Acute complications included hyperglycemia, hypoglycemia and soft tissue infection. Chronic complications were cardiovascular disease (stroke, AMI, or a CABG or PCI procedure), major or minor amputation (unless accompanied by a diagnosis of cancer of the nervous system or bone or Kaposi's sarcoma, an injury or an accident), chronic renal disease and death.	Individuals aged 20 and older with a diagnosis date of April 1, 2010, in the ODD.	DAD, ODD, RPDB
Diabetes: Number of ED visits for complications of diabetes	Annualized number of unscheduled ED visits during the two-year period with a pre-admission most responsible diagnosis of acute complication or chronic complication. Acute complications included hyperglycemia, hypoglycemia and soft tissue infection. Chronic complications included cardiovascular disease (stroke, AMI, or a CABG or PCI procedure), major or minor amputation (unless accompanied by a diagnosis of cancer of the nervous system or bone or Kaposi's sarcoma, an injury, or an accident), and chronic renal disease.	Individuals aged 20 and older with a diagnosis date of April 1, 2010, in the ODD.	NACRS, ODD

Indicator*	Numerator	Denominator*	Data Source
Potentially Avoidable Readmissions and ED Visits			
Ambulatory care–sensitive conditions: Annualized number of non-elective hospital admissions for each of asthma, COPD, diabetes and CHF. In each disease cohort, rates were per 1,000 people.	For each of the four cohorts, the annualized number of non-elective inpatient admissions with a pre-admission most responsible diagnosis matching the cohort (e.g., a diagnosis of asthma for someone in the asthma cohort) during the two-year period. The heart failure cohort excluded non-elective admissions as well as hospitalizations during which interventions to treat heart failure were performed (e.g., angioplasty).	Asthma: Individuals aged 20 and older with a diagnosis of asthma in the ICES asthma cohort as of April 1, 2010. COPD: Individuals aged 40 and older with a diagnosis of COPD in the ICES 'specific' COPD cohort on April 1, 2010. The specific cohort has greater specificity, and lower sensitivity than the 'sensitive' COPD cohort. Diabetes: Individuals aged 20 and older with a diagnosis of diabetes in the ODD on April 1, 2010. CHF: Individuals aged 40 years and older with a diagnosis of CHF in the ICES CHF cohort on April 1, 2010.	DAD, ICES asthma cohort, ICES CHF cohort, ICES COPD cohort (specific version), ODD
Mental health: Percentage of patients hospitalized for serious mental health reasons who were readmitted for any reason within 30 days after discharge	Individuals who within 30 days after discharge had a non-elective readmission for any reason.	Individuals who were discharged following an inpatient hospitalization for a serious mental health condition during the two-year period and were at least 20 years old at the time of discharge. Only the first hospital discharge for a given individual was retained.	DAD, OMHRS
Mental health: Percentage of patients hospitalized for serious mental health reasons who visited an ED for any reason within 30 days after discharge.	Individuals who within 30 days after discharge had an unscheduled ED visit for any reason.	Individuals who were discharged following an inpatient hospitalization for a serious mental health condition during the two-year period and were at least 20 years old at the time of discharge. Only the first hospital discharge for a given individual was retained.	DAD, NACRS, OMHRS
AMI: Percentage of people discharged following hospitalization for AMI who were readmitted for any reason within 30 days after discharge	Individuals who within 30 days after discharge had a non-elective readmission for any reason.	Individuals discharged home following an inpatient hospitalization with a most responsible diagnosis of AMI. Only the first AMI hospitalization for a given individual was examined.	DAD
AMI: Percentage of people discharged following hospitalization for AMI who visited an ED for any reason within 30 days after discharge	Individuals who within 30 days after discharge had an unscheduled ED visit for any reason.	Individuals discharged home following an inpatient hospitalization with a most responsible diagnosis of AMI. Only the first AMI hospitalization for a given individual was examined.	DAD, NACRS
CHF: Percentage of people discharged following hospitalization for CHF who were readmitted for any reason within 30 days after discharge	Individuals who within 30 days after discharge had a non-elective readmission for any reason.	Individuals discharged home following an inpatient hospitalization with a most responsible diagnosis of CHF. Only the first CHF hospitalization for a given individual was examined.	DAD
CHF: Percentage of people discharged following hospitalization for CHF who visited an ED for any reason within 30 days after discharge	Individuals who within 30 days after discharge had an unscheduled visit to the ED for any reason.	Individuals discharged home following an inpatient hospitalization with a most responsible diagnosis of CHF. Only the first CHF hospitalization for a given individual was examined.	DAD, NACRS
Stroke: Percentage of people discharged following hospitalization for stroke who were readmitted for any reason within 30 days after discharge	Individuals who within 30 days after discharge had a non-elective readmission for any reason.	Individuals discharged following an inpatient hospitalization (possibly followed by a stay in a rehabilitation hospital) for an ischemic stroke. Only the first stroke discharge for a given individual was examined.	DAD
Stroke: Percentage of people discharged following hospitalization for stroke who visited an ED for any reason within 30 days after discharge	Individuals who within 30 days after discharge had an unscheduled ED visit for any reason.	Individuals discharged following an inpatient hospitalization (possibly followed by a stay in a rehabilitation hospital) for ischemic stroke. Only the first stroke discharge for a given individual was examined.	DAD, NACRS

Indicator*	Numerator	Denominator†	Data Source
Imaging			
Number of people who had at least one scan (MRI, CT or X-ray) of the lower back	Annualized percentage of individuals who received at least one scan within the two-year period. The three types of scans were assessed separately.	Individuals who were assigned to a network, alive and aged 20 and older on April 1, 2010.	OHIP
Cancer End-of-Life			
Death in an acute care hospital but not in the palliative wing	Individuals who died in an acute care hospital, excluding those who received palliative care services during the hospitalization.	Individuals who died of cancer during calendar year 2010 and were at least 20 years old at the time of death, excluding those who had major cancer surgery within 30 days prior to death.	DAD, OCR
ICU stay	Individuals who had an ICU stay in the last two weeks of life.		DAD, OCR
ED visit	Individuals who had at least one ED visit during the last two weeks of life.		DAD, OCR
Chemotherapy	Individuals who received chemotherapy in the last two weeks of life.		OCR, OHIP
Home care	Individuals who received at least one home care service during the last six months of life.		HCD, OCR, HCD
Palliative care	Individuals who received palliative care in any setting during the last six months of life.		OCR, OHIP
Physician house call	Individuals who received a physician house call in the last two weeks of life.		OCR, OHIP

*Individuals assigned to the Weeneebayko network were excluded from all indicators due to small sample sizes. Individuals assigned to the SickKids and CHEO networks were excluded from all non-pediatric indicators. Individuals assigned to the CAMH network were excluded from all non-mental health indicators.

Certain tests ordered by primary care providers who work in hospital-associated practices and by primary care providers who work in communities that lack a private laboratory are performed in hospital laboratories. The hospitals cover the cost of these tests from their global budgets, rather than submitting individual claims for payment. We are therefore unable to determine rates of testing in the 9 networks in which most tests are performed in hospital laboratories. As well, patients of primary care providers in hospital-associated practices were excluded from the calculation of the rates for the remaining networks. This affects cholesterol and HbA1c tests for people with diabetes, and Pap tests.

†The denominators of all indicators are restricted to individuals who were assigned to a network and, unless stated otherwise, were alive on April 1, 2010. Unless stated otherwise, all individuals or events in the denominator were identified during the two-year period between April 1, 2010, and March 31, 2012.

AMI: acute myocardial infarction; CAMH: Centre for Addiction and Mental Health; CCRS–LTC: Continuing Care Reporting System – Long-Term Care Database; CHEO: Children's Hospital of Eastern Ontario; CHF: congestive heart failure; COPD: chronic obstructive pulmonary disease; CT: computed tomography; DAD: Discharge Abstract Database; ED: emergency department; GP/FP: general practitioner/family physician; HCD: Home Care Database; ICES: Institute for Clinical Evaluative Sciences; ICU: intensive care unit; IPDB: ICES Physician Database (includes information from the OHIP Corporate Provider Database, the OHIP Claims Database and the Ontario Physician Human Resource Data Centre database); MOHLTC: Ministry of Health and Long-Term Care; MRI: magnetic resonance imaging; OCR: Ontario Cancer Registry; ODB: Ontario Drug Benefit Plan Database; ODD: Ontario Diabetes Database; OHIP: Ontario Health Insurance Plan Claims Database; NACRS: National Ambulatory Care Reporting System Database (contains both SDS and ED records); NRS: National Rehabilitation Reporting System; OMHRS: Ontario Mental Health Reporting System Database; SDS: same-day surgery.

APPENDIX C Diagnostic, Procedure and Physician Billing Codes

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Acute coronary syndrome	I20, I21, I22, I23.82, I24				
Acute myocardial infarction	I21				
Angina, unstable; hospital admission	I200				
Angina, emergency department visit	I20, I23.82				
Asthma	J45, J46				
Atrial fibrillation	I48				
Bipolar disease	F30, F31				DSM-IV diagnosis code of 296+ excluding 2962 and 2963
Congestive heart failure	I50				
Chronic obstructive pulmonary disease	J41, J42, J43, J44				
Death					Death, recorded either in the RPDB or in one of the DAD (dischdisp = 07), NACRS (visdisp in 10, 11), NRS (dreason = 8), or CCRS (discharge_to_facility_type = 11)
Dementia	F00, F01, F022, F023, F03, F051, G30, G311, R54		290, 331, 797		A prescription for a cholinesterase inhibitor. An assessment in the long-term care database with a report of dementia other than Alzheimer's or Alzheimer's (variables I1V and I1R, respectively)
Depression	F32, F33				DSM-IV diagnosis codes 2962, 2963 or 311+
Diabetes					In the Ontario Diabetes Database
Emergency department, high-triage visit					A triage level of (1) resuscitation, (2) emergent or (3) urgent
Fall, requiring hospital admission	W01, W05, W06, W07, W08, W09, W10, W14, W15, W17, W18, W19				
Fracture, hip or pelvis	S321, S323, S324, S325, S327, S328, S721, S722				
Fracture indicating possible osteoporosis	S220, S221, S320, S327, S328, S422, S321, S323, S324, S325, S327, S328, S52, S720, S721, S722		813, 805, 812, 808		
Mental health diagnosis	F+				

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Newborn, healthy					CMG 576 (normal newborn, singleton vaginal delivery) in the baby's record. CMG 545 (vaginal delivery, no other intervention) in the mother's record. Baby's weight > 2,500 g
Pneumonia	J12, J13, J14, J15, J16, J18				
Renal failure, chronic	E102, E112, E132, E142, I12, I13, N08, N18		403, 585		
Schizophrenia	F20, F25				DSM-IV diagnosis code 295+
Stroke (ischemic)	G45 excluding G454, I60, I61, I63, I64				
Substance abuse	F10–F19				
Comorbid conditions, complications, outcomes					
Ambulatory care visits				W010	An OHIP record with a location of O (office visit), L (physician visited patient in long-term care facility), H (house call) or P (phone call). For visits after birth, only office visits and house calls are included.
Acute myocardial infarction	I21				
Amputation (chronic complication of diabetes)		1VC93, 1VG93, 1VQ93, 1WA93, 1WJ93, 1WL93, 1WM93			
Amputation exclusion criteria (used to identify amputations that are not due to complications of diabetes)	C402, C403, C461, C472, C492, D162, D163, D212, S72–S79, S84–S89, S98, T07, T023, T025, T026, T027, T028, T029, T033–T039, T043–T049, T053–T059, T132–T139, T142–T149				
Asthma, hospitalization for	J45				
Cardiovascular disease (chronic complication of diabetes)	G45 excluding G454, G461, G464, G465, G466, G467, I21, I22, I60, I61, I63, I64	1IJ50, 1IJ57, 1IJ76, 1JE50, 1JE57, 1JE76			
CHF, hospitalization for	I500, J81				
CHF procedures (used to flag CHF hospitalizations that are not categorized as ambulatory care sensitive)		1HB53, 1HB54, 1HB55, 1HD53, 1HB54, 1HD55, 1HZ53, 1HZ54, 1HZ55, 1HZ85, 1IJ50, 1IJ76			
Chemotherapy				G281, G339, G345, G359, G381	
Chronic obstructive pulmonary disease, hospitalization for	J41, J42, J43, J44, J47				

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Diabetes, hospitalization for	E101, E106, E107, E109, E110, E111, E116, E117, E119, E130, E131, E136, E137, E139, E140, E141, E146, E147, E149				
Diabetes, comorbidity					Individual is identified in the Ontario Diabetes Database with a diagnosis date prior to April 1, 2010
Died in hospital					A hospital discharge record with discharge disposition = 07
ED visit, low urgency					A triage level of (4) less urgent [semi-urgent] or (5) non-urgent
House call				A901, B990, B992, B994, B996, B998; excluding records with a fee code of A77, A771 or A902 on the same day	
Hyperglycemia (acute complication of diabetes)	E101, E110, E111, E130, E131, E140, E141, R739				
Hypoglycemia (acute complication of diabetes)	E1063, E1163, E1363, E1463, E15, E160, E161, E162				
Huntington's disease	G10				A report of Huntington's disease in the RAI (variable I1X)
ICU stay					A hospital discharge record with non-missing SCU code
Infection (acute complication of diabetes)	A480, E1051, E1061, E1071, E1151, E1161, E1171, E1351, E1361, E1371, E1451, E1461, E1471, L01, L02, L03, L04, L05, L08, R02				
LTC: pressure ulcer of stages 2–4					Variable M2A in the RAI with a value of 2, 3 or 4
LTC: use of daily restraints					One of the following variables in the RAI with a value of 2: P4C, P4D or P4E
LTC: moderate to severe pain					Either of the following recorded in the RAI: variable J2B with a value of 3 or variable J2A with a value of 2 and variable J2B with a value of 2
Palliative care				A945, C882, C945, C982, K023, W872, W882, W972, W982	Patient service (patserv) = 58 (palliative care) in a hospital discharge record. A home care record with residence_type = '2000' (hospice facility/palliative care unit)
Psychosis	F09, F20–F25, F28–F31, F39, F322, F323, F332, F333		295–299		A report of manic depression or schizophrenia in the RAI (variables I1HH or I1II, respectively)
Renal disease (chronic complication of diabetes)	E102, E112, E132, E142, I12, I13, N08, N18, N19				
Tic disorder	F95				

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Physician visits					
Office visits					ICES defined. Includes visits by patient to physician office, visits by physician to patient in a long-term facility or at home, and physician telephone calls
Home care visit after discharge					A record in the Home Care Database, excluding visits for the purpose of assessment for home care (case management (service = 10) or social work (service = 8) and date of service falling between the start and end of assessment for suitability for home care), and excluding visits made to the patient in a hospital or long-term care facility (care_site = 2, 7 or 10) and visits for which the care site was not specified (care_site = 23)
Comprehensive primary care physician					ICES-defined
Cardiologist					A physician with mainspecialty = 'Cardiologist' in the IPDB or spec = '60' in the physician billing record
Internist					A physician with mainspecialty = 'Internist' in the IPDB or mainspecialty is missing and spec = '13' in the physician billing record
Psychiatrist					A physician with mainspecialty = 'Psychiatry' in the IPDB or mainspecialty is missing and spec = '19' in the physician billing record
Respirologist					A physician with mainspecialty = 'Respirologist' in the IPDB or mainspecialty is missing and spec = '47' in the physician billing record. For pediatric indicators, mainspecialty = 'Pediatric Respirology' is included
Immunologist					A physician with mainspecialty = 'Clinical Immunology' in the IPDB or mainspecialty is missing and spec = '62' in the physician billing record. For pediatric indicators, mainspecialty = 'Pediatric Clinical Immunology' is included
Midwife, prenatal care	A813, A815, C813, C815				Provider type in the record of birth = 11004 (midwife)
Home care visits					
Referral source					An individual was deemed to have been referred for home care by a hospital if referral_source was 1 (outpatient general hospital), 2 (inpatient general hospital), 3 (outpatient special hospital) or 4 (inpatient special hospital)
Type of home care service					Home care visits for the purpose of case management (service = 10) were not considered to be 'home care visits.' Home care services considered to be 'therapy' after a stroke were any visit for physiotherapy, occupational therapy, speech-language therapy or social work (service = 5, 6, 7 or 8, respectively).

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Site of care					A home care visit was deemed to occur in the patient's home if the case_site was 21 (client's home), 19 (health care clinic), or 24 (public education facility, only for children), and the home care service requested for the client was 91 (in-home acute care), 92 (in-home rehabilitation), 93 (in-home maintenance), 94 (inhome supportive) or 95 (in-home end of life)
Medication					
ACE inhibitors or ARBs					Medications in subclass 'ACE inhibitor,' 'ACE inhibitor combination,' 'Angiotensin II Antagonist' or 'Angiotensin II combination'
Anticholinergics, HEDIS definition					Medication containing one of the following active ingredients: azatadine, belladonna, benztropine, brompheniramine, carbetapentane, carisoprodol, chlorpheniramine, chlorzoxazone, clemastine, cyclizine, cyclobenzaprine, cyproheptadine, dexchlorpheniramine, dicyclomine, dimenhydrinate, diphenhydramine, flavoxatel oxybutynin, hydroxyzine hydrochloride, hydroxyzine pamoate, hyoscyamine, meclizine, metaxalone, methocarbamol, orphenadrine, prochlorperazine, promethazine, propantheline, scopolamine, trihexyphenidyl, trimethobenzamide, tolterodine
Antihypertensive medications					Medications containing any of the following active ingredients, administered in tablet, capsule or kit formats: acebutolol, amiloride, amlodipine, atenolol, benazepril, bendroflumethiazide, bisoprolol, candesartan, captopril, carvedilol, chlorothiazide, chlorthalidone, cilazapril, clonidine, debrisoquine, diltiazem, doxazosin, enalapril, eprosartan, felodipine, fosinopril, guanethidine, hydralazine, hydrochlorothiazide, indapamide, irbesartan, isradipine, labetalol, lisinopril, losartan, methylclothiazide, methyldopa, metoprolol, minoxidil, nadolol, nicardipine, nifedipine, oxprenolol, perindopril, phenoxybenzamine, pindolol, prazosin, propranolol, quinapril, ramipril, reserpine, spironolactone, telmisartan, terazosin, timolol, trandolapril, triamterene, valsartan, verapamil
Antipsychotics					Medications in subclass 'Antipsychotic agent'
Beta blockers					Medications in subclasses' Beta-blockers' or 'Beta-blockers combination'
NSAIDs					Oral medications in subclass 'Non-steroidal anti-inflammatory: non-ASA base'
Sleeping agents, HEDIS definition					Medications containing any of the following active ingredients: aripiprazone, asenaprine, clozapine, haloperidol, iloperidone, loxapine, molindone, olanzapine, paliperidone, pimozide, quetiapine, risperidone, thiothixene, ziprasidone
Statins					Medications in subclass Antilipemic: statins
Tricyclic antidepressants					Medications in subclass Tricyclic antidepressants

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Procedures					
Angiography		3IP10			
CABG and PCI		1IJ50, 1IJ70, 1IJ76, 1IJ80			
Stress test (maximal stress ECG)				G319	
Perfusion test (myocardial perfusion imaging)				J607, J608, J807, J808	
Echocardiography				G561, G562, G567, G568, G571, G572, G575	
Eye examination				Any of the following fee codes billed by an ophthalmologist or optometrist (specialty code 23 or 56): A112, A115, A233, A234, A235, A236, A239, C233, C234, C235, C236, K065, K066, V402, V406, V408, V409, V450, V451	
Cholesterol test				All three of L055, L117 and L243	
HbA1c test				L093	
Screening					
Mammogram				X178, X185	A record in the Ontario Breast Screening Program database
Colorectal screening (fecal occult blood test, colonoscopy, sigmoidoscopy, barium enema)				E705, E740, E741, E747, G004, L179, L181, Q152, X112, X113, X234, Z535, Z536, Z555, Z580	
Up-to-date for colorectal screening (receipt of colorectal screening above, or an OHIP record indicating the patient does not require screening)				Q142	
Pap test				G365, G394 and fee suffix = A, E430, E431, L713, L812	
Bone mineral density test				X142, X145, X146, X148, X149, X152, X153, X155	

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Lower back scans					
CT scan of the spine				X128, X415, X416	
MRI of the spine				X490, X492, X493, X495, X496, X498	
X-ray of the lumbar or sacral spine				X028, X205, X206	
Inclusions/exclusions					
Living in long-term care					As an inclusion criterion: an assessment recorded in the CCRS-LTC database. This definition was used so as to have high specificity. As a stratification variable: Within the preceding 90 days, a record in the ODB database with the long-term care flag set or a physician visit made to the individual in a long-term care facility or a record in the CCRS-LTC database indicating that the individual was in long-term care on the date of interest. This definition was used so as to have high sensitivity (to ensure that those classified as living in the community really were living in the community).
Not discharged home					Institution to type coded as 2 (general rehabilitation), 3 (chronic hospital), 4 (nursing home), 7 (special rehabilitation) or 9 (home for aged) in the DAD
Cancer as cause of death (for the cancer end-of-life indicators)					dthcause variable in the OCR between 140 and 208
History of breast cancer					Diagnosis code in the OCR = 174+
History of colorectal cancer	C19, C20, C21, C180, C182, C183, C184, C186, C187, C188, C189				Diagnosis code in the OCR = 1530, 1531, 1532, 1533, 1534, 1536, 1537, 1538, 1539, 1540, 1541
History of cervical, endometrial or ovarian cancer					Record in the OCR with an ICD-9 code = 179, 1800, 1801, 1808, 1809, 1820, 1821, 1828, 1830, 1832, 1833, 1834, 1835, 1838, 1839
Hysterectomy				S710, S727, S757, S758, S759, S762, S763, S765, S766, S767, S810, S816	
Hospitalization for Crohn's disease or ulcerative colitis	K50, K51				
Huntington's disease	G10				An assessment in the long-term care database with a report of Huntington's disease in the RAI (variable I1X)
Psychosis	F09, F20–F25, F28–F31, F39, F322, F323, F332, F333		295–299		An assessment in the long-term care database with a report of manic depression or schizophrenia in the RAI (variables I1HH or I1II, respectively)

Cohort Selection Criteria	ICD-10-CA Diagnostic Codes	CCI Procedure Codes	OHIP Physician Billing Diagnostic Codes	OHIP Physician Billing Fee Codes	Other
Palliative care			A945, C945, C882, C982, K023, W872, W882, W972, W982		A record in the Home Care Database with residence type 2000 (hospice/palliative care unit). A hospital discharge record with patient service 58
Tic disorder	F95				

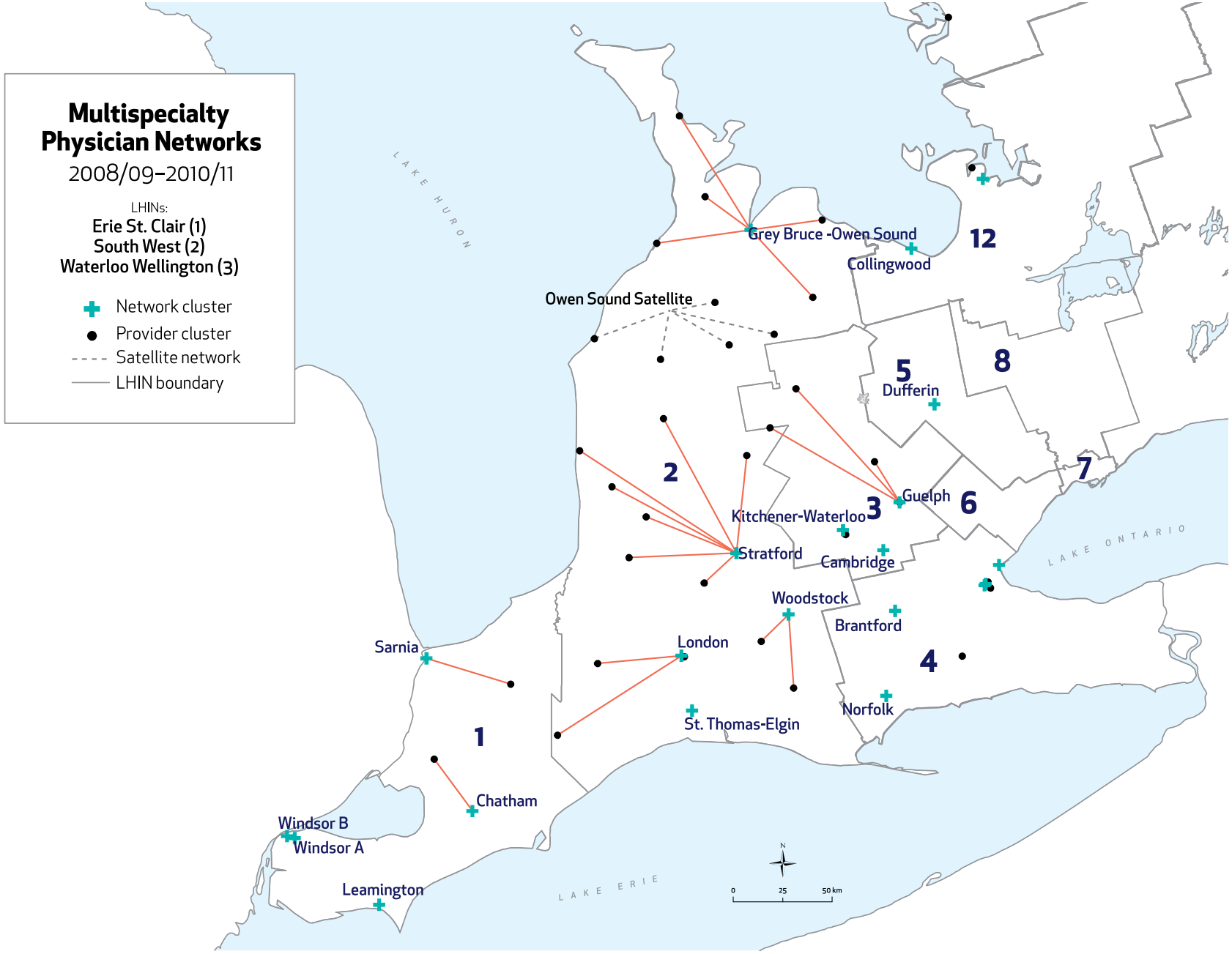
ACE: angiotensin-converting-enzyme; ARB: angiotensin II receptor blocker; CABG: coronary artery bypass grafting; CCI: Canadian Classification of Health Interventions; CCRS–LTC: Continuing Care Reporting System – Long-Term Care Database; CHF: congestive heart failure; CMG: Case Mix Group; CT: computed tomography; DAD: Discharge Abstract Database; DSM-IV: *Diagnostic and Statistical Manual of Mental Disorders,* 4th Edition; ECG: electrocardiogram; ED: emergency department; HEDIS: Health Effectiveness Data and Information Set; ICU: intensive care unit; ICD-10-CA: International Classification of Diseases and Related Health Problems, 10th Revision, Canada; IPDB: ICES Physician Database; LTC: long-term care; OCR: Ontario Cancer Registry; ODB: Ontario Drug Benefit; OHIP: Ontario Health Insurance Plan; NSAIDs: non-steroidal anti-inflammatory drugs; PCI: percutaneous coronary intervention; RAI: Resident Assessment Instrument; RPDB: Registered Persons Database

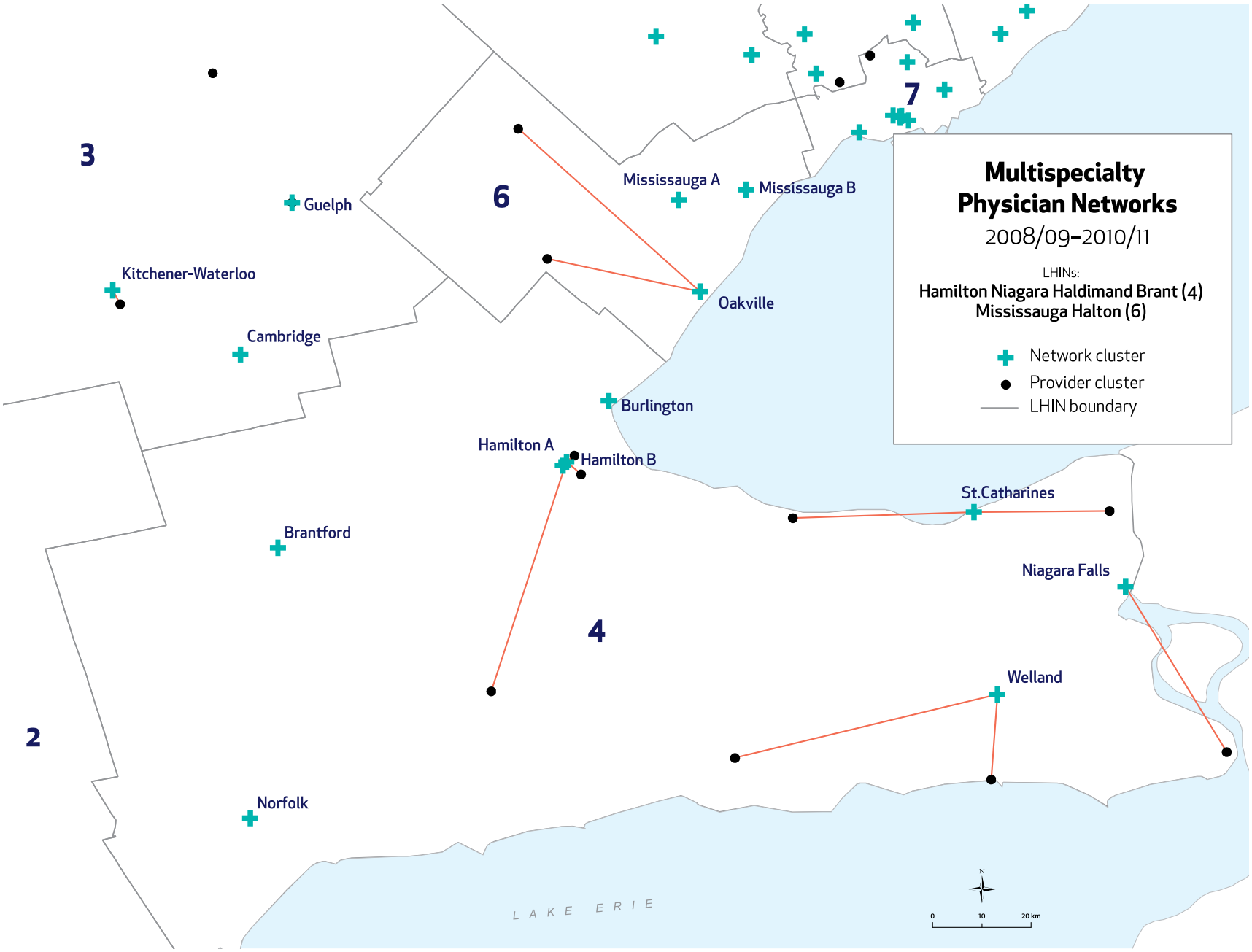
APPENDIX D Locations of Multispecialty Physician Networks in Ontario

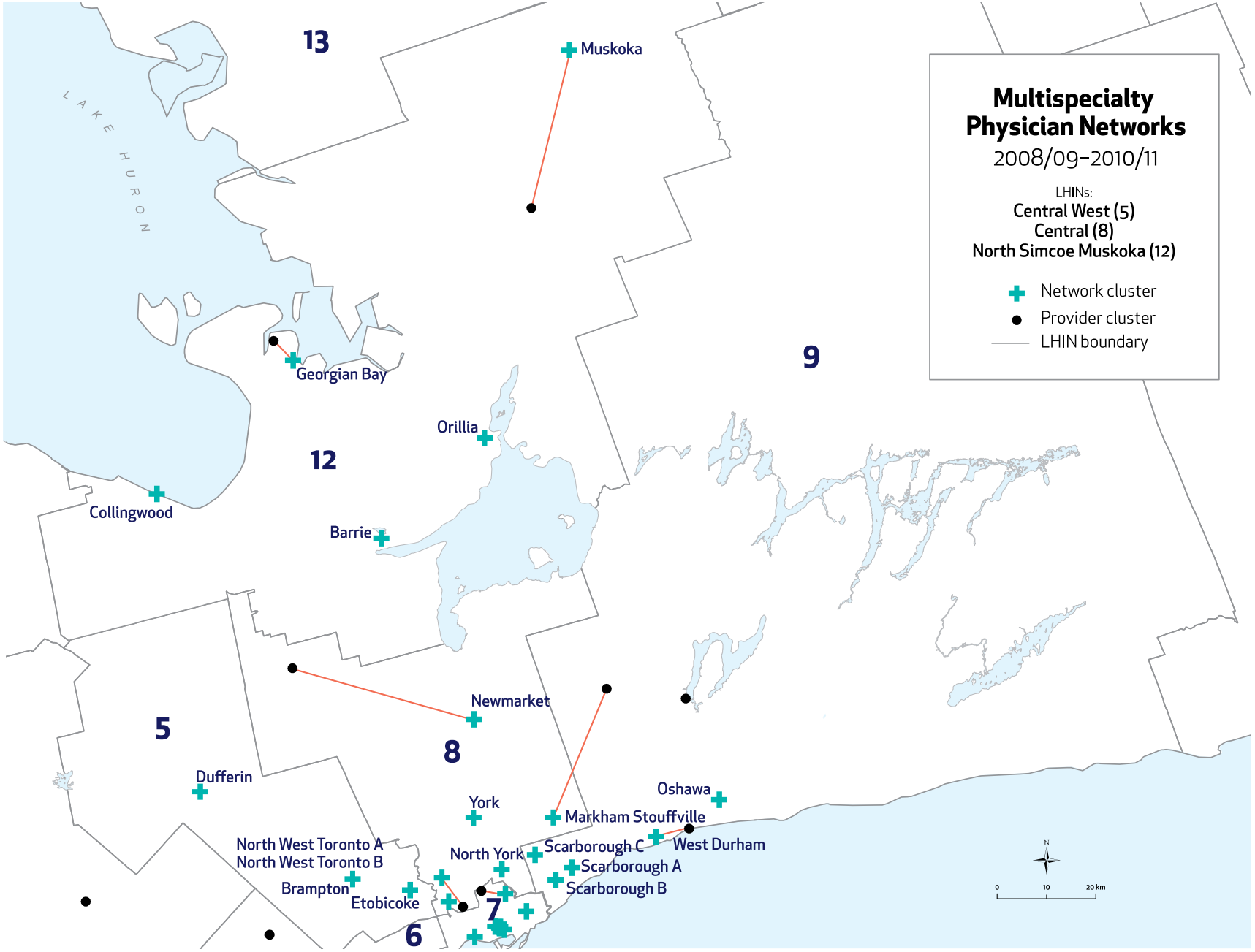
*For each physician network depicted in the following seven maps, the large **green markers** represent the locations of the largest hospitals, and the small **black dots** indicate the locations of other hospitals. Each network has either one provider hub or an aggregation of provider hubs linked by straight lines to the largest hospital, resulting in "spiders." Satellite networks are represented by dotted lines between provider clusters and the centroid of their respective provider hubs.*

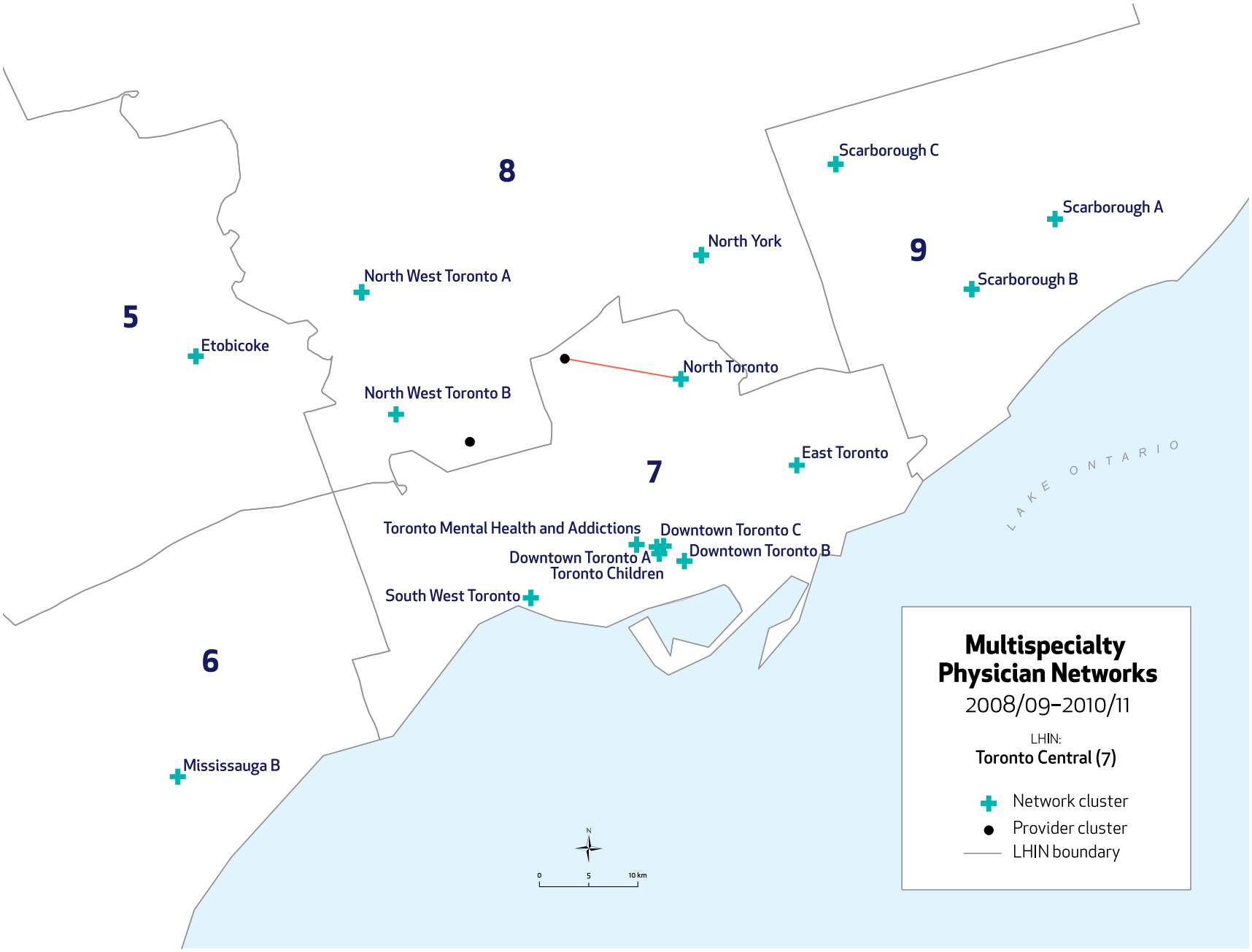
LHIN = Local Health Integration Network.

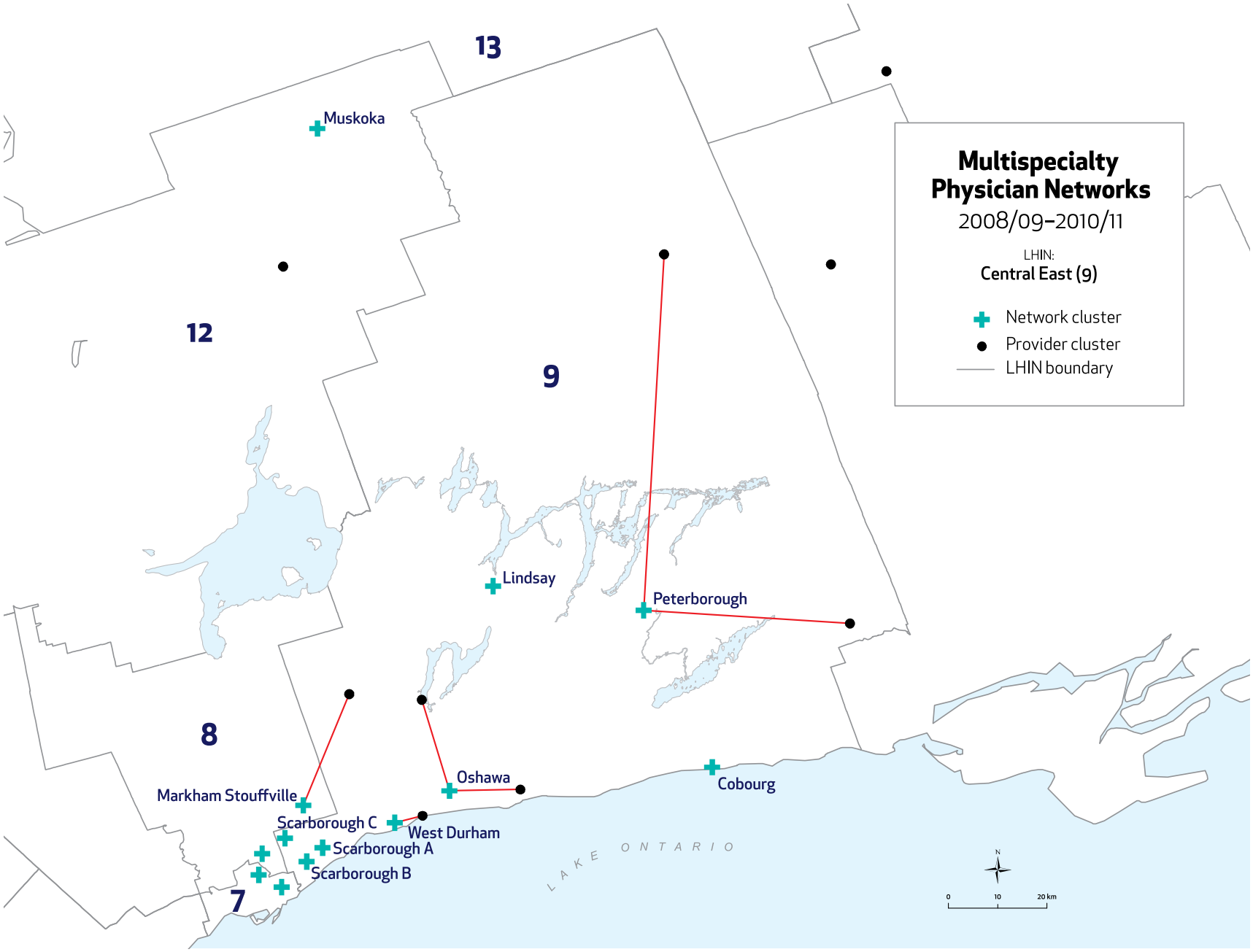
Within the legend for each map, only complete LHINs (designated by number) are specified.

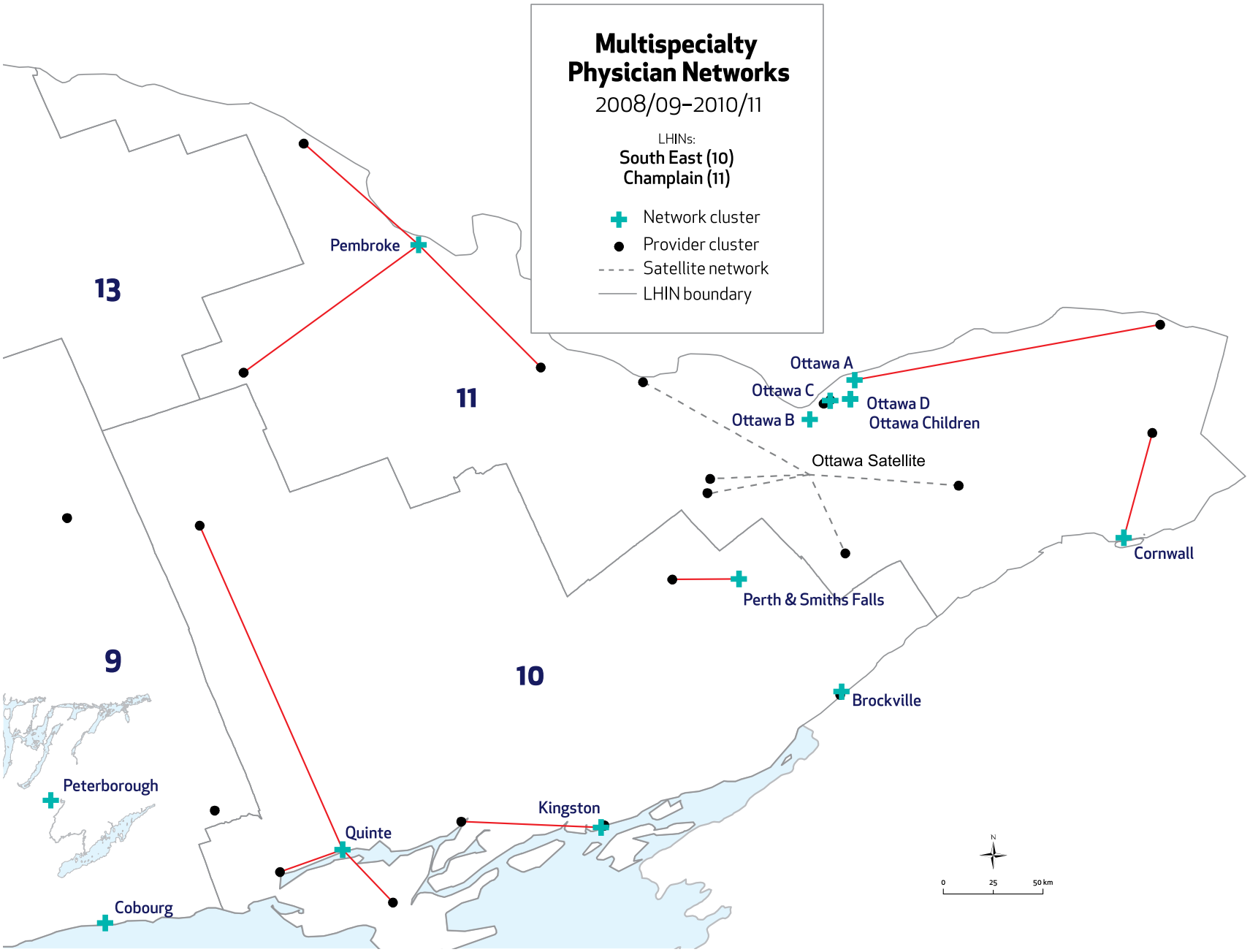

Multispecialty Physician Networks
2008/09–2010/11
LHINs:
Erie St. Clair (1)
South West (2)
Waterloo Wellington (3)
Network cluster
Provider cluster
Satellite network
LHIN boundary
LAKE HURON
LAKE ONTARIO
LAKE ERIE
Grey Bruce -Owen Sound
Collingwood
Owen Sound Satellite
Dufferin
Guelph
Kitchener-Waterloo
Stratford
Cambridge
Woodstock
Brantford
London
Sarnia
St. Thomas-Elgin
Norfolk
Chatham
Windsor B
Windsor A
Leamington
1
2
3
4
5
6
7
8
12
N
0
25
50 km

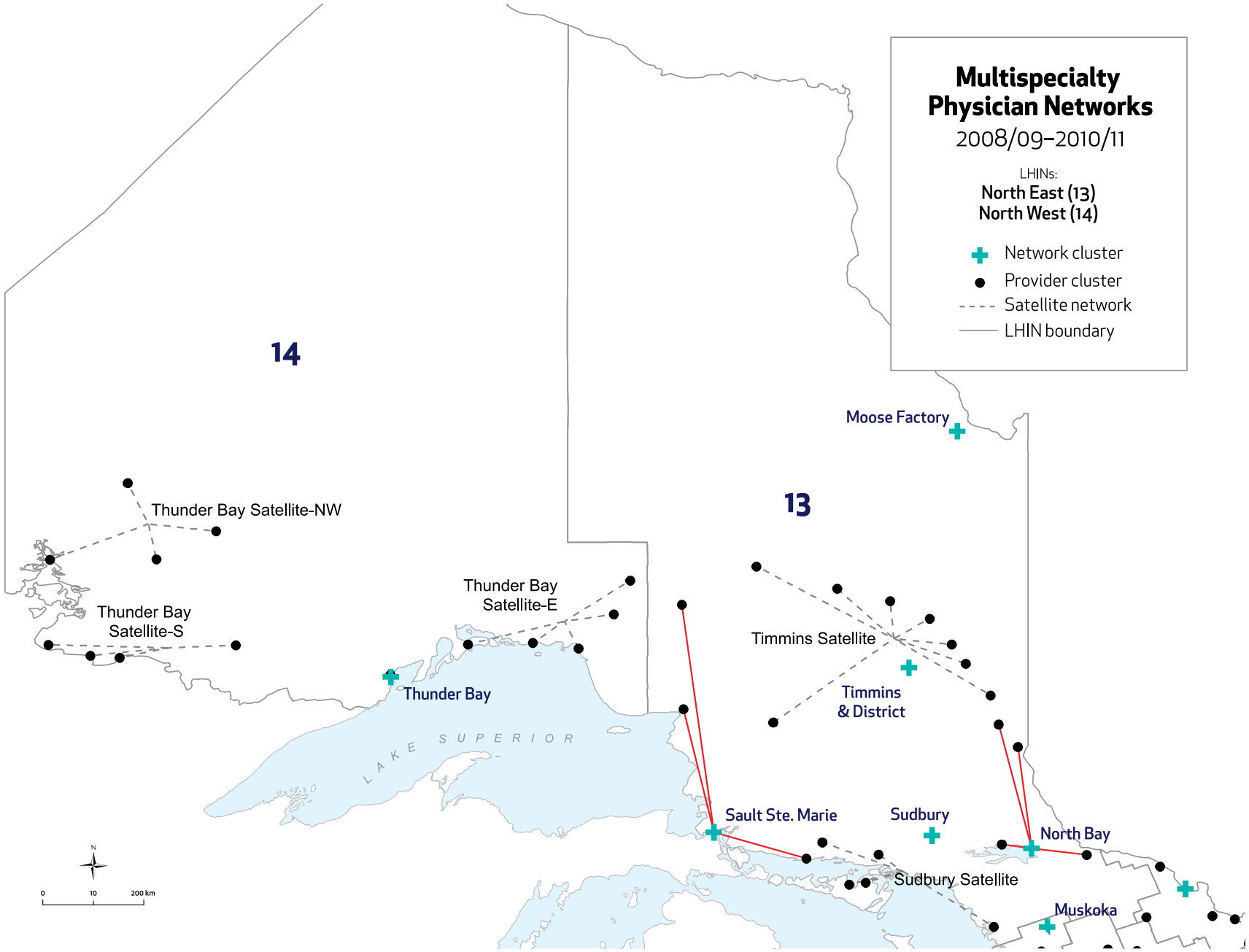

Multispecialty Physician Networks
2008/09–2010/11
LHINs:
Hamilton Niagara Haldimand Brant (4)
Mississauga Halton (6)
Network cluster
Provider cluster
LHIN boundary
3
6
7
4
2
Guelph
Mississauga A
Mississauga B
Kitchener-Waterloo
Oakville
Cambridge
Burlington
Hamilton A
Hamilton B
St.Catharines
Brantford
Niagara Falls
Welland
Norfolk
LAKE ERIE
N
0
10
20 km


Multispecialty Physician Networks
2008/09–2010/11
LHINs:
Central West (5)
Central (8)
North Simcoe Muskoka (12)
Network cluster
Provider cluster
LHIN boundary
LAKE HURON
13
Muskoka
Georgian Bay
9
Orillia
12
Collingwood
Barrie
Newmarket
5
8
Dufferin
Oshawa
York
Markham Stouffville
North West Toronto A
North West Toronto B
North York
Scarborough C
West Durham
Scarborough A
Brampton
Etobicoke
Scarborough B
7
6
N
0
10
20 km


8
9
5
7
6
Scarborough C
Scarborough A
North York
Scarborough B
North West Toronto A
Etobicoke
North Toronto
North West Toronto B
East Toronto
LAKE ONTARIO
Toronto Mental Health and Addictions
Downtown Toronto C
Downtown Toronto A
Downtown Toronto B
Toronto Children
South West Toronto
Mississauga B
N
0
5
10 km
Multispecialty Physician Networks
2008/09–2010/11
LHIN:
Toronto Central (7)
Network cluster
Provider cluster
LHIN boundary


13
12
9
8
7
Muskoka
Lindsay
Peterborough
Oshawa
Cobourg
Markham Stouffville
Scarborough C
West Durham
Scarborough A
Scarborough B
LAKE ONTARIO
N
0
10
20 km
Multispecialty Physician Networks
2008/09–2010/11
LHIN:
Central East (9)
Network cluster
Provider cluster
LHIN boundary

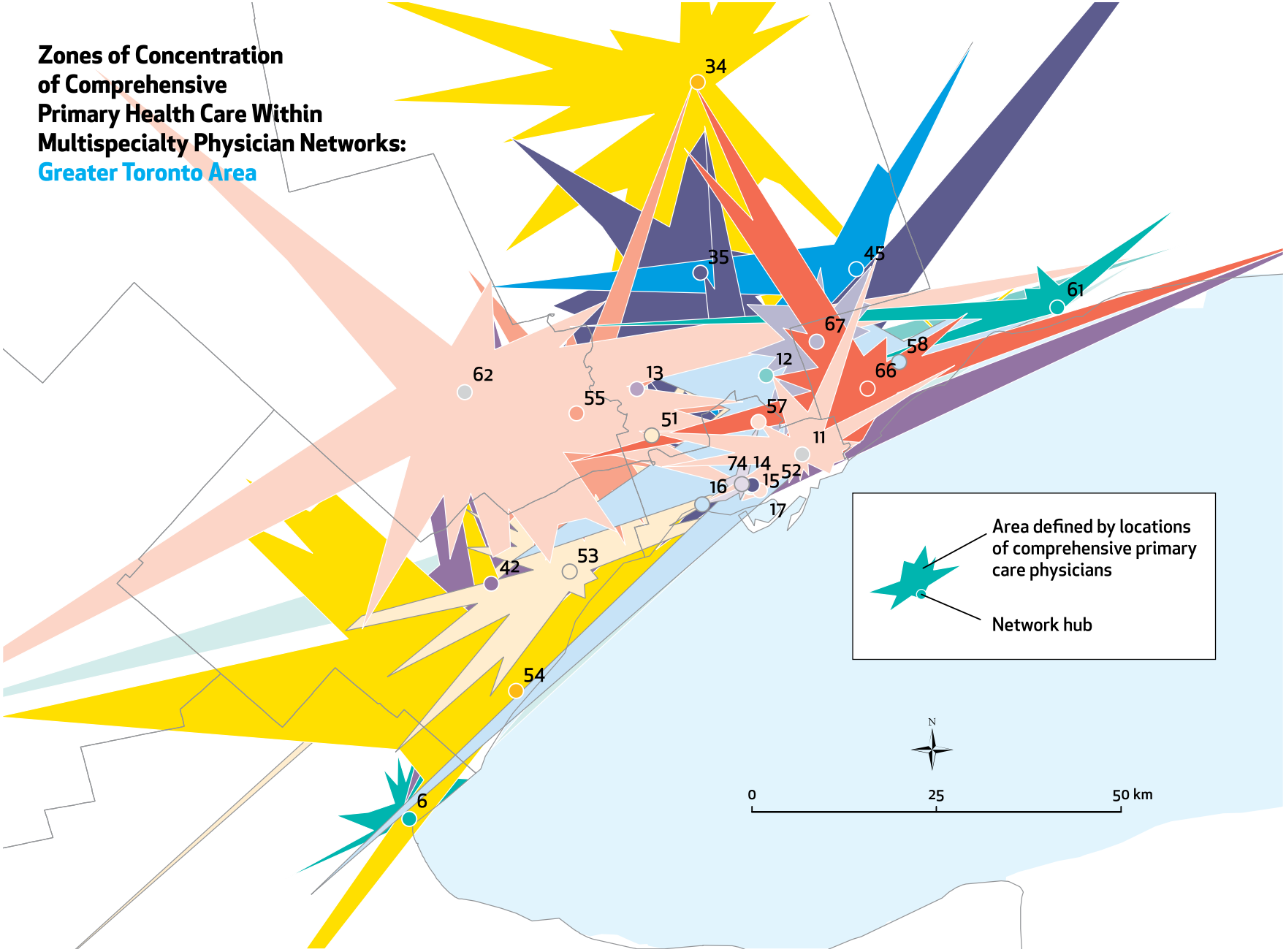

Multispecialty Physician Networks
2008/09–2010/11
LHINs:
South East (10)
Champlain (11)
Network cluster
Provider cluster
Satellite network
LHIN boundary
13
11
9
10
Pembroke
Ottawa A
Ottawa C
Ottawa D
Ottawa B
Ottawa Children
Ottawa Satellite
Cornwall
Perth & Smiths Falls
Brockville
Peterborough
Kingston
Quinte
Cobourg
N
0
25
50 km

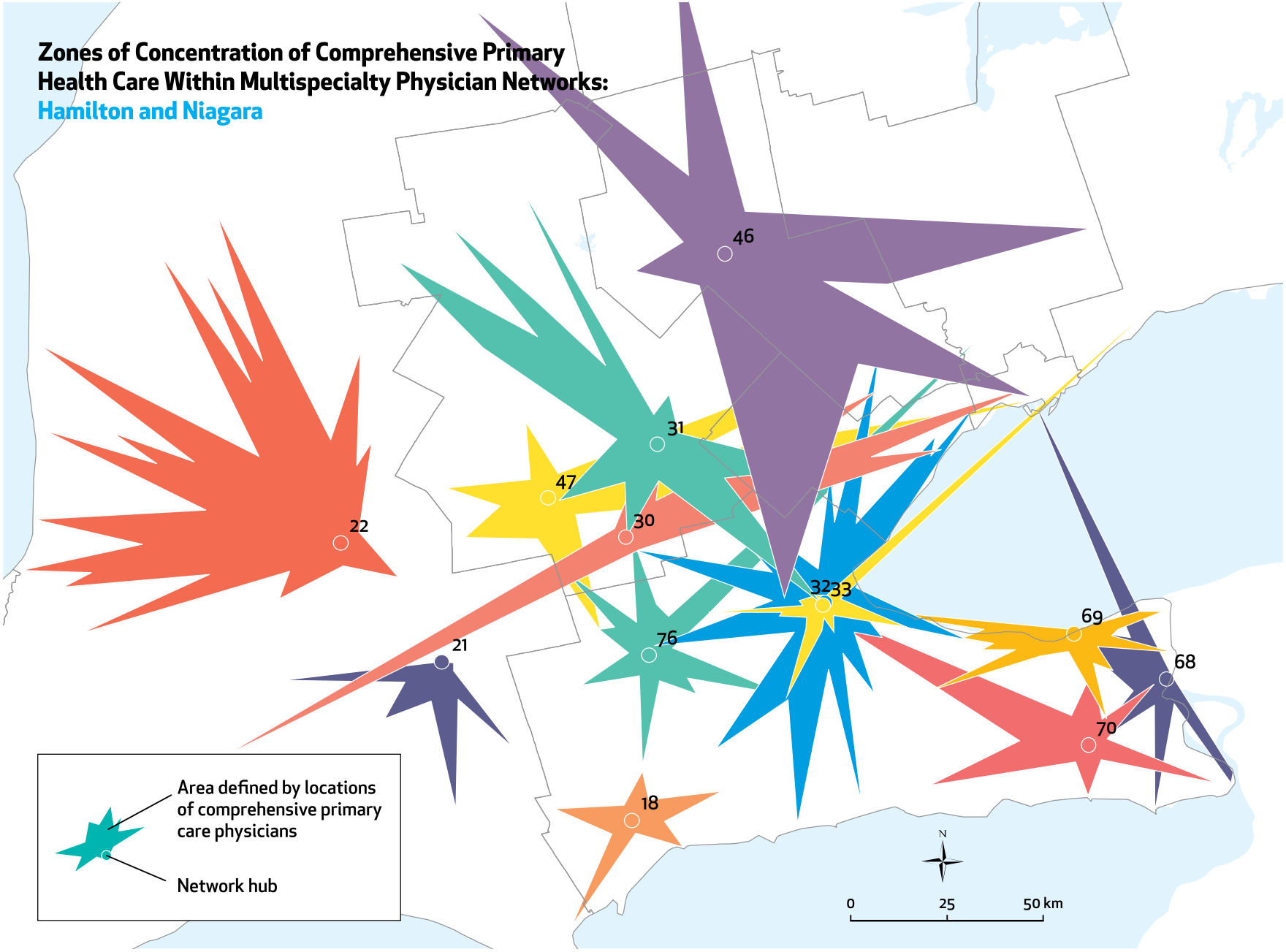

Multispecialty Physician Networks
2008/09–2010/11
LHINs:
North East (13)
North West (14)
Network cluster
Provider cluster
Satellite network
LHIN boundary
14
13
Moose Factory
Thunder Bay Satellite-NW
Thunder Bay Satellite-S
Thunder Bay Satellite-E
Thunder Bay
Timmins Satellite
Timmins & District
LAKE SUPERIOR
Sault Ste. Marie
Sudbury
North Bay
Sudbury Satellite
Muskoka
N
0
10
200 km

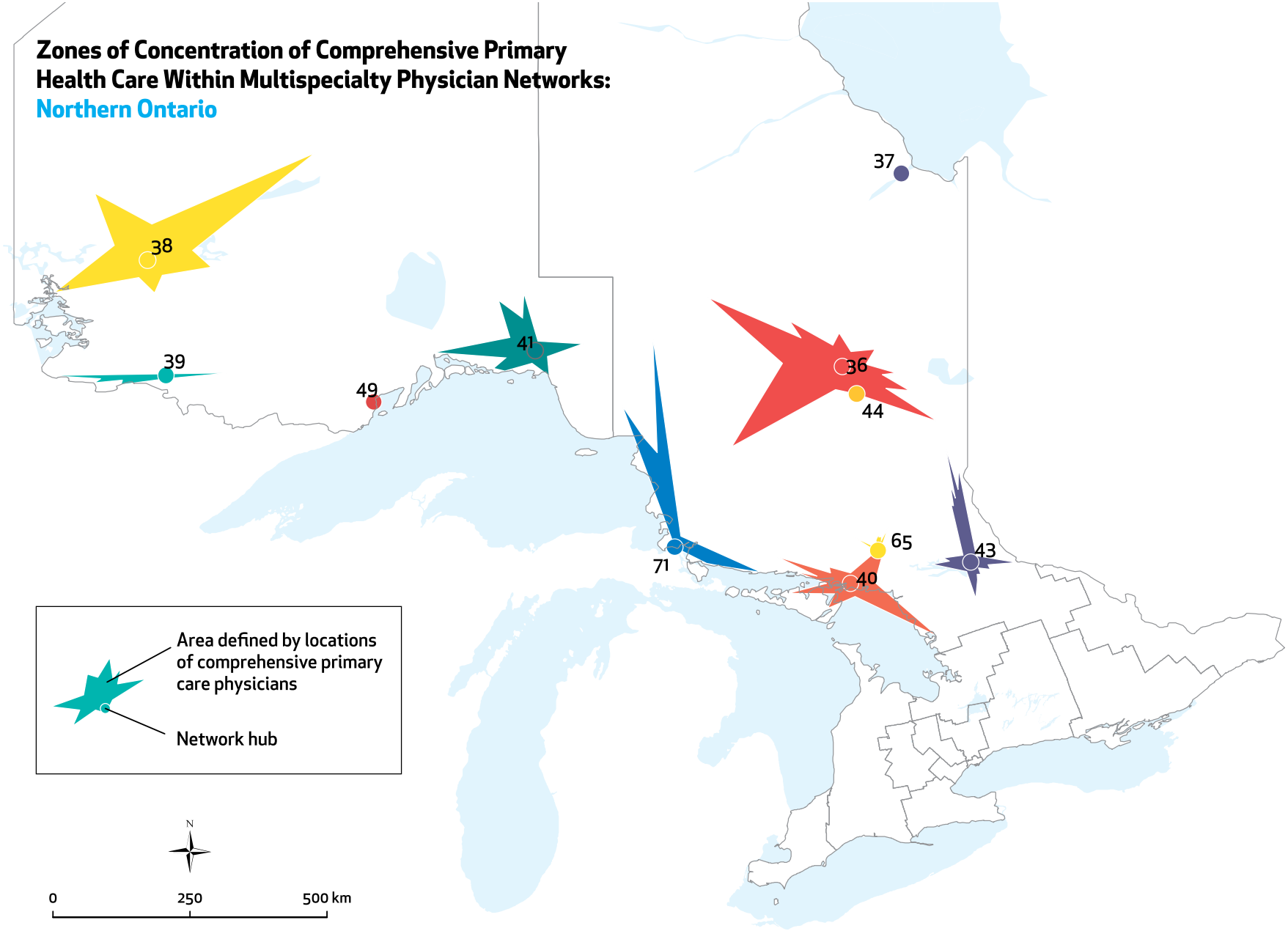
APPENDIX E Zones of Concentration of Primary Care Physicians within Multispecialty Physician Networks

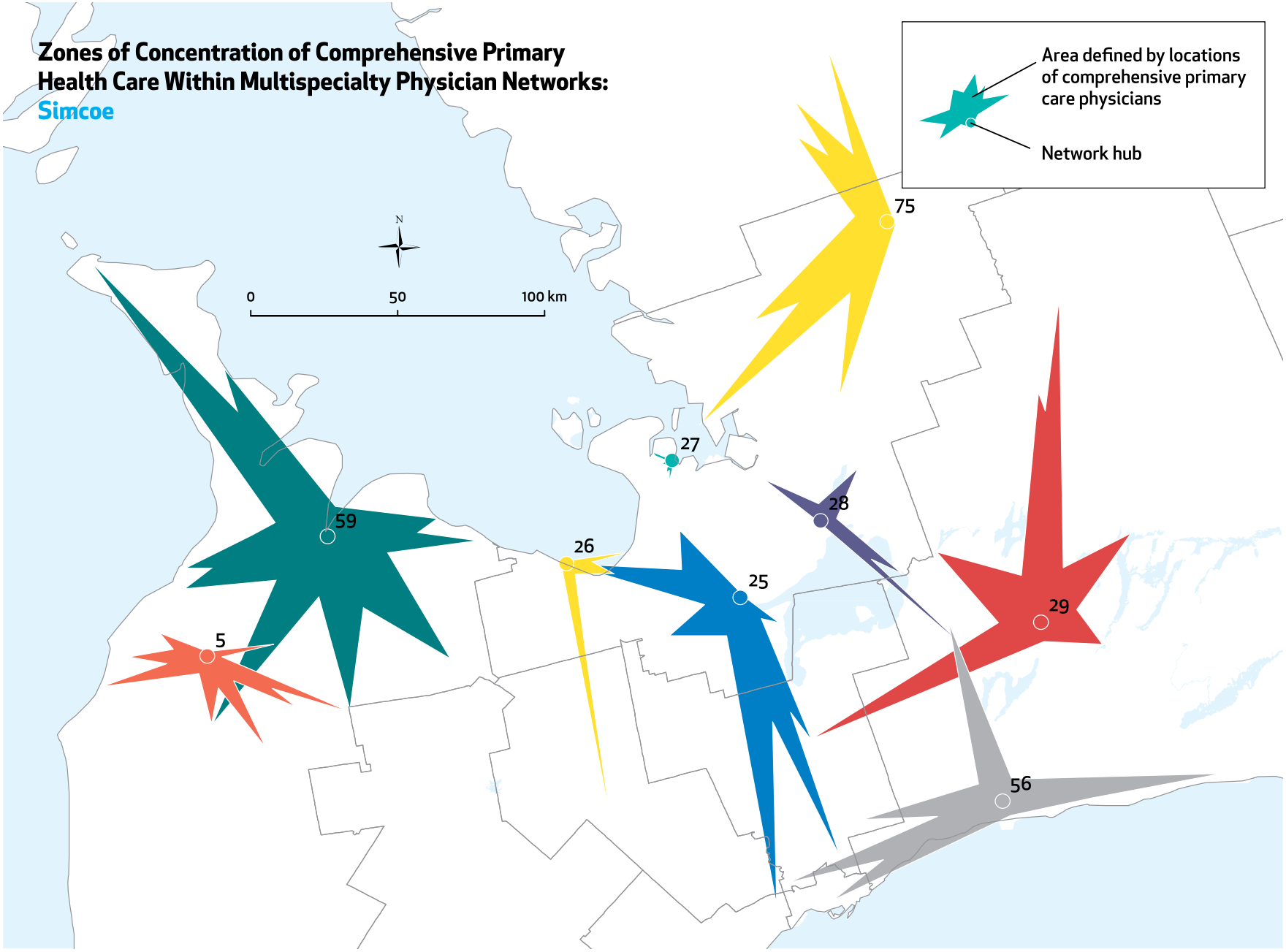
To create the following six maps, lines were drawn between the billing postal codes of primary care physicians and the postal code of the primary network hospital, after removal of outliers (defined as those for whom this distance was more than 100 km). The "stars" show locations of the primary care physicians linked to a network.

Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks: Greater Toronto Area

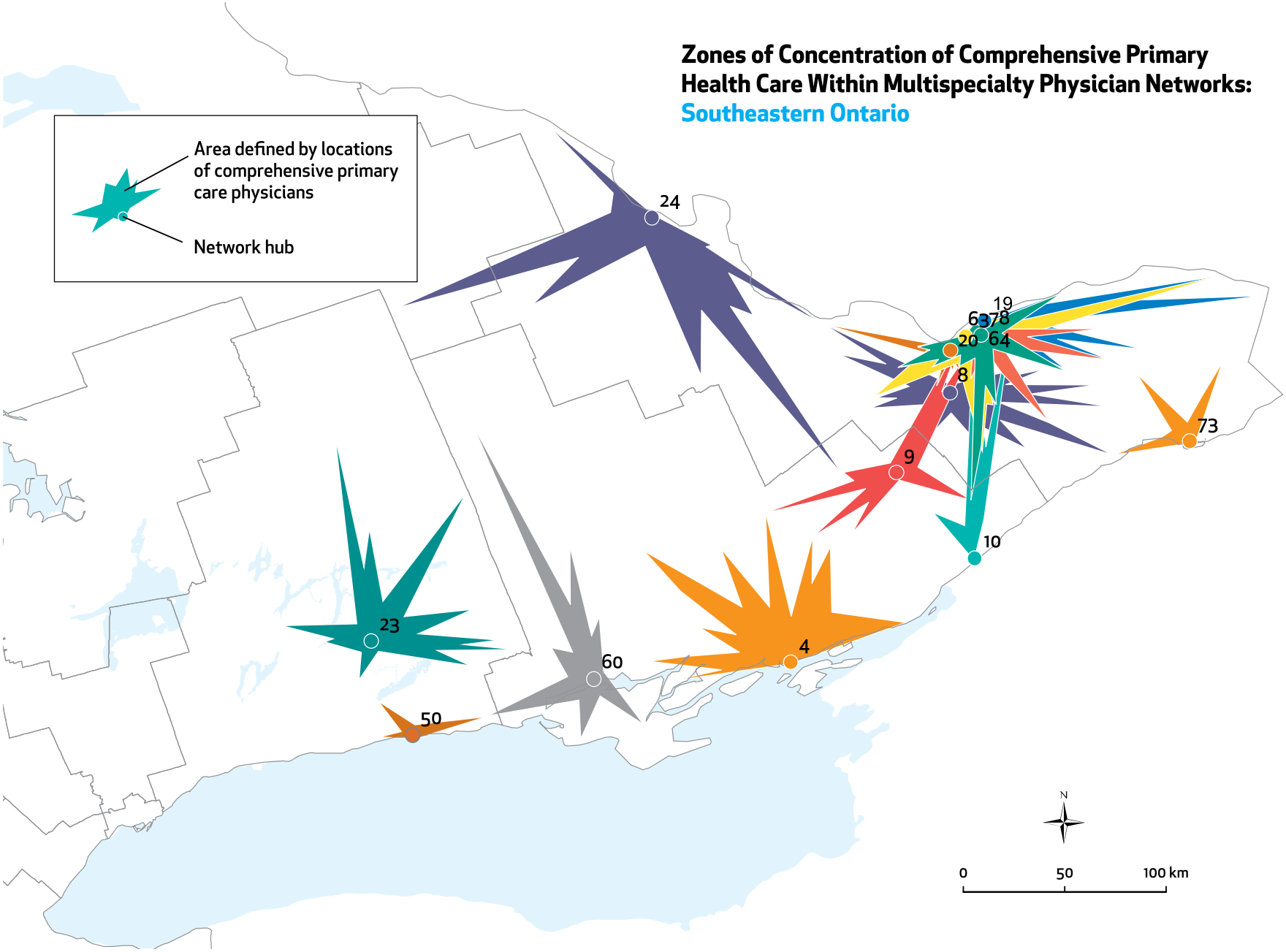



Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks:
Hamilton and Niagara
46
31
47
22
30
32
33
69
76
21
68
70
18
Area defined by locations of comprehensive primary care physicians
Network hub
N
0
25
50 km

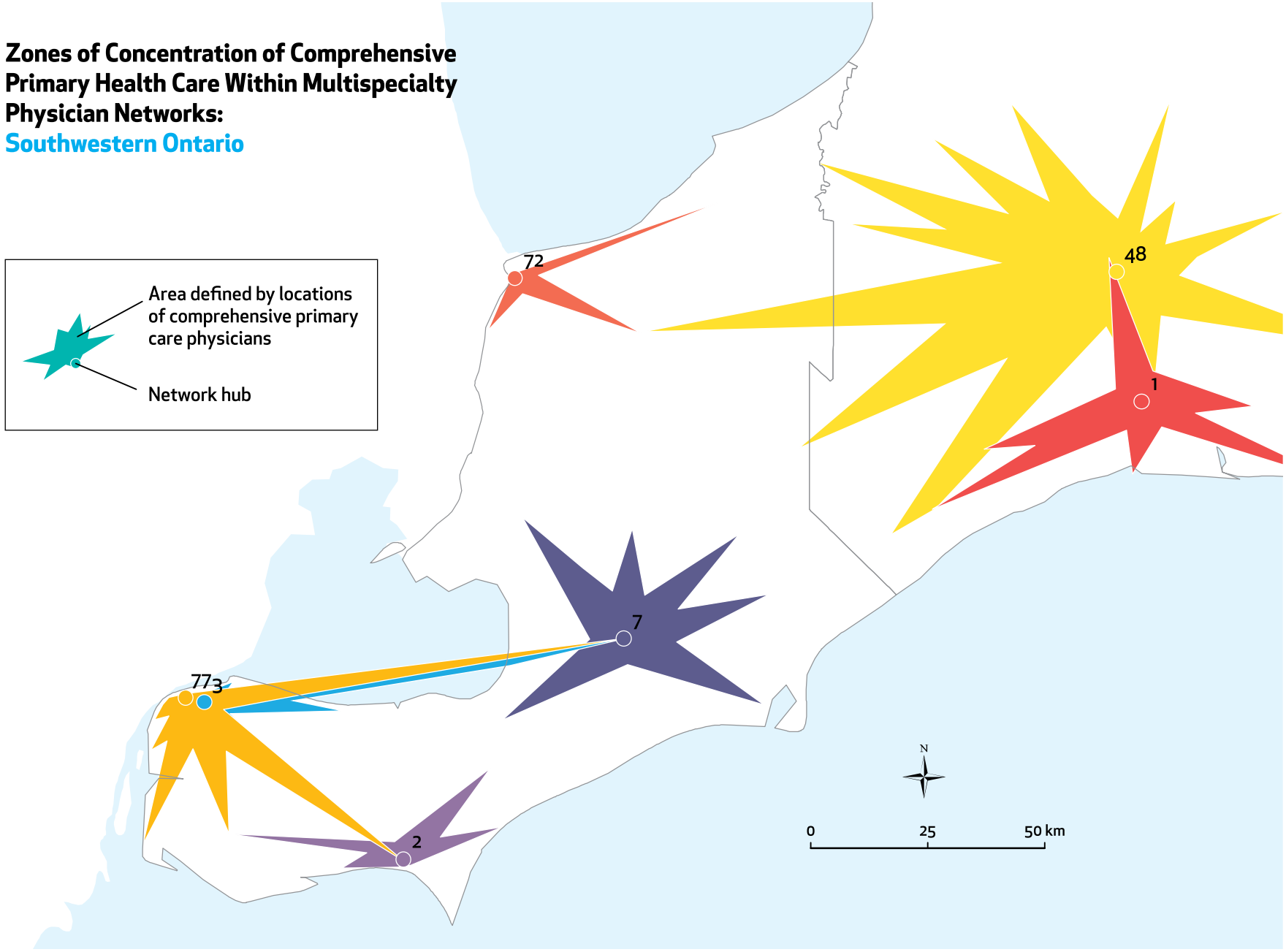

Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks:
Northern Ontario
37
38
39
41
49
36
44
71
65
40
43
Area defined by locations of comprehensive primary care physicians
Network hub
N
0
250
500 km


Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks:
Simcoe
Area defined by locations of comprehensive primary care physicians
Network hub
N
0
50
100 km
75
27
28
59
26
25
29
5
56

Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks: Southeastern Ontario



Zones of Concentration of Comprehensive Primary Health Care Within Multispecialty Physician Networks:
Southwestern Ontario



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