Practice Points

Jan – Jun 2020

Volume 7

Quality of Care NL

The right intervention, for the right patient, at the right time, with good outcomes.

Choosing Wisely NL™

Our partnership with Choosing Wisely Canada builds upon established national guidelines and recommendations that cross all disciplines to support the reduction of low-value health care, particularly where harms outweigh benefits.

Health System Performance in NL

Quality of Care NL

Who We Are

Quality of Care NL is an applied health systems research and evaluation program aimed at improving the quality of care delivered in Newfoundland and Labrador (NL). We work to ensure the right treatment gets to the right patient at the right time.

Our partnership with Choosing Wisely Canada builds upon established national guidelines and recommendations that cross all disciplines to support the reduction of low-value health care, particularly where harms outweigh benefits. This work is carried out by Quality of Care NL on behalf of Choosing Wisely NL.

Our Approach

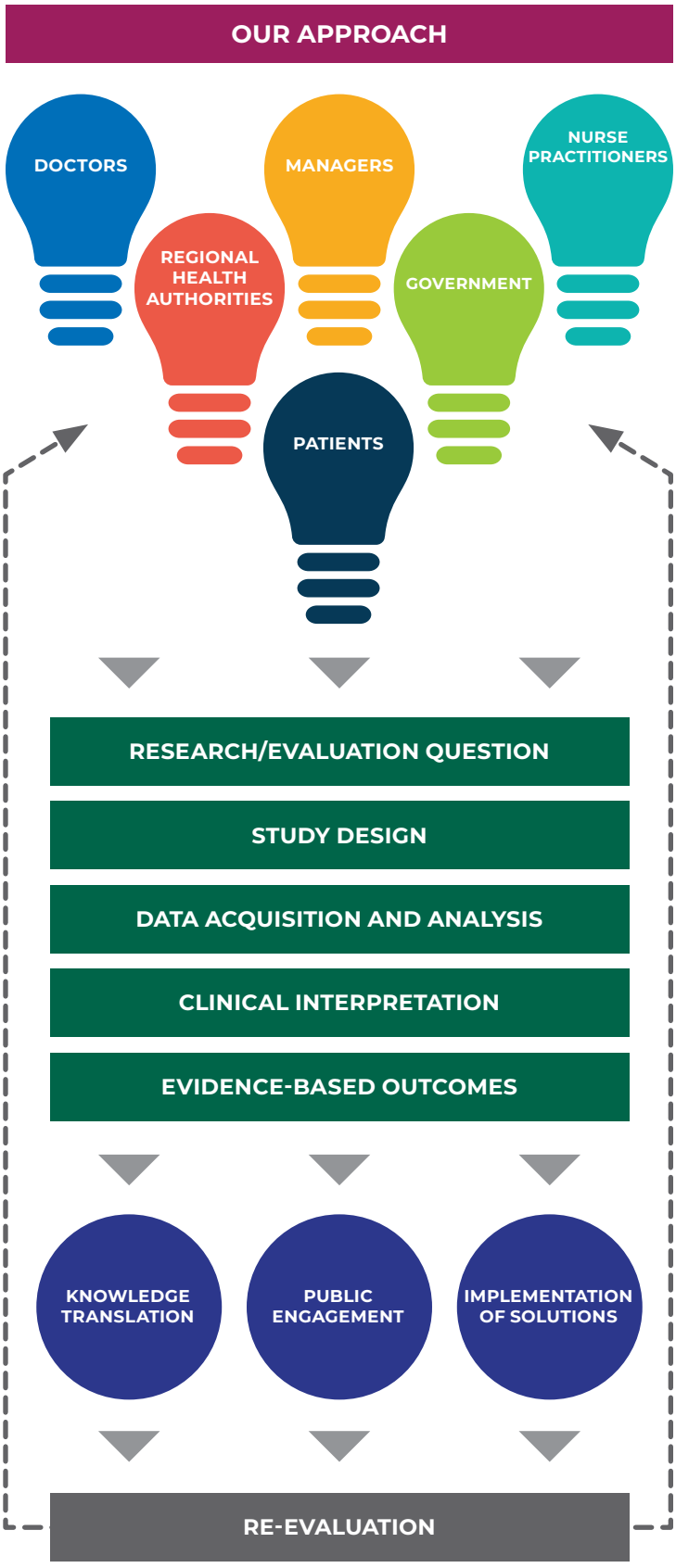
Our research and evaluation projects are centred on health care system priorities and are directed by many partners within the system. Project ideas are generated by health care providers, managers, policy decision-makers, and patients all with questions on how the system can be improved to deliver better quality care.

Quality of Care NL works with project teams to define methodologies, analyze data, provide clinical interpretation, and engage patients to ensure project outcomes are meaningful. We work with and engage all stakeholders to encourage the implementation of evidence-based research and evaluation outcomes through interventions that make it easier to determine the best course of treatment.

Do you have an idea for delivering improved quality of care? Let us help.

For more information on our projects and what we can do to move your idea forward, please contact:

Dr. Patrick Parfrey
Clinical Lead, Quality of Care NL
pparfrey@qualityofcarenl.ca



Our Change Strategies and Projects

These change strategies and projects reflect the strategic direction of our partners and the priorities of the people of NL, as set through a patient-oriented priority-setting process.

Report Cards and Academic Detailing

Acute Care Hospitals

Length of Stay
Stroke
Colonoscopy
Mammography
Antibiotics
Enhanced Recovery After Surgery (ERAS)
Surgery
Pre-operative Testing
Imaging
Drugs

Family Physicians

Drugs
Imaging
Biochemical Tests
Practice Characteristics

Long-Term Care Facilities

Drugs
Restraints
Falls
Length of Stay
Incidence & Prevalence of Clients
Physical/Cognitive Disability

Cardiac Cath Referrals

Stable Angina
Acute Coronary Syndrome

Health Care Restructuring

Regional Disparities

Urban vs. Rural

Acute Hospital Services

Obstetrics
Surgery
Pediatrics
Medicine
Alternate Level of Care

Community Services

Primary Care
Remote Monitoring
Telehealth

Long-Term Care

Nursing Home
Personal Care Home
Community

Engagement with the Public, Care Providers and Decision Makers

Medical Education

STARS
Research Apprenticeship Program
Lectures to Medical Students and Trainees

Public Campaigns

Antibiotics
Stroke
Proton Pump Inhibitors
Talk to your Provider

Tools & Resources

qcnl.ca
Practice Points
Scrip Pad
Posters
Videos

Events

SHARE Summit
Future Forums
Research Week
Health Accord NL

Implementation and eOrdering

eOrdering

Cardiac Cath
Carotid Artery Testing
CT Scans
Biochemical Testing
Virtual Care

Implementation of Process Change

CODE Stroke
- tPA Usage

ERAS
- Colorectal
- Thoracic
- Head & Neck
- Orthopedic

Mammography
- Time to Diagnosis

Randomized Control Trials

How to influence demand for antibiotics
Reduction of imaging for low back pain
Reduction of Pre-op testing in low risk surgeries
How to inform doctors on imaging use

Table of Contents

6. QUALITY OF CARE IN ACUTE CARE HOSPITALS

7. QUALITY OF CARE IN THE COMMUNITY

8. PATIENT-ORIENTED RESEARCH

Six Evidence-Based Strategies to Improve Health in NL, Based on Comparisons of Health System Performance in Canadian Provinces, Australia, and Tasmania

Objective

To summarize the evidence and strategies derived from comparisons of health system performance in Newfoundland & Labrador (NL), Canada (CAN), and Australia (AUS).

Increase Social Spending and Preventative Care

Evidence

- Life expectancy is the worst in Canada: 2.6 years lower
- 232% increase in medical spending compared to flat social spending over the past four decades
- Highest rates of unhealthy non-medical determinants of health in Canada
- St. John's is the city with the highest rate of food insecurity in Canada.
- Lowest discussion of non-medical determinants of health with provider in Canada
- 29% skipped dental care because of cost
- Worst prevalence of chronic disease, cancer and vascular mortality in Canada

Strategy

- Create a 10-year budget plan to increase proportion of the provincial budget on social spending
- Develop a plan to improve rate of homeless-ness, precarious housing and food insecurity
- Enhance the impact of the education system on non-medical determinants of health with a focus on supporting healthy eating, more exercise, and prevention of obesity, alcohol abuse, and smoking
  - Make improvement in non-medical determinants of health, especially in parents of children attending school, a focus of primary care renewal
  - Put into practice a "Health in All Policies" of Government to Promote health

Transform Primary Care

Evidence

- Low percentage of adults who talked to their provider about preventative care
- Low influenza vaccination rate for seniors
- High avoidable hospital admissions
- High use of low-value/unsafe care: antibiotics, long-term PPIs, psychotrophic drugs for seniors, CT scanning
- Low performance on patient engagement metrics
- Low percent of seniors with end-of-life directives
- Poor after-hours or weekend acess to family physicians
- 43% of family physicians spend 1–14 minutes with patients compared to 28% for Canada
- Low use of nurse practitioners in primary care

Strategy

- Transform primary care with an emphasis on group practices, multi-disciplinary care, nurse practitioners, e-technology and communication, provision of after-hours and weekend cover, and an accountability structure for the use of health care resources

Centralize Some Acute Hospital Specialties

Evidence

- High number of acute care hospitals but low number of specialists
- High level of many hospital services, relative to the population, but without the resources for optimal service
- Poor coordination of care between specialists and family physicians
- Poor access to specialists
- High cancer mortality
- High in-hospital myocardial infarction and stroke mortality
- Poor thrombolysis rates for ischemic stroke

Strategy

- Centralize some hospital specialties with an emphasis on the appropriate level of complexity for each hospital site and specialty area, use of multi-disciplinary teams, and an accountability structure to improve access and outcomes

Reduce Low-Value Care & Improve Quality of Care

Evidence

- High use of drugs associated with harm and of CT scanning in primary care
- High use of blood tests
- Longer than optimal wait times for interventions
- High in-hospital mortality for myocardial infarction and stroke
- Poor thrombolysis rates for ischemic stroke

Strategy

- Create an executive plan with stakeholders to improve the uptake of audit, feedback, and academic detailing on the use of health care resources in hospitals, long-term care facilities and in the community, that includes an accountability infrastructure
- Provide recommendations on e-ordering, implementation teams to improve care process, system care, public engagement and other interactions to improve quality
- Create a Quality of Care Health Council with legislative approval to evaluate and make recommendations on health quality and health system performance

Social Model for Care of the Aging Population

Evidence

- Low rate of end-of-life directives in seniors
- High use of benzodiazapine and antipsychotics in seniors
- Over half of seniors are at moderate/high risk of falling
- Low number of long-term care workers per 100 people ≥65 years
- Sparce geriatric services
- Support for ageing at home by Department of Health and Community Services
- High occupancy and high alternate level of care in acute care hospitals because of waiting for long-term care services

Strategy

- Create a new model of care for frail seniors that increases geriatric services, increases end-of-life directives, supports ageing at home, and encourages provision of medical care in long-term care facilities (not in acute care hospitals), and provides more long-term care workers in a better workplace environment, as recommended by the Royal Society of Canada report

Enhance Electronic Infrastructure

Evidence

- Low percentage of family physicians who report e-clinical decision support
- Poor bidirectional coordination of care
- Use of e-infrastructure to remove inequities is not optimal
- High rate of low-value care: CT scanning, blood tests, antibiotics, other drugs
- Need for virtual communication in multi-disciplinary primary care for areas with low population density

Strategy

- Create a plan involving stakeholders at the NL Centre for Health Information, RHAs, NL Medical Association, Department of Health and Quality of Care NL to enhance virtual communication, bidirectional coordination of care, access, e-ordering, e-support, and decision tools

Health and Social Spending in NL

Objective

To examine changes in health and social spending since 1981 and compare metrics on the non-medical determinants of health in NL to those in the other Canadian provinces.

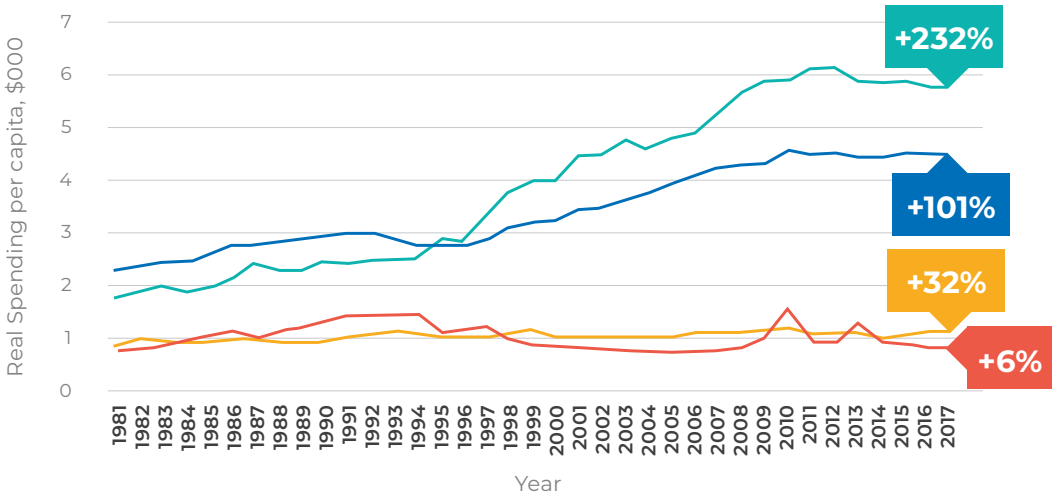
Practice Points

1. Life expectancy, prevalence of chronic disease, and incidence of cancer and vascular disease in NL are the worst in Canada, all of which are strongly influenced by non-medical determinants such as unemployment, education, income, diet, physical activity, smoking, and alcohol use.

Methods

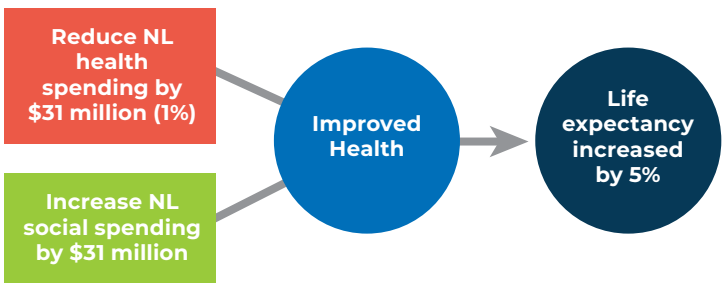
1. Data on non-medical and social determinants of health for 2017–18 was obtained from the Canadian Institute for Health Information (CIHI) and Statistics Canada. For each metric, NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst.
2. Real per capita health and social spending by the NL provincial government and the Canadian average for all provincial governments for 1981–2017 was requested from D. Dutton, Dalhousie University.
3. Analysis of the impact of social spending on health outcomes is cited from Dutton et al. (2018). CMAJ.

Results



- Since 1981, health spending in NL has increased by 232% in real spending per capita and social spending has been flat.

Figure 1. Real per Capita Canadian and NL Health and Social Spending



- Canadian research (Dutton et al., 2018) demonstrates that by spending one more cent on social services for every dollar spent on health, life expectancy in Canada could increase by 5% and avoidable mortality could drop by 3%.

Table 1. Non-medical and Social Determinants of Health, 2017–18

		CAN	NL	NL Rank
Healthy Eating	Fruit consumption at least once per day	66.5%	56.3%	10
	Vegetable consumption at least once per day	55.9%	34.1%	10
	Fruit or vegetable consumption 5+ times per day	28.6%	18.3%	10
Physical Activity	Adults (age 18+): 150 minutes per week	56.0%	49.4%	10
	Youth (age 12-17): 60 minutes per day	57.8%	51.0%	9
Alcohol Use	Heavy drinker	19.3%	26.7%	10
	Consumption (litres per capita)	8.2	9.1	10
Current Smoker	Daily or occasional	16.0%	20.8%	10
	Daily	11.3%	16.7%	10
Breast-feeding	Initiation	91.0%	70.6%	10
	Exclusive, at least 6 months	34.5%	20.6%	10
Employment	Unemployment rate	6.0%	14.8%	10
Income	Living on low income	8.7%	9.7%	9
Education	Tertiary education	58%	49%	9
	Bachelor's level or above	32%	20%	10
Family	Children living in lone-parent family	19.2%	23.2%	8
	Children living in a family without their parents	1.4%	2.0%	8
Stress	Most days quite a bit or extremely stressful	21.4%	14.9%	1
Belonging	Somewhat or very strong sense of belonging	68.9%	77.8%	1
Life Satisfaction	Satisfied or very satisfied	93.2%	92.6%	7

- NL has the lowest provincial ranking for the non-medical determinants of health in Canada.

Conclusions

1. NL ranks poorly in many non-medical and social determinants of health, relative to the rest of Canada. It would be better to address these factors than increase spending in the health care system.

2. Over 37 years, the level of social spending by the NL government has remained almost unchanged, while the level of health spending has more than tripled.

3. Reallocating some NL government expenditure from health to social spending would result in improved health outcomes, even if total government spending remained the same.

4. A preventative approach to improving population health requires coordinated action outside of the health sector, a review of policies in all government sectors to determine opportunities to promote health across the life cycle, and a "Health in all Policies" plan to address the non-medical factors which lead to the diminished life expectancy and excess comorbidity observed in NL.

5. Health promotion is not currently a responsibility of the Department of Health and Community Services, and should be. An integrated and imaginative approach is necessary targeted at children in school and parents through primary care, plus a communications plan to influence the population.

Mortality Rates and Co-Morbidity in NL Compared to Canada

Objective

To compare disease specific mortality rates and co-morbidity associated with COVID-19 risk in NL and Canada (CAN).

Practice Points

1. Health system structure should target the most frequent clinically important diseases defined by death and major clinical events.

2. We defined co-morbidity as disorders that increased risk for major adverse events in patients with COVID-19.

Methods

1. Provincial health outcomes for the most recent year available were obtained from CIHI (2015-17; 2018-19) and Statistics Canada (2017-18; 2018). NL was ranked against other provinces with 1=best/healthiest and 10=worst/unhealthiest.

2. Risk factors for severe illness from COVID-19 was obtained from the Centers for Disease Control and Prevention (CDC).

Results

Table 1. Life Expectancy (in Years) and Mortality (Rate per 100,000 Population) in Canada and NL, and Provincial Rank of NL

		CAN	NL	NL Rank
Life Expectancy	At birth	82.1	79.5	10
	At age 65	21.0	18.9	10
All causes mortality	Crude rate	766.4	993.0	9
	Age-standardized rate	671.8	839.8	10
Avoidable deaths	Overall	195	238	9
	From preventable causes	128	149	7
	From treatable causes	67	90	10

- Life expectancy at birth or at 65 years is the worst in Canada, as is the mortality from treatable causes.

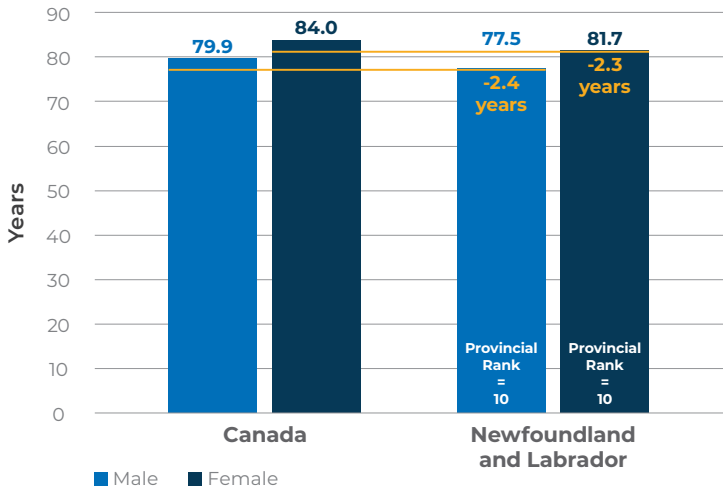


Figure 1. Life Expectancy

Table 2. Age-standardized Mortality Rates per 100,000 Population for Canada and NL and Provincial Rank of NL for the Most Common Natural Causes of Death in Canada

	CAN	NL	NL Rank
Malignant neoplasms	190.0	222.3	10
Diseases of the heart	123.6	167.8	10
Cerebrovascular diseases	31.4	44.2	10
Chronic lower respiratory diseases	30.4	40.9	8
Influenza and pneumonia	19.5	25.9	9
Diabetes mellitus	16.1	34.1	10
Alzheimer's disease	14.6	10.8	5
Nephritis, nephrotic syndrome, and nephrosis	8.4	16.6	10

- Mortality rates in NL are the highest in Canada for cancer, cardiac disease, cerebrovascular disease, diabetes and kidney disease.

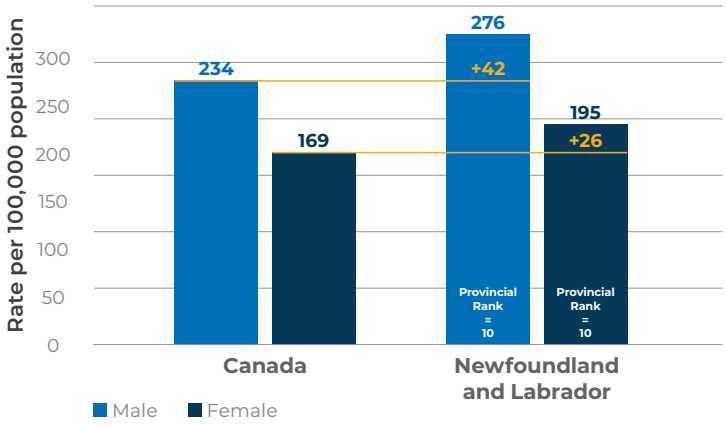


Figure 2. Age Standardized Cancer Mortality

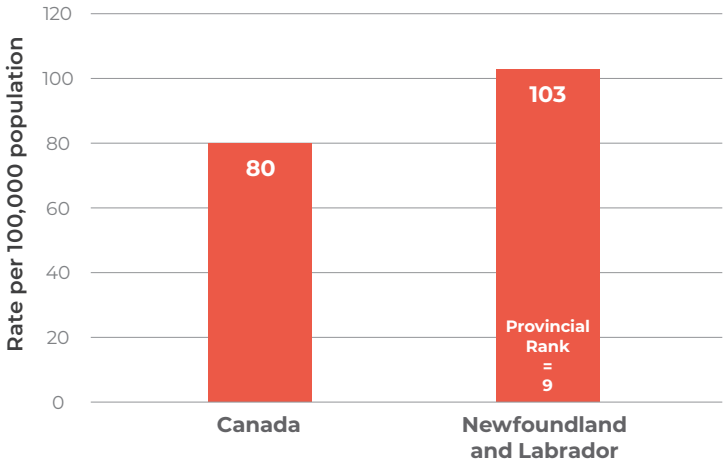


Figure 3. Age-Sex Standardized Cardiac Disease Mortality

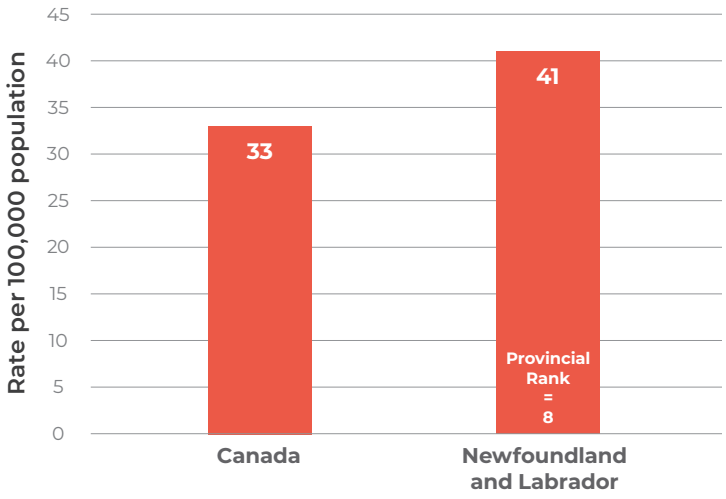


Figure 4. Age-Sex Standardized Stroke Mortality

Table 3. Standardized Rates for the Six Most Common Cancers in Canada (Excluding Quebec)

		CAN	NL	NL Rank
Lung and bronchus	Age-sex standardized incidence rate/100,000	61.4	68.4	6
	5-year survival, %	19	18	4
	Age-sex standardized mortality rate/100,000	47.2	57.5	8
Colorectal	Age-sex standardized incidence rate/100,000	60.5	94	9
	5-year survival, %	65	62	7
	Age-sex standardized mortality rate/100,000	21.8	38.6	9
Breast	Age-sex standardized incidence rate/100,000	128.2	128.9	8
	5-year survival, %	88	85	8
	Age-sex standardized mortality rate/100,000	22	26.2	9
Prostate	Age-sex standardized incidence rate/100,000	116.7	110.1	6
	5-year survival, %	93	93	2
	Age-sex standardized mortality rate/100,000	21.8	27.2	7
Non-Hodgkin's lymphoma	Age-sex standardized incidence rate/100,000	24.4	25.1	8
	5-year survival, %	68	71	1
	Age-sex standardized mortality rate/100,000	6.5	8.2	8
Bladder	Age-sex standardized incidence rate/100,000	25	25.2	6
	5-year survival, %	75	72	7
	Age-sex standardized mortality rate/100,000	5.7	5	2

- NL has high incidence and mortality rates for common cancers in comparison to other provinces and has the highest rate for age standardized mortality for colorectal and breast cancer in the country.

Table 4. Selected Groups at Higher risk for Severe Illness from COVID-19 in Canada and NL

Risk Factor	Measure	CAN	NL	NL Rank
Asthma	Prevelance (age 12+)	8.3%	7.4%	1
	Hospitalization rate per 100,000 population	14.7	21.5	10
	Mortality rate per 100,000 population	0.7	1.3	10
Chronic kidney disease	Incidence per 100,000 population	21.1	25.9	8 (of 9)
	Prevalence per 100,000 population	140.5	167.1	8 (of 9)
	Dialysis prevalence per 100,000 population	81.2	114.2	8 (of 9)
	Mortality rate per 100,000 population	9.8	19.4	10
Chronic lung disease	COPD prevalence	4.1%	5.4%	7
	COPD hospitalization rate per 100,000 population	238.0	288.2	6
	Mortality rate per 100,000 population	35.1	49.7	7
Diabetes	Prevalence	7.1%	9.2%	9
	Hospitalization rate per 100,000 population	95.9	164.8	9
	Mortality rate per 100,000 population	18.4	40.7	10
Chronic liver disease/ cirrhosis	Mortality rate per 100,000 population	4.7	8.4	9
Aged ≥65 years	% of total population	17.5%	21.5%	10
Long-Term Care resident	Per 1,000 population	7.2	7.2	3 (of 6)
Serious heart condition	Mortality rate per 100,000 population	192.6	274.3	10
	Heart failure hospitalization rate per 100,000 population	198.6	211.3	9
	Heart failure mortality rate per 100,000 population	16.6	17.1	6
	Pulmonary hypertension	17.1%	21.5%	9
	Hospitalized heart attacks per 100,000 population	243	340	10
	30-day in-hospital fatality per 100 admissions: AMI	4.8	5.6	10
Obesity	Adults (18+)	26.8%	40.2%	10
	Youth (12-17) overweight or obese	23.7%	31.4%	9

- The prevalence and severity of chronic disease in NL places the province at greater risk of poor outcomes for those who contract COVID-19 than the rest of Canada.

Conclusions

1. The highest mortality rate was for cancer. Reduction in incidence rates requires a focus on Health Promotion through improving the non-medical determinants of cancer. A holistic provincial plan is indicated to improve screening for colorectal and breast cancer and survival rates following diagnosis.

2. The second highest mortality rate was from cardiac disease. Here, a focus on the non-medical determinants of cardiac disease is also necessary. The provincial cardiac program should develop a holistic plan for the province to improve cardiac outcomes.

3. Reduction in the high prevalence of obesity and of diabetes will require improvement in the non-medical determinants of health.

4. The high hospitalization rate for asthma and diabetes indicates a need for improved primary care in the community.

Quality of Care NL

Demographic Change, Health Care Structure, and Value of Health Spending in NL

Objective

To determine demographic change in NL for the last 20 years and predict it for the next 20 years, to provide information on health care structure in regions of NL, and to assess the value of health spending.

Results

A. Demographic Change

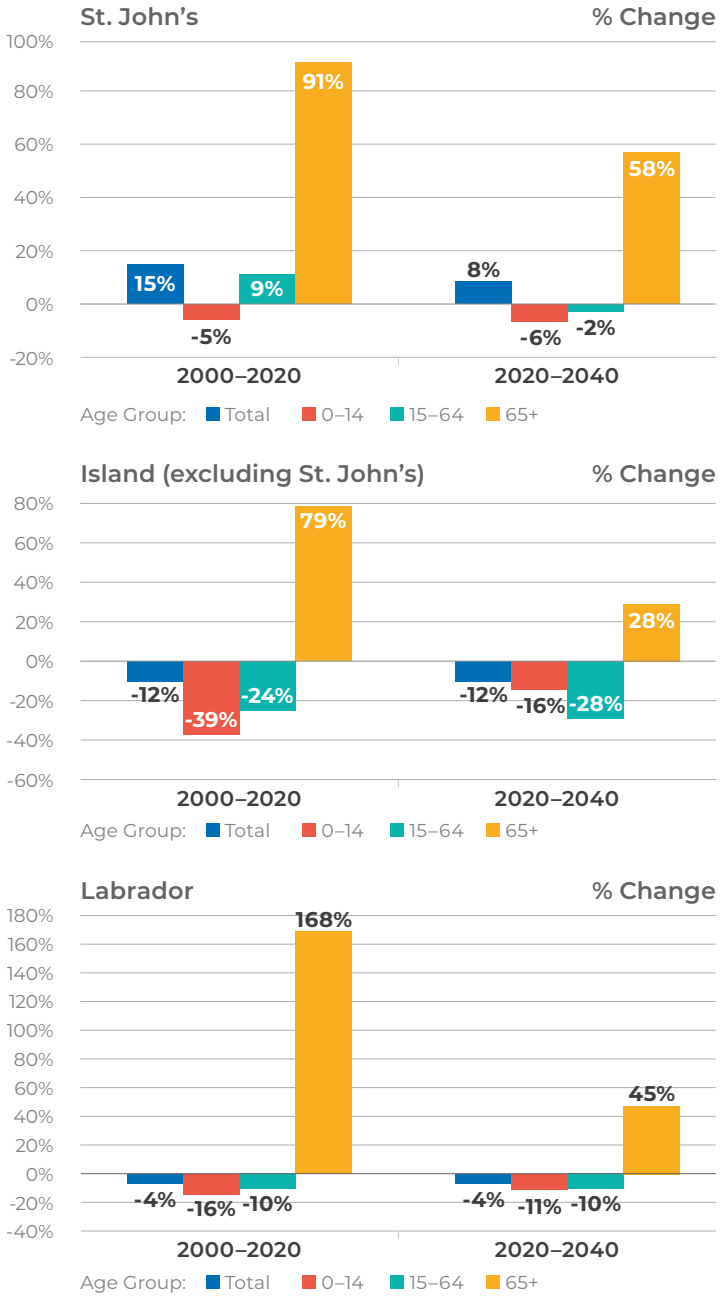


Figure 1. Demographic Change in the three Regions of NL From 2000-2020 and Predicted Change From 2020-2040

- Demographic change in NL has been and will be substantial, with a lower proportion of children, substantially higher proportion of seniors, and a decrease in population outside the Avalon.
- Demographic change in NL is increasing the need for health care services for seniors.

B. Health Structure

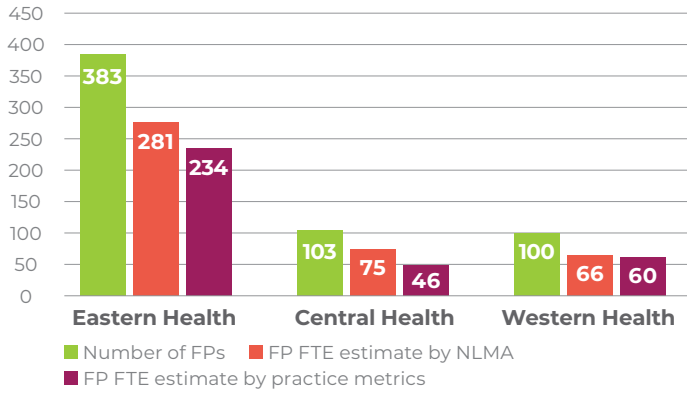
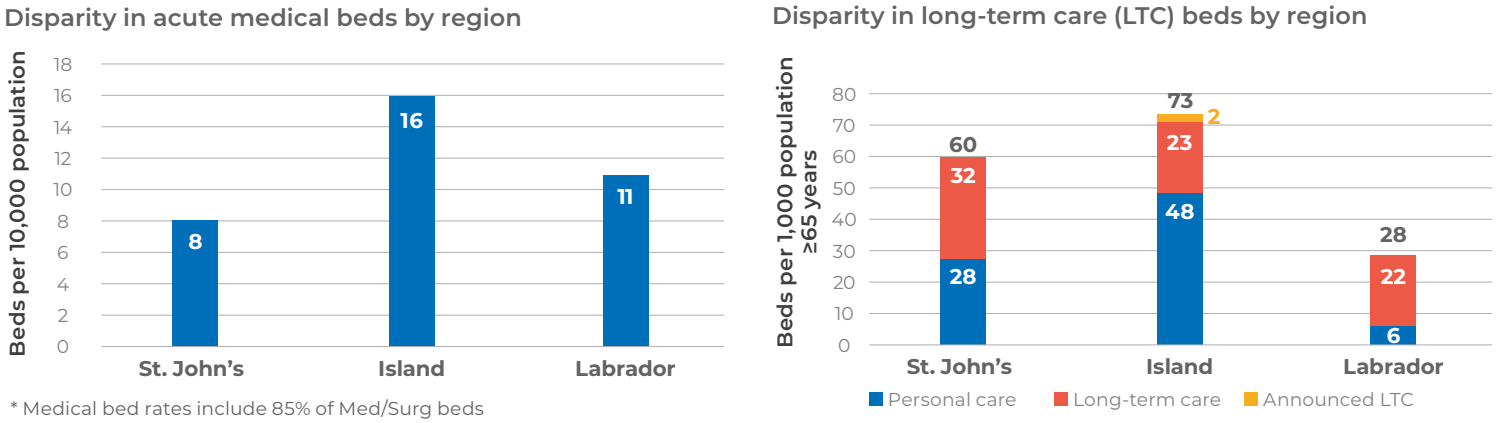


Figure 2. An Estimate of the Number of Fulltime Equivalent (FTE) Family Physicians (FPs) Working in NL

- The number of FTE FPs is substantially less than the number registered: 72% estimated by the NLMA and 59% based on estimates from clinical practice metrics (rate of ordering hemoglobin tests and of antibiotic prescription).
- The rate of FPs/1,000 in NL is 1.2 but the rate of FTE FPs is 0.7

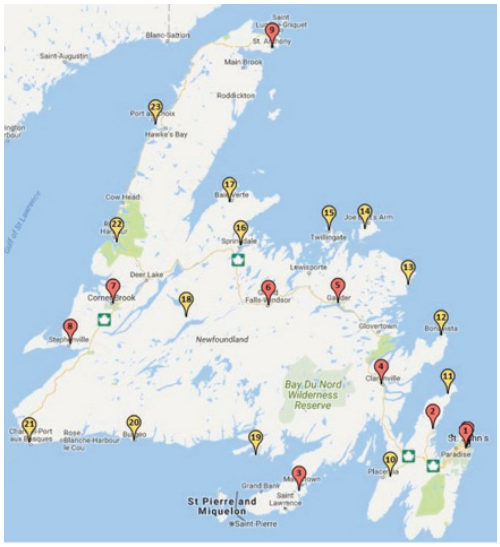
- In the 2019 survey of primary care doctors in NL, 17% were in private solo practices (5th highest in Canada), 40.8 % saw ≥200 patients/week (highest in Canada), 43% spent 1–14 minutes with a patient during a routine visit (second worst in Canada), compared to 27.9% for Canada and 24.7% for Australia.



* Medical bed rates include 85% of Med/Surg beds

Figure 3. Regional Rates of Acute Medicine and Residential Care Beds

- The structure of the institutional health system outside St. John's is not optimal, as there is an excess of acute medical beds and a deficit of long-term care beds.



Provincial Beds:
20 medicine beds + 130 medicine/surgery beds
* With available data, occupancy of medicine/surgery beds exclusively by medical patients could not be calculated

ALC = Alternate Level of Care

Hospitals Newfoundland

1. St. John's (Health Sciences Centre)
Beds: 92; Occupancy: 96%; ALC: 11%

St. John's (St. Clare's)
Beds: 76; Occupancy: 89%; ALC: 21%

2. Carbonear
Beds: 48; Occupancy: 83%; ALC: 15%

3. Burin
Beds: 22; Med/Surg; Occupancy: 69%*; ALC: 16%

4. Clarenville
Beds: 28; Med/Surg; Occupancy: 87%*; ALC: 16%

5. Gander
Beds: 27; Occupancy: 110%; ALC: 27%

6. Grand Falls- Windsor
Beds: 52; Occupancy: 108%; ALC: 38%

7. Corner Brook
Beds: 91; Occupancy: 94%; ALC: 37%

8. Stephenville
Beds: 25 + 16; Med/Surg; Occupancy: 94%*; ALC: 22%

9. St. Anthony
Beds: 24; Med/Surg; Occupancy: 86%*; ALC: 29%

Labrador

Happy Valley-Goose Bay
Beds: 25; Med/Surg; Occupancy: 97%*; ALC: 21%

Labradory City
Beds: 15; Med/Surg; Occupancy: 84*%; ALC: 16%

Health Centres

Overall
Occupancy: 75%; ALC: 42%

10. Placentia
Beds: 10; Occupancy: 42%; ALC: 13%

11. Old Perlican
Beds: 4; Occupancy: 37%; ALC: 4%

12. Bonavista
Beds: 10; Occupancy: 64%; ALC: 26%

13. New-Wes-Valley
Beds: 12; Occupancy: 76%; ALC: 36%

14. Fogo
Beds: 5; Occupancy: 70%; ALC: 49%

15. Twillingate
Beds: 12; Occupancy: 115%; ALC: 50%

16. Springdale
Beds: 9; Occupancy: 95%; ALC: 52%

17. Baie Verte
Beds: 7; Occupancy: 78%; ALC: 42%

18. Buchans
Beds: 3; Occupancy: 51%; ALC: 0%

19. Harbour Breton
Beds: 5; Occupancy: 64%; ALC: 63%

20. Burgeo
Beds: 3; Occupancy: 63%; ALC: 45%

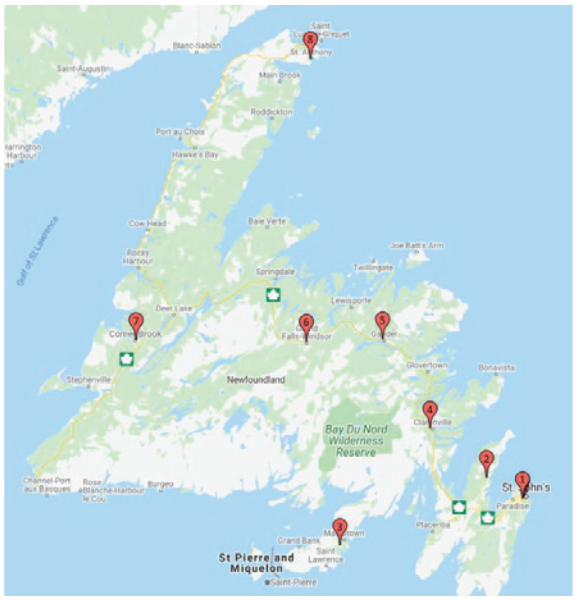
21. Port Aux Basques
Beds: 14; Occupancy: 85%; ALC: 45%

22. Norris Point
Beds: 8; Occupancy: 77%; ALC: 66%

23. Port Saunders
Beds: 7; Occupancy: 46%; ALC: 16%

Figure 4. Distribution and Utilization of Acute Medicine Beds

- There are 520 medicine beds and 130 medicine/surgery beds in 12 hospitals and 14 health centres.



Provincial Totals:
Beds: 112 Births: 3,909 Births/Bed: 35

Newfoundland

1. St. John's (Health Sciences Centre)
Beds: 35; Births: 2,246; Births/Bed: 64

2. Carbonear
Beds: 10; Births: 136; Births/Bed: 14

3. Burin
Beds: 9; Births: 102; Births/Bed: 11

4. Clarenville
Beds: 9; Births: 142; Births/Bed: 16

5. Gander
Beds: 10; Births: 51; Births/Bed: 5

6. Grand Falls- Windsor
Beds: 14; Births: 434; Births/Bed: 31

7. Corner Brook
Beds: 11; Births: 442; Births/Bed: 40

8. St. Anthony
Beds: 14; Births: 59; Births/Bed: 4

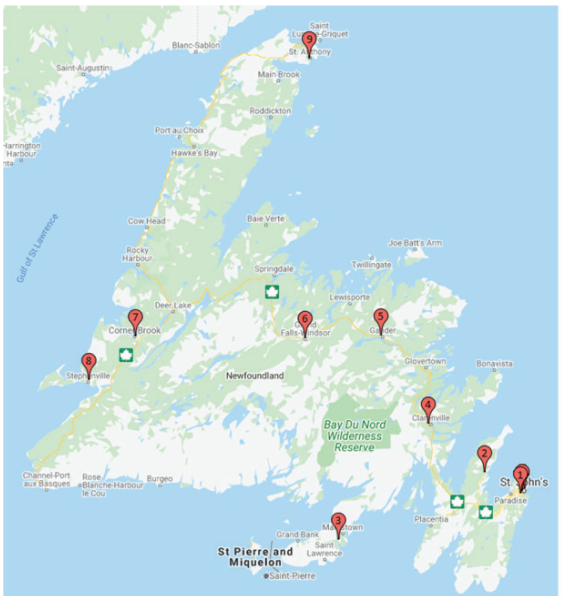
Labrador

Happy Valley-Goose Bay
Beds: 0; Births: 225; Births/Bed: N/A

Labrador City
Beds: 0; Births: 72; Births/Bed: N/A

Figure 5. Distribution and Utilization of Obstetrics Beds

- Capacity for obstetrics care exceeds requirements based on current births.



Provincial Beds:
387 surgery beds + 130 medicine/surgery beds

* With available data, occupancy of medicine/surgery beds exclusively by surgery patients could not be calculated

Hospitals Newfoundland

1. St. John's (Health Sciences Centre)
Beds: 162; Occupancy: 87%; ALC: 4%

St. John's (St. Clare's)
Beds: 104; Occupancy: 77%; ALC: 11%

2. Carbonear
Beds: 8; Occupancy: 60%; ALC: 10%

3. Burin
Beds: 22 Med/Surg; Occupancy: 69%*; ALC: 2%

4. Clarenville
Beds: 28 Med/Surg; Occupancy: 87%*; ALC: 6%

5. Gander
Beds: 40; Occupancy: 93%; ALC: 18%

6. Grand Falls- Windsor
Beds: 20; Occupancy: 90%; ALC: 30%

7. Corner Brook
Beds: 53; Occupancy: 89%; ALC: 39%

8. Stephenville
Beds: 16 Med/Surg; Occupancy: 99%*; ALC: 14%

9. St. Anthony
Beds: 24 Med/Surg; Occupancy: 86%*; ALC: 23%

Labrador

Happy Valley-Goose Bay
Beds: 25 Med/Surg; Occupancy: 97%*; ALC: 3%

Labrador City
Beds: 15 Med/Surg; Occupancy: 84%*; ALC: 0%

Figure 6. Distribution and Utilization of Surgery Beds

- Most surgeries in the province are performed as day surgeries. Capacity for surgery in-patient care exceeds requirements based on current volume.

Table 1. Hospital and Health Centre Metrics

Large Hospitals	Stays	Beds	Occupancy	Cost/Stay
St. Clare's Mercy	6,923	192	82%	$5,837
Health Sciences Centre	15,299	345	93%	$6,160
James Paton Memorial	2,668	85	98%	$6,580
Central NL Region	3,409	115	99%	$5,628
Western Memorial	5,883	217	88%	$5,298
Small Hospitals	**Stays**	**Beds**	**Occupancy**	**Cost/Stay**
Burin Peninsula	1,069	35	54%	$11,644
Dr. G.B. Cross Memorial	1,590	41	76%	$8,103
Carbonear General	2,393	72	73%	$7,671
Sir Thomas Roddick	1,119	44	91%	$5,575
Charles S. Curtis Memorial	1,173	42	83%	$9,887
Labrador Health Centre	1,372	25	97%	$7,899
Labrador West	758	15	84%	$9,180
Acute Care Health Centres*	**Stays**	**Beds**	**Occupancy**	**Cost/Stay**
Eastern Health	552	24	51%	$9,036
Central Health	676	45	90%	$8,989
Western Health	794	29	74%	$6,905

* Excludes 4 health centres for which cost per stay data is unavailable

- Assuming an optimal occupancy of 85%, most large hospitals are operating over capacity, while many small hospitals are operating under capacity.
- Small hospitals account for just over 20% of hospital stays in 2017–2018 but almost 30% of the total cost of stays.

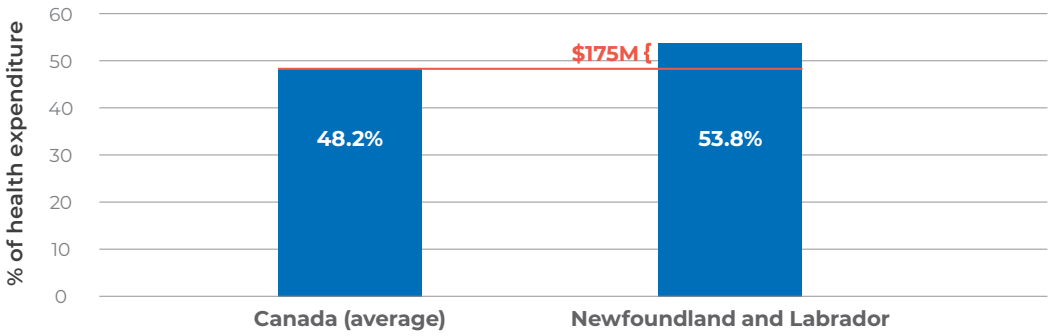


Figure 7. Provincial Government Expenditure on Institutional Health Care, 2019–2020

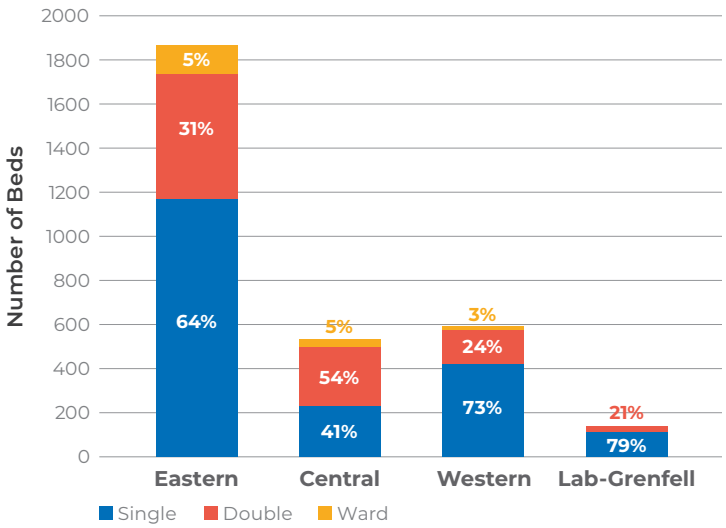


Figure 8. Number of Beds and Percent of Total Beds per RHA in LTC Homes in NL in Single Occupancy, Double Occupancy, or Ward Rooms, 2020

- Ward rooms (triple or quadruple occupancy) form a small percentage of LTC beds in three RHAs, accounting for 138 LTC beds in the province. There are no ward rooms in Labrador-Grenfell Health.
- LTC beds announced to open in Central Health are all in single occupancy rooms.

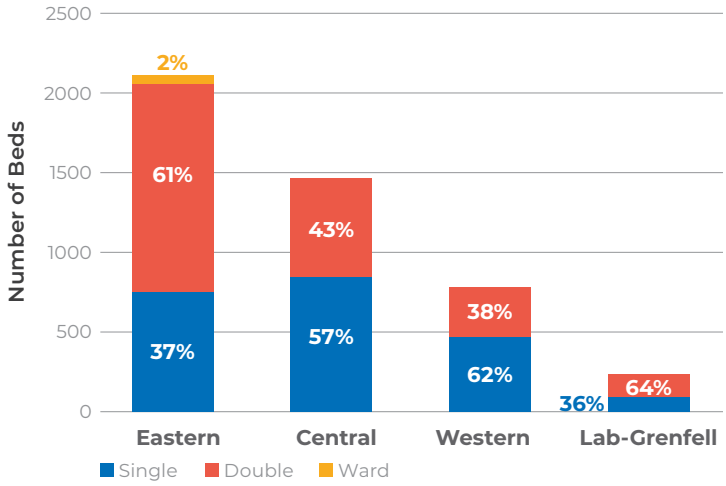


Figure 9. Number of Beds and Percent of Total Beds per RHA in Personal Care Homes in NL in Single Occupancy, Double Occupancy, or Ward Rooms, 2020

- Out of 87 PCHs in NL, only 4 have ward rooms. These 4 PCHs are all located in the Eastern Health region.
- Only 32 beds in PCHs are in ward rooms, which is less than 1% of all PCH beds in the province.
- Ward rooms have been demonstrated to be a risk to controlling the spread of infectious diseases in residential facilities in other jurisdictions, with fatal consequences during the COVID-19 pandemic.

C. Value of Health Spending

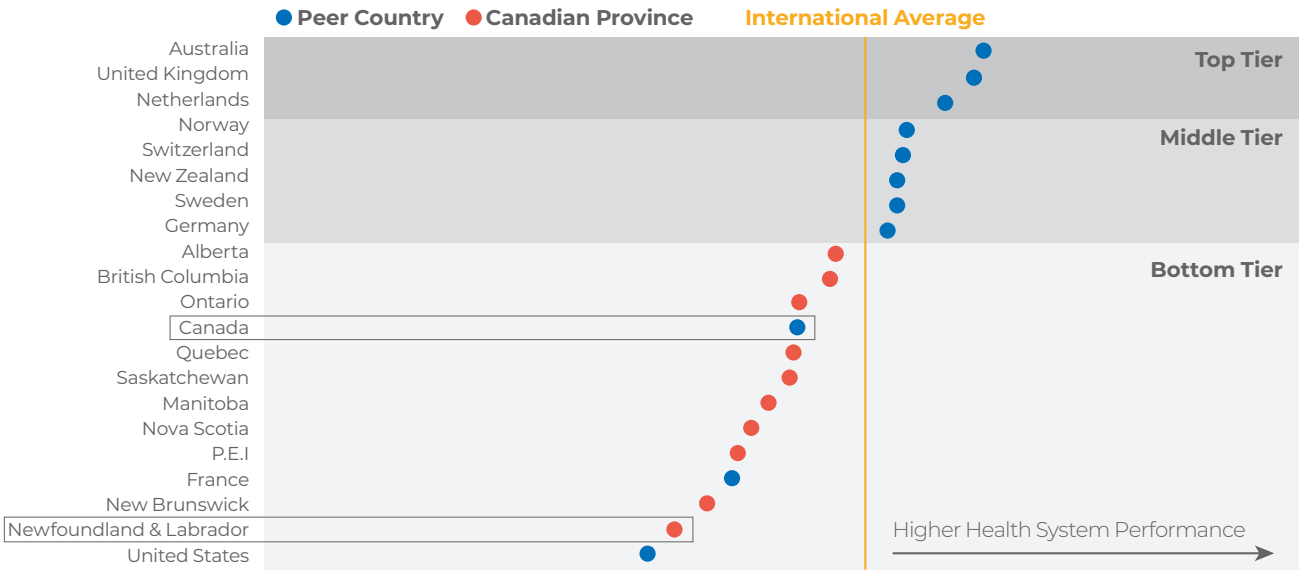


Figure 10. Ranking of Health System Performance in 11 OECD Countries and 10 Canadian Provinces

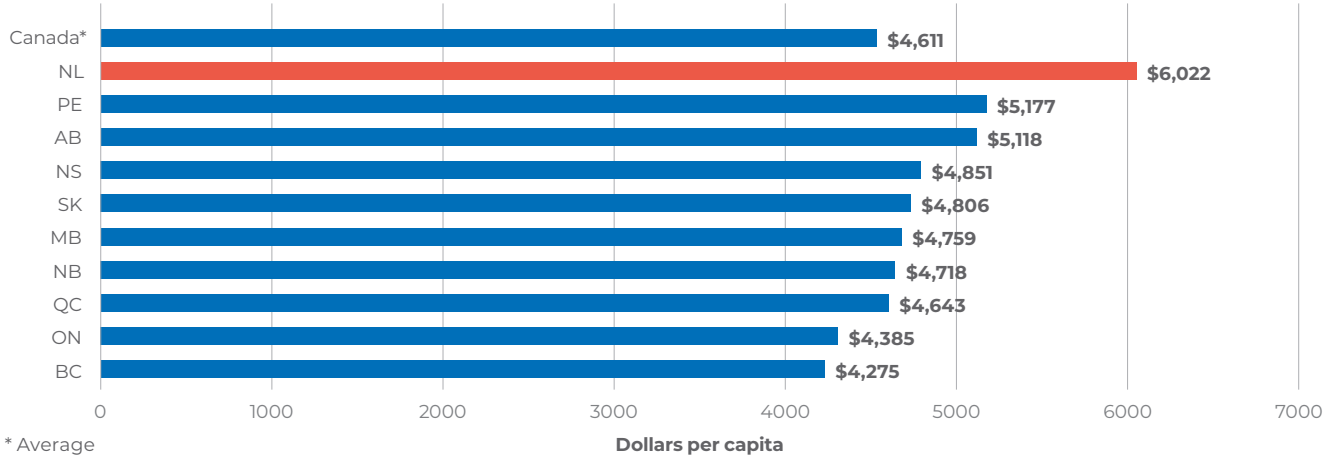


Figure 11. Provincial Government per Capita Health Expenditure, 2019-2020

- NL spends more per capita on health care than any other province, but achieves the worst health outcomes.
- The difference in health care expenditure is driven by above average spending on institutional care.
- Among the Canadian provinces, NL provides the worst value for health spending in that it spends the most per capita and has the worst health system performance.

A Proposal to Improve Quality of Care

Balance access to primary care collaborative centres, emergency rooms to stabilize and transfer, long-term care, public health, and social care in local communities with acute care located in specialized centres.

Quality of Care NL

Analysis of NL's Health System Performance Compared to Provincial Peers and Canada's Performance Compared to Australia

Background

The Commonwealth Fund surveys the public and doctors about health system performance in 11 OECD countries, and the OECD provides metrics on care processes and health outcomes. The following four sections examine NL's performance on care processes (preventative care, safe care, coordinated care, engagement, and patient preferences), access (timeliness and affordability), administrative efficiency, and health care outcomes, and we provide additional data from our own research. The next two sections compare health system structure, expenditures, and workforce in CAN and AUS. The final two sections compare NL's health system structure and workforce to that of Tasmania (TAS), an island off AUS comparable to NL in population size.

Health System Performance

- **Care Processes**
  - Preventative Care
  - Safe Care
  - Coordinated Care
  - Patient Engagement/Preferences
- **Access**
  - Timeliness
  - Affordability
- **Administration**
  - Efficiency
  - Equity
  - Low-Value Care
- **Health Outcomes**
  - Population Health
  - Mortality Rates
  - Cancer Epidemiology
  - Cardiovascular Disease Outcomes
- **Health Economics**
  - Structure
  - Expenditures
  - Workforce

Implications

From the data, strategies needed to improve the health of the province and the value of health care spending include:

- **Increase social spending and preventative care**
- **Transform primary care**
- **Centralize some acute hospital specialties**
- **Reduce low-value care & improve quality of care**
- **Social Model for care of the aging population**
- **Enhance electronic infrastructure**
- **Social and Health budget that reflects above priorities**

Respondents

The Commonwealth Fund has undertaken surveys of adults (2016), adults ≥ 65 years (2017), and primary care physicians (2019), plus indicators of health quality are published by the OECD.

Respondents	AUS	CAN	NL
Commonwealth Fund Survey 2016 – Adults	5,248	4,547	253
Commonwealth Fund Survey 2017 – Adults ≥ 65 Years	2,500	4,549	254
Commonwealth Fund Survey 2019 – Primary Care Physicians	500	2,569	192
Chronic Disease Prevalence	5,216	30,850	––

Source:
Commonwealth Fund International Comparisons 2017
Benchmarking Canada's Health Care Systems: International Comparisons 2019

Ranking

OECD countries are ranked according to the distance the metric is from its mean measured in standard deviations. Thus, the score could vary from -2 (very bad) to +2 (very good).

For each metric, NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst. In the tables rank 1–3 is coloured green, 4–7 is yellow, 8–10 is red, and no data is grey.

Care Processes in NL Compared to Canada and Australia

Objective

To compare care processes pertaining to preventative care, safe care, coordinated care, and patient engagement and preferences in NL to that in Canada (CAN), and to compare Canada's to that in Australia (AUS).

- *OECD countries are ranked according to the distance the metric is from its mean measured in standard deviations. Thus, the score could vary from -2 (very bad) to +2 (very good).*
- *For each metric NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst. In the tables rank 1–3 is coloured green, 4–7 is yellow, 8–10 is red, and no data is grey.*

Results

A. Care Processes: Canada vs. Australia

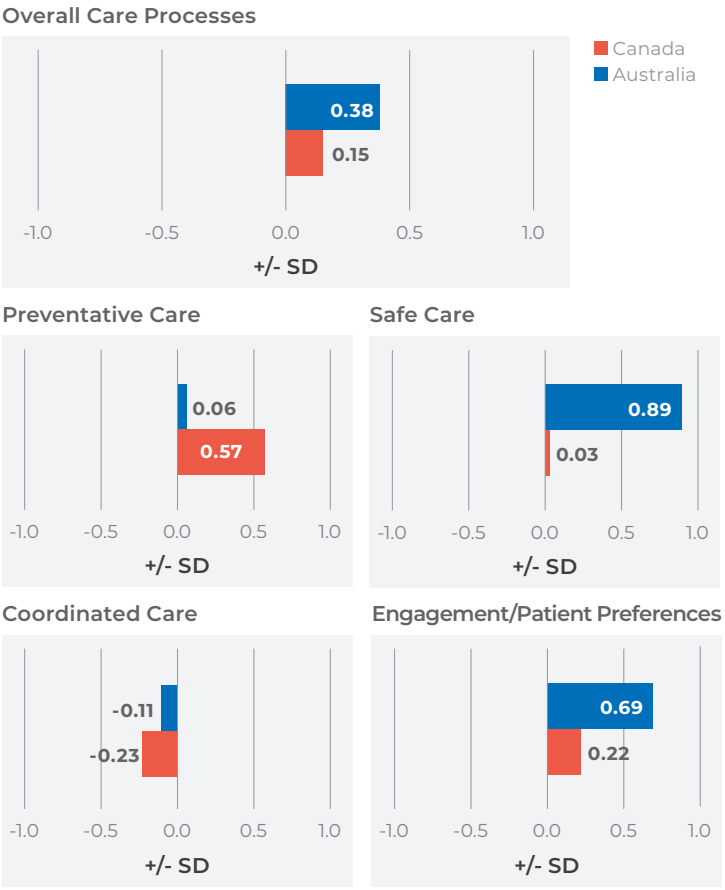


Figure 1. Scores for Care Processes in Canada and Australia, Defined as + and - Standard Deviations (SDs) From the International Mean.

- CAN's overall care process score was just above average whereas AUS's was better. CAN had a high score for preventative care, and AUS had high scores for safe care and engagement/patient preferences. CAN's score for coordinated care was below average.

B. Preventative Care in NL compared to Canada and Australia

Table 1. Non-Medical Determinants of Health

AUS	CAN	NL	NL Rank
Fruit consumption in adults (% at least once/day)			
94.8	66.5	56.3	10
Vegetable consumption in adults (% at least once/day)			
99.2	55.9	34.1	10
Reported obesity in adults (% BMI > 30)			
19.5	19.8	29.8	10
Alcohol consumption in adults (litres/capita)			
9.4	8.2	9.1	10
Smoking daily (%) Females			
10.8	10.0	15.7	10
Smoking daily (%) Males			
14.0	14.2	24.5	10

- NL has the worst rates of non-medical determinants of health in CAN related to diet, obesity, alcohol use and smoking.

Table 2A. Preventative Care in NL Reported by the Public

AUS	CAN	NL	NL Rank
Among all adults, during the past 2 years, % who talked with provider about:			
Healthy diet and healthy eating			
44.8	50.4	48.5	7
Exercise or physical activity			
47.4	55.2	37.1	10
Things in your life that cause worry or stress			
33.6	34.5	28.2	9
Alcohol use			
25.1	23.2	10.2	10
Health risks of smoking and ways to quit			
56.1	70.6	56.9	10

Table 2B. Preventative Care and Primary Care Metrics

AUS	CAN	NL	NL Rank
Influenza vaccination in past years in adults ≥65 years			
––	61.1	51.6	10
Avoidable hospital admissions, age-sex standardized/100,000 population			
Congestive heart failure			
239.3	187.9	210.0*	9
Diabetes			
143.8	95.9	164.8	9
Asthma			
71.3	14.7	21.5	10
COPD			
332.0	238	288.2	6

*unstandardized

- In comparison to CAN, NL has the lowest provincial ranking for preventative care, despite having the highest rates of non-medical determinants of health.
- Compared to the other provinces, NL has high incidence of avoidable hospital admissions for congestive health failure, diabetes, and asthma.

C. Safe Care in NL compared to Canada and Australia

Table 3. Patient Safety After Surgery

AUS	CAN	NL	NL Rank
Foreign body left in after surgery per 100,000 adult discharges			
––	9.8	9.1	3
Obstetrics trauma per 100 vaginal deliveries (with instrument)			
6.8	16.4	6.0	1
Obstetrics trauma per 100 vaginal deliveries (without instrument)			
2.5	3.1	1.3	1
Postoperative pulmonary embolism per 100,000 discharges for hip/knee replacements			
––	554.0	428.4	5
Postoperative sepsis per 100,000 discharges for abdominal surgery			
––	1,268.2	959.0	2
Defined daily dose (DDD) of antibiotics prescribed in hospital per 1,000 inpatient days			
––	1.5	2.5	10

- Patient safety using metrics for surgery is very good when compared to other Canadian provinces, but antibiotic use in hospital is the highest in CAN.

Table 4. Patient Safety in Primary Care

AUS	CAN	NL	NL Rank
% of adults ≥65 years taking ≥5 medications			
19.7	31.1	39.2	10
Antibiotics dispensed in the community (DDD/1,000 inhabitant days)			
22.7	17.9	29.1	10
Antibiotics dispensed in the community (Prescriptions/1,000 inhabitant days)			
––	––	970	10
Chronic use of benzodiazepines in adults ≥65 years per 1,000 population ≥65 years			
––	14.6	53.6	9
Use of long acting benzodiazepines in adults ≥65 years per 1,000 population ≥65 years			
––	10.6	32.1	10
Age-sex standardized rate of antipsychotic use per 1,000 population ≥65 years			
––	54.0	59.1	9
% of adults ≥65 years whose health provider reviewed medications during the past 12 months			
85.9	80.9	55.9	10
% of primary care providers who review prescribing practices at least yearly			
38.0	26.5	23.5	4

- Extensive prescribing of medications contrary to Choosing Wisely Canada recommendations occurs in NL and is the highest in the country.

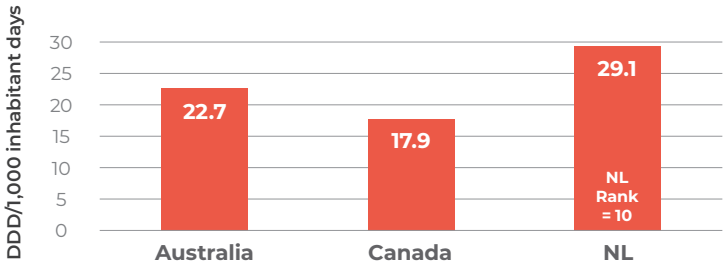


Figure 2. Antibiotics dispensed in the community

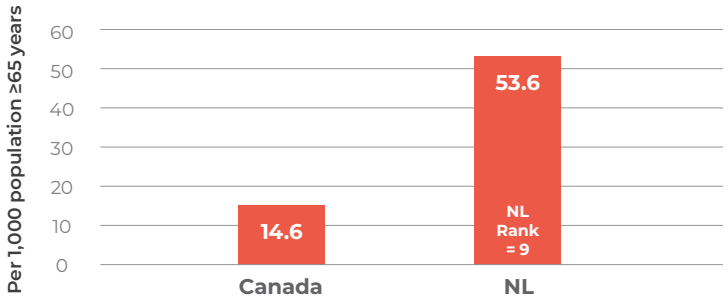


Figure 3. Chronic Use of Benzodiazepines in Adults ≥65 Years

Table 5. e-Support in Primary Care

AUS	CAN	NL	NL Rank
% of primary care physicians who report electronic clinical decision support in their practice			
72.0	28.0	––	––
% of primary care physicians who receive reminders for guideline-based interventions			
65.8	38.4	17.6	8
% of primary care practices where patients are sent a reminder when it is time for regular preventative or follow-up care			
82.8	25.6	8.1	8
% who experienced a medical, medication, or laboratory test mistake in the past 2 years			
22.0	22.0	––	––
% of family physicians (FPs) who can electronically exhange:			
Patient clinical summaries			
59.4	25.0	34.6	2
Laboratory and diagnostic tests			
57.0	36.0	42.1	4
List of all medications taken by individual patients			
54.6	32.6	45.6	2

- Despite 93% of primary care physicians in NL having electronic access to patient information systems outside their practice, use of electronic clinical support tools in their practice is low.

D. Coordinated Care in NL compared to Canada and Australia

Table 6. Coordinated Health System: FP Perspective

AUS	CAN	NL	NL Rank
% of FPs who usually (≥75% of the time):			
Send the patient history and the reason for the consult to the specialist			
94.7	90.3	96.1	4
Receive information from the specialist about changes made to patients' drugs/care plan			
57.2	59.2	58.5	9
Receive a report of the specialist's visit within 1 week of the service >50% of the time			
43.6	50.9	36.1	10
Receive notifications that patients have been seen in the emergency department (ED)			
40.1	48.8	54.2	6
Receive notifications that patients have been admitted to hospital			
41.1	54.1	49.4	8
Receive information on the care plan within 1–4 days for patients discharged from the hospital			
50.1	47.7	25.1	9
Communicate with home-based nursing care providers			
14.2	24.1	16.9	10
Receive communications from home-based nursing care providers			
20.8	36.1	22.2	10

- In NL, timely communication between the specialist/hospital/home care providers and FP is not optimal, nor is the bidirectional communication between home-based nursing care providers and FPs. These metrics can be improved because higher proportions of FPs in NL than in CAN can electronically exchange clinical summaries, laboratory and diagnostic tests, and medications. The proportions in AUS with this capacity are substantially higher than in CAN.

Table 7. Coordination of Care From the Perspective of Adults ≥65 Years

AUS	CAN	NL	NL Rank
Excluding hospitalizations, % who have seen >1 doctor in the past 12 months			
69.5	57.3	62.9	10
% whose regular practice always coordinates care from other doctors and places			
63.2	61.1	55.9	8
% who needed help to coordinate care from other health care professionals			
38.0	30.3	26.6	5
In the past 2 years, % whose tests results/medical records were unavailable at time of appointment			
8.2	11.4	9.0	2
In the past 2 years, % who received conflicting information from different health providers			
9.7	11.4	9.6	2
In the past 2 years, % who felt a test was unnecessary because it had already been done			
11.0	6.7	7.9	8
In the past 2 years, % who felt a medical mistake had been made in treatment or care			
11.8	8.4	6.9	1
After hospitalization, % whose regular practice seemed informed about the care received in hospital			
85.6	84.1	88.2	4

- From the patient's perspective, most of the metrics measuring coordination of care were better in NL than in CAN.

E. Engagement and Patient Preferences in NL compared to Canada and Australia

Table 8. Patient Engagement and Preferences

AUS	CAN	NL	NL Rank
In adults ≥65 years:			
% completely/very satisfied with quality of care received in the past 12 months			
71.3	65.6	70.8	4
% with a regular doctor			
96.8	95.5	93.5	7
% whose doctor always know important information			
67.4	69.9	66.5	7
% whose doctor always spends enough time with the patient			
63.0	64.1	63.7	6
% whose doctor always encourages patients to ask questions			
62.4	52.9	42.6	10
% whose doctor always explains things in a way that is easy to understand			
71.3	73.3	64.7	10
% whose doctor always involves the patient as much as they want in decisions about their care			
68.0	65.6	63.6	6
Among adults ≥65 years with a chronic condition, % who had any health provider seen for their condition:			
Discuss main goals of care			
67.2	61.9	58.4	10
Give clear instructions on symptoms to watch for and when to seek further care			
75.1	58.7	51.8	9

- There is room for improvement in NL, in comparison to CAN, concerning patient engagement, particularly as it relates to encouraging patients to ask questions, explaining things in a way that's easy to understand, and discussing main goals of care and symptoms to watch in patients with chronic conditions.

Table 9. Patient Engagement in Hospitalized Adults

AUS	CAN	NL	NL Rank
% always treated with courtesy and respect by doctors			
79.9	73.3	76.6	4
% always treated with courtesy and respect by nurses			
80.5	64.6	59.5	6
% definitely involved as much as they wanted in decisions about care			
65.1	57.7	67.8	1

- Compared to AUS, the proportion of patients who felt that they were not always treated with courtesy and respect is poor.

Table 10. End-of-Life Care for Adults ≥65 Years

AUS	CAN	NL	NL Rank
% who had a discussion with family, a close friend or health professional about what health care is wanted if incapacitated			
62.0	65.6	49.7	10
% who have written a plan or document on health care wanted at end of life			
33.3	43.0	22.3	10
% who have a written document that names someone else to make treatment decisions if incapacitated			
49.0	62.6	42.8	10

- Discussion of end-of-life care and having a written plan on health care wanted and person named to make treatment decisions if incapacitated has occurred in <50% of seniors in NL.

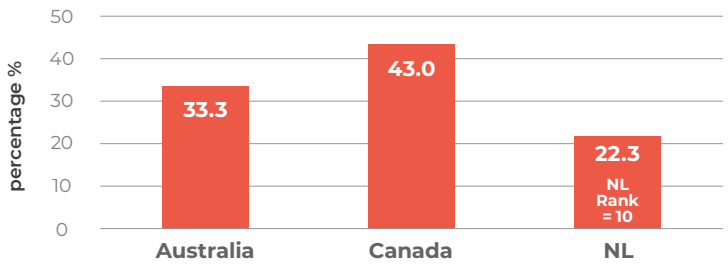


Figure 4. Percent Who Have Written a Plan or Document on Health Care Wanted at End of Life

Conclusions

1. Care processes in CAN are average and in NL some domains need substantial improvement.

2. A focus on the nature and adverse consequences of non-medical determinants of health, including obesity, smoking, excess alcohol use, diet, and physical activity, require investment in both education at a young age and preventative care.

3. Extensive prescribing of medications, contrary to guidelines and associated with harm, occurs in primary care, particularly for antibiotics, benzodiazepines, antipsychotics, and other medications. Audit and feedback with detailing could be effective in reducing these rates, particularly as there is now 100% coverage of pharmacies in the Pharmacy Network. Family practice renewal requires an element where evidence-based prescribing is facilitated, and electronic clinical decision support tools are used.

4. Communication between specialists/hospitals/ home care providers and family physicians is not optimal, requiring investment in the electronic infrastructure to enhance coordination of care.

5. Family practice renewal requires an element focused on enhancing patient engagement and their preferences and needs, particularly associated with chronic conditions.

6. The addition of nurses to primary care units, with a focus on preventative care, coordination of care, patient needs, and management of chronic disease would likely lead to an improvement of care processes.

7. Nursing management needs to improve the professional approach of hospital nurses to their patients.

8. Improvement in communication concerning end-of-life care is critically important and should become a focus for primary care and long-term care.

Access to Health Care in NL Compared to Canada and Australia

Objective

To determine the timeliness and affordability of health care in NL compared to Canada (CAN) and Australia (AUS), and to identify solutions to improve access.

- *OECD countries are ranked according to the distance the metric is from its mean measured in standard deviations. Thus, the score could vary from -2 (very bad) to +2 (very good).*
- *For each metric NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst. In the tables rank 1–3 is coloured green, 4–7 is yellow, 8–10 is red, and no data is grey.*

Results

A. Overall Scores for Access to Care comparing Canada and Australia

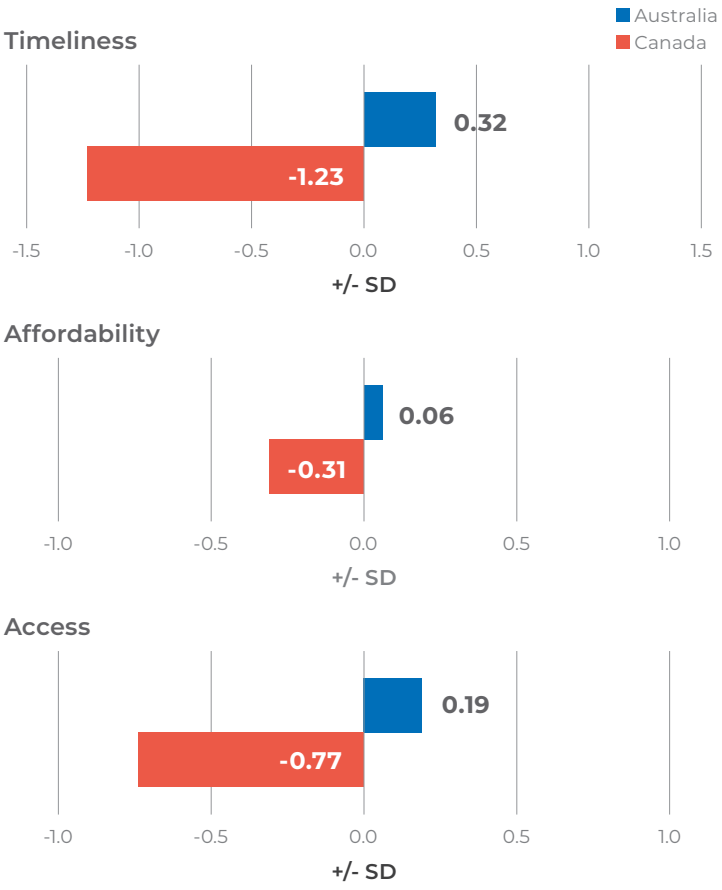


Figure 1. Scores for Timeliness, Affordability, and Access to Health Care in Canada and Australia, Defined as + and - Standard Deviations (SDs) From the International Mean

- Timeliness of health care in CAN is the worst of the 11 OECD countries compared, and despite its universal access, taxpayer funded health system, CAN is ranked below average for affordability.

B. Timeliness of Health Care in NL compared to Canada and Australia

Table 1. Timeliness of Health Care Reported by Adults

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Able to get an appointment on the same day if sick or needed medical attention			
41	27	19	9
Always get a response on the same day when contacting a regular doctor's office			
52	37	39	2
Getting medical care after hours without going to ED is very difficult			
13	32	49	10
Never attended an ED in the past two years			
77	58	55	5
Went to ED but thought it could be treated by regular doctor			
28	41	49	8
Went to ED and waited >4 hours for treatment			
10	30	39	9
Waited ≥ 4 months for elective surgery			
8	18	15	4
Waited at least 4 weeks to see a specialist			
39	59	68	10

- As a country, CAN timeliness of health care is bad, and as a province, NL is ranked poorly among the provinces for getting appointments on the same or next day when sick, getting care after hours, going unnecessarily to the ED, getting treatment in the ED within 4 hours, and waiting to see a specialist.

Table 2. Timeliness of Care Reported by Family Physicians (FPs)

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Care never offered after 6pm on Monday–Friday			
50	43	55	4
Care never offered on weekend			
17	50	60	5
No arrangement where patients can be seen by a doctor or nurse when practice is closed			
31	51	66	7
Receive notification patient has been seen after hours ≥50% of the time			
75	41	45	8
Practices where patients can communicate by email or secure website about medical condition			
34	23	9	10
Practices where patients can request appointments online			
73	22	4	9
Practice never makes home visits			
18	29	17	2
Patients often experience difficulty getting specialized tests (e.g., CT, MRI)			
11	40	--	--

- The majority of FPs do not see patients after hours or make arrangements for a patient to be seen by a doctor or nurse when the practice is closed and fail to receive notifications when patients are seen after hours. Very little opportunity is provided for patients to communicate electronically or to request appointments online.

Table 3. Wait Times for Procedures in NL

AUS Days	CAN Days	NL Days	NL Rank (1=best)
Wait time for:			
Cataract surgery			
86	66	85	7
Hip replacement			
119	105	92	2
Knee replacement			
198	129	132	4
% who had colonoscopy within target time Priority 1 (≤14 days)			
		59	
% who had colonoscopy within target time Priority 2 (≤60 days)			
		57	
% who had colonoscopy within target time Priority 3 (≤182 days)			
		64	
Time to cardiac catheterization after STEMI % within 24 hours			
		42	
% who achieved target time from abnormal screening mammogram to final diagnostic test breast biopsy performed			
		55	
% who achieved target time from abnormal screening mammogram to final diagnostic test no biopsy performed			
		86	

- Wait times for specialized surgery in CAN are better than in AUS and reasonable in NL, but wait times for colonoscopy, cardiac catheterization, and resolution of an abnormal mammogram are not optimal.

C. Affordability of Health Care in NL compared to Canada and Australia

Table 4. Health Care Coverage/Hardship Reported by Physicians

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Have private health insurance			
--	--	49	7
Doctors report patients often have difficulty paying for medications or out-of-pocket costs			
25	30	--	--
Doctors consider reducing cost-sharing, deductibles, and co-payments for patients is a top priority			
22	13	18	9
Reduction of prescription drug prices is a top priority			
12	37	50	8

Table 5. Cost Barriers Reported by Adults

AUS	CAN	NL	NL Rank
In the past 12 months, % who had a medical problem but because of cost:			
Did not visit a doctor			
8.6	6.3	5.4	4
Skipped test/treatment/follow-up			
7.4	5.7	2.8	3
Skipped doses of medicine			
6.3	10.2	9.8	5
Skipped dental care			
20.9	28.1	28.6	8
Serious problems paying medical bills			
4.7	6.5	5.5	5
Spent a lot of time on paperwork			
4.8	5.3	2.3	1
Insurance denied payment or did not pay as much as expected			
8.8	14.0	9.8	1

- Because of cost barriers, 29% of adults skipped a dental appointment, the third highest province for this metric. In general, cost barriers to health care in NL were not a major issue.

Conclusions

1. Timeliness of health care is a major problem in CAN, and in NL several of the metrics were ranked as the worst in CAN.

2. Primary care renewal should assure better access to a FP for both urgent and after-hours care. Finding a solution to this problem may alleviate long wait times in emergency department.

3. The reasons for long waits to see a specialist need investigation and resolution and should be a focus of the strategy on centralization of hospital specialties.

4. Timeliness of colonoscopy, cardiac catheterization and of resolution of an abnormal mammogram were not optimal. These are complicated care processes that require examination and implementation of change.

5. Both affordability and equity were influenced by cost barriers to dental care.

Quality of Care NL

Administrative Efficiency and Equity in NL Compared to Canada and Australia

Objective

To determine the administrative efficiency and equity of health care in NL compared to Canada (CAN) and Australia (AUS).

- *OECD countries are ranked according to the distance the metric is from its mean measured in standard deviations. Thus, the score could vary from -2 (very bad) to +2 (very good).*
- *For each metric NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst. In the tables rank 1–3 is coloured green, 4–7 is yellow, 8–10 is red, and no data is grey.*

Results

A. Administrative efficiency and equity scores for Canada and Australia

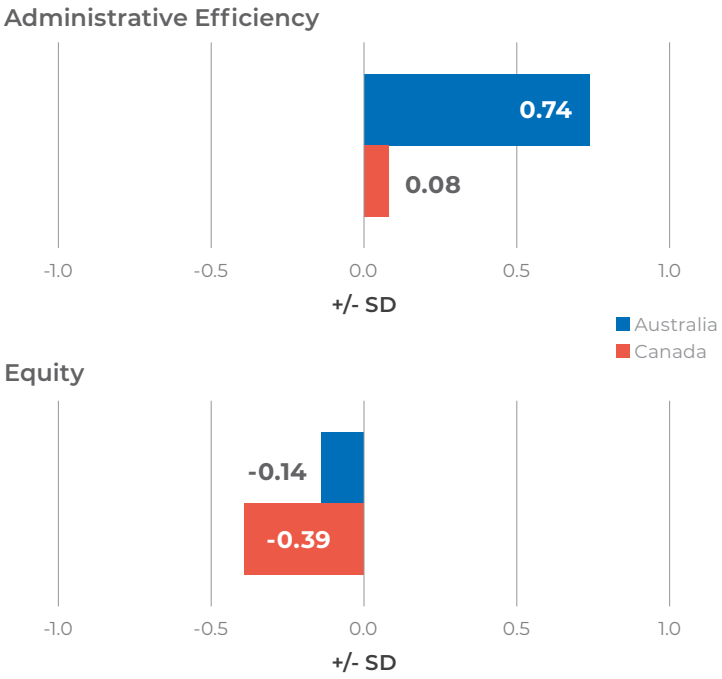


Figure 1. Scores for Administrative Efficiency and Equity in Canada and Australia, Defined as + and - Standard Deviations (SDs) From the International Mean

- CAN was average for administrative efficiency among the 11 OECD countries compared, whereas AUS was ranked number 1. CAN was ranked in the lower tier for equity and AUS was ranked 6th.

B. Administrative Efficiency in NL compared to Canada and Australia

Table 1. Administrative Efficiency, Reported by Adults (2016)

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
In the past 2 years, medical reports/records not available at medical appointment			
5	8	6	2
Doctor ordered an unnecessary test that had already been done			
6	6	3	2
In the past 2 years, when seeing a specialist:			
The specialist did not have basic medical information or test results from the regular family physician			
11	13	10	3
After seeing the specialist the regular family physician (FP) was not up to date on the care the specialist provided			
16	21	22	8
After leaving the hospital:			
The hospital made arrangements for follow-up			
81	73	86	2
The patient received written information on what to do on returning home			
80	75	74	8
The regular FP seemed informed about care received in hospital			
75	76	68	9
After visit in emergency department (ED), regular FP seemed informed about care received in ED			
--	--	62	8
Adults ≥65 years visited ED for a condition that could have been treated by a FP had he/she been available			
28	41	49	8
FP reported time spent getting patients needed medications or treatment because of coverage restrictions was a major problem			
11	21	--	--

- For most of the metrics on administrative efficiency NL was comparable to CAN, except for regular FPs did not seem informed about care received in hospital or ED, and visiting an ED for a condition that could have been treated by the regular FP.

C. Low-Value Care in NL

Table 2. Barriers to Reducing Low-Value Care Reported by FPs

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Major barriers to reducing low-value care:			
Lack of tools or decision aids			
25	23	24	7
Patient requests for unnecessary tests and treatment			
54	59	63	8
Lack of time for shared decision making with patients			
35	37	37	4
The medical malpractice environment			
40	27	25	5

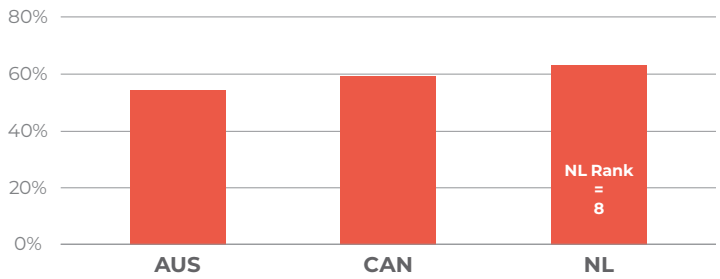


Figure 2. Patient Requests for Unnecessary Tests and Treatment

- 63% of NL FPs believe that patient requests are a major barrier of unnecessary tests and treatments.

Table 3. Rate of Biochemical Tests and CT Scans Ordered by FPs in NL

	NL (total)	NL (N/100)
Hemoglobin	446,689	85
Ferritin	121,837	23
Creatinine	415,903	80
Urea	229,966	44
Uric acid	70,309	14
AST	58,871	11
Creatine kinase	93,784	18
ANA	12,000	2.3
Thyroid tests	168,766	33
CT scans	88,400	17
Lumbar CT Scans	6,760	1.3

- Rate of biochemical testing and of CT scans is very high, particularly for tests that are potentially unnecessary (ferritin in low risk patients with normal hemoglobin, urea, uric acid, AST, creatine kinase, CT scans in people without alarm symptoms) or ordered too frequently (Hb, creatinine, ANA, thyroid tests).

- Compared to CAN (15.9 CTs/100 population) and AUS (13.4 CTs/100 population), rate of CT scans in NL was high (17 CTs/100 population).

D. Health Care Equity in Canada and Australia

Scores for equity were not available by province. CAN's poor score on equity was driven by meaningful differences in rates comparing high income to low income for (1) coordinated care: specialist lacked medical history or regular FP not informed about specialist care in the past 2 years, (2) affordability: cost related access to medical care in the past year, and (3) skipped dental care or checkup because of cost in the past year.

Conclusions

1. Administrative efficiency should be enhanced by using electronic infrastructure to improve coordination between hospitals and primary care. This should also remove equity imbalances that relate to coordinated care.

2. Reduction in unnecessary visits to the ED should be an objective of primary care reform.

3. Reduction in low-value care and accountability for utilization of health care resources should be an objective of primary care reform.

4. The biggest barrier to reducing low-value care reported by FPs was patient requests. Public engagement about low-value care reinforced by FP education will be necessary, as will audit and feedback to FPs plus system change in the biochemistry laboratory.

5. Electronic ordering matched to criteria of appropriateness for each test will be necessary.

Quality of Care NL

Health Care Outcomes in NL Compared to Canada and Australia

Objective

To compare health care outcomes provided by the Commonwealth Fund and OECD, and additional metrics available in Canada (CAN) to determine why NL's health system performance is poor.

- *OECD countries are ranked according to the distance the metric is from its mean measured in standard deviations. Thus, the score could vary from -2 (very bad) to +2 (very good).*
- *For each metric NL was ranked in comparison to the 9 other provinces: 1st is the best and 10th is the worst. In the tables rank 1–3 is coloured green, 4–7 is yellow, 8–10 is red, and no data is grey.*

Results

A. Health Care Outcomes in Canada and Australia

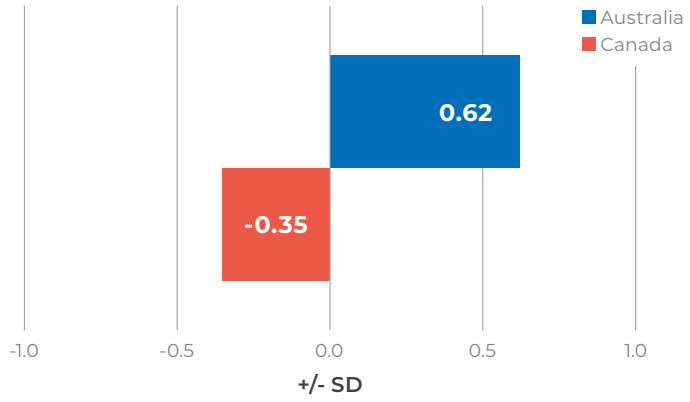


Figure 1. Scores for Health Care Outcomes in Canada and Australia, Defined as + and - Standard Deviations (SDs) From the International Mean.

- CAN's health care outcomes are in the bottom tier of 11 OECD countries, whereas AUS is ranked number 1.

Table 1. Health Care Outcomes in Canada and Australia With Scores Derived From Standard Deviations

AUS	CAN	AUS score	CAN Score	CAN Rank (1=best)
Population health				
Infant mortality, deaths/1,000 live births				
3.8	4.8	0.35	-0.94	10
Adults aged 18–64 with at least 2 of 5 common chronic conditions, %				
10	16	0.41	-1.17	10
Life expectancy at age 60 years				
25.5	25.0	1.20	0.52	4
Mortality amenable to health care				
Deaths/100,000				
62	78	0.81	-0.15	7
10-year decline in mortality amenable to health care				
29	26	0.03	-0.52	9
Disease specific health outcomes				
30 day in-hospital mortality rate following AMI, deaths per 100 patients				
4.1	6.7	1.79	-0.05	6
30 day in-hospital mortality rate following ischemic stroke, deaths per 100 patients				
9.3	10.0	-1.08	-1.45	11
Major lower extremity amputation in adults with diabetes, age-sex standardized rate/100,000				
3.9	7.1	--	--	--
Breast cancer five-year relative survival rate				
88	88	0.46	0.46	4
Colon cancer five-year relative survival rate				
69	64	1.59	0.10	3

- For health outcomes, CAN was ranked 9 of 11 countries, although higher than the UK and US, but substantially worse than AUS (score -0.35 vs. 0.62). CAN scored badly for infant mortality, adults aged 18–64 years with at least 2 of 5 common chronic conditions, mortality amenable to health care (particularly when measured by the 10-year decline in mortality), and 30-day in-hospital mortality rate following ischemic stroke. AUS has a better 30-day in-hospital mortality rate following AMI, rates of lower limb amputation in diabetics, and colon cancer survival rate.

B. Mortality Rates in NL, Canada and Australia

Table 2. Mortality Rates by Disease in NL, Canada and Australia

AUS	CAN	NL	NL Rank (1=best)
Infant mortality (Deaths/1,000 live births)			
3.3	4.5	4.4	6
Life expectancy at birth (Females)			
84.6	84.0	81.7	10
Life expectancy at birth (Males)			
80.5	79.9	77.5	10
Cancer mortality (Females) Age standardized rate/100,000			
148	169	195	10
Cancer mortality (Males) Age standardized rate/100,000			
231	234	276	8
Heart disease mortality Age-sex standardized rate/100,000			
80	80	103	9
Stroke mortality Age-sex standardized rate/100,000			
42	33	41	8
Suicide (Females) Age standardized rate/100,000			
5.8	5.3	8.4	9
Suicide (Males) Age standardized rate/100,000			
18.2	16.6	25.5	10
Transport accident mortality (Females) Age standardized rate/100,000			
3.0	2.7	4.0	5
Transport accident mortality (Males) Age standardized rate/100,000			
9.4	7.4	9.9	5

- NL has a high rate of infant mortality, and higher rates than CAN for life expectancy, cancer mortality, heart disease and stroke mortality, and suicide.

C. Cancer Epidemiology in NL, Canada and Australia

Table 3. Cancer Incidence, Survival, and Mortality Rates in NL, Canada and Australia

AUS	CAN	NL	NL Rank* (1=best)
Lung and bronchus			
Age-sex standardized incidence rate/100,000 population			
42.8	61.4	68.4	6
5-year survival, %			
17.4	19	18	4
Age-sex standardized mortality rate/100,000 population			
30.4	47.2	57.5	8
Breast – female			
Age standardized incidence rate/100,000 females			
124.4	128.2	128.9	8
5-year survival, %			
90.8	88	85	8
Age standardized mortality/100,000 females			
19.8	22	26.2	9
Colorectal			
Age-sex standardized incidence rate/100,000 population			
57.4	60.5	94	9
5-year survival, %			
69.8	65	62	7
Age-sex standardized mortality/100,000 population			
19.2	21.8	38.6	9
Prostate – male			
Age standardized incidence rate/100,000 males			
140.9	116.7	110.1	6
5-year survival, %			
95.2	93	93	2
Age standardized mortality/100,000 males			
25.3	21.8	27.2	7

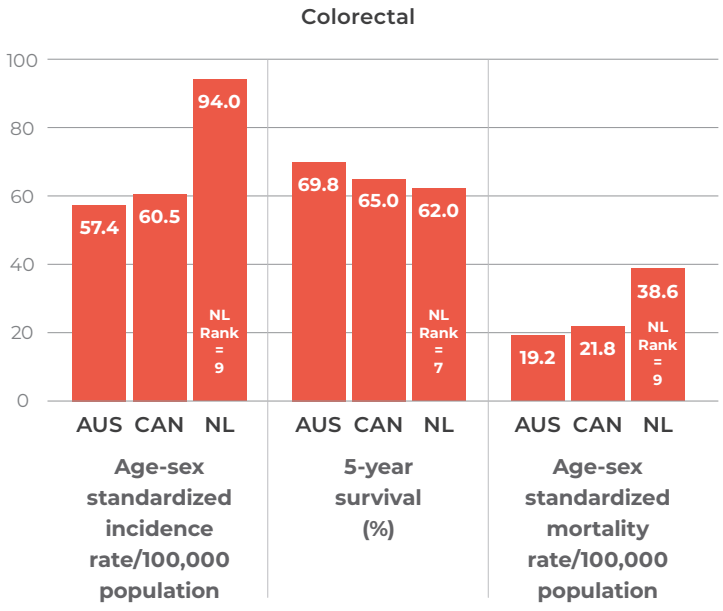
* Rank excludes Quebec. Rank 1–3 is green, 4–6 is yellow, and 7–9 is red.

Table 3. Continued

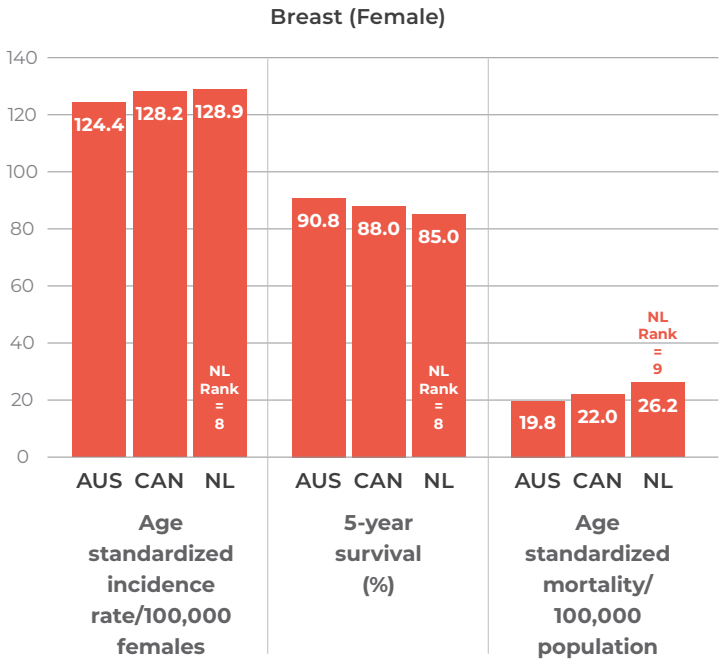
AUS	CAN	NL	NL Rank* (1=best)
Bladder			
Age-sex standardized incidence rate/100,000 population			
10	25	25.2	6
5-year survival, %			
53.5	75	72	7
Age-sex standardized mortality/100,000 population			
3.9	5.7	5	2
Non-Hodgkin's lymphoma			
Age-sex standardized incidence rate/100,000 population			
18.7	24.4	25.1	8
5-year survival, %			
74.6	68	71	1
Age-sex standardized mortality/100,000 population			
5.3	6.5	8.2	8
Uterus (body, NOS) – female			
Age standardized incidence rate/100,000 females			
19.3	35	32.5	6
5-year survival, %			
83.3	83	83	6
Age standardized mortality rate/100,000 females			
3.2	5.4	4.6	2
Cervical – female			
Age standardized incidence rate/100,000 females			
6.9	7.1	10.8	9
5-year survival, %			
73.5	72		
Age standardized mortality/100,000 females			
1.7	2	3.2	7

* Rank excludes Quebec. Rank 1–3 is green, 4–6 is yellow, and 7–9 is red.

- Compared to CAN, NL has a higher incidence rate of lung and bronchus cancer and of colorectal cancer. Five-year survival rates for the most frequent cancers are within 3% of the Canadian survival rates for all 8 cancers reviewed.



*Provincial rank excludes Quebec (9 = worst)



*Provincial rank excludes Quebec (9 = worst)

Figure 2. The Epidemiology of Colorectal and Breast Cancer in NL, Canada and Australia

D. Cardiovascular Outcomes in NL, Canada and Australia

Table 4. Short Term Cardiovascular Mortality Rates and Thrombolysis Rates for Ischemic Stroke

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Cardiovascular			
30-day in-hospital mortality, age-sex standardized/100 admissions			
Myocardial infarction			
3.8	4.8	5.6	10
Ischemic stroke			
6.0	7.9	10.3	10
Thrombolysis rates for ischemic stroke			
	19	11	8 (of 8)

E. Health Status in NL, Canada and Australia

Table 5. Health Status Reported by Adults ≥65 Years

AUS (%)	CAN (%)	NL (%)	NL Rank (1=best)
Health very good/excellent			
44	48	54	1
Have chronic conditions			
79	86	90	9
Have ≥3 chronic conditions			
27	33	48	10
High/moderate risk of failing			
51	50	54	8
Admitted to hospital overnight in past 2 years			
29	22	21	3
Have experienced emotional distress which was difficult to cope with by oneself			
27	19	20	5

- NL has a high rate of people with chronic conditions, but residents rank health as very good to excellent and have relatively low rates of hospitalization and emotional distress.

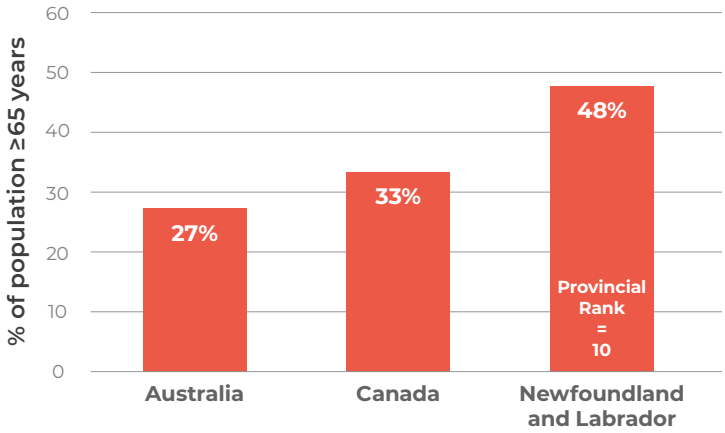


Figure 3. Seniors with ≥3 Chronic Conditions*

* Hypertension or high blood pressure; heart disease, including heart attack; diabetes; asthma or chronic lung disease such as chronic bronchitis, emphysema or chronic obstructive pulmonary disease; depression, anxiety or other mental health problems; cancer; joint pain or arthritis; stroke.

Conclusions

1. Infant mortality is higher in CAN and in NL than in AUS. The reasons for infant mortality in NL should be investigated and whether centralization of obstetrics units could improve infant mortality.

2. Life expectancy is substantially reduced in NL compared to CAN and AUS, and likely associated with low social spending, high prevalence of negative non-medical determinants of health, high prevalence of chronic conditions, high cancer mortality, particularly the high incidence rate of lung and colorectal cancer, high cardiovascular mortality, and suicide. Much of this mortality is likely to improve with increased spending on the social and non-medical determinants of health, and on preventative care.

3. Cardiovascular in-hospital survival and thrombolysis rates for ischemic stroke are the worst in CAN, and may be improved by reduction of the number of services providing acute care, and implementation of better care processes in cardiac care and in stroke care in the acute care hospitals.

Quality of Care NL

Canada vs. Australia: Background and Health System Structure

Objective

To examine the health system organization in Canada (CAN) and Australia (AUS) to determine whether there are structural differences that contribute to better health system performance in AUS.

Practice Points

1. CAN's health system performance ranks in the bottom tier of 11 OECD countries whereas AUS's ranks in the top tier.
2. CAN and AUS have similarities in history, population size, and distribution of population on the peripheries.
3. AUS has a universal public health insurance program, and access to private health insurance, which represents 8.7% of all health spending. CAN provides universal access to health care through Medicare.
4. In AUS, public hospitals are funded by state and federal governments and private hospitals exist.
5. In AUS, family physicians (FPs) are self-employed and fee-per-service is paid by the federal government. A practice incentives program accounts for 5.5% of federal spending on FPs. Public hospital physicians are salaried, and private physicians providing public services are paid per session or per service.

Methods

1. Comparative data was obtained from the OECD for 2018–2019.

Results

Table 1. Demographic and Economic Metrics for Canada and Australia

		AUS	CAN
Geographic size (km²)		7,774,220	9,984,670
Population (millions)		25.0	37.1
Foreign-born (%)		30	21
White (%)		92	73
GDP per capita (US$)		54,752	50,967
Average weekly earnings (US$)		1,025	939
Life expectancy at birth (years)	Male	80.5	79.9
	Female	84.6	84.0
Life expectancy at age 65 years (years)	Male	19.7	19.3
	Female	22.3	22.1

- CAN has similar percentage of the population born overseas as AUS, but AUS is less racially/ethnically diverse. GDP per capita is almost identical and average weekly earnings is higher in AUS. Life expectancy is the same.

Table 2. Chronic Disease Prevalence in Men and Women ≥45 Years in Canada and Australia

		AUS (%)	CAN (%)
Arthritis and osteoporosis	Male	31	23
	Female	43	40
	Total	38	32
Asthma	Male	10	6
	Female	16	9
	Total	13	8
Hypertension	Male	33	31
	Female	41	33
	Total	37	32
Bronchitis/emphysema	Total	5	5
Cancer	Total	9	3
Diabetes	Total	10	12
Heart disease	Total	10	12

- The prevalence of chronic disease is higher in AUS than in CAN for arthritis and osteoporosis, asthma, hypertension, and cancer.

Table 3. Health Care Economic Metrics in Canada and Australia (OECD 2018)

		AUS	CAN
Health expenditure	% GDP	9.3	10.7
	Per capita (US$, adjusted for PPP)	5,005	4,943
% population coverage for core services		100	100
% total expenditure covered by public sources		69	70
Voluntary private health insurance		54	67
Hospital best/1,000 population		3.7	2.5
Long-term care beds/1,000 people ≥65 years		51.2	54.2
Employment in health and social care workforce (% of total employment)		13.3	10.3
Doctors/1,000 population		3.6	2.7
Nurses/1,000 population		11.5	9.9
Long-term care workers/100 people ≥65 years		6.2	3.6

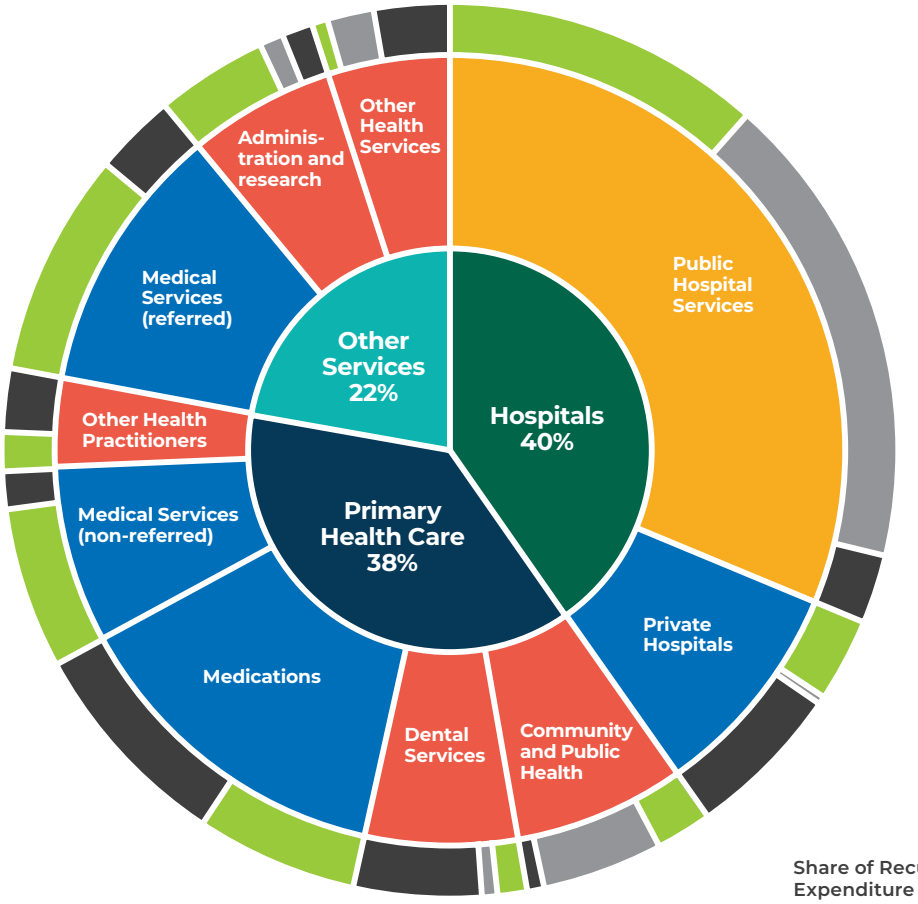


Figure 1. Health Expenditures in AUS for 2014/15 by Share of Recurrent Expenditure, Responsibility for Services, and Source of Funding.

- CAN spends more on health than AUS as % of GDP and per capita health spending is similar.
- AUS has more hospital beds/1,000 population than CAN. This comprises 2.51 public hospital beds and 1.28 private hospital beds.
- AUS has more doctors, nurses, and long-term care workers per capita than CAN.
- AUS spent about $158 billion on health care in 2014/15: $60 billion on hospitals, $56 billion on primary care, $32 billion on other health goods and services and $10 billion on capital projects.

Primary care in AUS

In 2015 there were 91,813 doctors in AUS of whom 34,367 were family physicians (FPs) (1.5/1,000 population). FPs usually work in group practices with an average of 4/practice.

In 2015 there were 11,040 nurses working in a FP setting (0.5/1,000 population) funded by the practice incentives program or out of practice earnings. They provided chronic disease management, care coordination, preventive health education, and oversight of patient follow-up and reminder systems. FPs are required to ensure that after-hours care is available to patients but are not required to provide care directly.

Conclusions

1. Like AUS, CAN has universal access to health care, with fee-per-service for most FPs and for many specialists. The provincial governments play a bigger role than the federal government in spending compared to the states in AUS.
2. Number of hospital beds is substantially higher in AUS, driven by the provision of private hospital beds. It has been stated that AUS has a similar case mix to CAN but more even distribution of health funds across areas.
3. There are fewer physicians, nurses, and long-term care workers per capita in CAN compared to AUS.

Quality of Care NL

Canada vs. Australia: Differences in Health Expenditures and Health Workforce

Objective

To compare health spending and workforce in Canada (CAN) and Australia (AUS) to identify potential reasons for differences in health system performance.

Methods

1. Comparative metrics were obtained from OECD 2019 for both countries.

Results

Table 1. Health Expenditures in Canada and Australia, 2017

		AUS	CAN
Government/compulsory spending, US$ per capita		3,467	3,466
Voluntary/out of pocket spending, US$ per capita		1,538	1,508
Spending as % of health expenditure on:	Outpatient care	33	28
	Inpatient care	31	24
	Long-term care	2	18
	Medical goods	16	19
	Other	18	19
Hospital expenditure by type of service (%)	Hospital inpatient	61	53
	Day care	13	13
	Outpatient care	19	22
	Long-term care	5	10
	Other	2	2
Capital expenditure as % of current expenditure		8	6

- Health per capita expenditures are virtually the same in CAN and AUS, whether that is measured by government, voluntary, or total expenditures.
- Less money is spent on primary care and hospital care in CAN. Of hospital expenditures, CAN spends a lower proportion on inpatient care and a higher proportion on long-term care.

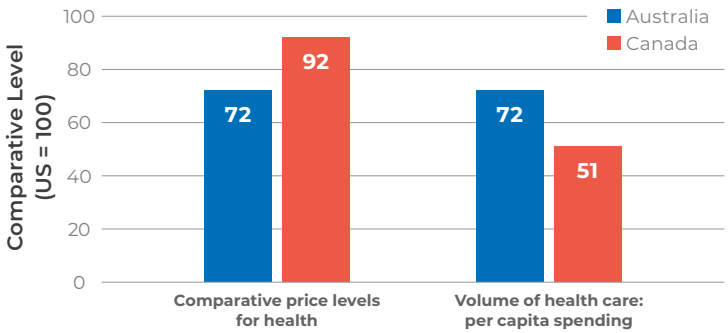


Figure 1. Comparative Price Levels and Health Care Volume for Canada and Australia

Table 2. Health Workforce in Canada and Australia, 2017

		AUS	CAN
Health Professionals (N/1,000 population)	Family physicians	1.6	1.3
	Specialists/generalists	2.1	1.5
	Nurses	11.7	10.0
Average annual income (2016, US$)	Family physicians	104,276	156,208
	Specialists	210,785	249,008
	Nurses	67,700	57,000
Remuneration of doctors (ratio to average self-employed wage)	Family physicians	1.9	3.8
	Specialists	3.1	4.9
Remuneration of nurses (ratio to average wage)		1.2	1.1
Graduates/100,000 population	Medical	15.5	7.7
	Nursing	84.5	52.5

- The price of health is higher in CAN and the volume of care provided for the money spent is lower than in AUS.
- Compared to AUS there are fewer family physicians (FPs) in CAN and they are paid more (twice as much as in AUS relative to the average self-employed wage).
- There are substantially fewer specialists in CAN and they are paid more (58% more than in AUS relative to the average self-employed wage).
- This relative deficiency of doctors in CAN is maintained by graduating half the number of doctors per capita compared to AUS.
- There are fewer nurses per capita in CAN, they are paid less than in AUS, and there are fewer nursing graduates per capita.

Conclusions

1. Although total health expenditures are similar in CAN and AUS the volume of care provided for the money spent is lower in CAN than in AUS and the price of care is higher.
2. There are fewer FPs and specialists in CAN and they are paid more than in AUS.
3. There are fewer nurses in CAN and they are paid less than in AUS.
4. There are fewer medical and nursing graduates in CAN compared to AUS.

Quality of Care NL

Canada vs. Australia: Low-Value Care

Objective

To compare metrics on low-value care in Canada (CAN) and Australia (AUS).

Practice Points

1. Low-value care, which is associated with harm or little benefit relative to the cost, accounts for more than 20% of health spending.

2. Interventions that comprise low value care include drugs, imaging, tests, and procedures, when done for inappropriate reasons, inconsistent with clinical practice guidelines. Examples include antibiotics for viral infections, opioids, CT scanning without appropriate indication, various biochemistry tests in asymptomatic patients, and tonsillectomy and cataract surgeries as inpatient procedures. The overarching strategy for ensuring quality of care in AUS is captured in the National Healthcare Agreement of the Council of Australian Governments. The agreement sets out the common objectives of Australian governments in providing health care — improving outcomes for all and the sustainability of the system — and the performance indicators and benchmarks on which progress is assessed.

3. The Australian Commission on Safety and Quality in Health Care is the main body for safety and quality improvement in health care. It has developed service standards that have been endorsed by health ministers. It is unclear how accountability for safe care and low-value care functions.

Methods

1. The metrics were obtained from the OECD 2019.

2. Data on chronic benzodiazepine and antipsychotic use in adults ≥ 65 years was not available for AUS.

Results

Table 1. Selected Metrics on Low-Value Care in Canada and Australia

	AUS	CAN
Antibiotics prescribed, DDD/1,000 people	23.5	14.8
2nd line antibiotics, DDD/1,000 people	4.8	2.9
Volume of opioids prescribed, DDD/1,000 people/day	15.4	17.6
Opioid-related deaths/million population	15	120
CT scans/million population	126	153
MRI exams/million population	45	51
Cataract surgery as in-patient, %	3	0.2
Tonsillectomy as in-patient, %	87.2	27.3

- Antibiotics prescribed was higher in AUS, as was cataract surgery and tonsillectomy done as an in-patient.

- Volume of opioids prescribed was 16% higher in CAN but opioid related deaths was 700% higher than in AUS.

- The rate of CT scanning was 21% higher in CAN.

Table 2. Major Barriers to Reducing Low-Value Care Reported by Family Physicians (FPs)

	AUS %	CAN %
Lack of tools or decision aids	25	23
Patient requests for unnecessary tests and treatment	54	59
Lack of time for shared decision making with patients	35	37
The medical malpractice environment	40	27

- Major barriers to reducing low-value care were similar in CAN and AUS, except in CAN a lower proportion of FPs reported the medical malpractice environment as a major barrier.

Conclusions

1. From the data available, it appears that increased use of low-value care in CAN is not an explanation for its lower health system performance.

2. There was a deficit of metrics on low-value care by which to compare the two countries.

Quality of Care NL

Canada vs. Australia: Long-Term Care and the Impact of COVID-19

Objective

To compare long-term care (LTC) organization and regulation in Australia (AUS) and Canada (CAN), and identify the potential relation to the impact of COVID-19 in LTC facilities.

Practice Points

1. Nursing homes in AUS may be private non-profit or for-profit, or run by state or local government. Federally subsidized residential aged-care positions are available to those who are approved by an Aged Care Assessment Team. Eligibility is determined through needs assessment, and permanent care is means tested. Federal government supports permanent and respite residential aged care.
2. The COVID-19 pandemic has provided insight into the quality of care in LTC facilities that would not normally be available in CAN.
3. In AUS, compliance with eight Quality Standards (Figure 1) has been mandatory since 1 July 2019. LTC facilities are required to demonstrate performance on an ongoing basis to meet Australian Government requirements.

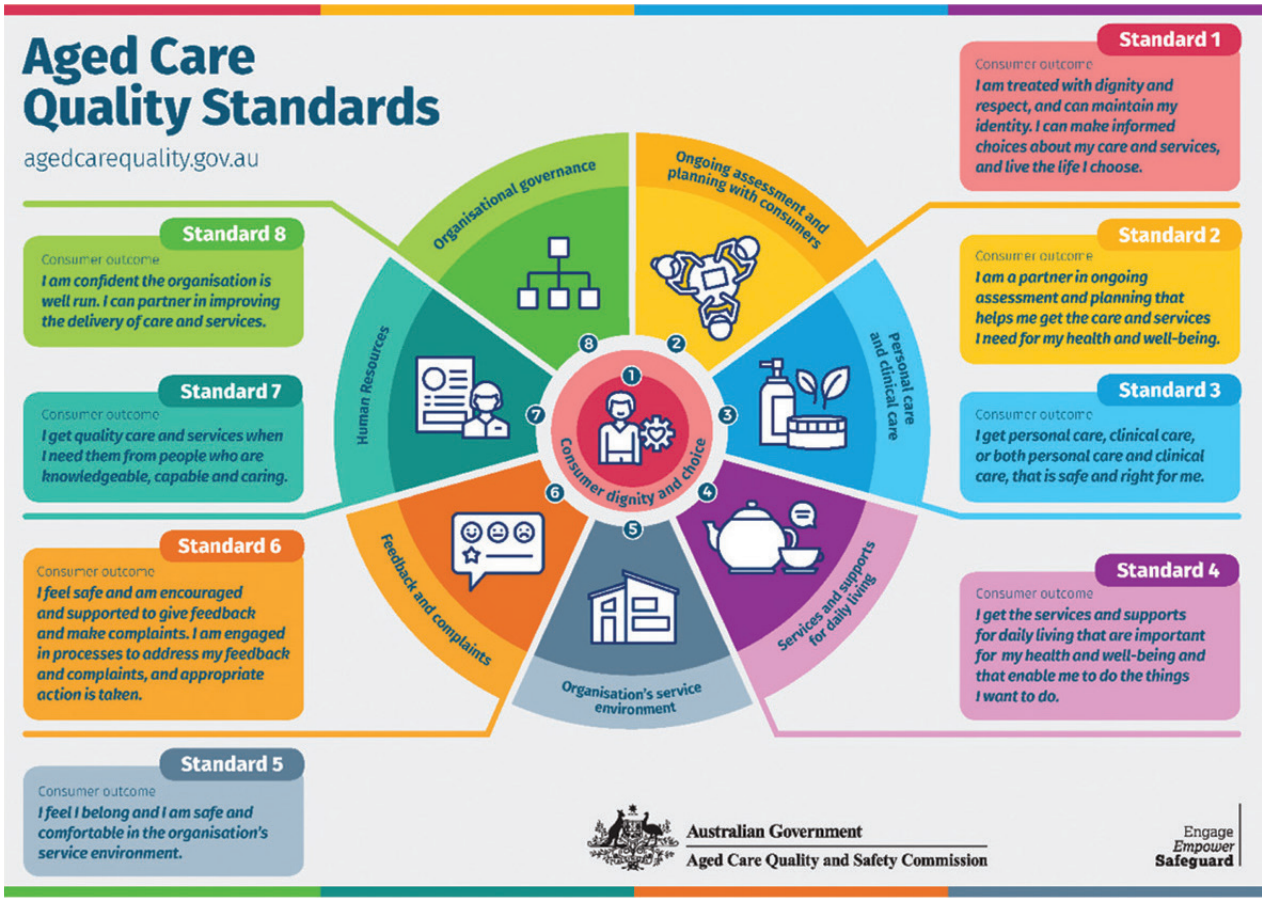


Figure 1. Australia Aged Care Quality Standards

- If a LTC provider in AUS fails to meet the standards, the Aged Care Safety and Quality Commission will take action ranging from identifying areas for improvement to imposing a sanction, which revokes the provider's approval to deliver aged care. In 2019, there were 267 non-compliance notifications including 55 sanctions.

Methods

1. Data on the characteristics of LTC facilities and COVID-19 interventions in AUS and CAN was obtained from CIHI.

2. Data on the impact of COVID-19 in LTC facilities in CAN was obtained from the Government of Canada COVID-19 webpage and for AUS from the Australian Government COVID-19 webpage.

3. Information on the Australia Aged Care Quality Standards was accessed from the Australian Government Aged Care Quality and Safety Commission.

Results

Table 1. LTC Characteristics in Canada and Australia, 2017–19

	AUS	CAN
Number of LTC residents age 65+	233,171	415,530
Percentage of LTC residents age ≥65	94.0	91.0
Percentage of LTC residents age ≥80	75.2	73.5
Percentage of total population age ≥65 residing in LTC	6.2	7.0
Nurses per 100 LTC residents age ≥65	1.3	1.3
Nursing aides/personal support workers per 100 LTC residents age ≥65	4.9	2.3
Type of funding in model care classification	Income-tested user fees	Mixed: Universal coverage/Income-tested user fees
Type of regulation in model of care classification	National: Legislation	Local: Regional

- AUS has double the rate of nursing aides/personal support workers for LTC residents compared to CAN.

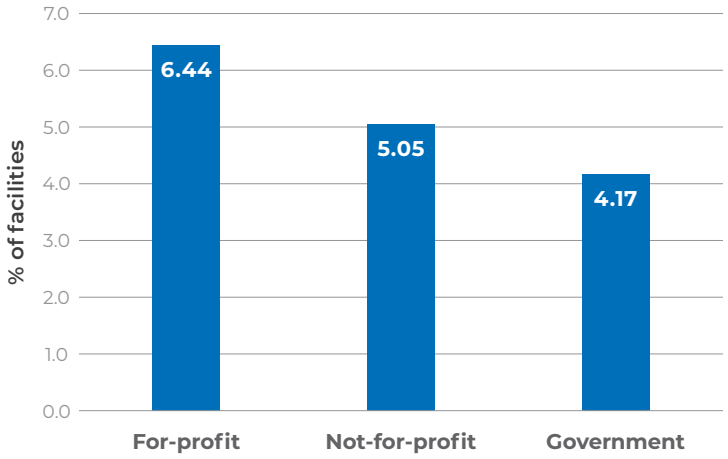


Figure 2. Percentage of Australian LTC Facilities That Failed Aged-Care Standards, by Type of Facility, 2019

- For-profit LTC facilities in AUS failed to meet quality standards more commonly than not-for-profit facilities or government facilities. This has been attributed to slim profit margins in this sector leading to cost cutting that impacts residents' care.

- Data on inspections, complaints, performance, and actions for long-term care facilities in AUS are available in quarterly aggregate reports from the Aged Care Quality and Safety Commission of the Australian Government and by facility on the My Aged Care website of the Australian Government Department of Health. Comparable data for CAN is not available.

Table 2. Interventions Announced/Implemented at the Time of the Country's 1,000th Case of COVID-19

	AUS	CAN
Date of 1,000th COVID-19 case	March 20	March 20
LTC infection control training and audit	March 11	n/a
LTC rapid response prevention and control teams	March 11	n/a
Isolation wards for infected LTC residents	n/a	n/a
COVID-19 testing of all LTC residents and staff	n/a	n/a
Hazard pay	March 11	n/a
LTC health care worker recruitment and surge staffing	March 11	n/a
Updated LTC guidelines for COVID-19: Recommended	March 13	n/a
Funding for personal protective equipment	March 10	n/a
Enforced restriction of visitors to LTC	March 18	March 17
Increased acute care, economic and research funding	March 10	March 17
Stay-at-home order enforced	March 10	April 1
Closure of public places and educational institutions	March 10	March 15

n/a: Dates for policy interventions/announcements are included only if they occurred around the time of the country reporting its 1,000th case of COVID-19

- AUS initiated numerous interventions, particularly in terms of guidelines/training and staffing to reduce COVID-19 in LTC facilities much more promptly than CAN.

Table 3. Impact of COVID-19 on LTC Facilities in Canada and Australia (as of 22 July 2020)

	AUS	CAN
LTC confirmed cases	280	21,569
LTC deaths	43	6,677
LTC cases as a percentage of all COVID-19 cases	2.1	19.2
LTC deaths as a percentage of all COVID-19 deaths	33.6	75.3
LTC deaths as a percentage of LTC cases	15.4	31.0
Total confirmed COVID-19 cases	12,896	112,240
Total confirmed COVID-19 deaths	128	8,870
Number of deaths per 1 million population	5.1	239.3

- The impact of COVID-19 has been much more devastating in LTC facilities in CAN than in AUS.

Conclusions

1. Extensive data is available on the quality of LTC facilities in AUS and on the regulations and oversight of these facilities. Comparable data is not available for CAN.

2. For-profit LTC facilities in AUS are associated with a lower standard of care. Due to the lack of data available, conclusions cannot be made about CAN, but this corresponds to media reports in CAN that private, for-profit LTC facilities had a poorer response to COVID-19, resulting in larger outbreaks and more deaths.

3. LTC facilities in AUS had more staffing for normal operations and increased staffing in response to COVID-19 than CAN. While a lack of Canadian data on LTC facilities prevents conclusions on the usual quality of care, the impact of COVID-19 on LTC facilities in the two countries suggests that the quality of care in LTC facilities during the pandemic was better in AUS than in CAN.

Canada vs. Australia: Public Health and Infectious Disease Preparedness

Objective

To identify the preparedness of public health systems for the COVID-19 pandemic.

Practice Points

1. Gostin (2020) identified seven critical lessons from the COVID-19 pandemic:
    - ◇ Build resilient health systems
    - ◇ Leadership and public trust are the single greatest indicator of success
    - ◇ Defend the integrity of science and public health agencies
    - ◇ Invest in biomedical research and development
    - ◇ Focus on equity
    - ◇ Adopt evidence-based laws
    - ◇ Fund and support robust global institutions

Methods

1. Data on preparedness for epidemics and pandemics were obtained from the 2019 Global Health Security Index.
2. Rates of deaths from COVID-19 in Canada were obtained from the Government of Canada COVID-19 webpage and for Australia from the Australian Government COVID-19 webpage.
3. Provincial government expenditure on Public Health data for 2019–20 were obtained from CIHI.

Results

Table 1. Overall and Category Scores and Rankings of Australia and Canada for Epidemic and Pandemic Preparedness (Global Health Security Index)

	Score (out of possible 100)		Rank (1=most prepared)	
	AUS	CAN	AUS	CAN
Overall preparedness score	75.5	75.3	4	5
1. Prevention of the emergence or release of pathogens	68.9	70.0	8	7
1.1 Antimicrobial resistance	83.3	75.0	8	22
1.2 Zoonotic disease	76.9	33.0	4	78
1.3 Biosecurity	62.7	82.7	10	3
1.4 Biosafety	50.0	100.0	21	1
1.5 Dual use research & culture of responsible science	33.3	33.3	3	3
1.6 Immunization	96.5	91.2	60	114

- CAN ranked 22nd for antimicrobial resistance (antimicrobial resistance surveillance, detection and reporting, and antimicrobial control), poorly for zoonotic disease (national planning for zoonotic diseases/pathogens, surveillance systems for zoonotic diseases/pathogens, international reporting of animal disease outbreaks, animal health workforce, and mechanisms for working with the private sector on zoonotic disease), and very poorly for immunization (vaccination rates for humans and livestock).

2. Early detection & reporting for epidemics of potential international concern	97.3	96.4	2	4
2.1 Laboratory systems	100.0	100.0	1	1
2.2 Real time surveillance & reporting	90.0	86.7	8	13
2.3 Epidemiology workforce	100.0	100.0	1	1
2.4 Data integration between human/animal/ environmental health sectors	100.0	100.0	1	1

3. Rapid response to & mitigation of the spread of the epidemic	65.9	60.7	10	17
3.1 Emergency preparedness & response planning	50.0	50.0	17	17
3.2 Exercising response plans	0.0	0.0	54	54
3.3 Emergency response operation	33.3	33.3	10	10
3.4 Linking public health & security authorities	100.0	100.0	1	1
3.5 Risk communication	100.0	75.0	1	26
3.6 Access to communications infrastructure	88.8	82.3	40	71
3.7 Trade & travel restrictions	100.0	100.0	1	1

- CAN ranked poorly for exercising response plans (biological threat-focused International Health Regulation exercises within the past year), 26th for risk communication (risk communication plans and public communication about public health emergencies), and poorly for access to communications infrastructure (internet users, mobile subscribers, gender gap in mobile phone access, and gender gap in internet access).

4. Sufficient & robust health system to treat the sick & protect health workers	63.5	67.7	6	4
4.1 Health capacity in clinics, hospitals & community care centres	66.3	43.3	5	41
4.2 Medical countermeasures & personnel deployment	33.3	100.0	24	1
4.3 Health care access	43.8	44.7	82	67
4.4 Communications with health care workers during a public health emergency	100.0	100.0	1	1
4.5 Infection control practices & availability of equipment	50.0	50.0	6	6
4.6 Capacity to test & approve new medical countermeasures	100.0	75.0	1	14

- CAN ranked poorly for health capacity (available human resources for the broader health care system and facilities capacity) and health care access (universal coverage, access to skilled birth attendants, out-of-pocket expenditures, and priority access for health care workers).

5. Commitments to improving national capacity, financing & adherence to norms	77.0	74.7	3	5
5.1 International Health Regulations reporting compliance & disaster risk reduction	100.0	100.0	1	1
5.2 Cross-border agreements on public health emergency response	100.0	100.0	1	1
5.3 International commitments	100.0	100.0	1	1
5.4 Joint External Evaluation (JEE) & Performance of Veterinary Services (PVS)	75.0	25.0	2	30
5.5 Financing	33.3	33.3	108	108
5.6 Commitment to sharing of genetic & biological data & specimens	66.7	100.0	11	1

- CAN ranked 30th for JEE & PVS (completion and publication of assessments and gap analyses) and very poorly for financing (financing allocated under JEE and PVS reports and gap analyses, financing for public health emergency response, and accountability for international financial commitments to address epidemic threats).

6. Overall risk environment & country vulnerability to biological threats	79.4	82.7	18	10
6.1 Political & security risk	89.3	92.9	9	6
6.2 Socio-economic resilience	88.1	98.5	24	10
6.3 Infrastructure adequacy	83.3	83.3	18	18
6.4 Environmental risks	57.2	59.2	77	59
6.5 Public health vulnerabilities	76.1	76.5	16	15

- CAN ranked poorly for overall environmental risks (urbanization, land use, and natural disaster risk to the economy).
- Both CAN and AUS have room to improve in epidemic/pandemic preparedness, particularly in the rapid response to and mitigation of the spread of an epidemic and in some aspects of having a sufficient and robust health system.

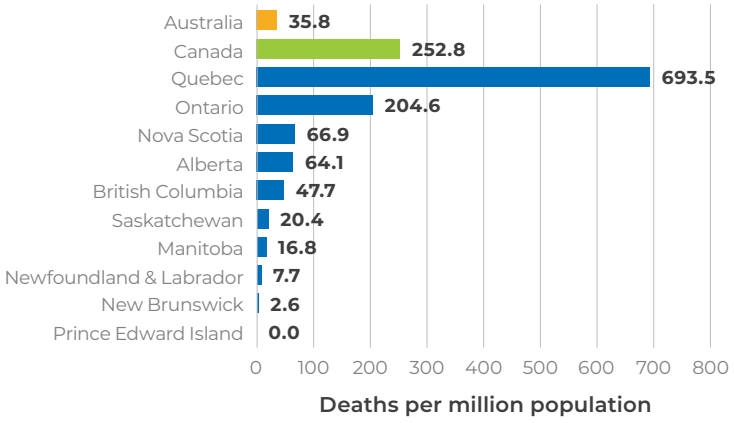


Figure 1. Deaths per Million Population From COVID-19 as of 5 Oct 2020

- CAN has a much higher death rate from COVID-19 than AUS to date, primarily due to the death rates in Quebec and Ontario.

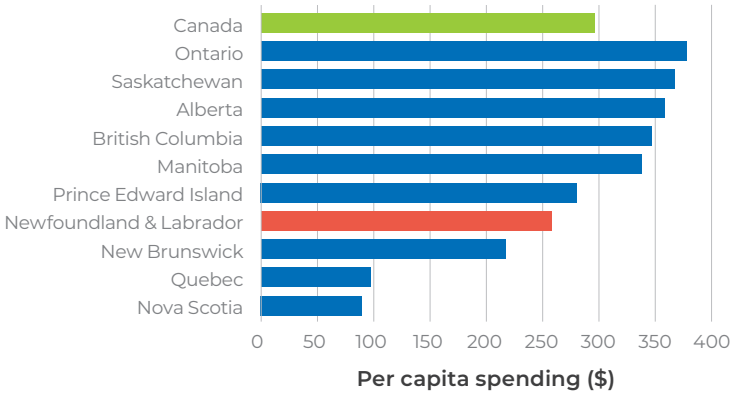


Figure 2. Provincial Government per Capita Spending on Public Health, 2019–20

- NL spending on public health is below the Canadian average.

Conclusions

1. CAN and AUS rank among the top countries in the world for epidemic/pandemic preparedness, however, the Global Health Security Index is not completely predictive of countries' success managing COVID-19. This is particularly striking in the fact that the United States, with one of the worst COVID-19 responses globally, is rated at the most prepared country. Further, New Zealand, which has been identified as one of the most successful countries in its response to COVID-19 is only ranked as a midrange country for epidemic/pandemic preparedness.

2. Deaths due to COVID-19 or future epidemics or pandemics may be greatly reduced through investment in public health. It is notable that Quebec and Nova Scotia are the two provinces that spend much less per capita on public health than any other provinces. Quebec had the highest COVID-19 death rate in the country and Nova Scotia, the highest in Atlantic Canada.

Quality of Care NL

NL vs. Tasmania: Health System Structure

Objective

To compare the health system profile in NL, a province in Canada (CAN), to that in Tasmania (TAS), a state in Australia (AUS), both islands with similar sized populations but NL having a geographic area 59% greater than that of TAS.

Practice Points

1. The island of NL has a population of 492,000 people in a land mass of 109,000 km^2, and Labrador has 30,000 in a land mass of 300,000 km^2. The urban to rural distribution of NL is 58:42. TAS has a population of 535,500 in a land mass of 68,400 km^2, with urban to rural distribution of 74:26.

2. AUS ranks in the top tier of 11 OECD countries for health system performance, whereas CAN ranks in the bottom tier. NL provides the worst value for health spending in CAN.

3. NL has the highest number of doctors per capita in CAN, according to data from Canadian Medical Association (CMA).

Methods

1. Data on TAS health profile was obtained from their White Paper "Delivering Safe and Sustainable Services" available at dhhs.tas.gov.au. Data on doctors in TAS was obtained from doctors registered at Medical Board of Australia and in NL from the College of Physicians and Surgeons of NL (CPSNL).

Results

Table 1. Demographics of NL and Tasmania

	NL (%)	TAS (%)
Male	48.9	48.9
Children ≤14	14.3	17.7
Seniors ≥65	19.4	19.4

Table 2. Health Care Facilities in NL and Tasmania

	NL	TAS
Number of major acute hospitals	13	4
Number of rural health centres	15	13
Number of hospital beds/1,000 population	2.5	2.6 +1.2 private
Number of residential aged care facilities	40 LTC + 87 PCH	78

- NL has substantially more acute care hospitals than TAS but has fewer beds, with the difference provided by private hospitals in TAS.

- NL has a high number of personal care homes providing 4,608 beds with 76% occupancy (30 Mar 2020).

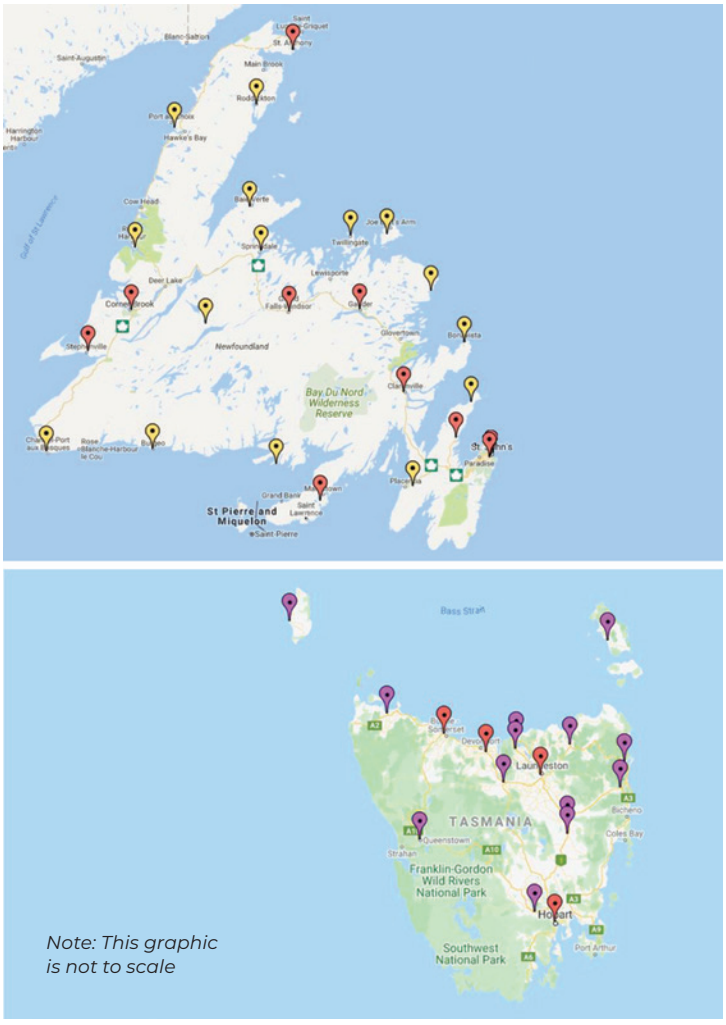


Figure 1. Geographic Distribution of Hospitals and Health Centres in NL and TAS

- NL has 13 acute care hospitals and 15 health centres which provide acute care (1,022 beds).
- TAS has 4 acute care hospitals and 13 health centres.

Table 2. Doctors and Nurse Practitioners (NPs) in NL and Tasmania

	TAS Med Board	NL CPSNL	% Difference
Total	1,583	1,384[1]	-13
Family Physician	666	704[2]	+6
Other Specialists	917	693	-24
Nurse Practitioners	320	181	-43

[1]There are 123 physicians with multiple specialties
[2]There are 13 Family Physicians (FP) with a specialty counted as both a FP and another Specialist

- The CMA count of 910 FPs in NL is an overestimate as CPSNL has 670 registered FPs. Our research using primary practice indicators reveals 625 FPs active in clinical practice. On the island of Newfoundland, there are 583 FPs in active practice but this amounts to 344 full-time equivalents.
- The CMA estimates 591 specialists in NL but there are 781 registered by CPSNL.
- NL has a similar number of FPs as TAS, but TAS has substantially more nurses in primary care practices (N=320). The 181 Nurse Practitioners (NPs) in NL include both nurses attached to primary care and to other organizations/hospitals.
- In NL, 136 of 181 NPs are in urban communities and likely some are attached to local hospitals. 45 are in communities without hospitals. 122 are involved in the provision of primary care.
- There are 298 physiotherapists working in NL and 214 occupational therapists.

Table 3. Number of Specialists in NL and Tasmania by Subspecialty

	TAS Med Board	NL CPSNL	% Difference
ER Doctors	65	3	-95
Radiologists/ Nuclear Medicine	58	72	+24
Medical Specialists	256	190	-26
Surgical Specialists	138	101	-27
Anesthetists	125	72	-42
Obstetrician/ Gynecologists	50	54	+8
Pediatricians	51	81	+60
Psychiatrists	78	88	+13
Laboratory Medicine Specialists	47	37	+21
Other	49	14	-71
Total	917	712[1]	

[1]There are 19 doctors counted twice among specialty groupings

- NL has 24% fewer specialists than TAS, in particular fewer specialized ER doctors, medical specialists, surgery specialists, anesthetists, laboratory medicine specialists, and 'other' specialities. NL has more radiologists and pediatricians.

Conclusions

1. In TAS, the service requirements for high-level care are met by having fewer hospitals but with more beds and more specialists, whereas in NL there are more hospitals but fewer beds and fewer specialists.
2. The number of privately owned Personal Care Homes (PCHs) in NL is responsible for the difference in facilities for the frail elderly comparing NL and TAS.
3. The count of doctors in NL is higher than in TAS, but the number of full-time equivalent FPs in the island of NL is 59% that of the FPs registered in family practice.
4. There are substantially more NPs linked to primary care in TAS compared to NL, but similar numbers of FPs.

Quality of Care NL

NL vs. Tasmania: Level of Hospital Services

Objective

To compare acute hospital services currently provided in NL, an island province of Canada (CAN), to Tasmania (TAS), an island state of Australia (AUS).

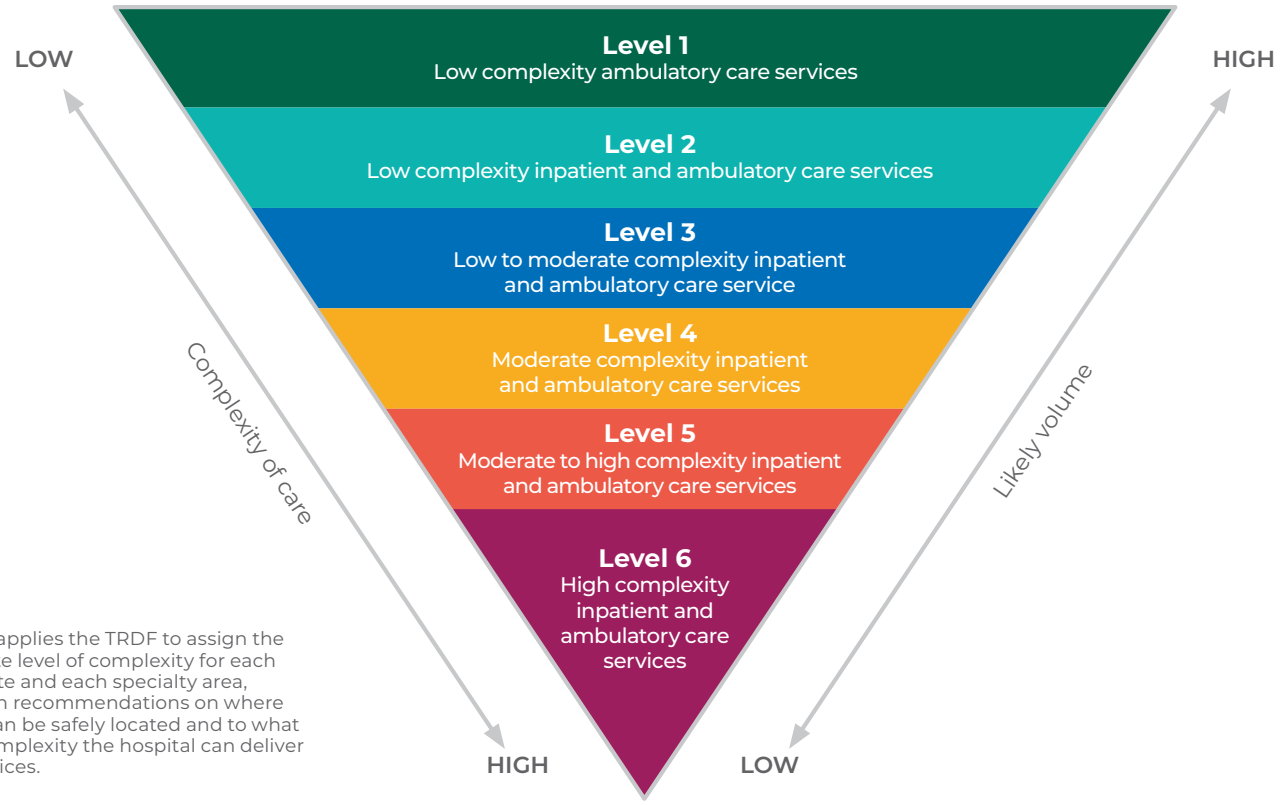
Methods

1. We compared the clinical services matrix for Tasmanian hospitals to those provided currently in NL, with the limitation that the role delineation criteria have not been applied to hospitals in NL.

2. TAS hospitals were defined by level of service for 47 services. The level of service ranges from the lowest level 1 to the highest level 6 (Figure 1).

3. The definitions can be obtained from the Tasmanian Role Delineation Framework and Clinical Services Profile at dhhs.tas.gov.au.

4. Here we provide comparisons for only 10 services.



The TCSP applies the TRDF to assign the appropriate level of complexity for each hospital site and each specialty area, resulting in recommendations on where services can be safely located and to what level of complexity the hospital can deliver those services.

Figure 1. Tasmanian Role Delineation Framework Service (TRDF) Complexity Levels

Results

- NL has 13 acute care hospitals, 1,022 beds and 15 health centres which provide acute care (110 beds).
- TAS has 4 acute care hospitals and 13 health centres.

A. OBSTETRICS

Table 1. Number of Hospitals by Level of Service (1–6) for Obstetrics in NL and TAS

	1	2	3	4	5	6
NL	0	0	0	7	2	1
TAS	7	0	0	1	1	1

- N births/year: NL: 4,052; TAS: 5,835.
- Despite having a lower birth rate, NL provides a substantially higher level of obstetrics services. Level 1 in TAS provides community antenatal and postnatal care by a midwife for mothers and infants who have normal care needs, with access to an obstetrician. There are no planned birthing services.
- Level 4 (7 services in NL) provides intrapartum care for low and moderately complex mothers and babies with pregnancies ≥34 weeks by an obstetrician.

B. PEDIATRIC MEDICINE

Table 2. Number of Hospitals by Level of Service (1–6) for Paediatrics in NL and TAS

	1	2	3	4	5	6
NL	2	6	1	0	1	0
TAS	9	0	1	1	1	0

- The increased level for paediatrics in NL is driven by the presence of paediatricians in 6 centres.

C. GENERAL SURGERY

Table 3. Number of Hospitals by Level of Service (1–6) for General Surgery in NL and TAS

	1	2	3	4	5	6
NL	--	0	0	1	10	2
TAS	--	0	1	1	1	1

- If level 5 is defined as doing general surgery with a moderate to high level of complexity and risk and has an on-site ICU, there are 10 level 5 general surgery units, which is substantially higher than in TAS. Seven of the surgery units do less than 200 inpatient surgeries per year.

D. INTENSIVE CARE

Table 4. Number of Hospitals by Level of Service (1–6) for Intensive Care in NL and TAS

	1	2	3	4	5	6
NL	--	0	1	9	1	2
TAS	--	1	0	1	1	1

- If an ICU is defined as providing mechanical ventilation, there are 9 level 4 ICUs in NL, a level of service substantially higher than in TAS.

E. ORTHOPEDICS

Table 5. Number of Hospitals by Level of Service (1–6) for Orthopedics in NL and TAS

	1	2	3	4	5	6
NL	--	7	0	1	3	2
TAS	--	0	1	1	1	1

- St. Anthony does <200 orthopedic inpatient procedures/year. St John's Orthopedic Service works collaboratively on 2 sites.
- Level 2 is the provision of minor reduction of fractures on low-risk patients by a doctor with anaesthesia support.

F. UROLOGY

Table 6. Number of Hospitals by Level of Service (1–6) for Urology in NL and TAS

	1	2	3	4	5	6
NL	--	--	--	1	1	2
TAS	--	--	--	2	0	2

G. GENERAL MEDICINE

Table 7. Number of Hospitals by Level of Service (1–6) for General Medicine in NL and TAS

	1	2	3	4	5	6
NL	––	0	16	1	6	5
TAS	––	13	0	1	1	2

- TAS has 13 low-acuity medical services with access to a FP whereas NL has 16 FP lead health centres. In addition, NL has substantially more units with internal medicine attending staff than TAS.

H. GERIATRICS

Table 8. Number of Hospitals by Level of Service (1–6) for Geriatrics in NL and TAS

	1	2	3	4	5	6
NL	––	0	0	1	1	0
TAS	––	9	5	1	1	1

- TAS has a far more robust geriatrics care structure than NL, which is rudimentary. A level 2 service in TAS provides outpatient and outreach care from a higher-level geriatrics service and has access to a health practitioner specializing in geriatric assessment. A level 3 service has inpatient beds in the facility with onsite FP, and access to a visiting geriatrician. Level 4 adds interdisciplinary assessment and management of the care and needs of older people, with service by a geriatrician. Level 5 adds inpatient care by a geriatrician, and level 6 provides inpatient care for specialized geriatric assessment.

I. MEDICAL IMAGING

Table 9. Number of Hospitals by Level of Service (1–6) for Medical Imaging in NL and TAS Based on Equipment

	1 General Radiology	2 +Ultrasound	3 +CT	4 +MRI	5 +Nuclear	6 +Interven-tional
NL	24	4	7	0	4	1
TAS	10	3	1	1	1	1

- NL has substantially more general radiology units than TAS (40 vs. 17), ultrasound (16 vs. 7), CT (12 vs. 4), MRI (5 vs. 2), nuclear imaging (5 vs. 2), and interventional radiology (5 vs. 2).

J. EMERGENCY MEDICINE

Table 10. Number of Hospitals by Level of Service (1–6) for Emergency Medicine in NL and TAS

	1	2	3	4	5	6
NL	0	0	13	11	0	2
TAS	7	6	1	1	1	1

- Level 1 is basic life support by a RN with access to a doctor within 30 minutes. Level 2 is 24 hour advanced life support by an RN with access to a doctor and/or paramedic within 15 minutes, Level 3 is a unit staffed by FPs who can provide emergency treatment to low risk patients and have access to a higher level emergency unit. Level 4 is staffed by emergency physicians 24 hours and has an ICU onsite. Level 5 has access to interventional cardiology and critical medicine 24 hours. Level 6 can manage complex trauma and can provide full range of time critical services 24 hours.

- NL has substantially more emergency services than TAS.

Conclusions

1. NL has substantially higher level of hospital services than TAS for Obstetrics, General Surgery, Intensive Care, Emergency Medicine, General Medicine, and Medical Imaging.

2. NL has an extremely large dearth of Geriatrics services compared to TAS.

3. Each level of service by speciality has different service requirements and workforce requirements, which have not been assessed. The current provision of these requirements in NL should be obtained, and a plan created to rationalize services and to provide optimal outcomes for the population.

Lessons Learned from the First Wave of COVID-19 in NL

Objective

To prepare for the second wave of COVID-19 by examining the epidemiology of the first wave.

Practice Points

1. COVID-19 was first diagnosed in NL on March 14, 2020. A super spreader event occurred at a funeral home in St. John's from 13–15 Mar 2020.

2. The Coronavirus is spread by respiratory transmission. Management of clusters depends on social isolation, physical distancing, masks, and contact tracing.

3. Importation of cases can be ameliorated by banning travel, 14-day isolation on arrival, and testing for the virus at the border, with a second test done 5–10 days before or after arrival.

4. Physical distancing to more than 2 meters can be enhanced by a combination of working from home, limiting workplaces to essential services, closing restaurants and bars, closing schools, and limiting the number and size of gatherings.

5. Mortality from COVID-19 can be prevented by shielding the vulnerable, especially long-term care residents, and having hospital and ICU beds available during community transmission.

Methods

1. Incidence of new cases was obtained from media presentations by Public Health from 14 Mar to 30 Aug 2020 (5.5 months). We defined (a) flattening of the curve as <1 case/100,000/day for 1 week, which for the population of Eastern Health (EH), 317,250, was ≤3 cases/day, and (b) eradication of the virus as no new cases for >14 days (excluding travel related cases).

2. Daily use of beds was obtained from the Department of Health. Average daily use of beds before COVID-19 from 6 Jan to 15 Mar 2020 was compared to average daily use in the first 12 weeks of COVID-19 from 16 Mar – 7 Jun 2020.

Results

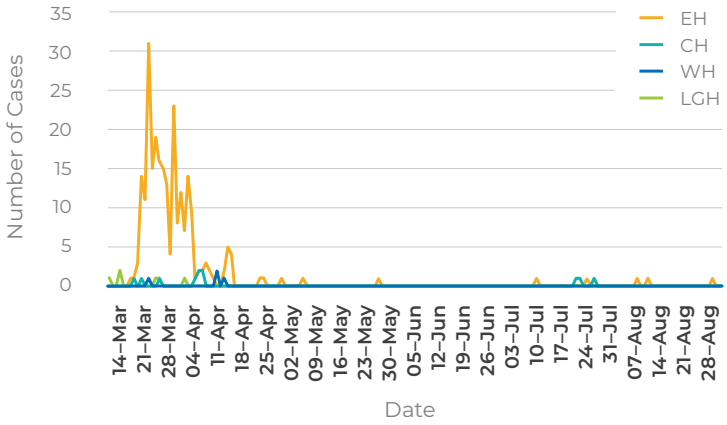


Figure 1. Incidence of New Cases by Regional Health Authority (RHA)

- The first cases identified in EH were like the tip of the iceberg in that they predicted exponential growth in numbers.

- The peak of the curve in EH occurred quickly within 5 days of onset, reflecting the effect of adherence to physical distancing interventions and good contact tracing.

- Flattening of the curve occurred within 25 days of onset.

- Eradication of the virus occurred within 42 days of onset.

- There were few cases in Central Health (CH), Western Health (WH), and Labrador-Grenfell Health (LGH) with little community transmission.

- Mortality was 1.1%, with 1 of 3 deaths occurring in a resident of a long-term care facility. Social isolation of residents protected them from the virus but at the expense of no social interactions with their families as they came to the end of their lives.

- Initial models predicted greater need for hospital and ICU beds and higher incidence of new cases around holidays than actually occurred.

  This was the result of not having local data to populate models, dependence on data derived from populations with higher population density, and assumptions for the adherence to restrictions that were worse than what actually occurred.

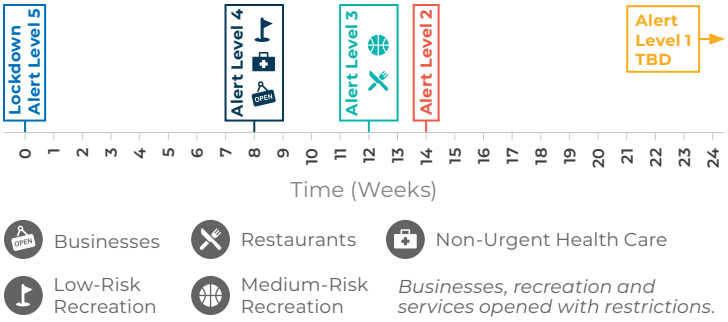


Figure 2. Timeline for Loosening of Restrictions in NL

- On 18 Mar 2020, NL declared a Public Health State of Emergency (SOE) (Level 5 of NL's COVID-19 Alert Level System). Non-essential businesses, schools, restaurants, public venues & recreational activities were all closed. Restaurants were closed for in-person dining. Private clinics were closed and non-urgent health care was postponed.
- On 11 May 2020, 54 days after SOE declared, NL moved to Alert Level 4 with some select businesses (eg. law firms), health care services and low-risk outdoor recreational activities (eg. golf) permitted to reopen/resume with restrictions.
- On 8 Jun 2020, 82 days after SOE, NL moved to Alert Level 3 allowing more businesses to reopen (eg. retail) with restrictions, medium-risk outdoor recreational activities (eg. sports such as baseball) to resume, private clinics to reopen, and restaurants to reopen at reduced occupancy.
- On 25 Jun 2020, 99 days after SOE, NL moved to Alert Level 2. More recreational activities, such as gyms & indoor pools were reopened with restrictions, and businesses, such as bars & lounges, were reopened with reduced occupancy.
- NL currently remains at Alert Level 2 with no date set for a move to Alert level 1.

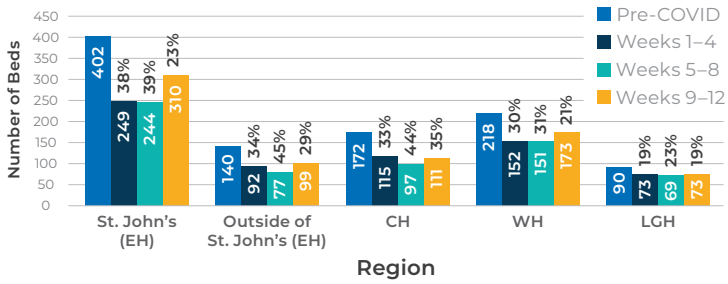


Figure 3. Reduction of Acute Hospital Beds in Use During the Initial 12 Weeks of COVID-19 Compared to the Average Number in Use for the 9 Weeks Preceding the Epidemic, by RHA

- Despite flattening the curve within 4 weeks of the start of the epidemic in EH, and eradication of the virus within 6 weeks, hospital bed use in weeks 9–12 of the epidemic was reduced by 23% in the three St. John's hospitals, and by 29% in the three rural hospitals of EH.
- Despite no community transmission of COVID-19 in regions outside EH, reduction in bed use for weeks 9-12 of the epidemic continued: 35% in CH, 21% in WH, and 19% in LGH.

Lessons Learned

1. Rapid introduction of society lockdown, adherence to restrictions and good contact tracing lead to early peaking of new cases and flattening of the curve within 25 days.
2. Eradication of the virus is possible and is a feasible goal should a second wave occur. Importation of new cases will be necessary for a second wave to occur and can be prevented by good border control together with either double testing over 7 days for the virus in people travelling to the province or 14 days isolation in the province.
3. Community transmission was restricted to regions facilitated by a travel ban within the province. Restrictions to manage a cluster do not need to be province wide but can be restricted to localities with new cases.
4. The relatively rapid flattening of the curve and eradication of the virus, but later loosening of restrictions in the first wave, supports earlier start to loosening of restrictions when these epidemiological events occur with a second wave.
5. Prediction modelling using local data and assumptions based on local behaviour should improve the accuracy of predictions.
6. Protection of the vulnerable is critical, but time is now available to create policies for social isolation that facilitate family interactions.
7. Bed occupancy was lower than necessary during the epidemic, with attendant diminished access to necessary hospital care. Rapid introduction of lockdown in regions who have new cases plus effective contact tracing should prevent growth of clusters large enough to stress hospitals.
8. Once cluster control is obtained, normalization of hospital bed use should be possible soon after flattening the curve.

Comparison of COVID-19 Epidemiology in NL to PEI and Vancouver Island and to Other Canadian Provinces

Objective

To monitor COVID-19 events in Canada with emphasis on the island communities of Prince Edward Island (PEI) and Vancouver Island.

Practice Points

1. Two island communities of PEI (population 157,000) and Vancouver Island (population 870,300) are comparable to NL.

2. The Atlantic provinces formed a bubble to permit interprovincial travel within the four provinces on 3 Jul 2020, but a Canadian bubble had not been introduced by end of September.

Methods

1. Incidence of new cases and interventions was obtained from provincial websites up to 22 Sept 2020. Low rate of new cases was defined as <10/1,000,000 population/day for 7 days.

2. For PEI and Vancouver Island, events analyzed included: first cases, time to peak of incidence curve, time to flattening of the curve (day after 7 days of new cases <10/1,000,000 population) and time to virus eradication (day after 14 days without new cases).

Results

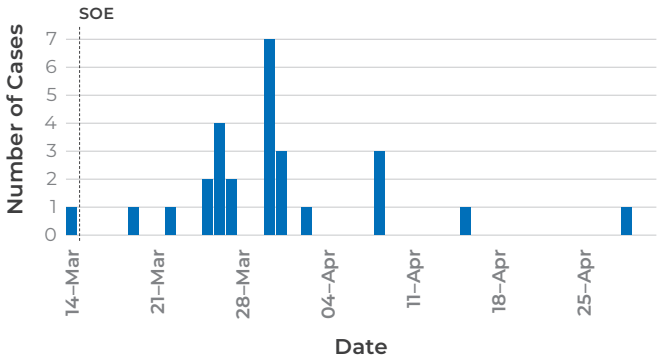
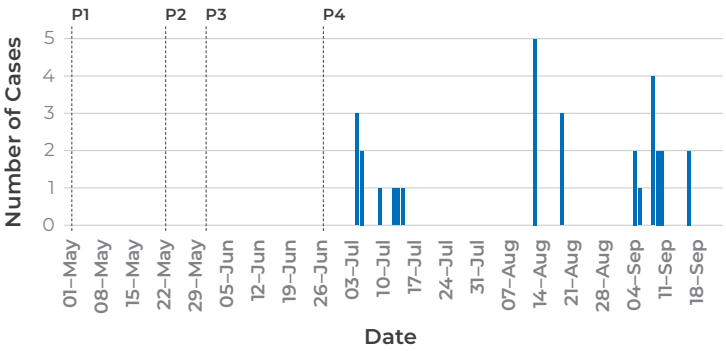


Figure 1. Incidence of New Cases in PEI From Start of Pandemic to First Stage of Loosening Restrictions

- For the first wave of the virus, the first case was identified on 14 Mar 2020, lockdown was imposed on 16 Mar, peak of the incidence curve was 16 days after first case, time to flattening the curve was 33 days and to eradication of the virus 60 days.

- Mortality was 0.0%.



Legend:
SOE – Public Health State of Emergency (16 Mar); P1 – Phase 1 Reopening (1 May); P2 – Phase 2 Reopening (22 May); P3 – Phase 3 Reopening (1 Jun); P4 – Phase 4 Reopening (26 Jun)

Figure 2. Incidence of New Cases in PEI Since the First Stage of Loosening Restrictions up to 22 Sept 2020

Border control: Travel into PEI is restricted. 14-day self-isolation is required if you are entering PEI from outside Atlantic Canada.

- Restrictions started to loosen in PEI 46 days after lockdown.

- There have been no community acquired cases since start of loosening restrictions.

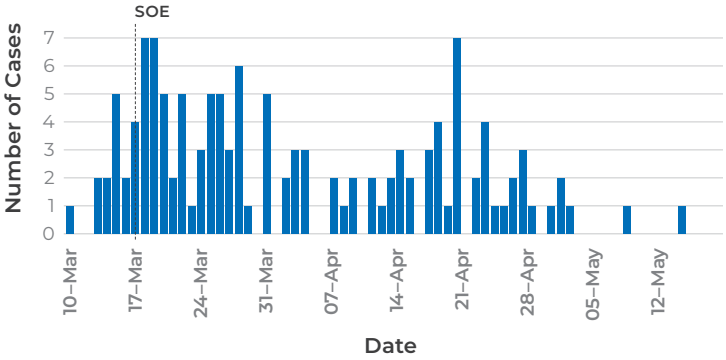
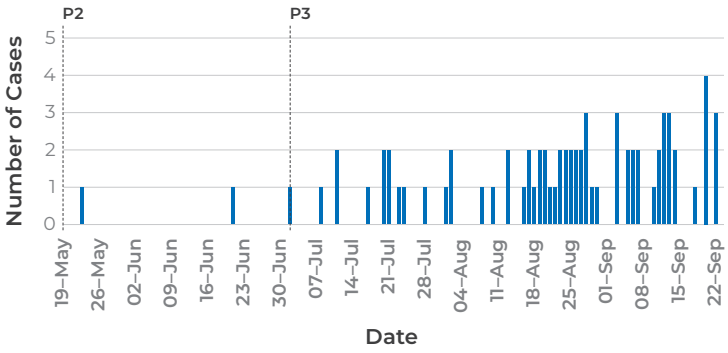


Figure 3. Incidence of New Cases in Vancouver Island From Start of Pandemic to First Stage of Loosening Restrictions

- For the first wave of the virus on Vancouver Island, the first case was identified on 10 Mar 2020, lockdown was imposed on 17 Mar, peak of the incidence curve was 8 days after first case and incidence of new cases/million population/day was never above 10.

- Mortality was 2.5%.



Legend:
SOE – Provincial State of Emergency (17 Mar) (Phase 1: Public health measures enacted 14-21 Mar); P2 – Phase 2: Start of reopening (19 May); P3 – Phase 3: Continued reopening (1 Jul)

Figure 4. Incidence of New Cases in Vancouver Island Since the First Stage of Loosening Restrictions up to 22 Sept 2020

Border control: Travel within BC is permitted. Only international travellers returning to BC are required to self-isolate for 14 days.

- ◇ Restrictions started to loosen in Vancouver Island 63 days after lockdown.

- ◇ Community acquired cases continue to occur.

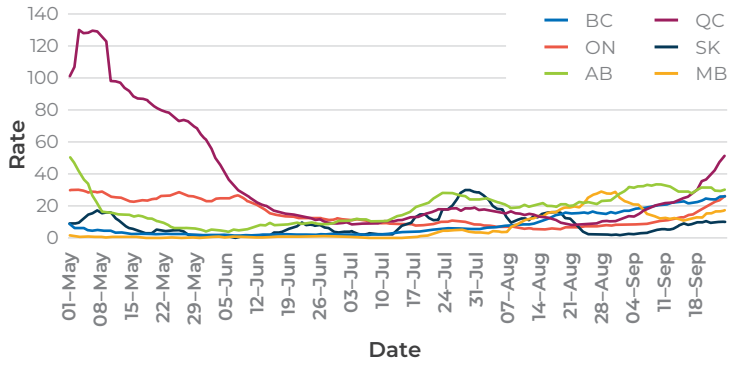


Figure 5. Incidence of New Cases in Non-Atlantic Provinces From 1 May 2020 - 22 Sept 2020 (Rolling 7-Day Average Rate per 1,000,000 Population)

- Following the more extensive loosening of restrictions in July in the non-Atlantic provinces, rate of new cases increased above 10/million population.

- As of 22 Sept, the rolling 7-day average for all non-Atlantic provinces was 10 or above, with BC, ON, QC and AB all above 25.

Conclusions

1. In the first wave, PEI only had 27 cases of COVID-19. Since eradication of the virus it has had no community acquired cases, an outcome facilitated by a 14-day isolation period for those entering PEI.

2. The rate of new cases/day in Vancouver Island never went above the low rate of 10/million population, either in the first wave or after loosening restrictions. The importation of new cases was limited solely by its geography as it did not have a 14-day isolation period for incoming travellers from Canada or a testing protocol at its border.

   Control of community transmission may have been facilitated by good adherence to restrictions, no large super spreader events and relatively low population density.

Lessons Learned About Control of COVID-19 From Populations Comparable to NL

Objective

To monitor COVID-19 events and interventions undertaken in the island communities of New Zealand, Australia and Iceland.

Practice Points

1. Examination of actual events in real time in comparable populations together with predictive modelling of future events, provides good information for public health decision making. The former requires assumptions be made to extrapolate the results to NL whereas the latter requires assumptions be made to obtain results from the models.

2. We decided early in the COVID-19 epidemic to follow events in New Zealand (island population of 4.8 million), Tasmania (island population 540,000), Victoria (population 6.5 million), and Iceland (island population 364,000).

3. The major elements of COVID-19 control are prevention of importation of new cases and management of clusters.

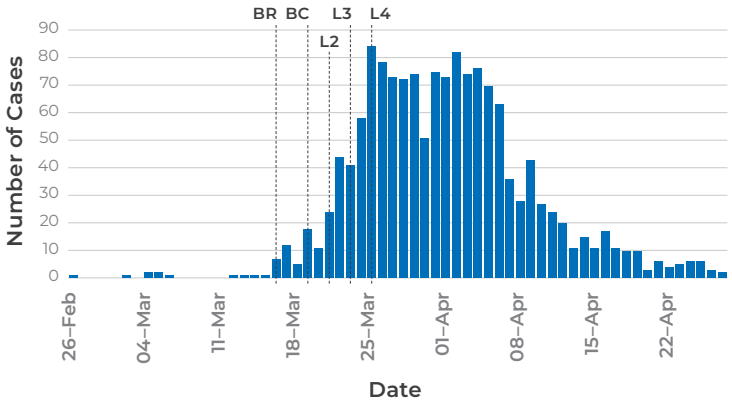
Methods

1. Data on incidence of new cases and deaths, together with a description of various types of interventions imposed or loosened, were obtained from government websites up to September 14, 2020.

2. Events analyzed included first cases, time to peak of incidence curve, time to flattening of the curve (day after 7 days of new cases < 10/1,000,000 population), time to virus eradication (day after 14 days without new cases), time to new cluster (new case of community acquired COVID-19 after the start of loosening restrictions), time to recrudescence (last day of accumulating >70/1,000,000 new cases in less than a week), and time from lockdown to flattening of the curve.

Results

NEW ZEALAND

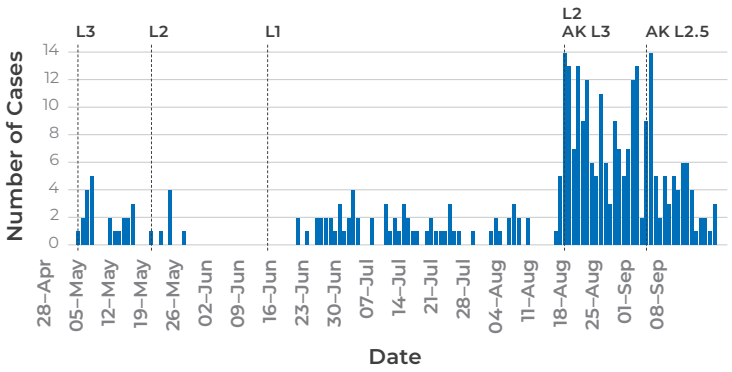


BR: Border restrictions, compulsory self-isolation (16 Mar); BC: Border closed to all but NZ residents & citizens (19 Mar); L2: Alert level 2 – Reduce (21 Mar); L3: Alert Level 3 – Restrict (23 Mar); L4: Alert Level 4 – Lockdown (25 Mar)

Figure 1. Incidence of New Cases in New Zealand From Start of Pandemic to First Stage of Loosening Restrictions

- The first case was identified on 26 Feb 2020; intermittent cases were identified during the following 18 days; lockdown was imposed on 25 Mar 2020, 28 days after the first case, which also happened to be the peak of the incidence curve. Flattening of the curve occurred 20 days after lockdown, time to flattening the curve was 48 days, and to eradication of the virus 80 days from first case.

- Mortality in the first wave was 1.4%.



L3: Alert level 3 – Restrict (28 Apr); L2: Alert Level 2 – Reduce (14 May); L1: Alert level 1 – Prepare (9 Jun); L2, AK L3: NZ Alert Level 2 - Reduce, Auckland Alert Level 3 – Restrict (12 Aug); AK L2.5: Auckland Alert Level 2 with some extra restrictions (31 Aug)

Figure 2. Incidence of New Cases in New Zealand Since the First Stage of Loosening Restrictions up to 14 Sept 2020

- From 28 Apr to 11 Aug, 2020, new cases were all travel related.

Border control: Obtained by three interventions — travel ban, 14-day isolation in government facilities for returnees, and virus testing at day 3 and day 12 of isolation.

- ◇ There were 147 cases detected at the border, 65% identified at day 3 testing and 35% at day 12 testing.
- ◇ There were no community acquired cases for 102 days after starting to loosen restrictions.

Cluster control of new Community Outbreak: Lockdown to Level 3 was re-imposed in the region in which new cases were detected (Auckland), the origin of which is still unknown, and the remainder of NZ moved to Alert level 2.

- ◇ First cases were detected on 11 Aug, lockdown followed on 12 Aug, peak of incidence curve occurred 2 days after first case, the incidence of new cases/million/day was never above 10, and restrictions were loosened in Auckland after 18 days (Auckland moved to Alert level 2 on 31 Aug with restrictions on gatherings, funerals and tangihanga).
- ◇ There have been 2 deaths related to the community cluster.
- ◇ Next review of Alert Levels will be 21 Sept 2020. Government has agreed, in principle, to move NZ down to Alert Level 1 on 22 Sept (42 days after start of new community outbreak) and Auckland to Alert Level 2 with eased restrictions on 24 Sept (44 days after start of new community outbreak).

TASMANIA

- First case was on 2 Mar 2020, and lockdown was imposed on 19 Mar 2020.
- There have been 228 cases and 13 deaths since the beginning of pandemic.

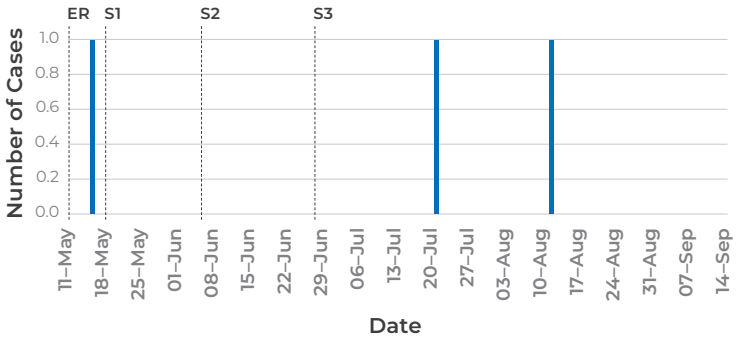


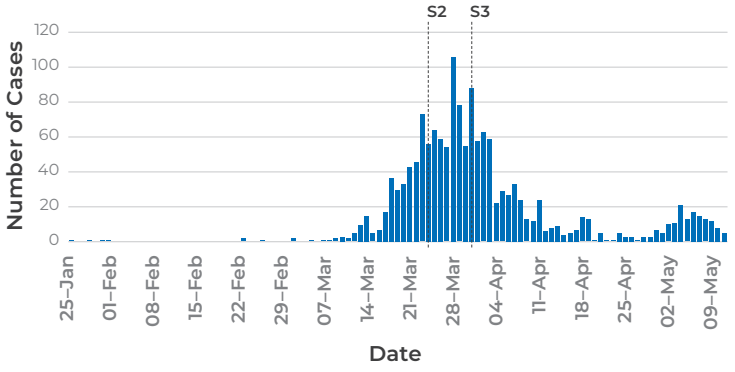
Figure 3. Incidence of New Cases and Stages of Loosening Restrictions in Tasmania up to 14 Sept 2020

- Restrictions started to loosen 70 days after first case detected and 53 days after lockdown.

Border control: Obtained by 14-day isolation in government facilities on coming into Australia and a further 14 days on coming into Tasmania.

Cluster Control: There has been no community transmission or deaths since start of loosening restrictions.

VICTORIA

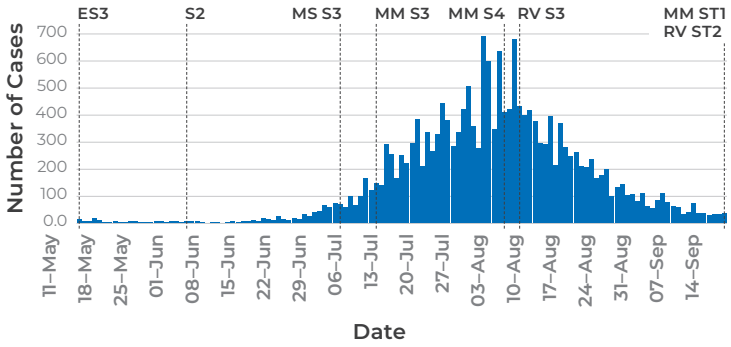


S2: Stage 2 Stay Safe Directions (23 Mar); S3: Stage 3 Stay at Home Restrictions – 1st wave Lockdown (30 Mar)

Figure 4. Incidence of New Cases in Victoria From Start of Pandemic to First Stage of Loosening Restrictions

- The first case was identified on 25 Jan 2020, peak of the incidence curve was 62 days after first case, intermittent cases were identified for the next 45 days, time to flattening the curve was 73 days. Lockdown was imposed on 30 Mar 2020, 3 days after the peak of incidence. Time from lockdown to flattening of the curve was 6 days; eradication of the virus was never achieved.

- Mortality in the first wave was 1.2%.



ES3: Easing of some Stage 3 Restrictions (11 May); S2: Stage 2 Stay Safe Directions (1 Jun); MS S3: 36 Melbourne Suburbs Stage 3 Stay at Home Restrictions (1 Jul); MM S3: Metropolitan Melbourne Stage 3 Stay at Home Restrictions (8 Jul); MM S4: Metropolitan Melbourne Stage 4 Stay at Home Restrictions (2 Aug); RV S3: Regional Victoria Stage 3 Stay at Home Restrictions (5 Aug); MM ST1, RV ST2: Metropolitan Melbourne First Step of New Reopening Roadmap, Regional Victoria Second Step of New Reopening Roadmap (14 Sept)

Figure 5. Incidence of New Cases in Victoria Since the First Stage of Loosening Restrictions up to 14 Sept 2020

Border control: Obtained by 14-day isolation in government facilities. Failures in hotel quarantine by private security firms that were contracted to operate them, such as illegal socializing between staff and physical contact between guards and quarantined travelers, led to the current community outbreak.

Cluster control of new Community Outbreak: The unofficial "beginning" of the new community outbreak was 1 Jun 2020. Lockdown was imposed in stages and by region.

- ◇ Under Stage 3 restrictions, people could leave home for only one of four reasons: shopping for food or other essential items, care and caregiving, outdoor exercise and work/study if this could not be done from home. Stage 4 restrictions included a curfew from 8pm to 5am and more restrictive time, distance (within 5km) and gathering limits for shopping and exercise.

- ◇ Failure to adhere to lockdown caused further spread of the virus. As many as 9 out of 10 people who later tested positive were not isolating between the onset of symptoms and getting a test. In addition, 53% of positive cases did not isolate between being tested and receiving their results.

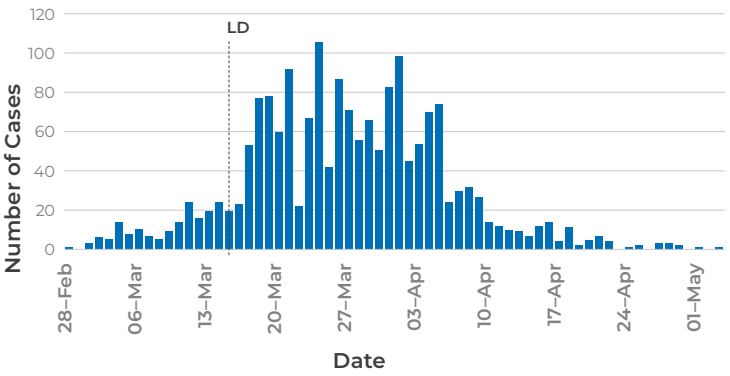
- ◇ Rise in incidence of new cases occurred on 1 Jun 2020, peak of incidence curve was 58 days after recrudescence, and curve is starting to flatten (less than 10 new cases/million/day for the last 6 days). Full lockdown occurred on 2 Aug and flattening of the curve occurred 44 days later.

- ◇ There have been 710 deaths since 1 Jun 2020 (with first death occurring on 23 Jun).

- ◇ Victoria released a 4-step Roadmap to Recovery which begins on 14 Sept. The steps are subject to "trigger points" and public health advice. Trigger points are based on daily average case numbers and source of transmission being known. Restrictions will only be eased when the time period passes AND the number of cases is low enough to move to the next step.

- ◇ Regional Victoria started on the Second Step and had reached the necessary trigger point to move to the Third Step on 17 Sept.

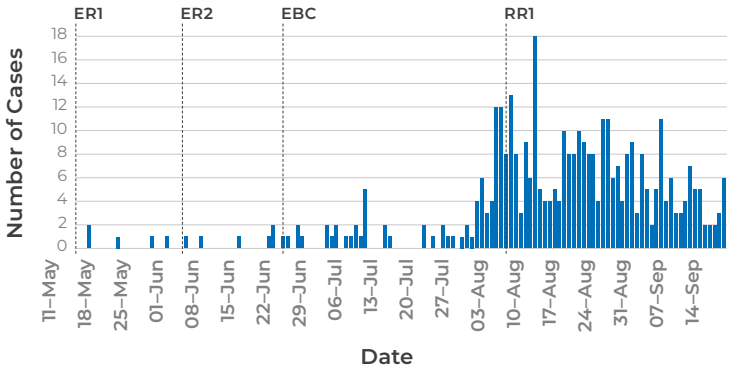
ICELAND



LD: Lockdown measures started (March 13 – 24)

Figure 6. Incidence of New Cases in Iceland From Start of Pandemic to First Stage of Loosening Restrictions

- First case was identified on 28 Feb 2020, restrictions were imposed around 15 Mar, peak of initial incidence curve (prior to 26 Jul) was 25 days after first case, time to flattening of the initial curve was 62 days. Flattening of the curve occurred 30 days after introduction of restrictions, virus was never eradicated.
- Mortality in the first wave was 0.5%.



LD: Lockdown measures started (March 13 - 24); ER1: Easing of Many Restrictions (May 4); ER2: Further easing of Restrictions (May 25); EBC: Easing of Border Control Measures (June 15); RR1: Some Restrictions Re-imposed (July 31)

Figure 7. Incidence of New Cases in Iceland Since the First Stage of Loosening Restrictions up to 14 Sept 2020

Border control: No full travel ban, testing on arrival and initially no isolation. On 15 Jun, Iceland allowed single PCR testing at the border for Icelandic citizens/ residents and travelers of other EU & Schengen states instead of 14-day self-isolation.

- ◇ On 13 Jul, double PCR testing was required for Icelandic citizens & residents with special precautions to be taken for the first 5 days after arrival until the 2nd PCR test. This was expanded on 31 Jul to include all those arriving from high risk areas and who intended to stay in Iceland for 10 days or more.
- ◇ As of 19 Aug 2020, all passengers arriving in Iceland must either undergo a double testing procedure, one test upon arrival and another 5-6 days later (along with quarantine between tests), or a 14-day quarantine.
- ◇ From 15 Jun to 14 Sept, number of cases detected at the border was 116 and number in the community was 251.

Cluster control: 26 Jul 2020 is the unofficial "beginning" of the second community outbreak. Precautionary measures were introduced on 31 Jul and re-imposed a 100-person limit of larger gatherings and reinstated the 2-meter social distancing rule.

- ◇ Rise in the incidence of new cases occurred on 26 Jul, peak of recrudescence occurred 11 days after start of recrudescence, curve has not yet been flattened, despite 45 days of restrictions.
- ◇ There have been no new deaths since 19 Apr.

Conclusions

1. In the initial wave, both New Zealand and Victoria delayed imposition of lockdown because cases were intermittent.
2. Border control to prevent importation of new cases depends on either 14-day isolation or double testing. New Zealand used both interventions and were successful in preventing importation. Iceland failed to prevent importation with a single test at the borders.
3. Escape from isolation led to recrudescence in Victoria.
4. Imposition of lockdown flattened the curve within 20–44, but the efficacy was dependent on adherence to restrictions. Poor adherence led to recrudescence in Victoria.
5. Early loosening of restrictions in New Zealand was not associated with new cases and rapid imposition of restrictions limited the new cluster.
6. A few community transmission cases at the beginning predict increased subsequent incidence but a few cases after lockdown suggest that restrictions can begin to loosen.

Choosing Wisely NL

Guidelines for Medical Laboratory Testing

In the COVID-19 era, it is particularly important to optimize the need for laboratory testing. The following guidelines from Choosing Wisely Canada and other sources are provided to support this endeavour. To read more about the source for each guideline, visit https://bit.ly/37M5M2U.

A. Screening and Chronic Disease Testing

1. Don't do annual screening blood tests unless directly indicated by the risk profile of the patient. (Choosing Wisely Canada)

2. In the frail elderly, don't order screening or routine chronic disease testing just because a blood draw is being done. (Choosing Wisely Canada)

3. Don't order baseline laboratory studies (complete blood count, coagulation testing, or serum biochemistry) for asymptomatic patients undergoing low risk non-cardiac surgery. (Choosing Wisely Canada)

Quality of Care NL advises that in patients with stable, non-progressive disease, monitoring does not need to occur every quarter.

B. Thyroid Tests

1. Don't use Free T4 or T3 to screen for hypothyroidism or to monitor and adjust levothyroxine (T4) dose in patients with known primary hypothyroidism, unless the patient has suspected or known pituitary or hypothalamic disease. (Choosing Wisely Canada)

2. Don't order thyroid function tests in asymptomatic patients. (Choosing Wisely Canada)

3. Quality of Care NL advises that in stable asymptomatic patients on levothyroxine, order TSH 1–2 times/year.

C. HbA1c

1. In many adults 65 years or older, moderate control of diabetes is generally better, with the aim of achieving glycemic control between 7.0 and 8.5, depending on life expectancy. (Choosing Wisely Canada)

Consequently, Quality of Care NL advises that less HbAIC testing is required compared to in insulin dependent diabetes.

D. Specific Tests

1. Don't request uric acid as part of the routine evaluation of cardiovascular risk, obesity or diabetes. (Choosing Wisely Canada)

2. Testing creatine kinase and ALT levels at baseline on statin initiation or for monitoring is not required; perform CK as clinically indicated. (College of Family Physicians of Canada)

3. In patients established on lipid lowering therapy, routine monitoring of lipid profiles is not required. (College of Family Physicians of Canada)

4. Screening of the general population for iron deficiency is not indicated. (Ontario Association of Medical Laboratories)

Quality of Care NL advises that in anemic patients, ferritin testing should be done, and in female patients of reproductive age with normal hemoglobin and MCV/MCHC, ferritin testing would be reasonable if oral iron would be prescribed for hypoferritinemia.

5. Don't routinely measure Vitamin D in low risk adults. (Choosing Wisely Canada)

6. Don't order ANA as a screening test in patients without specific signs or symptoms of systemic lupus erythematosus (SLE) or another connective tissue disease (CTD). (Choosing Wisely Canada)

7. Don't request a serum protein electrophoresis in asymptomatic patients in the absence of otherwise unexplained hypercalcemia, renal insufficiency, anemia or lytic bone lesions. (Choosing Wisely Canada)

E. INR

1. In patients on warfarin with a stable INR, many patients are monitored once monthly. Very stable patients can be monitored as infrequently as every 12 weeks. (Thrombosis Canada)

Unstable INR is often related to overly frequent monitoring or to excessively large dose adjustments.

Quality of Care NL

The Impact of COVID-19 on the Frequency of Blood Draws by Family Physicians in Eastern Health

Objective

To determine the reduction in blood draws ordered by family physicians (FPs) during COVID-19, for how long the reduction was maintained, and the extent of reduction for individual FPs.

Practice Points

1. The state of emergency for COVID-19 started on 16 Mar 2020 necessitating restrictions on visits to FPs and dependence on communication with patients by phone or virtually.

2. The need for Personal Protective Equipment (PPE) slowed the rate at which patients could be processed for blood collection, resulting in a reduction of blood testing that was less urgent or less necessary. The Regional Health Authorities (RHAs) started an audit and feedback program to control blood draws during COVID-19 in July 2020.

Methods

1. Weekly quantity of blood draws ordered by FPs in Eastern Health (EH) from 6 Jan 2020 – 15 Mar 2020 (10 weeks) and from 16 Mar – 22 Jun 2020 (13 weeks) were obtained from EH. The weekly number during COVID-19 were compared to the weekly average over the 10 weeks pre-COVID-19.

2. The number of blood draws ordered by individual FPs on week 10 of the epidemic was compared to the average number they ordered during the 10 weeks pre epidemic.

Results

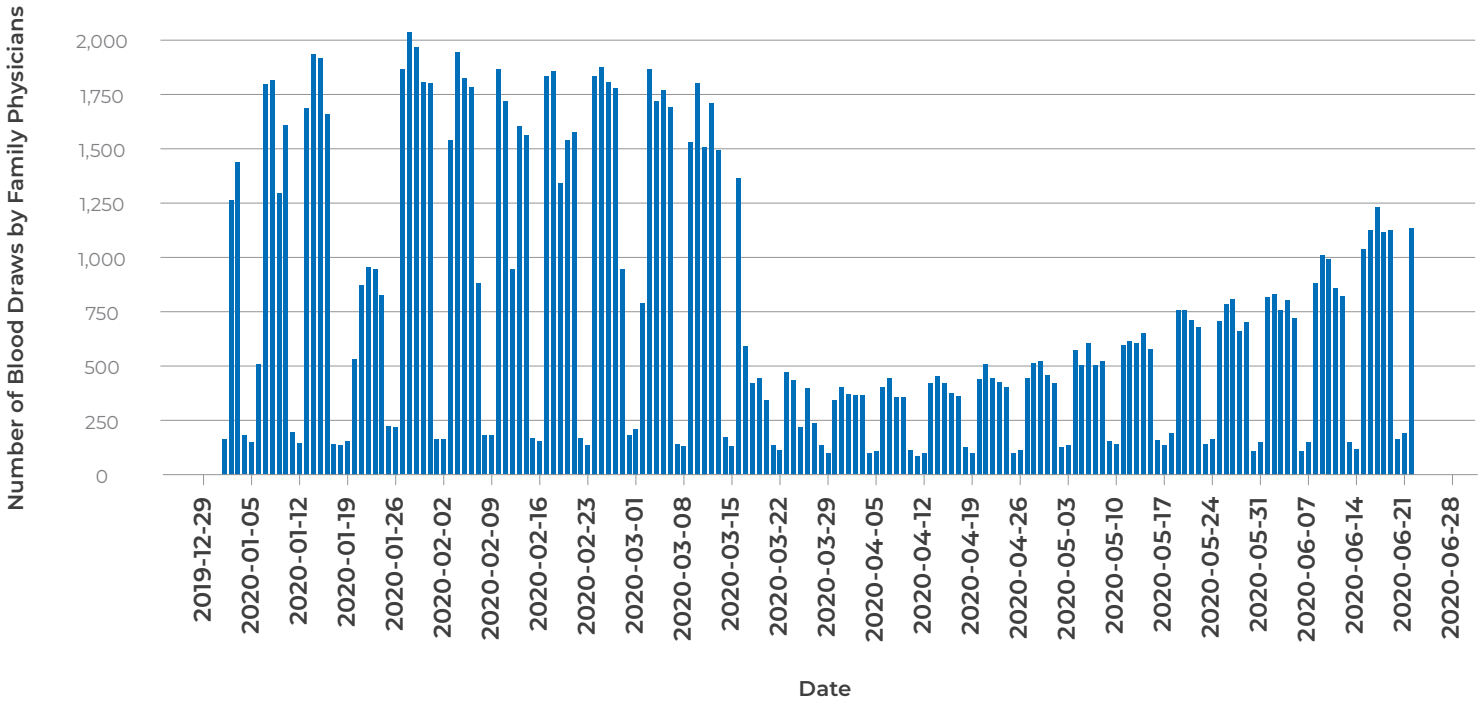


Figure 1. Number of Blood Draws Ordered Daily by FPs in EH From 1 Jan – 22 June 2020

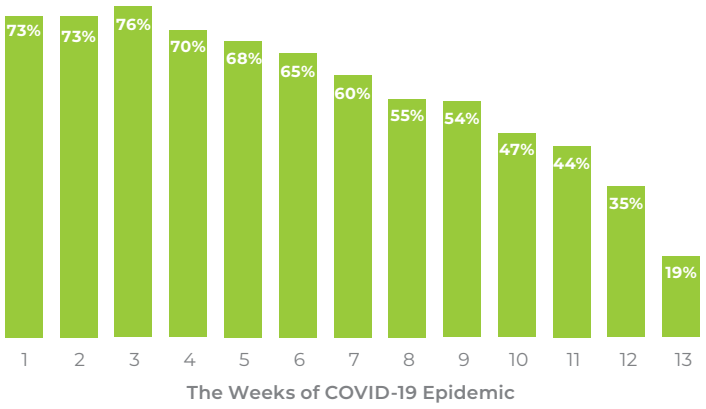
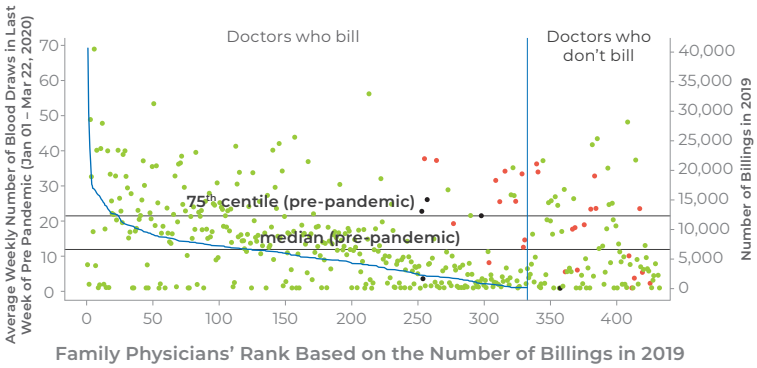


Figure 2. The Percent Reduction in Blood Draws for Each of the First 13 Weeks During COVID-19

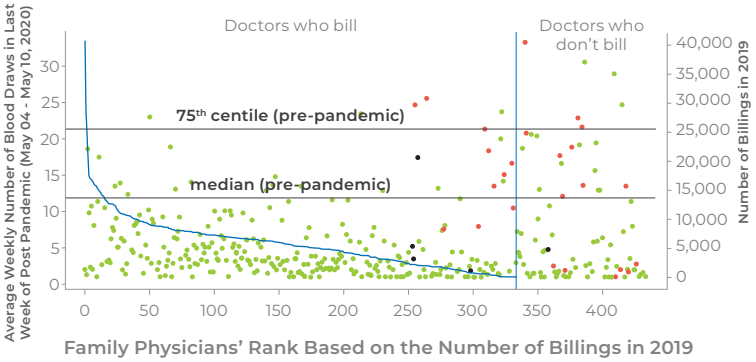
- At week 10 of the epidemic, the reduction in blood draws was 47% compared to the average of the 10 weeks pre-COVID-19.



The vertical line separates FPs who bill and those who do not bill.
Green dots represent clinic FPs.
Red dots represent FPs with an ER practice.
Black dots represent unknown.

Figure 3. Average Weekly Number of Blood Draws by Individual FPs in the 10 Weeks Pre-COVID-19 (Y-axis) (Dot) and the Ranking of FPs Based on the Number of Billings Each Made in 2019 (Solid Line Curve)

- Although there is a positive relationship between the quantity of blood draws and the quantity of billings, there is wide variability in the number of blood draws when analyzed by groups defined by quintile of billings.



The vertical line separates FPs who bill from those who do not.
Green dots represent clinic FPs.
Red dots represent FPs with an ER practice.
Black dots represent unknown.
The horizontal lines represent the median and 75th centile of average weekly blood draws by FPs pre-COVID-19.

Figure 4. Number of Blood Draws Ordered During Week 10 of COVID-19 (Y-axis) (Dot) and the Ranking of FPs Based on the Number of Billings in 2019 (Solid Line Curve)

- There were only three FPs who billed and three who did not who ordered blood draws above the 75th centile of blood draws pre-COVID-19, in addition to five FPs with an ER practice.

Conclusions

1. The reduction in blood draws ordered by FPs in EH was substantial during COVID-19. In the first 4 weeks, reduction was 73%. By week 10, it was 47% and by week 13 it was 19%.

2. By week 10 of the epidemic very few FPs exceeded the 75th centile of ordering observed in the pre-COVID-19 era.

3. Pre-COVID-19 variability in ordering blood draws was substantial, whether or not FPs billed, and whether or not the FP was a frequent biller.

4. Adherence to Clinical Practice Guidelines outlined in page 54 would help lower the quantity of blood draws both during COVID-19 and after the epidemic is over.

Quality of Care NL

The Impact of COVID-19 on Blood Testing in Eastern Health by Family Physicians

Objective

To determine the degree to which blood testing was reduced by family physicians (FPs) during the COVID-19 epidemic, for how long the reduction was maintained in Eastern Health (EH), which categories of blood tests were reduced, and whether selection of patients for testing had improved.

Practice Points

1. The state of emergency for COVID-19 started 16 Mar 2020 necessitating restrictions on visits to FPs and dependence on communication with patients by phone or virtually.

2. The need for Protective Personal Equipment (PPE) slowed the rate at which patients could be processed for blood collection to less than 50% of pre-COVID-19 rates. As a result less urgent/ unnecessary test ordering had the potential to delay more critical testing.

3. A measure of appropriateness of testing is percent abnormal. So, an increase in per cent abnormal suggests a reduction in unnecessary tests.

Methods

1. Weekly average tests ordered by FPs from 6 Jan 2020 – 15 March 2020 (10 weeks) in Eastern Health were compared to those ordered from 16 Mar 2020 – 22 Jun 2020 (14 weeks). This included hemoglobin (Hb), serum creatinine, INR, TSH and HbA1c .

Results

Table 1. Average Weekly Number of Each of the Five Tests Ordered by FPs Within Eastern Health in the 10 Weeks Pre-COVID-19

Test Pre-COVID	Average N Weekly	Annualized Rate/100 Population
Creatinine	3,950	40
Hemoglobin	4,184	42
TSH	2,094	21
HbA1c	1,940	19
INR	1,222	12

- Rate of testing/100 people in the population is high pre-COVID-19.

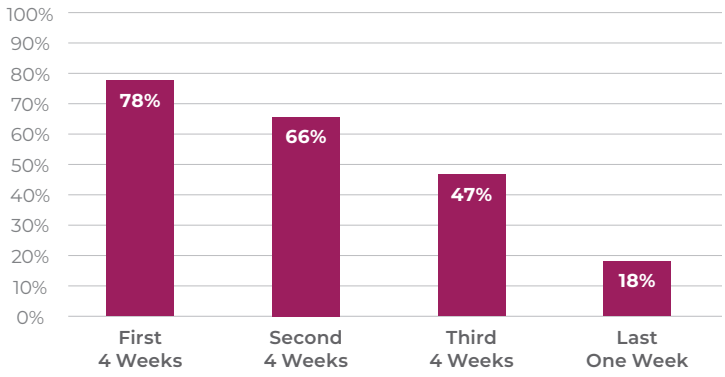


Figure 1A. Percent Reduction in Number of Hemoglobin Tests Done Weekly During the First 13 Weeks of COVID-19

- ≥70% reduction in Hb testing was observed for the first six weeks of COVID-19.

- By week 13 of the epidemic, the reduction was 18%.

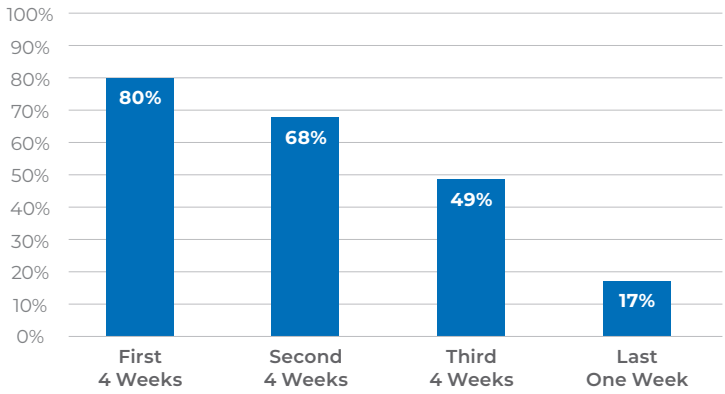


Figure 1B. Percent Reduction in Number of eGFR Tests Done Weekly During the First 13 Weeks of COVID-19

- Reduction in eGFR testing mirrored that of Hb testing.

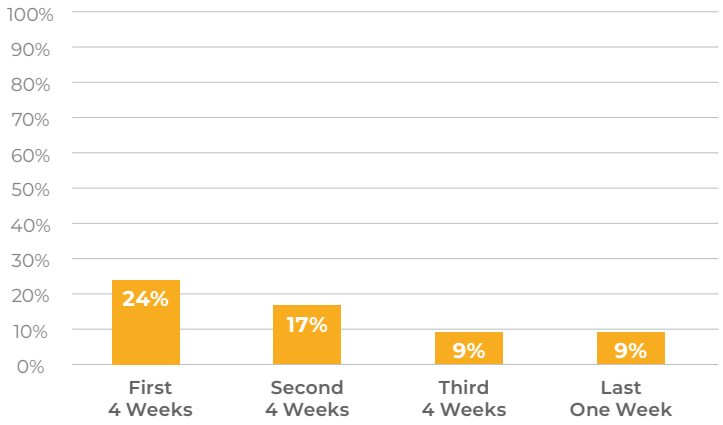


Figure 1C. Percent Reduction in Number of INR Tests Done Weekly During the First 13 Weeks of COVID-19

- Reduction in INR testing was never greater than 30%.
- By week 10, the reduction was 10%.

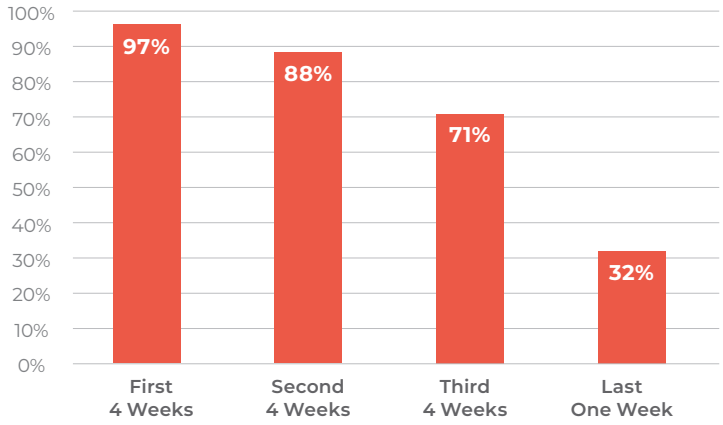


Figure 1D. Percent Reduction in Number of HbA1c Tests Done Weekly During the First 13 Weeks of COVID-19

- HbA1c testing was reduced by ≥ 90% for the first six weeks of COVID-19.
- By week 13, the reduction was 32%.

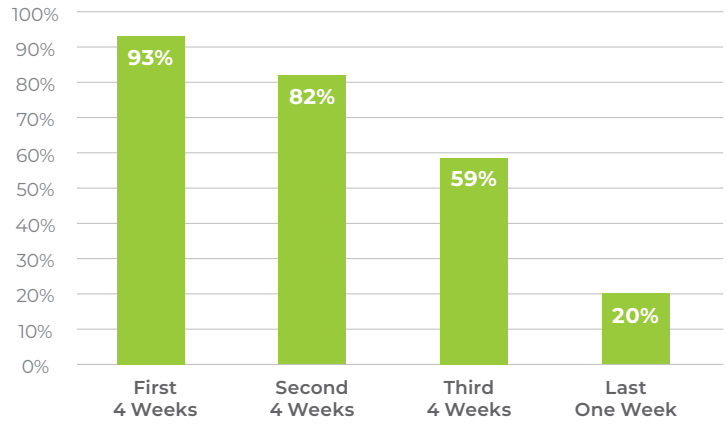


Figure 1E. Percent Reduction in Number of TSH Tests Done Weekly During the First 13 Weeks of COVID-19

- Initial reduction in TSH testing was similar to HbA1c.
- By week 13, the reduction was 25%.

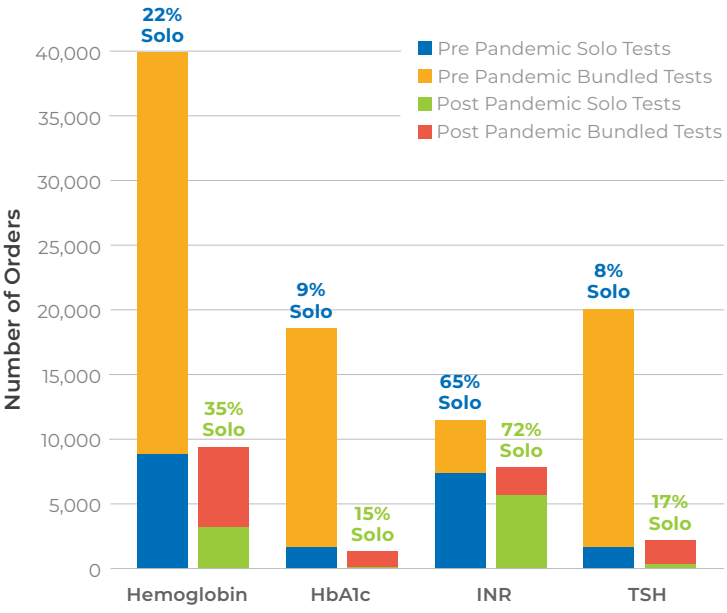


Figure 2. Number and Combination of Tests Ordered by FPs in the 8 Weeks Pre and During the First 8 Weeks of the COVID-19 Period

- INR is frequently ordered as a solo test, whereas Hb, HbA1c and TSH are frequently ordered with other tests, a practice that changed little during the epidemic.

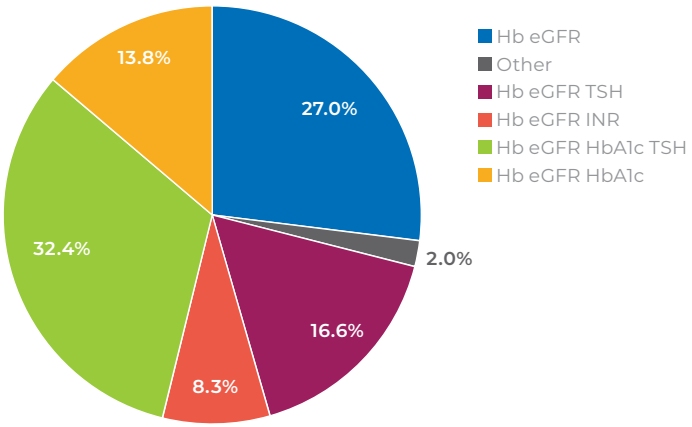


Figure 3A. Tests Bundled With Hb and e-GFR Pre-COVID-19

- Hb and eGFR are often bundled together. In these patients, blood draws usually include other tests.

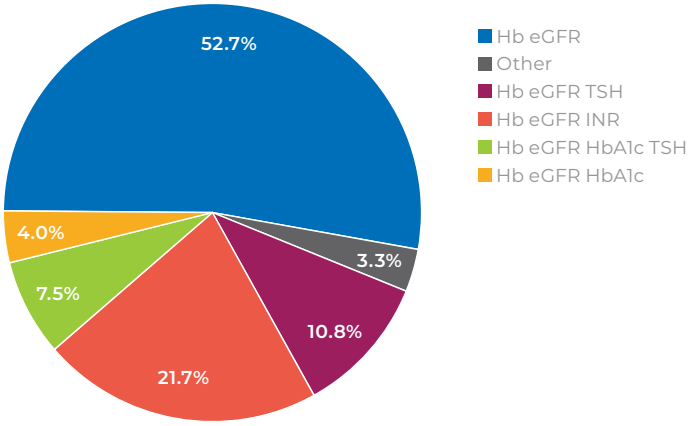


Figure 3B. Tests Bundled With Hb and eGFR During COVID-19

- Together with a reduction in the quantity of combined Hb and e-GFR testing during the epidemic, there was also a reduction in the tests bundled with Hb and eGFR.

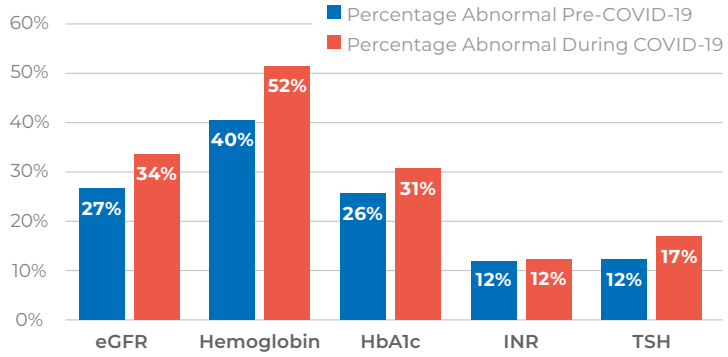


Figure 4. Percentage Abnormal Results for the 10 Weeks Pre and During the COVID-19 Epidemic

- Increase in the percent abnormal comparing COVID-19 to pre-COVID-19 was observed for eGFR (26% improvement), Hb (30% improvement), HbA1c (19% improvement), and TSH (29% improvement) but not for INR.

Conclusions

1. Even in a time of enforced rationing INR testing is considered essential, with relatively small reductions in volume during COVID-19, return to within 10% of the pre rate after 10 weeks, and no change in percent abnormal.

2. The frequency of INR testing should be considered by NLPDP when decisions are made on funding Xaralto.

3. Hb and kidney function testing occured in about 40/100 population annually pre-COVID-19, substantial reduction in testing occurred during COVID-19, selection of those who needed testing was undertaken (% abnormal went up) , and volume was within 20% of pre-rate after 10 weeks. Consideration should be given to ordering these tests 1–2 times/year in patients with mild, non-progressive chronic disease.

4. Monitoring of diabetic and thyroid control was surprisingly frequent pre-COVID-19 (about 20/100 population), there was a very substantial fall in volumes during COVID-19, selection of those who needed testing occurred, after 10 weeks volume was within 30% of pre for HbA1c and 20% for TSH.

5. Consideration should be given to testing 1–2 times/year in stable non-insulin dependant diabetics and in stable patients on thyroxine.

Substantial Decrease in Peripheral Artery Testing During COVID-19 But No Change in the Number Diagnosed with Critical Stenotic Disease

Objective

To determine the impact of COVID-19 on peripheral artery testing in patients who needed testing.

Practice Points

1. About 12% of adults in NL have peripheral artery disease (PAD) but usually these patients do not need a Peripheral Artery (PA) test or revascularization procedure.

2. PA testing is indicated in those who could potentially benefit from a revascularization procedure who have rest pain/severe claudication or tissue loss with signs of ischemia. Sometimes testing may be helpful in making a diagnosis of PAD in patients with symptoms consistent with ischemia, even though a procedure is not contemplated.

3. Testing is not indicated in patients with mild claudication, atypical symptoms like leg cramps, paraesthesiae, numbness, or Raynaud's phenomenon, or signs such as digital cyanosis, or absent peripheral pulses without symptoms of PAD. Screening for PAD in the general population is not recommended.

4. COVID-19 induced a reduction in hospital services starting 16 Mar 2020, including a reduction in PAD testing.

Methods

1. Data on PAD testing was obtained from St. Clare's Vascular Laboratory from 2 Jan 2020 to 19 May 2020. The period 2 Jan to Mar 15 (pre-COVID-19: 52 working days) was compared to 16 Mar to 19 May (during COVID-19: 44 working days) for indication and rate of diagnosis of PAD. A correction factor of 0.85 was made for pre-COVID-19 era, in which 182 had testing, when comparing numbers during the epidemic, when 46 patients had testing.

Results

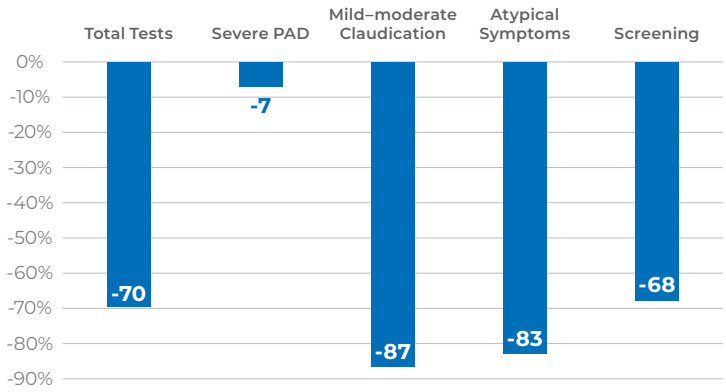


Figure 1. Percent Reduction in Volume of Testing During COVID-19 Compared to Pre-COVID-19 (Using the Correction Factor of 0.85) by Indication

- Substantial reduction in testing occurred in patients without a good indication for testing, and little change occurred in the volume of tests in those with manifestations consistent with severe PAD.

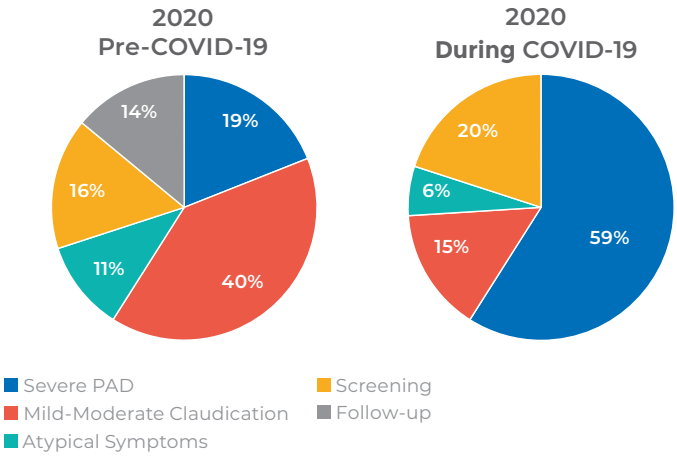


Figure 2. Proportion of PAD Tests by Indication Pre and During COVID-19

- During COVID-19, the appropriateness of testing improved enormously particularly as the proportion with severe PAD increased from 19% to 59%.

- During COVID-19, no tests were undertaken as follow-up for those who had previous revascularization, as follow-up clinics had been cancelled.

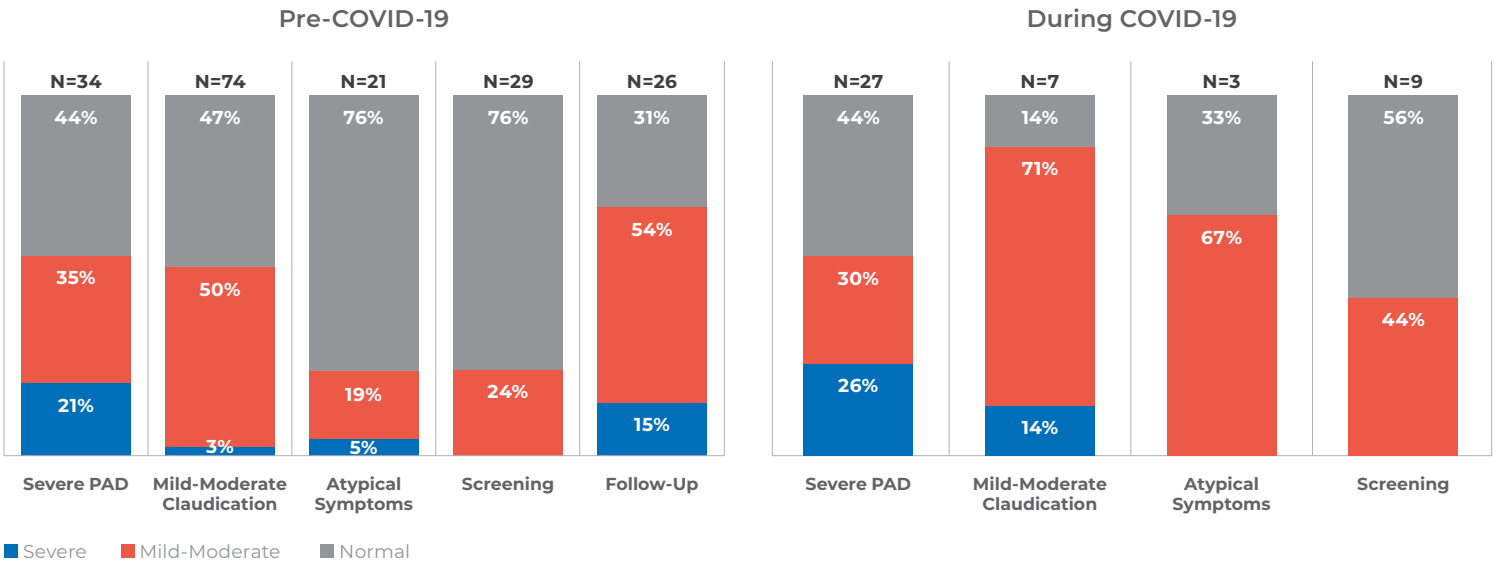


Figure 3. Diagnosis of PAD on Testing by Indication Pre and During COVID-19

- The number of patients who had manifestations of severe PAD diagnosed with critical stenotic PAD was identical pre and during COVID-19 (n=7).

Conclusions

1. There was substantial reduction in PAD testing during COVID-19 but this occurred in the groups without good indications for testing.

2. The number of patients with strong indications did not change nor did the number/proportion diagnosed with critical stenotic disease.

The Impact of COVID-19 on Cardiac Catheterization in NL

Objective

To determine the extent of reduction of cardiac catheterizations (CC) during COVID-19 by indication and whether the percent diagnosed with critical coronary artery disease (CAD) improved.

Practice Points

1. During COVID-19, restrictions on use of hospital services were imposed, including admissions to hospital, visits to doctors, blood tests and imaging of various kinds.

2. CC for ST elevation myocardial infarction (STEMI) should be performed within 24 hours of symptoms, and also undertaken in specific patients with Acute Coronary Syndrome (ACS).

3. Patients with stable angina are not urgent but prior to COVID-19 there was a big wait list with many patients already waiting longer than the recommended time.

Methods

1. All patients who had CC for Coronary Heart Disease from 1 Jan 2020 – 15 Mar 2020 were compared to those from 16 Mar 2020 – 31 May 2020: 75 days pre-COVID-19 and 76 days during COVID-19. Data in the APPROACH database was analyzed. Critical CAD is defined as ≥70% stenosis or ≥50% stenosis of left main coronary artery.

Results

Table 1. Number of CCs and Number Diagnosed With Critical CAD Pre and During COVID-19 by Indication

Indication	Pre-COVID-19		During COVID-19	
	N CC	N Critical CAD	N CC	N Critical CAD
Stable Angina	157	89	75	46
STEMI	79	64	58	49
NSTEMI	235	169	180	118
Unstable Angina	76	48	66	32
Total	**547**	**370**	**379**	**245**

- The actual number of patients who had CC for STEMI diagnosed with critical CAD was 15 less during COVID-19 compared to pre-COVID-19, and for ACS it was 95.

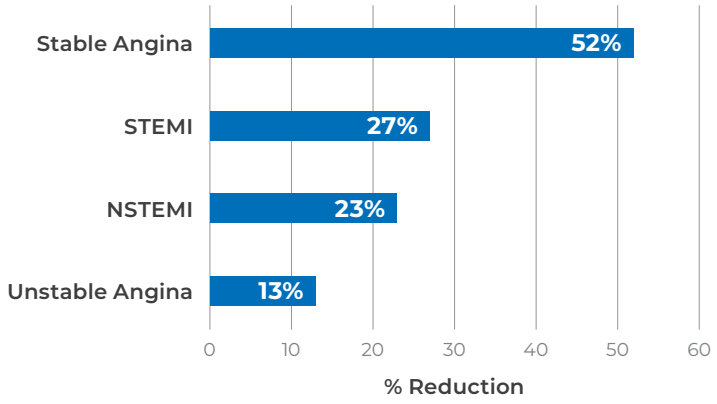


Figure 1. Percent Reduction in Number of CCs Performed During COVID-19 by Indication

- The biggest reduction in CCs during COVID-19 was for stable angina.

- The percent reduction for STEMIs was 27%.

- The smallest reduction was for unstable angina, 13%.

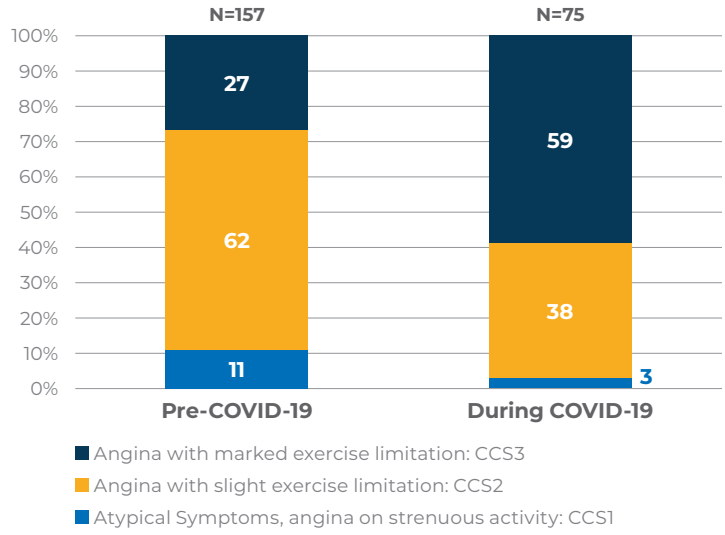


Figure 2. The Percent Who had CC for Stable Angina by CCS Score Pre and During COVID-19

- During COVID-19, the proportion selected for CC from the wait list with high CCS angina score increased from 27% to 59%.

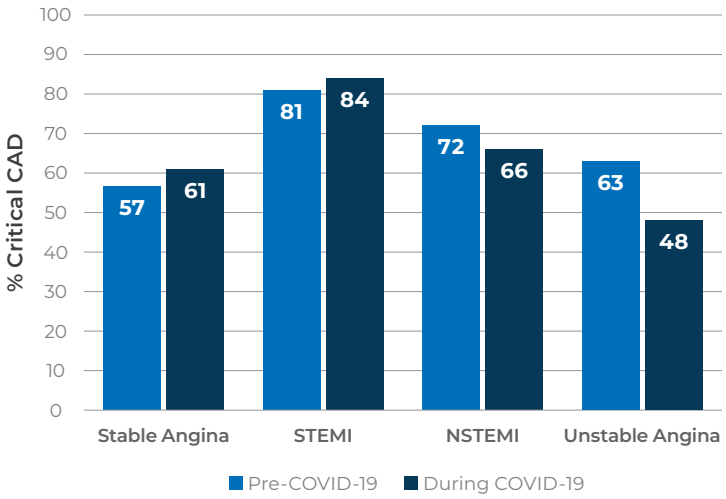


Figure 3. Percent of CCs Diagnosed With Critical CAD Pre and During COVID-19 by Indication

- Selection of patients for CC with ACS did not improve during COVID-19 as the percent diagnosed with critical CAD was lower compared to pre-COVID-19 (66% in those with NSTEMI and 48% with unstable angina).

Conclusions

1. In patients who required CC, there was a 26% reduction in procedures for STEMI and a 21% reduction for ACS.

2. The actual difference in numbers of patients who had critical CAD diagnosed in pre-COVID-19 group compared to during COVID-19 for STEMI and ACS was 110 over 11 weeks. The benefit of reductions in CC to prevent transmission of COVID-19 should be balanced against the harms of restrictions on CC in patients who need the procedure.

3. Failure to improve rate of diagnosis of critical CAD in patients with ACS at a time of rationing of CC caused by COVID-19 implies there is a need for an education program on workup and selection of ACS patients for CC.

The Impact of COVID-19 on Surgery by Regional Health Authority

Objective

To determine the reduction in number of surgeries during COVID-19 in each Regional Health Authority (RHA), for how long and to what degree the reduction persisted.

Practice Points

1. The lockdown that occurred as a result of COVID-19 included deferral of surgeries to ensure adequate hospital and ICU beds during the epidemic.

2. The consequence of this decision was that the number of people waiting for surgery likely increased.

3. The only region with substantial number of community acquired cases of COVID-19 was Eastern Health (EH). Virus was likely eradicated within 6 weeks of lockdown.

Methods

1. For the first 10 weeks of COVID-19 each RHA reported the number of surgeries undertaken in the OR combined with the number of minor procedures undertaken outside the OR/week compared to the corresponding week in 2019. The definition of minor procedures differed for each RHA.

2. For the weeks 11–26 of the epidemic, surgeries were differentiated from minor procedures. Consequently, comparison for surgeries only across RHAs is possible after 10 weeks.

Results

Table 1. The Number of Surgeries and Minor Procedures Undertaken Outside the OR During First 10 Weeks of COVID-19 Compared to the Corresponding Period in 2019 by RHA

	EH	CH	WH	LGH
Weeks 1–4 COVID-19	488	151	93	35
Comparable 4 weeks in 2019	2,282	516	498	209
Weeks 5–8 COVID-19	409	121	76	46
Comparable 4 weeks in 2019	1,981	446	407	131
Weeks 9–10 COVID-19	272	47	56	30
Comparable 2 weeks in 2019	1,001	181	188	87

- The difference in the number of surgeries undertaken in EH during the first 10 weeks of COVID-19 compared to the corresponding period in 2019 is estimated at around 2,600 in EH, around 920 in Central Health (CH), around 820 in Western Health (WH), and 150 in Labrador-Grenfell Health (LGH). This is derived from the average number of surgeries done per week in weeks 11–26 of 2019 and the average percent reduction of procedures done during the first 10 weeks of COVID-19.

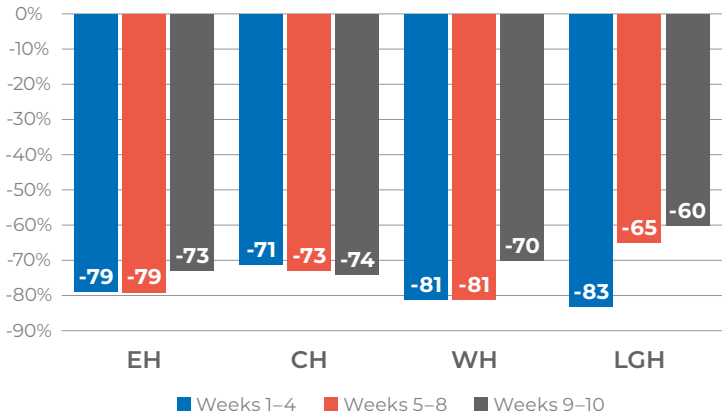


Figure 1. Percent Reduction in Surgeries and Minor Procedures During the First 10 Weeks of COVID-19 Compared to the Corresponding Period in 2019, Analyzed by RHA

- Very substantial reductions in surgeries/minor procedures occurred in all four RHAs for the initial 10 weeks of the COVID-19 epidemic.

Table 2. The Number of Surgeries Undertaken During Weeks 11–26 of COVID-19 Compared to the Corresponding Period in 2019 by RHA

	EH	CH	WH	LGH
Weeks 11–14 COVID-19	734	168	180	51
Comparable 4 weeks in 2019	1,459	616	385	110
Weeks 15–18 COVID-19	924	348	292	93
Comparable 4 weeks in 2019	1,257	414	409	74
Weeks 19–22 COVID-19	1,157	360	350	81
Comparable 4 weeks in 2019	1,274	478	390	81
Weeks 23–26 COVID-19	1,218	362	325	102
Comparable period in 2019	1,287	448	444	90

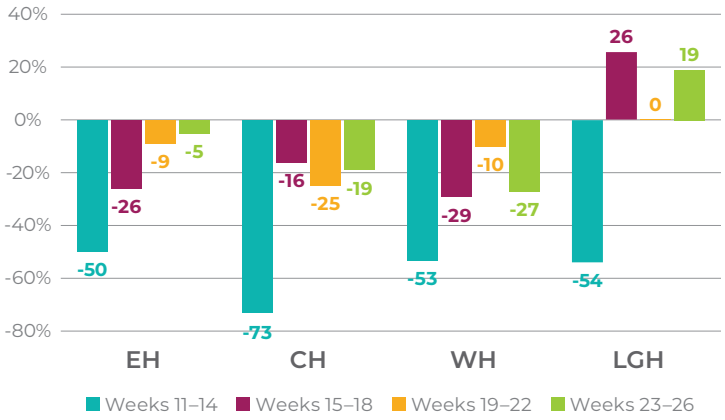


Figure 2. Percent Reduction in Surgeries in Weeks 11–26 of COVID-19 Compared to the Comparable Period in 2019

- 50% reduction in surgeries lasted for 12 weeks in EH. For the 26 weeks of the epidemic, the number of surgeries was always less than the number performed in the corresponding week of 2019, except for week 24 when the difference was +9 cases.

  In EH, the difference in the actual number of surgeries for the weeks 11–26 compared to the comparable period in 2019 was 1,318.

- In CH greater than 50% reduction in surgeries lasted for 14 weeks. At no stage of the 26 weeks of the COVID-19 era did the volume of surgeries performed exceed those undertaken in the comparable period of 2019.

  For weeks 11–26, the difference in the actual number of surgeries was 718.

- In WH, less than 50% reduction in surgeries lasted for 14 weeks. For 25 of 26 weeks of the COVID-19 era the number of surgeries was less than the number performed in the comparable period of 2019, with the exception being a week with +25 surgeries.

  For weeks 11–26, the difference in the actual number of surgeries was 524.

- In LGH, greater than 50% reduction in surgeries lasted for 14 weeks. For 19 of 26 weeks of the COVID-19 era the number of surgeries was less than the number performed in the comparable period of 2019. For the other 7 weeks, the number was +47.

  For weeks 11–26, the difference in the actual number of surgeries was only 21.

Conclusions

1. Substantial (>50%) reduction of surgeries continued for the first 12 weeks of COVID-19 in EH despite the absence of community transmitted cases after 6 weeks.

2. Similar reductions for longer periods (14 weeks) were observed in the other RHAs despite the diagnosis of few community acquired cases.

3. The 6 months of the COVID-19 era was associated with around 6,000 fewer surgeries than in the comparable period in 2019. Dealing with this deficit will depend on the need for surgery and the capacity of the health system to increase the volume of surgeries beyond its capacity revealed in 2019.

4. In 16 weeks from 27 May 2019 – 15 Sept 2019, 9,216 surgeries were performed in the province, 576/week. Increasing this rate by 100/week would clear the deficit in about a year but this is unlikely to be feasible and may even be unnecessary, as the need for surgery in these missed cases may not be revealed.

5. The impact of lost surgeries on provincial mortality will require evaluation over the next years.

The Use of Personal Protective Equipment (PPE) During Covid-19 by Regional Health Authority

Objective

To assess use of masks, gloves and gowns before and during COVID-19 in each Regional Health Authority (RHA).

Practice Points

1. It is critical to protect front line health workers from getting infected during an epidemic. A reduction in health care workers could have a catastrophic impact on health care delivery.

2. Respiratory protection requires masks, and N95 masks are indicated for those in contact with COVID-19 or in patients at high risk of having COVID-19.

3. When facing a new pathogen, it is necessary to protect health care workers at the highest level until its epidemiology is understood. However, it is possible that during COVID-19 use of specialized PPE was high when the risk of coming in contact with COVID-19 was very low or absent, especially as the coronavirus was eradicated from the community after 6 weeks of the epidemic.

4. During COVID-19 the supply of some PPE was tenuous, and in future months this may continue. Lack of PPE could also be catastrophic for health care delivery.

5. The vast majority of cases of COVID-19 occurred in Eastern Health (EH) but incidence rate per capita was low (261/317,251 population = 0.08%). In Central Health (CH: population 91,500), Western Health (WH: population 76,500) and Labrador-Grenfell Health (LGH: population 36,300) there was little community acquired infection.

Methods

1. The daily dashboard provided by the NL Centre for Health Information (NLCHI) on PPE supplied from inventory to all departments in each RHA was analyzed. The average weekly supply was calculated from 6 Jan 2020 to 7 Mar 2020 (8 weeks pre-COVID-19) and compared to average weekly supply from 8 Mar to 31 May, 2020 (last week before and 11 weeks during the COVID-19 epidemic). The rate/1,000 population of PPE was calculated to facilitate comparisons between RHA.

Results

Table 1. Weekly Quantity of PPE by RHA

Weekly Quantity	EH	CH	WH	LGH
N95 masks				
Pre-COVID-19	2,679	1,149	516	641
During COVID-19	6,714	617	1,492	605
% increase	151	-46	189	-5
Other masks/shields				
Pre-COVID-19	12,571	444	1,305	41
During COVID-19	18,371	1,606	1,825	682
% increase	46	262	40	1,563
Gowns				
Pre-COVID-19	11,619	1,146	3,038	662
During COVID-19	27,113	2,361	3,827	1,570
% increase	133	106	26	137
Gloves				
Pre-COVID-19	51,703	1,888	4,672	-
During COVID-19	111,311	5,792	8,023	-
% increase	101	207	72	-

* excluding earloop masks and alternate rating masks

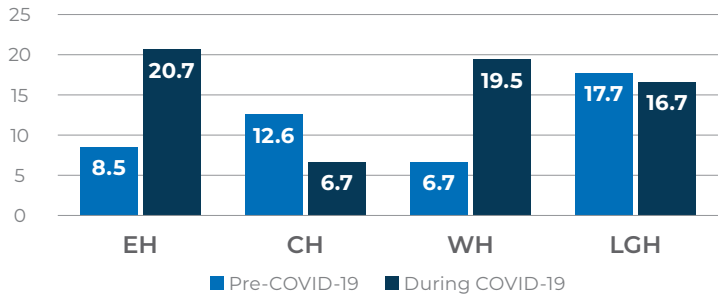


Figure 1. Quantity per 1,000 Population of N95 Masks, Pre and During COVID-19, by RHA

- Likely low rate in CH related to poor capture of data in CH during epidemic and also close management of supply by PPE committee.

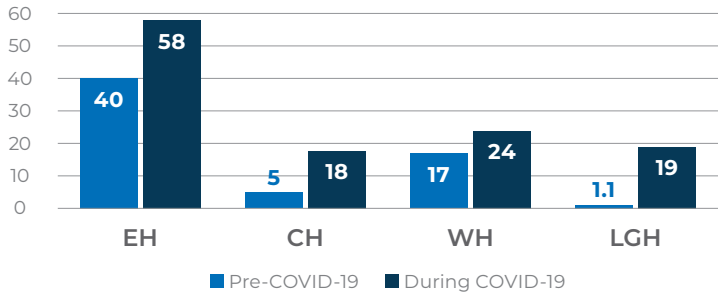


Figure 2. Quantity per 1,000 Population of 'Other' Masks, Pre and During COVID-19, by RHA

**excludes earloop and alternate rating masks*

- Low use of 'other' masks in CH and LGH pre-COVID-19. High use in EH pre and during COVID-19.

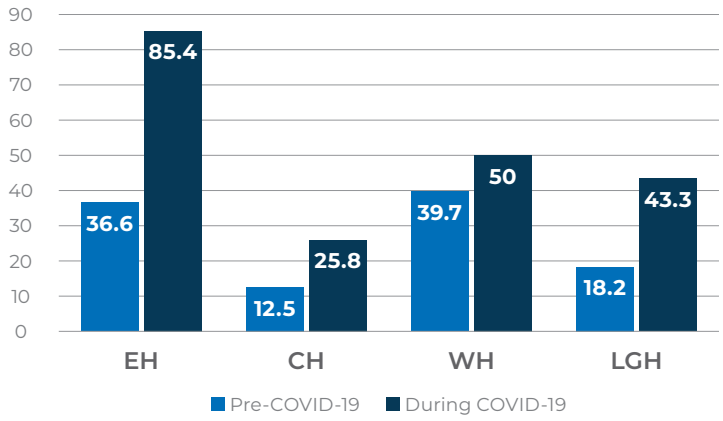


Figure 3. Quantity per 1,000 Population of Gowns, Pre and During COVID-19, by RHA

- Low rate in CH pre-COVID-19 likely related to poor capture of data.

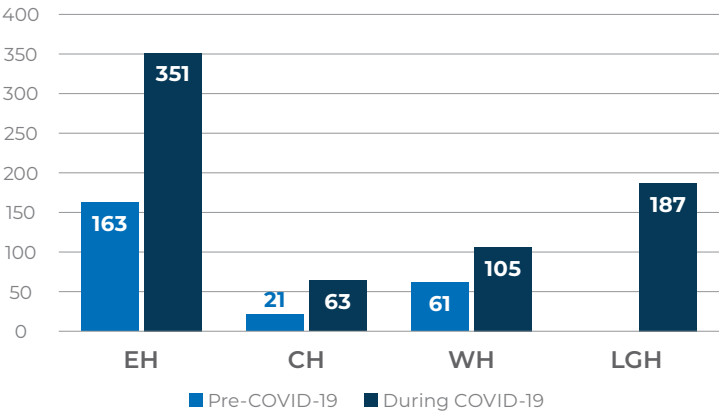


Figure 4. Quantity per 1,000 Population of Gloves, Pre and During COVID-19, by RHA

- High use of gloves both pre and during COVID-19 in EH for uncertain reasons.

Conclusions

1. Substantial and sustained increase in use of PPE occurred during the first twelve weeks of COVID-19, not only in EH exposed to a cluster of cases, but in RHAs with little exposure.

2. EH is different from the other RHAs because of the presence of tertiary hospital care and exposure to community acquired COVID-19. Nonetheless it had substantially higher use of 'other' masks and of gloves both pre and during COVID-19.

3. Although WH has 16% fewer people than CH, its use of PPE was higher. Whether this was related to better capture of data in WH or better management of supply in CH is unclear.

4. The current management of PPE is based on supply to departments, not on use within the departments. Auditing of use at bi-weekly intervals is indicated for specialized PPE whose supply is tenuous.

5. The cost of N95 masks has increased OVER 12 FOLD since the epidemic started, related to more than two fold increase in use and six fold increase in price. The average weekly cost for N95 during the epidemic was nearly $120,000, which is an annual cost of $6,240,000. Also, supply is uncertain. In addition, these masks were distributed to many departments not at risk of COVID-19. Evidence-based criteria for use of PPE should not only be developed but also monitored by appropriate committees.

6. Buying PPE is dependent on accurate capture of prior use. Consequently business-based accounting systems, rather than Meditech, should be obtained as PPE costs the province tens of millions of dollars.

7. Capture of data was unreliable because of possible failure to record transfer of PPE between RHAs, taking faulty PPE out of inventory, and obtaining PPE without recording it. Staff in the health supply sector need training to ensure accurate data capture.

The Impact of eOrdering for Cardiac Catheterization on Rates by RHA and on Diagnosis of Critical Coronary Artery Disease

Objective

To determine whether the objectives of eOrdering Cardiac Catheterization (CC) were achieved: similar rates of CC across Regional Health Authorities (RHAs) and improvement in percentage diagnosed with critical coronary artery disease (CAD).

Practice Points

1. Electronic ordering of CC with embedded decision supports was undertaken using MyCCath (a Mobia developed tool) in the CC Unit of the Health Sciences Centre, the provincial centre for CC.

2. The decision tool included the Thrombolysis in Myocardial Infarction (TIMI) score which predicts risk for adverse outcomes in patients with acute coronary syndrome (ACS).

3. Prior to introduction of MyCCath, Western Health had the lowest rate of CC/1,000 population but the highest rate of diagnosis of critical CAD.

4. Initial evaluation revealed that users of MyCCath felt it improved the referral process and that they supported its introduction.

5. Audit, feedback, and academic detailing was undertaken in 2019 for 46 referring physicians to improve selection of patients with stable angina for CC who had high risk features.

Methods

1. MyCCath was introduced in Dec 2017 and in Feb 2019 referrals could only be made electronically.

2. Data was obtained on patients who had CC for CAD from 2014-2017 (pre-MyCCath) and for 2019 (post-MyCCAth) from the APPROACH database to determine rates of CC by indication and the percent diagnosed with critical CAD. Rates were standardized for age and sex/1,000 adults/year to facilitate accurate comparison of RHAs.

Results

Table 1. Age Standardized Rates/1,000 Adults/Year of CC for Stable Angina and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern (EH)	Central (CH)	Western (WH)	Labrador-Grenfell (LGH)
Age Standardized Rate/1,000 Adults 2014–17 (per year)	2.35	2.89	1.52	1.76
Age Standardized Rate/1,000 Adults 2019	1.74	2.69	1.13	0.93
% Critical CAD 2014–17	50.2	50.0	58.8	57.3
% Critical CAD 2019	58.7	57.2	59.5	72.4

- In all four regions, rate of referral for CC for stable angina in 2019 fell. The provincial age standardized rate was 1.77 (95% CI: 1.64% – 1.89) in 2019.
- Rate of referral was significantly higher than the provincial rate in CH and significantly lower in WH and LGH.
- Rate of diagnosis of critical CAD improved from 51% to 59%.
- In 2019, 11% of those who had CC for stable angina had more atypical symptoms or angina on strenuous activity (CCSI), 58% had angina with slight exercise limitation and 31% had angina with severe exercise limitation.

Table 2. Age Standardized Rates/1,000 Adults/Year of CC for STEMI and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	0.86	0.84	0.69	0.77
Age Standardized Rate/1,000 Adults 2019	0.91	0.98	1.08	1.03
% Critical CAD 2014–17	78.0	71.0	77.0	70.3
% Critical CAD 2019	75.6	85.0	78.0	71.0

- Rate of CC for ST Elevated Myocardial Infarction (STEMI) increased in all four regions, particularly in WH.
- The provincial age standardized rate in 2019 was 0.96 (95% CI: 0.86 – 1.05).

- Despite increase in utilization the provincial rate of diagnosis was good at 77%, similar to that in 2014–2017 (76%).

TABLE 3. Age Standardized Rates/1,000 Adults/Year of CC for NSTEMI and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	2.11	2.33	1.34	2.05
Age Standardized Rate/1,000 Adults 2019	2.37	2.37	2.05	2.44
% Critical CAD 2014–17	68.9	67.8	73.5	62.9
% Critical CAD 2019	71.0	70.0	65.0	76.0

- The standardized rates of CC for Non ST Elevated Myocardial Infarction (NSTEMI) increased, particularly in WH. This was accompanied by a fall in percent diagnosed with critical CAD from 73.5 to 65.
- The age standardized rate for the province in 2019 was 2.32 (95% CI: 2.18 – 2.47).
- Percent diagnosed with critical CAD was 69%, similar to 2014–2017 (69%).

TABLE 4. Age Standardized Rates/1,000 Adults/Year of CC for Unstable Angina and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	0.87	1.01	0.69	0.94
Age Standardized Rate/1,000 Adults 2019	0.85	0.92	0.92	1.10
% Critical CAD 2014–17	55.7	58.7	64.7	36.6
% Critical CAD 2019	60.0	63.6	54.0	48.5

- The age standardized rate for the province was 0.89 (95% CI: 0.80 – 0.98).
- The rate increased in WH with percent diagnosed with critical CAD falling from 65 to 54.
- The percent diagnosed in the province with critical CAD who had unstable angina was 56% in 2014–2017 and in 2019 it was 59%.

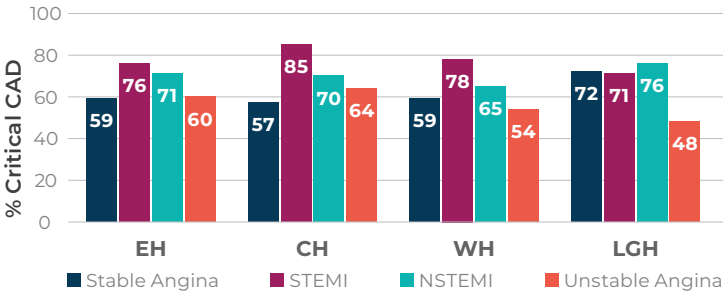


Figure 1. Percent Diagnosed With Critical CAD by Indication and by RHA in 2019

- In 2019, the provincial rate of diagnosis of critical CAD was 59% for stable angina, 77% for STEMI, 70% for NSTEMI, and 59% for unstable angina.

Conclusions

1. Rates of CC use for stable angina decreased in 2019 and percent diagnosed with critical CAD increased associated with introduction of eOrdering and of audit, feedback, and academic detailing. This was a good outcome.
2. Potential exists to reduce CC in stable angina in patients with CCS scores 1 and 2.
3. Rates of CC use for STEMI increased and percent diagnosed with critical CAD was 77%, close to optimal target, another good outcome.
4. Rates of CC for NSTEMI increased and percent diagnosed with critical CAD was 70%, a good result in the era of high sensitivity Troponin use.
5. Rates of CC use for unstable angina increased in WH but percent diagnosed with critical CAD decreased, an outcome of concern.
6. The provincial rate of diagnosis of critical CAD in unstable angina was 59% in 2019, whereas during COVID-19, the rate of diagnosis fell to 48% instead of increasing at a time of forced rationing. These facts support an educational intervention for referring physicians.
7. eOrdering facilitated appropriate decrease in the use of CC for stable angina and appropriate increase in the use for STEMI and Acute Coronary Syndrome (ACS). However, the educational intervention likely had additional benefit in stable angina where percent with critical CAD improved.
8. Audit, feedback, and academic detailing on the work up and referral strategy for CC in ACS should be undertaken with referring physicians.

The Impact of an Educational Intervention on the Diagnosis of Critical Coronary Artery Disease in Men and Women With Stable Angina by Age

Objective

To compare rates of diagnosis of critical coronary artery (CAD) disease by indication following the introduction of universal use of eOrdering at a time when an educational intervention for management of stable angina was undertaken.

Practice Points

1. In February 2019, ordering of a cardiac catheterization (CC) in NL could only be undertaken electronically using MyCCath.

2. In 2019, audit, feedback, and academic detailing of 46 referring physicians was undertaken to improve appropriate referral of patients with stable angina, particularly in women in whom the rate of diagnosis of critical CAD from 2014–2017 was 32%.

3. No educational program was undertaken in patients with ST Elevated Myocardial Infarction (STEMI) and Acute Coronary Syndrome (ACS). ACS comprises Non ST Elevated Myocardial Infarction (NSTEMI), in whom the use of CC may have been influenced by the advent of high sensitivity troponin tests, and unstable angina, in whom CC may be undertaken in patients with chest pain falsely attributed to CAD.

4. The hypothesis was that the use of the thrombolysis Myocardial Infarction (TIMI) score in the eOrdering tool, MyCCath, may be associated with some improvement in the rate of diagnosis of critical CAD in ACS but that the educational intervention would increase the rate more in patients with stable angina, particularly women and people <60 years.

Methods

1. Patients in the APPROACH database who had cardiac catheterization for CAD were analyzed for the period 1 Jan 2019 – 15 Mar 2020 (63 weeks) by indication, age and sex, and compared to comparable groups in 2014–2017. Critical CAD was defined as ≥1 coronary artery with ≥70% stenosis or ≥50% stenosis of left main coronary artery.

Results

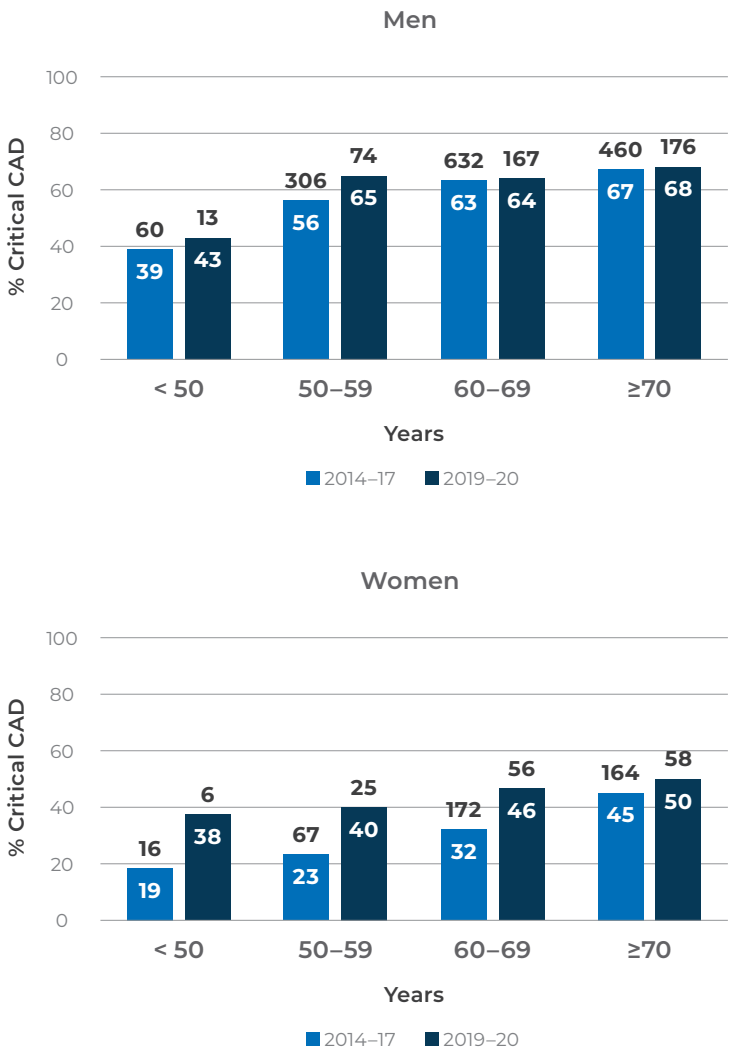
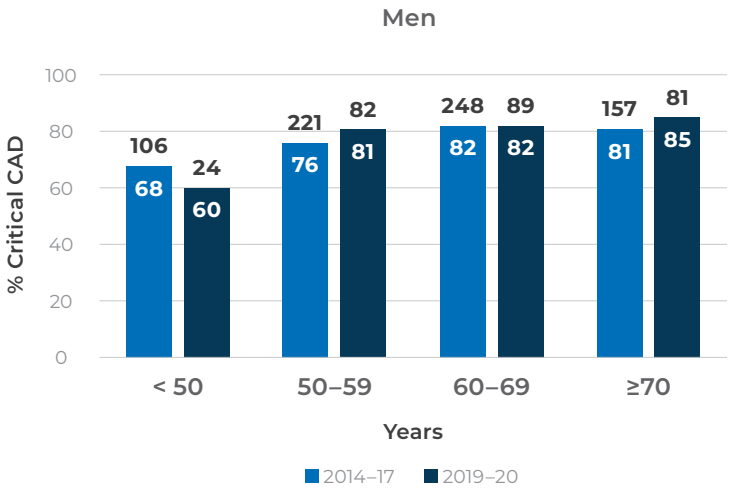


Figure 1. Percent Diagnosed With CAD in Men and Women With Stable Angina by Age in 2014–2017 and 2019–2020

- For men <60 years, improvement in percent with critical CAD was observed: overall rate improved from 60% in 2014-2017 to 65% in 2019-2020.

- For women, substantial improvement in the rate of diagnosis was observed in 2019-2020: overall the rate improved from 32% to 46%.



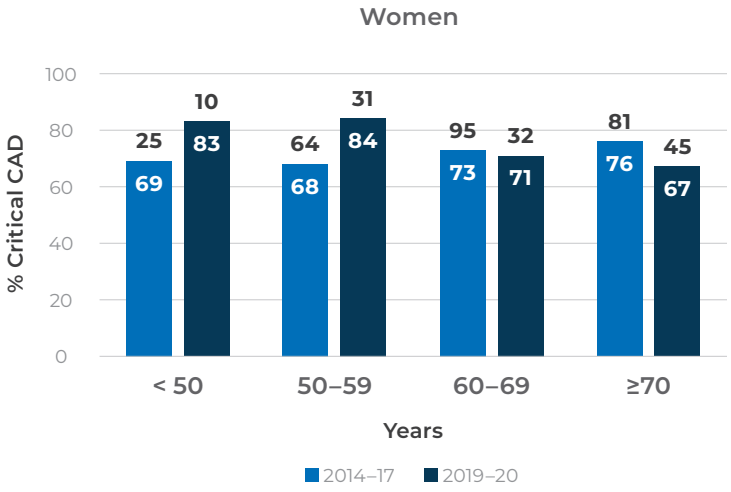
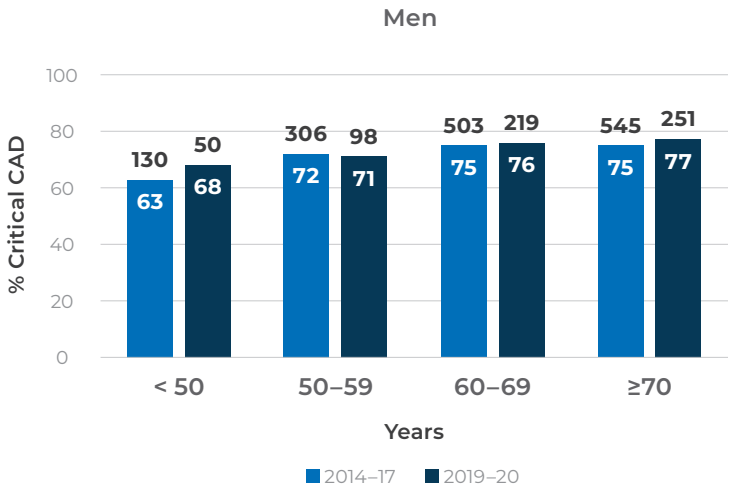


Figure 2. Percent Diagnosed With Critical CAD in Men and Women with STEMI by Age in 2014–2017 and 2019–2020

- Overall rate of diagnosis in men with STEMI was 80% in 2019–2020, compared to 78% in 2014–2017.
- Overall rate of diagnosis with critical CAD in women with STEMI was 77% in 2019–2020 and 72% in 2014–2017.



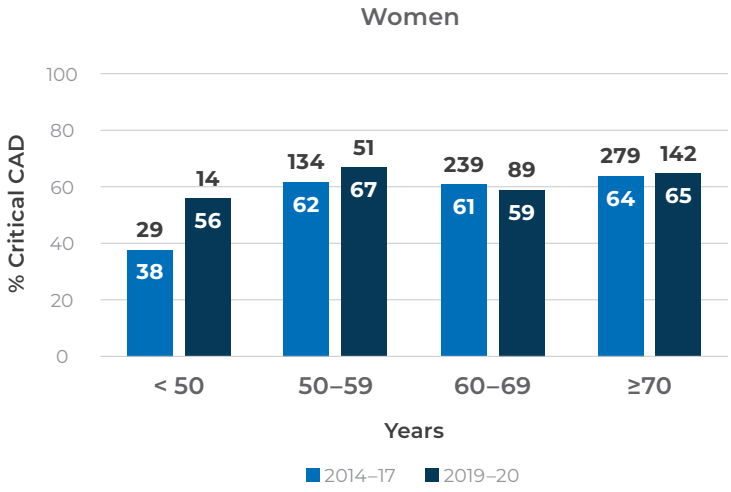


Figure 3. Percent Diagnosed With Critical CAD in Men and Women With NSTEMI by Age in 2014–2017 and 2019–2020

- Overall the rate of diagnosis in men with NSTEMI in 2019-2020 was 75% compared to 73% in 2014–2017.
- Overall the rate of diagnosis in females with NSTEMI was 63% in 2019–2020 compared to 61% 2014–2017.

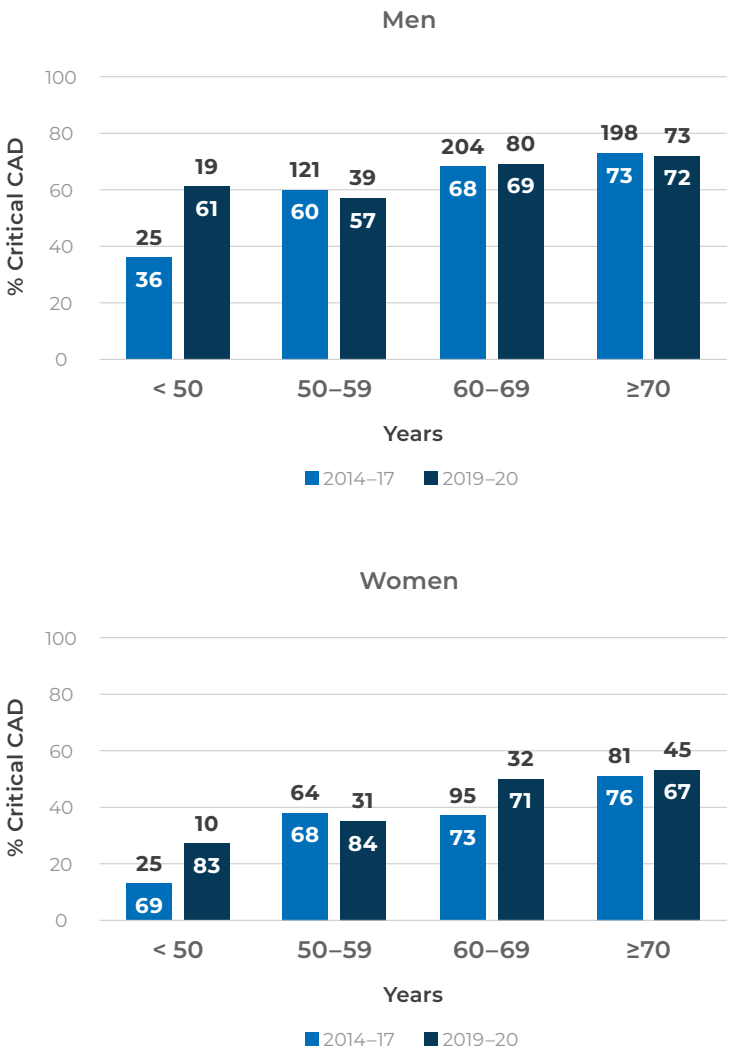


Figure 4. Percent Diagnosed With Critical CAD in Men and Women With Unstable Angina by Age in 2014–2017 and 2019–2020

- Overall, percent diagnosed with CAD in males with unstable angina was 67% in 2019–2020 compared to 65% in 2014–2017.
- Overall, the percent diagnosed with critical CAD in females with unstable angina was 46% in 2019–2020 compared to 40% in 2014–2017.

Conclusions

1. eOrdering and the educational intervention in stable angina were associated with an improvement in the diagnosis of critical CAD in men <60 years from 52% to 60% and in women from 32% to 46%.
2. In the groups with no educational intervention, the rate of diagnosis in men with STEMI was virtually unchanged, but a bigger improvement was observed in women. A small change was observed in NSTEMI (an absolute difference of 2%) and in unstable angina (3%).
3. In view of relatively low rates of diagnosis of critical CAD in unstable angina, particularly in women, and the benefit of an educational program on stable angina management, an educational program involving audit, feedback and academic detailing is indicated for referring physicians.

Choosing Wisely NL

Peripheral Artery Testing by Indication and Diagnosis of Critical Disease at St Clare's Hospital

Choosing Wisely Canada Recommendations

1. Don't perform percutaneous interventions or bypass surgery as first line therapy in patients with asymptomatic peripheral artery disease (PAD) and in most patients with claudication.
2. Do not suggest a test that will not change the patient's clinical course.

Practice Points

1. Patients with rest pain, tissue loss, or severe claudication need testing urgently because they may benefit from revascularization if critical Peripheral Artery (PA) stenosis is identified. Follow-up testing after revascularization is often undertaken.
2. Patients with atypical symptoms like numbness, paranesthesia, leg cramps, Raynaud's phenomenon do not need PA testing, nor do asymptomatic patients with absent pedal pulses or digital cyanosis.
3. There is no evidence that screening for PAD is beneficial.

Methods

1. Indications for PA testing (Ankle-brachial index and Doppler ultrasound) and results of testing were obtained from the Vascular Laboratory at St Clare's Hospital for 2018 (n=937) and 2019 (n=1,027).

Results

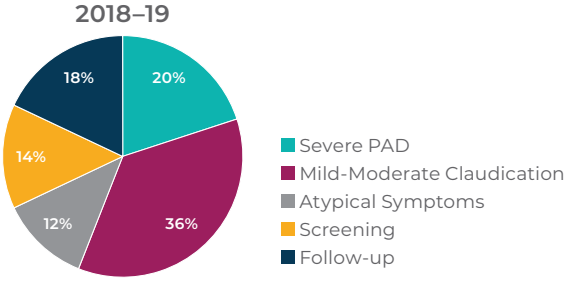


Figure 1. Indications for PA Testing in 2018–19

- There was no difference in indications for 2018 compared to 2019.
- Proportion who needed PA testing because they had manifestations of severe PAD was 20% and who had testing in follow-up was 18%.
- The majority had indications for whom PA testing was not needed.

Table 1. Number of Patients Who had PA Testing by Indication and by Diagnosis of Critical PAD in 2018–19

Indication	Critical Stenosis	Mild-Moderate	Normal	Total
Severe PAD	109	143	138	390
Mild-Moderate Claudication	69	461	190	720
Atypical Symptoms	20	73	141	234
Screening	17	74	181	272
Follow-up	47	187	114	348
Total	262	938	764	1,964

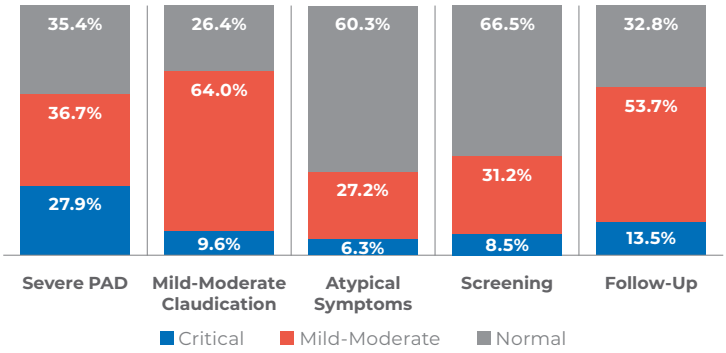


Figure 2. Diagnosis of Critical PAD by Indication

- In patients tested because they had manifestations of severe PAD, 28% had critical stenosis, whereas in patients with mild to moderate claudication, 9.6% had critical disease.
- Critical PAD was identified in 8.5% with atypical symptoms and in 6.3% of those being screened.

Conclusions

1. The majority of patients referred for PA testing did not need testing because they had mild-moderate claudication, atypical symptoms or were being screened. Although cases with critical stenotic disease were identified, intervention with revascularization would be unlikely in the absence of severe clinical manifestations of PAD.
2. No impact on the appropriateness of ordering PA tests was observed following knowledge translation interventions with Eastern Health family physicians in 2018.
3. eOrdering for the vascular laboratory has started with the intent to improve the time to testing in patients with severe PAD and decrease the rate of inappropriate testing.

Population Rates of Mammography by Age and Region in NL

Guidelines: Choosing Wisely Canada

1. Don't routinely do screening mammography for average risk women age 40–49 years.

2. Canadian Task Force for Preventive Health: Screen women aged 50–74 years every 2–3 years for breast cancer.

Practice Points

1. The age standardized incidence rate of breast cancer/100,000 women in NL is one of the highest in Canada (129) and the age standardized mortality is the highest in Canada (26.2/100,000 females).

2. Early detection of breast cancer should reduce the risk of dying from breast cancer, although harms from screening include diagnosis of cancers without long-term adverse consequences and false positive results.

Methods

1. Data was obtained from the breast screening database and analysed by age and by region.

Results

- In 2019, 21,554 females had a mammogram, 37 (0.2%) <50 years and 688 (5.3%) ≥75 years in Eastern Health (EH).

- The proportion aged 50–74 years was 94.7% in EH, 92.9% in Central Health (CH), and 95.4% in Western Health (WH).

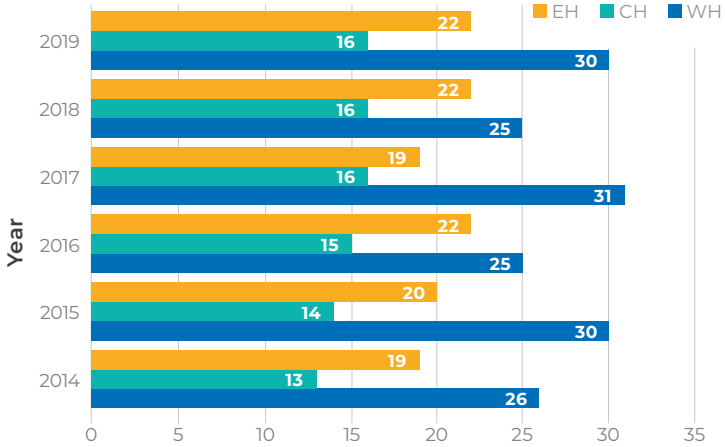


Figure 1. Annual Population Rate of Mammography per 100 Women Aged 50-74 Years by Region From 2014-2019

- WH consistently had the highest rate and CH had the lowest.

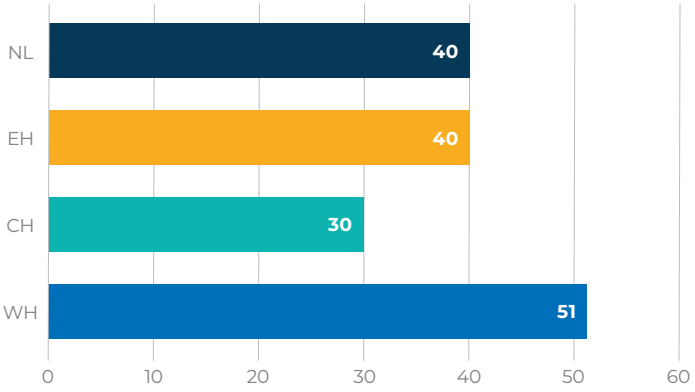


Figure. 2 The Population Rate/100 Women of at Least One Screening Mammography Done Over the 3 Years (2017–19) by Region

- The population rate/100 women over 3 years from 2017–2019 by region was 40/100 (22,332/56,425) for EH, 30/100 (5,925/19,650) for CH, and 51/100 (8,257/16,325) for WH.

Conclusions

- 5.5% of mammograms were performed in women aged <50 years or >74.

- The screening rate of at least one mammogram in women aged 50-74 years over 3 years was 40% and does not account for mammograms done outside the screening program ordered by other doctors.

- The lowest rate of mammography was in CH.

- In view of the high mortality rate of breast cancer in NL, efforts to increase the population rate of screening mammography in women 50–74 years are indicated.

Quality of Care NL

Improvement in Time From Abnormal Screening Mammogram to Final Diagnostic Test in NL over 6 Years (2014–2019)

Guidelines

Canadian Partnership against Cancer (CPAC):

The target times for abnormal mammogram to final diagnostic tests should be:

a. <7 weeks in those who had a breast biopsy,

b. <5 weeks in those who did not have a biopsy

Practice Points

1. The age standardized incidence rate of breast cancer/100,000 women is one of the highest in Canada (129) and the age standardized mortality in NL is the highest in Canada (26.2/100,000 females).

2. In Canada, <10% of screening mammograms are abnormal.

3. In 2018, CPAC reported that NL's median time to final diagnostic test in those who required a biopsy was ranked ninth compared to the other Canadian provinces but 90th centile was ranked eleventh. In those who did not require a biopsy, median time was seventh and 90th centile was ranked eleventh.

Methods

1. Data were obtained from the breast screening database, diagnostic imaging, pathology reports, laboratory, and ARIA tumor registry 2014–2019, and were analysed by region.

2. In Eastern Health (EH), process changes were made to improve efficiency over time. Changes were also implemented in Central Health (CH) in 2019.

3. Total number of mammograms completed in NL was 18,541 in 2014, 19,952 in 2015, 20,884 in 2016, 19,930 in 2017, 20,779 in 2018 and 21,555 in 2019.

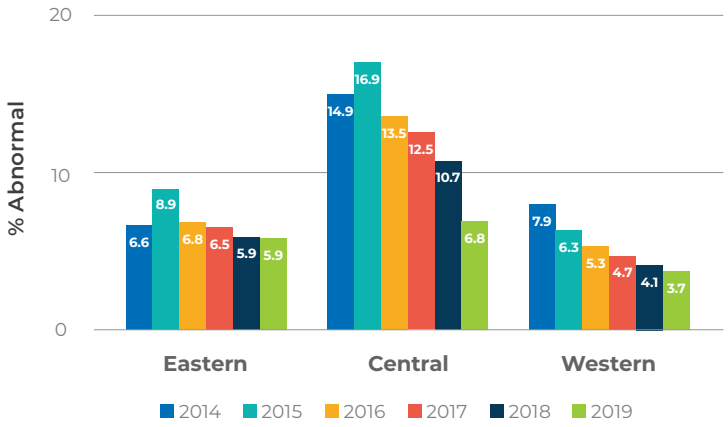


Figure 1. Percentage Abnormal Mammograms in Each Region (2014–2019)

- The provincial rate of abnormal mammograms in 2019 was 5.5%. Central Health consistently has the highest rate but it improved to 6.8% in 2019.

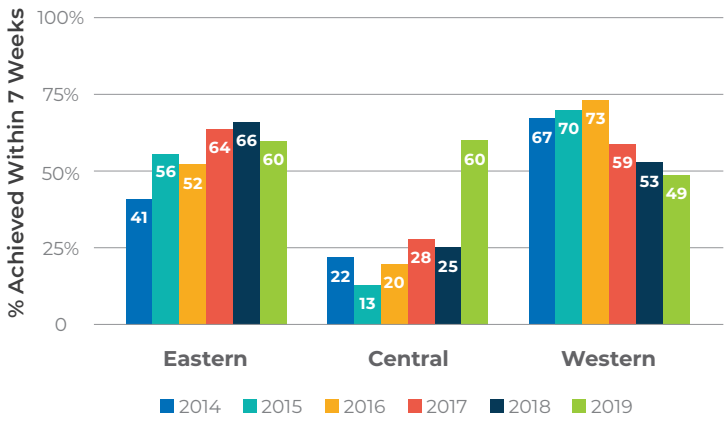


Figure 2. Time From Abnormal Screening Mammogram to Final Diagnostic Test in Those Who had a Breast Biopsy: Percentage Achieved Within 7 Weeks by Region

- In patients who had a breast biopsy in 2019, Western Health (WH) had the lowest percentage of patients who had a final diagnostic test within 7 weeks at 49%. CH improved substantially.

- In 2018 in the province the number of weeks taken for 90% to have received a final diagnostic test was 31 and in 2019 it was also 31.

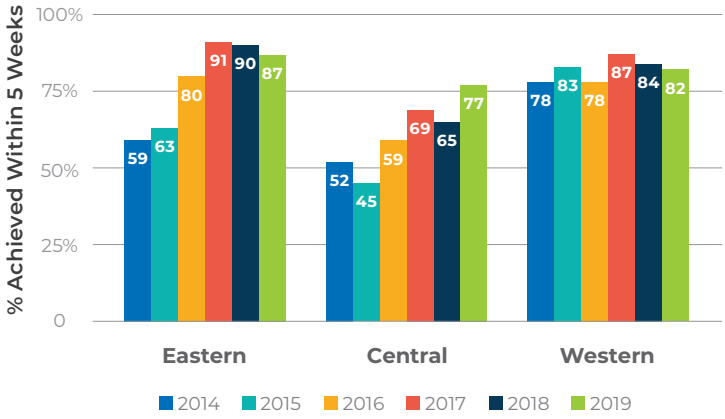


Figure 3. Time from Abnormal Screening Mammogram to Final Diagnostic Test in Patients Who Did Not Have a Breast Biopsy: Percentage Achieved Within 5 Weeks by RHA

- In patients who had abnormal mammogram and no breast biopsy, CH had the lowest percentage of patients who had final diagnostic test within 5 weeks at 77% but this percentage has improved over time. Both EH and WH had good performance.

- In 2018 in the province, the number of weeks taken for 90% to have received a final diagnostic test was 7 and in 2019 it was 8.

Conclusions

1. Time from abnormal screening mammography to final diagnostic test in women who had a breast biopsy has improved in EH and CH and deteriorated in WH. Times are not yet optimal.

2. Time to final diagnostic test in women who did not have a breast biopsy improved in EH and CH. In WH, around 80% consistently had a resolution within the target time of 5 weeks.

Quality of Care NL

The Impact of a Mobile Decision Support Tool (Spectrum) on Antimicrobial Use in St. John's Hospitals

Objective

To determine the impact of the Spectrum app on inpatient antimicrobial use (AMU) and on appropriateness in the Health Sciences Centre and St. Clare's hospital.

Practice Points

1. Excess AMU in hospitals selects for the expression of AM resistance genes among bacteria causing human infections. AM resistance is associated with attributable deaths and economic loss in Canada.

2. Hospital AM purchasing in the Atlantic provinces is twice as high as in Ontario.

3. Spectrum is a mobile app containing AM prescribing guidelines based on the local antibiogram, AM and pathogen information, and it advises on management of AM allergy, prophylaxis, dosing, duration and de-escalation strategies.

Methods (Dr. P. Daley)

1. Spectrum was introduced at start of Jan 2019. AMU was collected using Pyxis automated dispensing system from Jan 2019 to Mar 2020 (15 months).

2. Defined Daily Dose (DDD)/1,000 patient days was calculated.

3. Appropriateness was assessed using the Australian National AM prescribing survey on 25 Jun 2018 in 176 inpatients (6 months prior to Spectrum introduction) and on 25 Jun 2019 in 192 patients (6 months post introduction).

Results

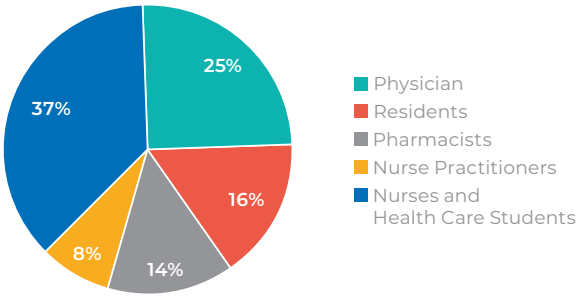


Figure 1. Spectrum Users by Health Profession

- Spectrum was accessed 20,016 times during 20 weeks of 2019, by a mean of 598 monthly active users, comprising multiple health provider groups.

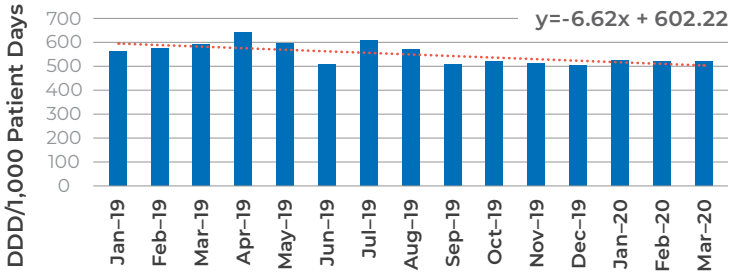


Figure 2. Total Monthly Antimicrobial Use (AMU)

- AMU declined by 6.62 DDD/1,000 patient days/month (p=0.05). Comparing rates of AMU use in Jan 2019 to Mar 2020 there was a 12% reduction.

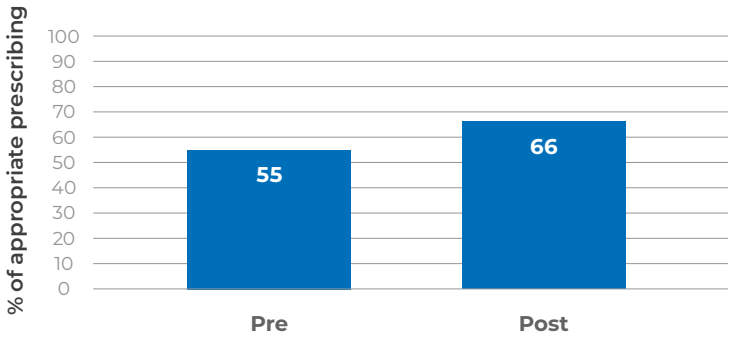


Figure 3. Appropriateness of AMU pre Spectrum Introduction and Post Introduction (% of Prescriptions Appropriate)

- Appropriateness of AMU improved by 11% (p=0.05) comparing pre to post Spectrum introduction. Carbapenem appropriateness improved from 17% of prescriptions pre to 86% post Spectrum introduction (p=0.05).

Conclusions

1. Reduction in inpatient AMU and increase in inpatient appropriateness was observed following introduction of a mobile decision support tool in the two St. John's hospitals. This association does not prove Spectrum was responsible for all the improvement.

2. National AMU in 2016 was 555/1,000 patient days, and in St. John's in 2020, it was lower at 514. Continued use of the Spectrum decision support tool and of other antibiotic stewardship measures are necessary to improve AMU.

Quality of Care NL Report: St. Clare's Mercy Hospital

A. HOSPITAL UTILIZATION

Table 1. Hospital Utilization-St. Clare's Mercy Hospital (SCM)

Hospital Utilization	
Stays (2019/20)	6,923
Beds (2019/20)	192
Average LOS (Days) (2019/20)	8.4
Occupancy (2019/20)	82.3
Cost/Stay	$5,837
% Patients Admitted Through ED (2018/19)	58.2
ALC LOS (Days**) (2019/20)	10,341 (18%)

Table 2. Acute Length of Stay (LOS) vs. Canadian Average

	Surgery		Medicine		ICU	
	SCM	Can	SCM	Can	SCM	Can
Days	6.3	8.1	6.0	6.2	3.0	4.4

B. WAIT TIME EVALUATION FOR OESOPHAGEAL GASTRIC DUODENOSCOPY AND COLONOSCOPY

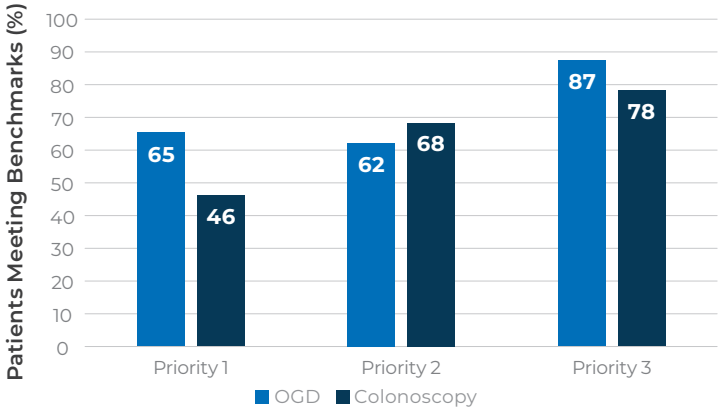


Figure 1. Percentage of Patients Meeting Benchmarks for wait time by Priority 1–3 in St. Clare's Mercy Hospital

C. PRE-OPERATIVE TESTING PRIOR TO LOW-RISK SURGERY

Table 3. Volume of Low-Risk Surgeries and Pre-op Tests Informed by Year

	Low Risk Procedures	Creatinine	Hemoglobin	INR	Chest X-Ray
2016	789	525	592	301	305
2017	739	396	465	134	86

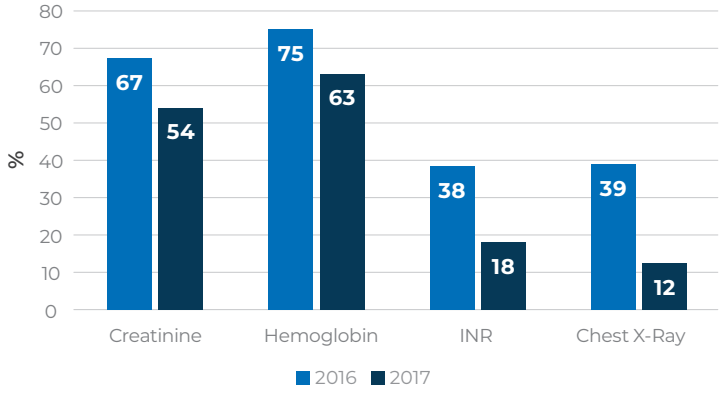


Figure 2. Percentage of Low to Moderate Risk Surgeries with Pre-Operative Tests in 2016 and 2017

D. DEMAND AND ACCESS TO ORTHOPEDIC INTERVENTIONS IN ST. JOHN'S

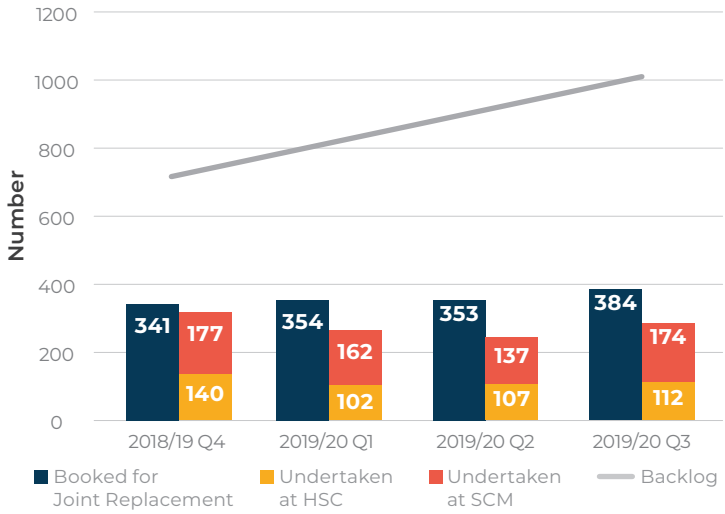


Figure 3. Booking vs. Procedures Undertaken for Total Joint Replacement at SCM and Health Sciences Centre (HSC) by quarter in 2019/20

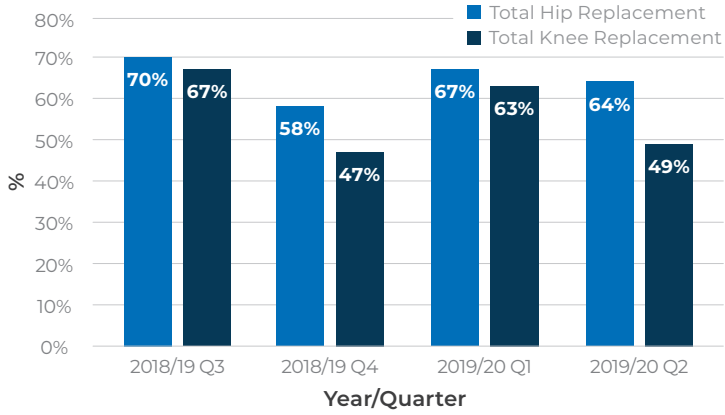


Figure 4. Percentage of Total Hip and Knee Replacements Completed within 182 Days at SCM and HSC

E. IN-HOSPITAL USE OF ANTIBIOTICS

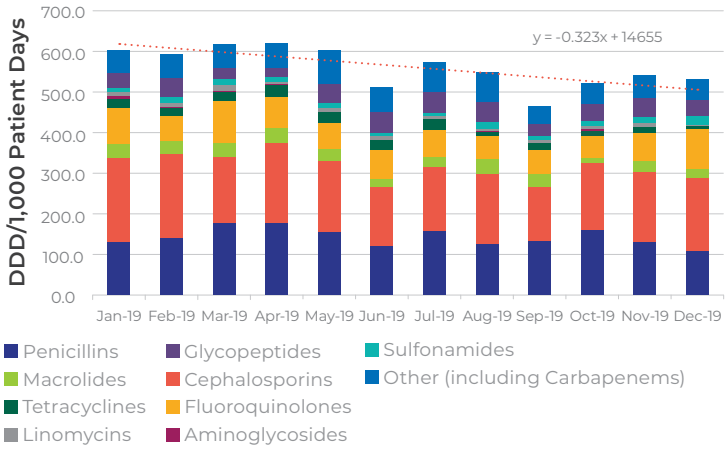


Figure 5. Defined Daily Dose (DDD)/1,000 Patient Days for 2019 by Month and Antibiotic at SCM

F. TIME FROM ABNORMAL SCREENING MAMMOGRAPHY TO FINAL DIAGNOSTIC TEST

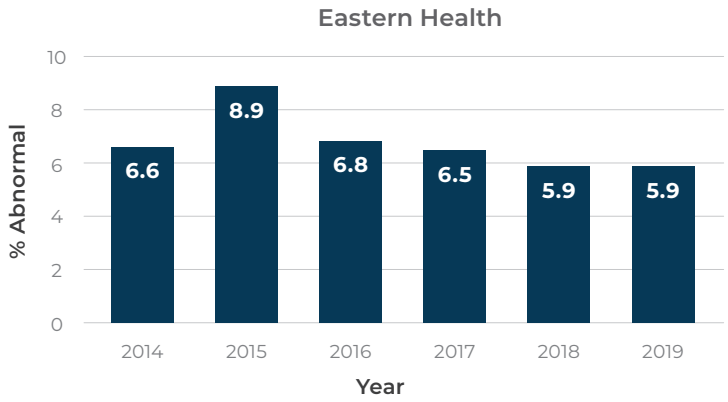


Figure 6. Percentage Abnormal Mammograms in Eastern Health (EH) by Year

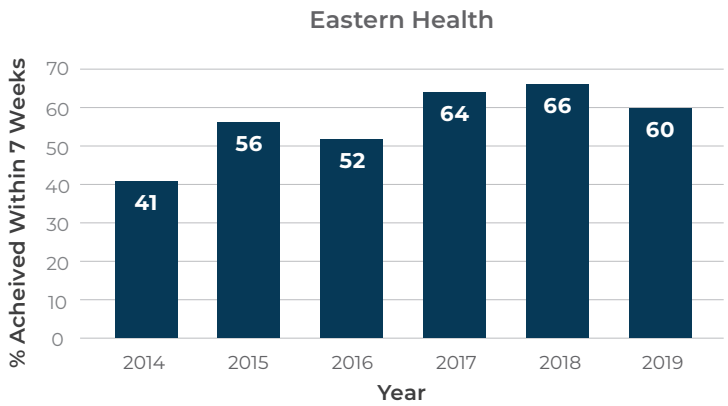


Figure 7. Time from Abnormal Screening Mammogram to Final Diagnostic Test in Those who had a Breast Biopsy: Percentage Achieved Within 7 Weeks in EH by Year

G. PERIPHERAL ARTERY TESTING BY INDICATION

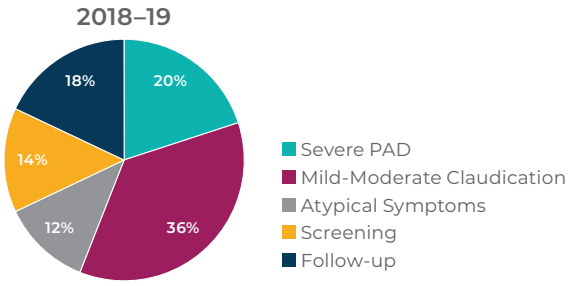


Figure 9. Indications of Peripheral Artery Testing in 2018–19

Table 4. Number of Patients Who had Peripheral Artery Testing at the Vascular Laboratory in SCM by Indication and by Diagnosis of Critical PAD in 2018–19

Indication	Critical Stenosis	Mild-Moderate	Normal	Total
Severe PAD	109	143	138	390
Mild-Moderate Claudication	69	461	190	720
Atypical Symptoms	20	73	141	234
Screening	17	74	181	272
Follow-up	47	187	114	348
Total	262	938	764	1,964

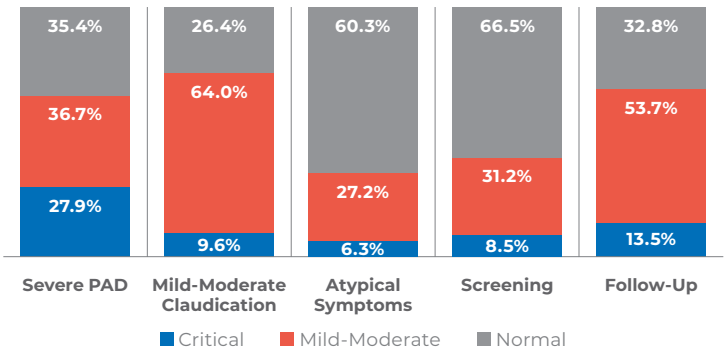


Figure 10. Diagnosis of Critical PAD by Indication

H. THROMBOLYSIS RATES FOR ISCHEMIC STROKE AT SCM

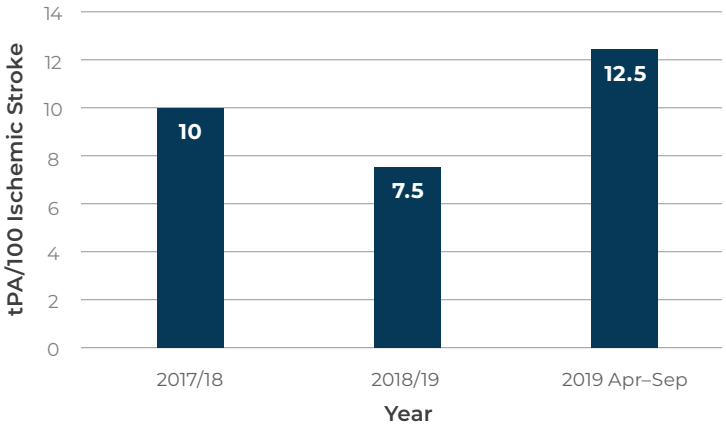


Figure 11. Rate of tpA/100 Ischemic Strokes

Table 5. Number of tPA Administrations and of Ischemic Strokes (IS) at SCM

	N IS	N tPA
01 Apr 2017–31 Mar 2018	90	9
01 Apr 2018–31 Mar 2019	120	9
01 Apr 2019–30 Sept 2019	56v	7

Note: tPA – Tissue Plasminogen Activator

Conclusions

1. ALC is high at 18% of hospital days, but acute length of stay is less than the Canadian average.

2. Percentage of priority 1 and 2 patients meeting time to oesophageal-gastro-duodenoscopy or colonoscopy is not optimal.

3. Preoperative INR and chest x-rays in patients having low to moderate risk surgeries has decreased, but other blood testing remains high.

4. Orthopedics is a collaborative program involving both SCM and HSC. Wait list for orthopedic interventions continues to increase and percentage of hip and knee replacements achieved within 6 months has decreased.

5. There was a 12% decrease in overall anti-microbial use at SCM in 2019. Audit and feedback was provided to physicians on use of the broad spectrum antibiotics piperacillin-tazobactam and the carbapenems. Comparing Jan to Dec, there was no decrease in their use.

6. From 2014–19, time from abnormal screening mammography to final diagnostic test in those who had a breast biopsy has improved.

7. The majority of patients referred for peripheral artery testing did not need testing because they had mild–moderate claudication, atypical symptoms or were being screened. Although cases with critical stenotic disease were identified, intervention with revascularization would be unlikely in the absence of severe clinical manifestations of PAD.

8. Thrombolysis rates for ischemic stroke are trending upwards, but are quite low compared to Canadian benchmarks of 25–30%.

Choosing Wisely NL

Substantial Use of Long-term Proton Pump Inhibitors in NL

Choosing Wisely Canada Recommendation

Don't maintain long-term Proton Pump Inhibitors (PPIs) for gastrointestinal symptoms without an attempt to stop/reduce PPI at least once per year in most patients.

Practice Points

1. Long-term PPI use predisposes to gastric cancer, enteric infection, fractures, pneumonia, acute interstitial nephritis, hypomagnesemia, Vitamin B12 deficiency.

2. Exemption from the guideline include patients with Barrett's esophagus, gastrointestinal bleeding, severe esophagitis, or those requiring prednisone/ NSAIDs.

3. In a study of NLPDP patients, about 6% of patients on PPIs for at least one year were also on NSAIDs or prednisone for at least 75% of the time.

4. For mild-moderate gastroesophageal reflux PPIs are necessary for 4–6 weeks, and for peptic ulcer disease for up to 12 weeks.

Data Source

Pharmacy Network of NL at NL Centre for Health Information provided prescriptions to outpatients for PPIs from 1 Jun 2017 – 30 Jun 2019 (25 months).

Results

- During the study there were 996,946 dispenses for 526,425 prescriptions of PPIs provided to 138,455 patients, 86% provided by family physicians (FPs) and 4.3% by registered nurses (RNs)/nurse practitioners (NPs).

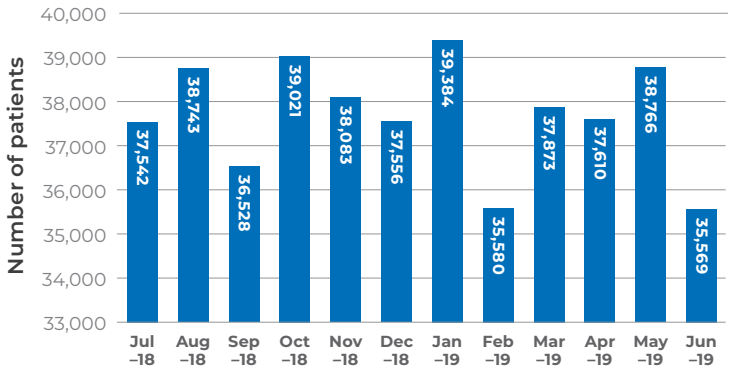


Figure 1. The Number of Patients Prescribed PPIs Each Month From 1 Jul 2018 – 30 Jun 2019

- During one year (1 July 2018 – 30 June 2019), 114,186 patients received at least one prescription for PPIs, a rate of 22/100 population.

- In June 2019, the number of patients taking PPIs was 73,047 (73,047/521,542), a prevalence rate of 14/100 population.

- The number of new patients started on PPIs during the year was 25,686, an incidence rate of 5/100 population.

- The number of patients during the year who were prescribed PPIs for longer than 3 months was 97,228, 85% of total.

- Excluding incident patients, the number of patients in the year prescribed PPIs for at least one year was 70,904, a rate of 14/100 population.

Table 1. Patients on PPIs for >3 Months or >1 Year by Age, Sex, and Locality for the Year 1 Jul 2018 – 30 Jun 2019

Patients		>3 months (>90 days)		>12 months (>365 days)	
		N	%	N	%
Sex	Male	42,958	44	31,164	44
	Female	54,268	56	39,740	56
Locality	Urban	46,863	48	33,793	48
	Rural	50,084	52	36,985	52
Age		Median		Median	
	Male	60		61	
	Female	61		62	

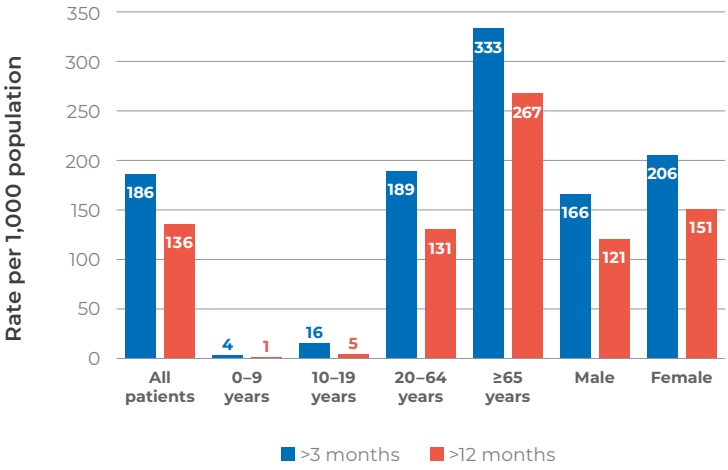


Figure 2. Prescription Rate/1,000 Population for Patients on PPIs for >3 Months and >12 Months

- There was little use of long-term PPIs in people <20 years. Although the quantity used was higher in adults 20–64 years the rate/1,000 people was highest in those ≥65 years.
- Women were more frequent long-term users of PPIs than men whether analysed by quantity or rate/1,000 population.

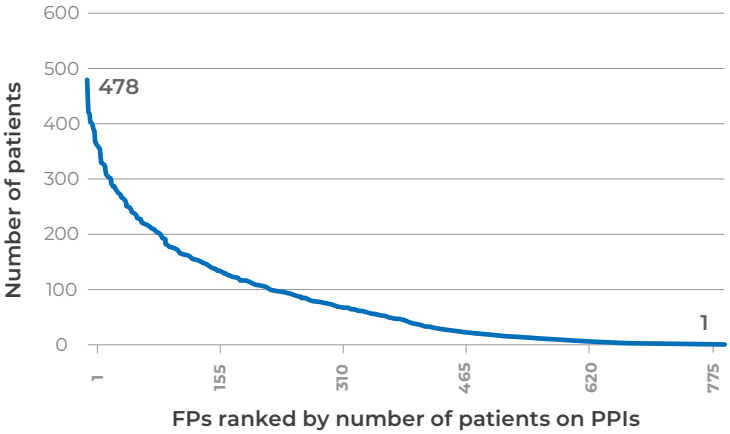


Figure 3. Ranking of FPs by the Number of Patients on PPIs for ≥12 months (1 Jul 2018 – 30 Jun 2019)

- When analyzed by prescriber, 80% of long-term prescribing by FPs is undertaken by 44% of FPs.
- 225 FPs prescribed PPIs for >1 year in >100 patients.

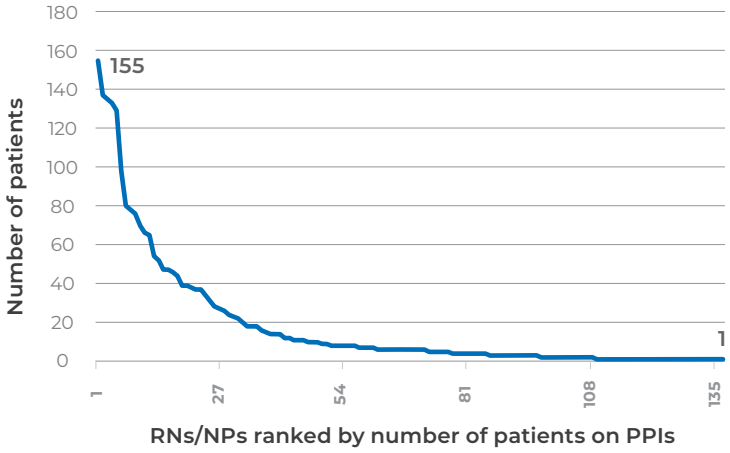


Figure 4. Ranking of Registered Nurses (RNs)/Nurse Practitioners (NPs) by the Number of Patients on PPIs for ≥12 months, 1 Jul 2018 – 30 Jun 2019

- 4 RNs/NPs prescribed PPIs for >1 year in >100 patients.

Conclusions

1. The use of PPIs in NL is high and they are generally prescribed for >3 months.
2. Long-term use for >1 year occurs in 14% of the population. Although the quantity of prescriptions was highest in adults 20–64 years, the rate/1,000 people was highest in those ≥65 years. Women were more frequent users of long-term PPIs than men.
3. The prescription of long-term PPIs was a practice common to the majority of FPs suggesting de-prescribing will be a challenge.

Choosing Wisely NL

Increase in HLA-B27 Testing Despite Knowledge Translation to Doctors

Choosing Wisely Canada Recommendation

Don't order an HLA-B27 test unless Spondyloarthritis (SpA) is suspected based on specific signs and symptoms.

Practice Points

1. Ankylosing Spondylitis (SpA) is a progressive inflammatory rheumatologic disease, which can be ameliorated by medical interventions.
2. In patients with ≥3 months of back pain and age of onset <45 years, SpA is a potential diagnosis.
3. This diagnosis may be made by finding: sacroiliitis on MRI or HLA-B27 with at least two features of SpA.

Methods

1. HLA-B27 tests undertaken in Eastern Health laboratory from 2016–2019 were analysed.
2. In 2018, Practice Points Volume 3 provided information on the diagnosis of SpA which was sent to all doctors in NL.
3. Data for 2016 and 2017 was compared to 2018 and 2019.

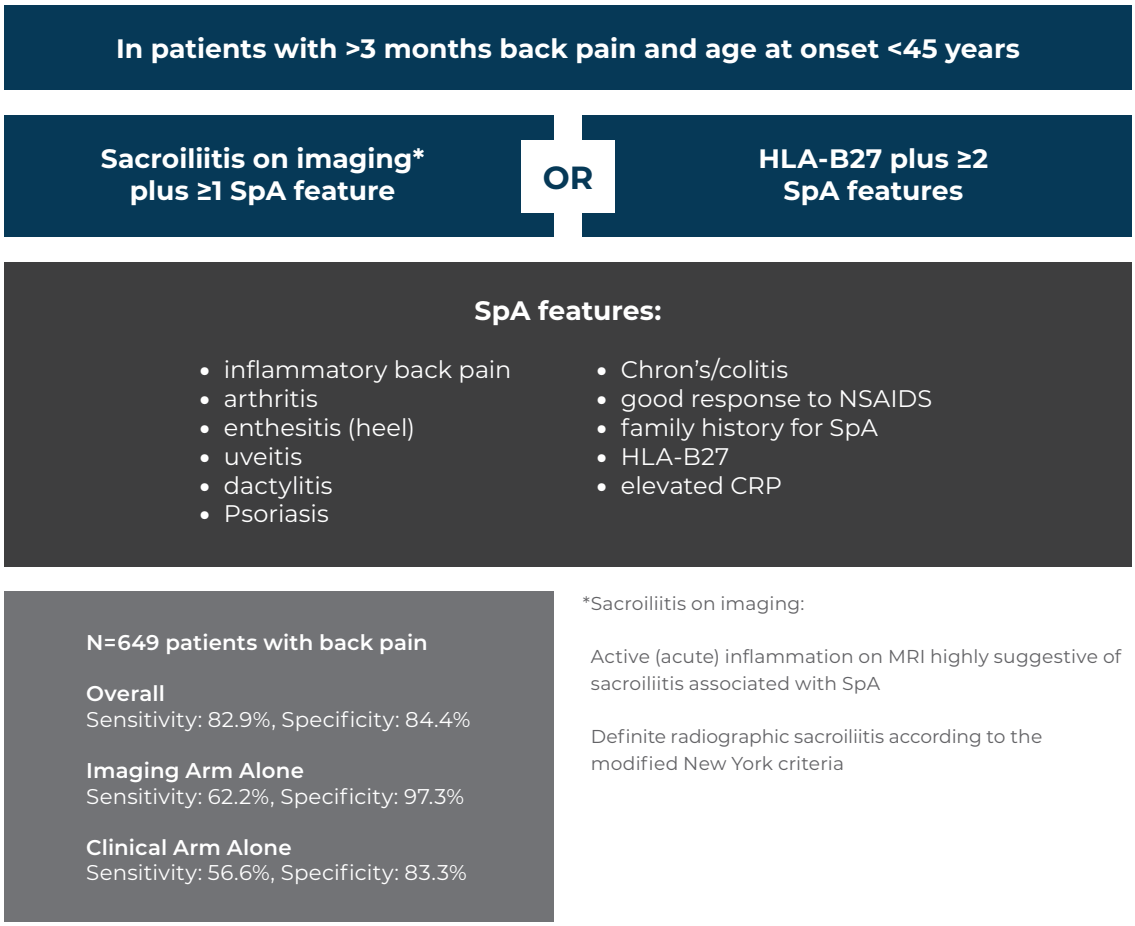


Figure 1. ASAS Classification Criteria for Axial Spondyloarthritis (SpA)

Results

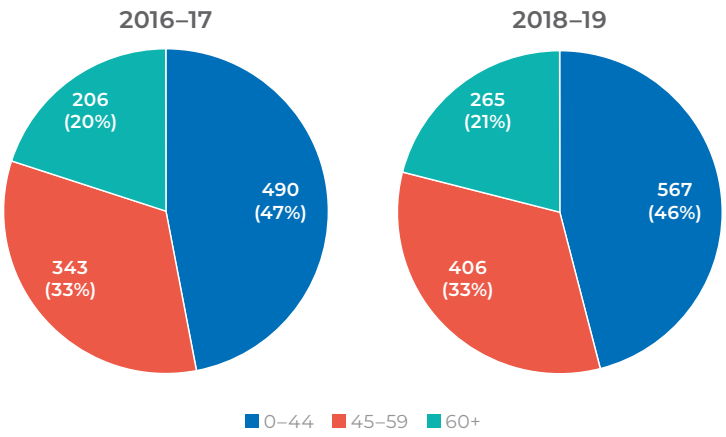


Figure 2. Proportion of HLA-B27 Tests by Age Group by Year

- In 2016–17, there were 1,039 tests undertaken and in 2018–19 the number increased by 19% to 1,238. There was little change in the proportion aged <45 years. Over half of the tests were undertaken in people at low risk of HLA-B27.

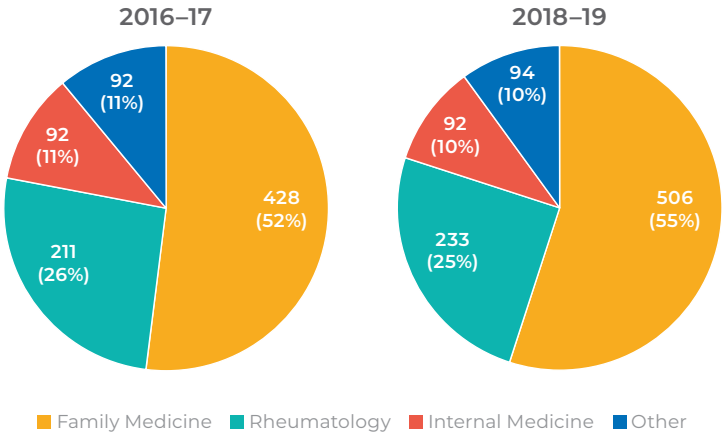


Figure 3. Proportion of HLA-B27 Tests Ordered by Health Care Provider by Year

- Of the 2,277 ordered from 2016–2019, 52% were by clinicians. For both periods 2016–17 and 2018–19, the distribution by doctor ordering the test was similar, with Family Physicians ordering the majority of tests.

Conclusions

1. The number HLA-B27 tests has increased over time and over half of the tests are in low risk patients.
2. Knowledge translation using Practice Points Volume 3 had no impact on appropriate utilization of HLA-B27 tests.
3. HLA-B27 tests should be ordered if SpA is suspected based on the presence of low back pain for ≥3 months with onset <45 years, and the presence of specific signs and symptoms consistent with SpA.

Choosing Wisely NL

Classes of Antibiotics Used in the Community and Overuse of Quinolones

Choosing Wisely Canada Recommendations

Multiple recommendations exist for not using antibiotics for upper respiratory infections, sore throat and otitis media (because they are usually viral in ethology) or for asymptomatic bacteriuria in pregnant women.

https://choosingwiselycanada.org/campaign/antibiotics/

Practice Points

1. The World Health Organization has named antibiotic resistant bacterial disease as one of its top 10 concerns.

2. In 2020, the Public Health Agency of Canada identified community acquired antibiotic resistant organisms as of particular concern including Methicillin-resistant *Staphylococcus aureus*, multi-antibiotic resistant *Neisseria gonorrhoeae*, *Streptococcus pneumonia*, *E. coli*, and *Clostridium difficile*.

3. In Canada in 2018, >25% of *E. coli* isolates were resistant to Ampicillin, Amoxycillin-Clavulanate, Ciprofloxacin, or Trimethoprim-sulfamethoxazole. In NL, the rate of Ciprofloxacin resistant *E. coli* was 18%.

4. Ciprofloxacin should not be a first line antibiotic except in prostatitis or in the presence of proven/ likely *Pseudomonas aeruginosa*.

Methods

Data from the NL Pharmacy Network on all antibiotics prescribed in the province to outpatients from 1 Jul 2017 – 30 Jun 2019 were provided by the NL Centre for Health Information.

The Defined Daily Dose (DDD) is the assumed average maintenance dose/day for an antimicrobial drug used for its main indication in adults. This fixed unit of measurement was calculated because it facilitated examination of trends over time and comparisons between groups.

Results

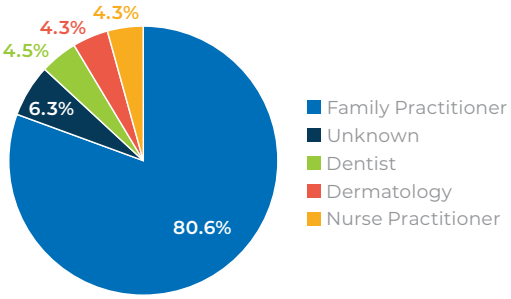


Figure 1. Antibiotic Consumption in the Community by Health Care Provider

- 81% of antibiotics were prescribed by FPs

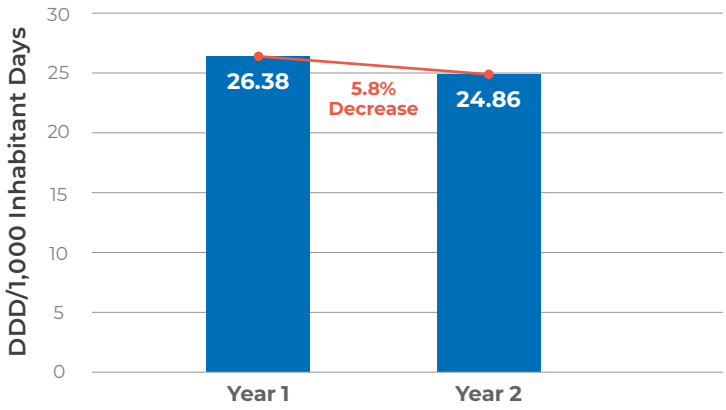


Figure 2. Change in Antibiotic Consumption in the Community From 2017/18 to 2018/19

- In 2017/18, the DDD/1,000 inhabitant days was 28.4; it fell by 5.8% to 24.9 in 2018/19

- Consumption of the quinolones class of antibiotics decreased by 11% in 2018/19 from 2.7 to 2.4.

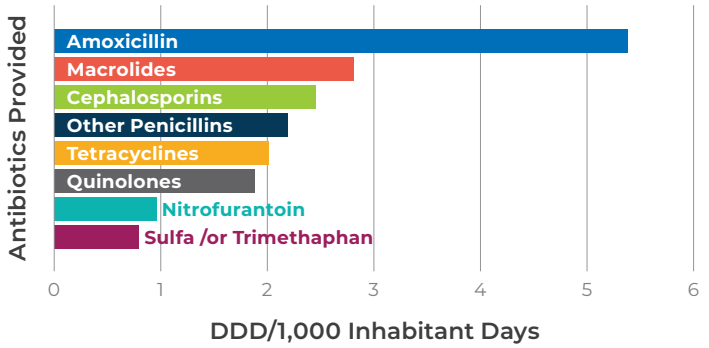


Figure 3. Classes of Antibiotics Provided by Family Practitioners in 2018/19

- The most frequent drugs prescribed by FPs were amoxicillin, Macrolides, Other Penicillins, Tetracyclines, and Quinolones.
- Amoxycillin comprised 85% of antibiotics prescribed by dentists.
- 94% of antibiotics prescribed by dermatologists were Tetracyclines.

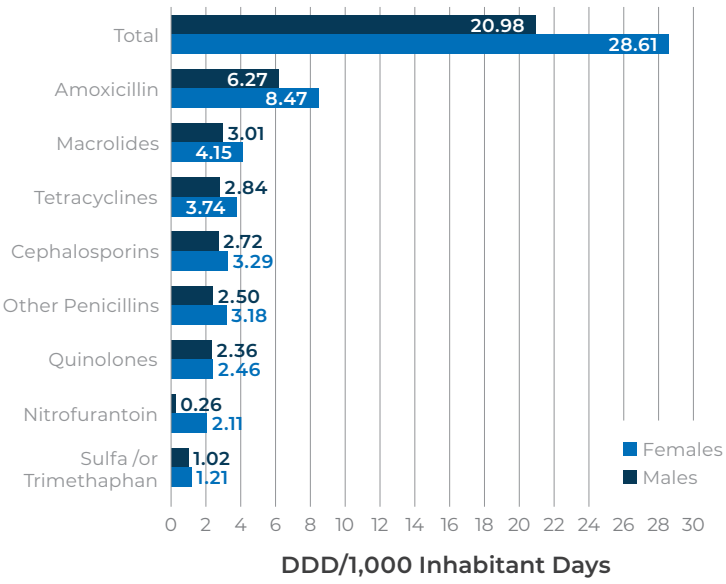


Figure 4. Classes of Antibiotics Consumed in 2018/19 by Males and Females

- The DDD/1,000 inhabitant days was 21.0 in males and 28.6 in females (36% higher).
- The DDD/1,000 inhabitant days for the quinolones class was 2.36 in males and 2.46 in females.

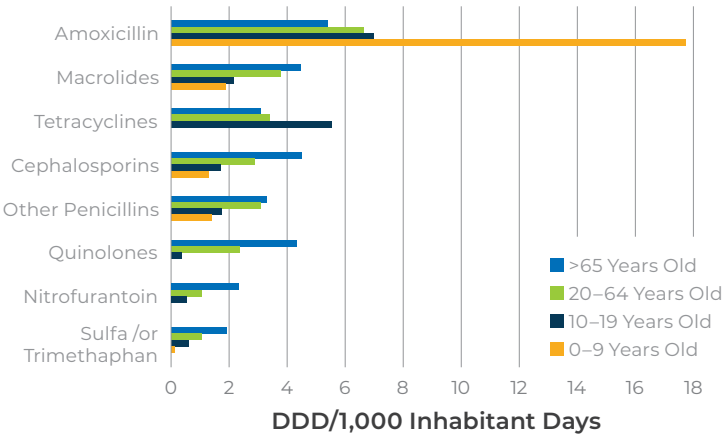


Figure 5. Classes of Antibiotics Consumed in 2018/19 by Age Group

- The DDD/1,000 inhabitant days was 22.6 in children aged 0–9, 19.8 in those aged 10–19 years, 24.4 in those 20–64 years, and 29.4 those ≥65 years.
- The DDD/1,000 inhabitant days for the quinolones was 0.02 in children aged 0-9, 0.4 in those aged 10–19 years, 2.42 in those 20-64 years, and 4.32 in those ≥65 years.
- Amoxycillin comprised 78% of antibiotics provided to children aged 0–9.
- Tetracyclines were most frequently used in children aged 10–19, and comprised 28% of antibiotics prescribed for this group.
- Nitrofurantoin was generally used in females, particularly in those ≥65 years.

Conclusions

1. The prescription of Amoxycillin is high in children aged 0–9 years, likely associated with viral infections. Efforts should be made to reduce use.
2. Quinolones were prescribed to men and women, predominantly in those ≥65 years. In view of the high incidence of Ciprofloxacin resistant *E. coli*, quinolones should not be used as first line agents, other than for prostatitis and *P. aeruginosa* infection.
3. Nitrofurantoin could be reduced if prescribed for asymptomatic bacteriuria.
4. NL has very high use of antibiotics in the community and prescriptions need to adhere to current practice guidelines.

Quality of Care NL

Geospatial Mapping of the NL Population by Age, Sex and Standardized Rates of Antibiotic Use

Objective

To determine whether there are particular regions in NL with high antibiotic use.

Practice Points

1. Antibiotic resistant bacterial infection is one of the top 10 concerns of the WHO and a major public health problem in Canada. It is associated with unnecessary antibiotic prescribing, often driven by patient demand.

2. Despite audit, feedback and academic detailing to family physicians (FPs) in Eastern Health (EH) and provision of Practice Points advice to all FPs in the province, only a modest decrease in antibiotic use has occurred.

3. Antibiotic use is associated with the volume of patients seen by FPs, but there is wide variability in the quantity of prescriptions provided by FPs seeing similar volumes of patients.

4. Antibiotics are prescribed more frequently in females and in those ≥65 years. Consequently, comparisons of different regions of the province requires controlling for differences in demography between regions.

5. Geo-spatial mapping of prescriptions using postal codes, together with age and sex standardized rates, may identify areas of high use for public education and prescriber communication.

Methods

1. Data on all antibiotic prescriptions provided to outpatients in NL was obtained from the NL Pharmacy Network from 1 Jul 2017 to 30 Jun 2019.

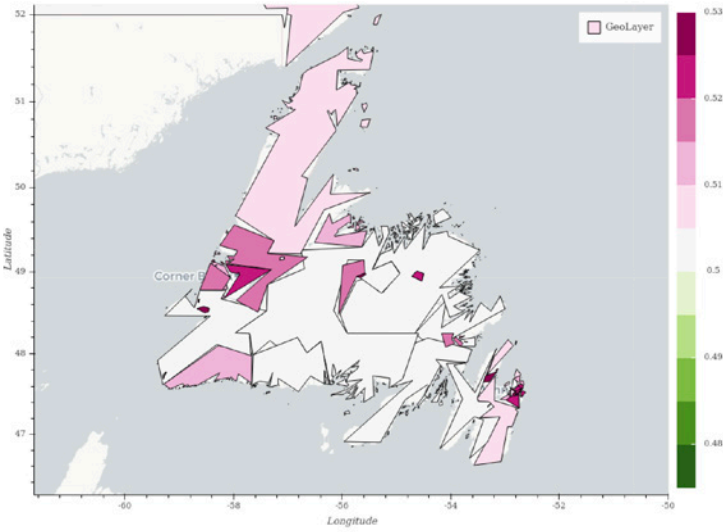
2. The Defined Daily Dose (DDD)/1,000 inhabitant days was calculated (see previous summary paper) to facilitate comparisons between regions.

3. Geo-spatial mapping of the amount of antibiotics DDD/1,000 inhabitant days was mapped based on patients' postal code. For calculating the DDD/1,000 inhabitant days of each postal code, region population rates by postal code was obtained from Census 2016 on www.statscan.gc.ca.

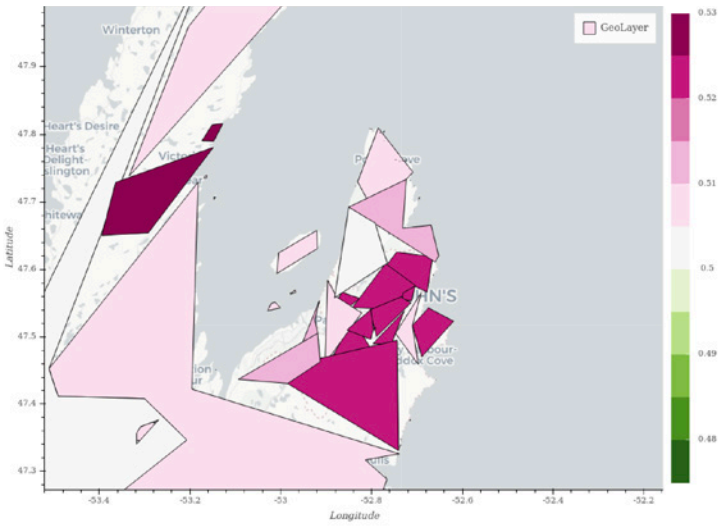
**Antibiotics rates were standardized according to proportions in NL of males and females in four age categories (<10 years, 10–19, 20–64, and ≥65 years).*

Results

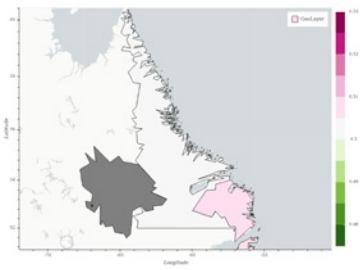
A. Newfoundland



B. St. John's



C. Labrador

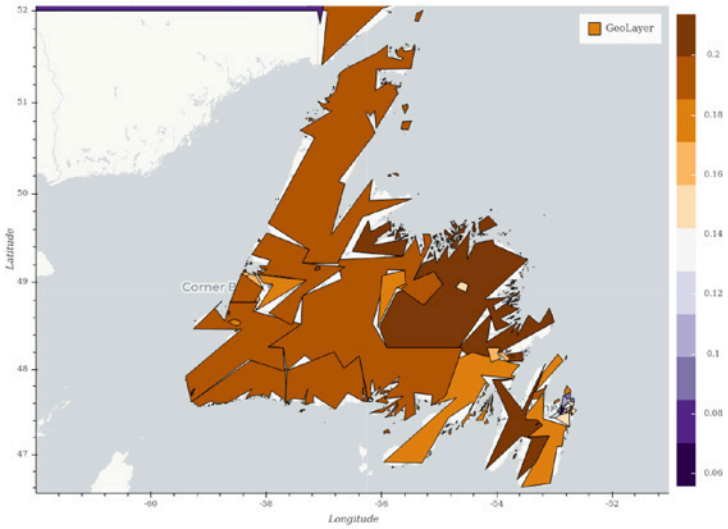


*Dark Purple = Regions With a Higher Rate of Females

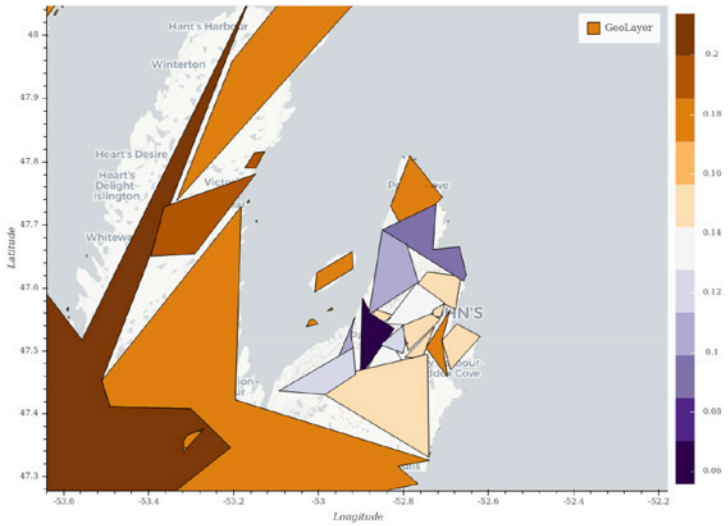
- St. John's and Corner Brook areas have higher female population compared to the rest of the province.

Figure 1. Map of NL Showing the Rate of Females in the Population by Postal Code

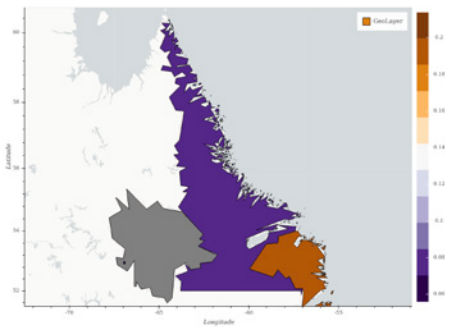
A. Newfoundland



B. St. John's



C. Labrador

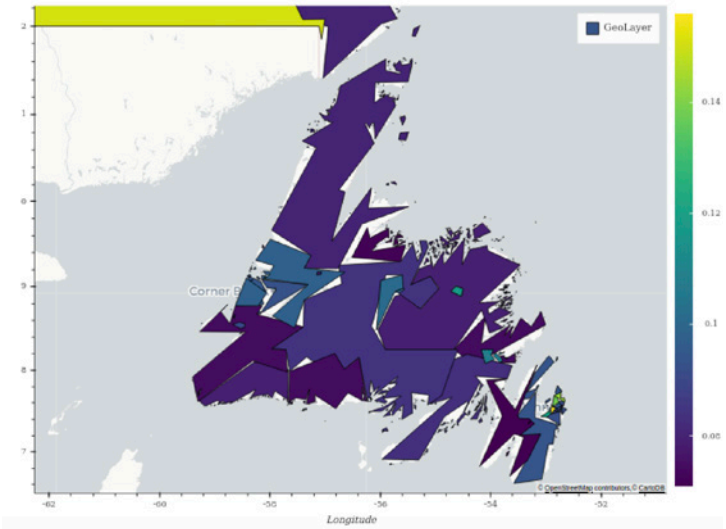


*Dark Brown = Regions with the highest proportion of seniors

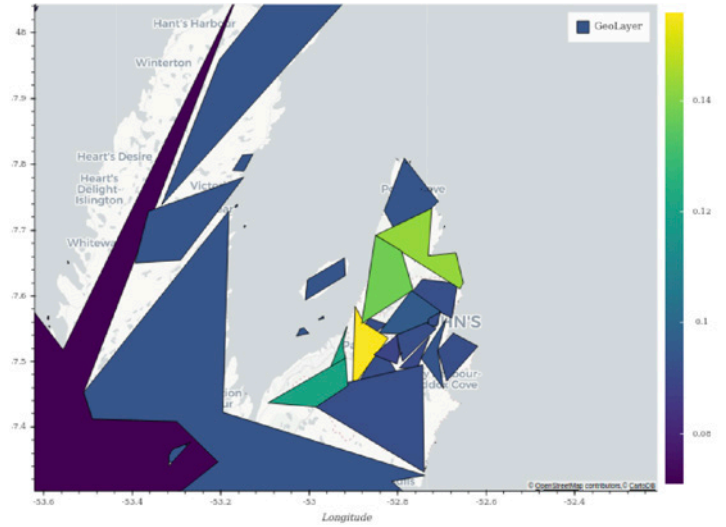
Figure 2. Map of NL Showing the Rate of Persons ≥65 Years in the Population by Postal Code

- The regions with the highest proportion of persons ≥65 years were Western Avalon, Bonavista Peninsula, North East Newfoundland, and Northern Newfoundland.

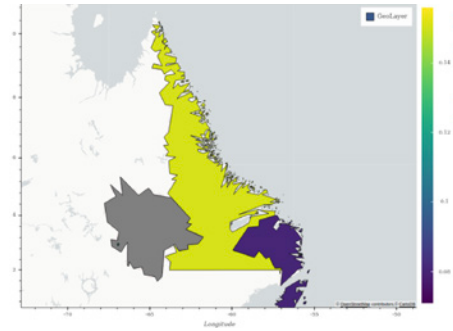
A. Newfoundland



B. St. John's



C. Labrador

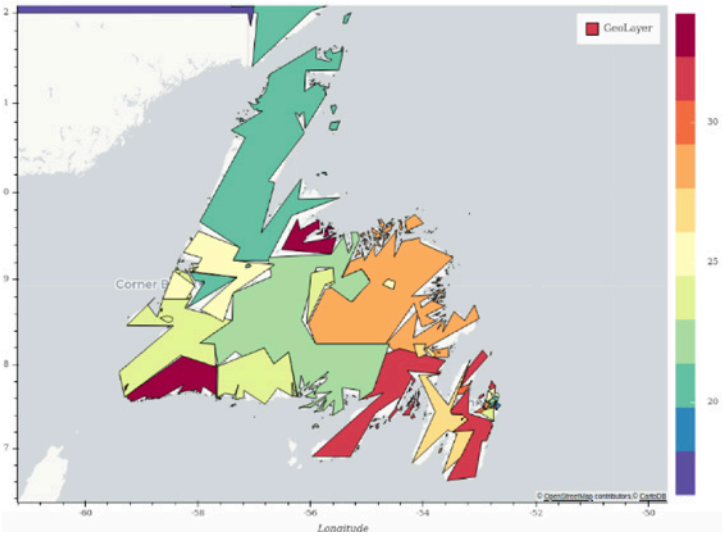


*Light Green = Areas With a Higher Rate of Children

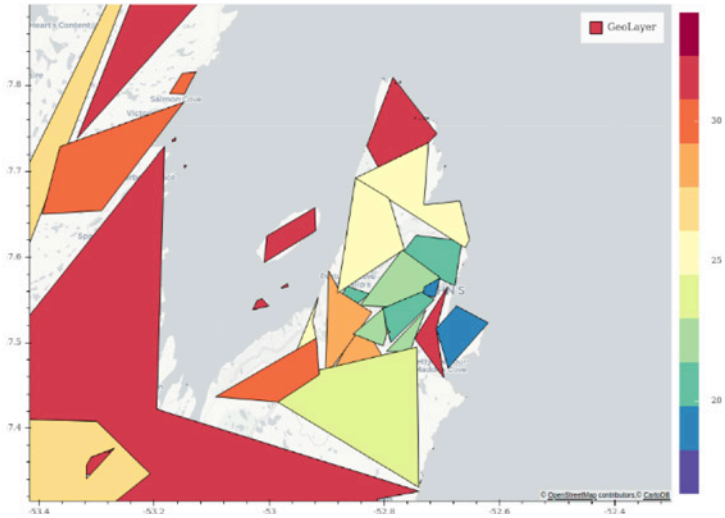
Figure 3. Map of NL Showing the Rate of Children <10 Years Old in the Population by Postal Code

- Areas with the highest proportion of children are Paradise, Torbay, Portugal Cove-St. Phillips, and CBS.

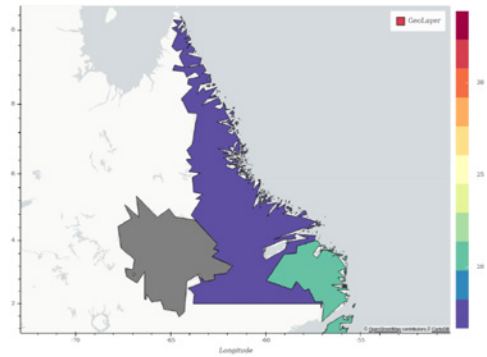
A. Newfoundland



B. St. John's



C. Labrador



*Dark Red = Regions with highest rate of antibiotics

Figure 4. Map of NL Showing the Age and Sex Standardized DDD/1,000 Inhabitant Days by Postal Code

- The highest rates of antibiotic use, corrected for difference in sex and age, were in the rural areas area of La Poile Bay, Northern Newfoundland, South East Avalon, and the Burin Peninsula.
- Higher rates were also observed in St John's South West, Conception Bay, Paradise, North Eastern Newfoundland, and Carbonear.

Conclusions

1. There are substantial demographic differences across the regions of NL with more women and children in urban areas and more seniors in rural areas.
2. Even with correction for these differences, the highest rates of antibiotic use are in rural areas of NL. To limit antibiotic use in these areas, prescriptions could be post-dated for use if symptoms persist.
3. Some urban areas have high rates, which could be ameliorated by education of mothers/females on unnecessary antibiotics in an attempt not to provide a prescription.

Evaluation of the Cardiovascular Assessment Screening Program (CASP) with Nurse Practitioners and Patients aged 40–74 years in Newfoundland and Labrador-A Randomized Controlled Trial

Objective

To evaluate a newly developed cardiovascular screening intervention, Cardiovascular Assessment Screening Program (CASP), with nurse practitioners and patients aged 40–74 years without established cardiovascular disease (CVD) in Newfoundland and Labrador (NL).

Practice Points

1. Screening for CVD risk factors in clinical practice often involves identifying single risk factors or conditions rather than using a comprehensive approach to identify multiple risk factors simultaneously in a systematic manner.

2. There are current guidelines available in the Canadian Cardiovascular Harmonized and National Guidelines Endeavour (C-CHANGE) for effective CVD screening and management of asymptomatic adults without established CVD.

3. Screening for CVD is complex and implementation of current guidelines such as the C-CHANGE is difficult to do in daily practice, so we developed CASP to simplify the screening and management process for clinicians and patients in NL.

4. There are many people in NL with multiple risk factors for CVD such as hypertension, obesity, and diabetes that could benefit from comprehensive CVD screening using CASP to identify CV risk factors early, to determine level of CVD risk, and to intervene using current evidence.

5. Engaging people to set personalized goals for heart health using tools provided in CASP can decrease the risk of a CV event and promote healthy aging.

Methods (PI: Dr. J. Bruneau)

1. Researchers recruited 8 NPs and randomly allocated them to groups. In turn, NPs recruited 167 patients aged 40-74 years from their community practices across NL. There were 68 patients in the intervention group and 99 patients in the control group.

2. Intervention group NPs screened patients for 10 risk components for CVD and documented these in the study CVD database. The research team reviewed the patients' charts in the control group receiving usual care.

3. Comprehensive CVD screening was based on the NPs obtaining information from the patients on 9 or 10 of the following components: age, family history of premature coronary artery disease, Framingham Risk Score, smoking status, body mass index, waist circumference, blood pressure, lipid profile, A1C, and stress.

4. Screening was categorized as moderate if 6–8 components were evaluated, as limited if 3–5 components were evaluated and minimal if 1–2 components were evaluated.

Results

- Comprehensive CVD screening and management by NPs using CASP.

- Comprehensiveness of screening (i.e. screened for 9 to 10 risk components) was significantly higher in the NP intervention group using CASP (96%) versus the NP control group (7%) providing usual care after controlling for the effect of the NP. The adjusted RR was 43.9, 95% CI [13.3, 144.2], p<0.0001.

Table 1. Degree of Comprehensive Screening Comparison Between Groups

Degree of Comprehensive CVD Screening	Intervention (N=68)	Control (N=99)
Comprehensive CVD screening (9–10 components)	**90% (61)**	2% (2)
Moderate CVD screening (6–8 components)	**10% (7)**	1% (1)
Limited CVD screening (3–5 components)	0% (0)	**54% (54)**
Minimal CVD screening (1–2 components)	0% (0)	**42% (42)**

- CASP was effective in the identification of multiple risk factors for CVD.

The majority (71%) of patients in the intervention group had more than four CVD risk factors documented. Only 5% of the patients in the control group had more than four risk factors recorded, with the majority (46%) of the patients having two or three risk factors documented in their charts.

Table 2. CVD Risk Factors in the Intervention and Control Group Patients by Sex

Number of Risk Factors	Intervention Patients	Sex		Control Patients	Sex	
7–10	18% (12)	Female	14% (7)	0% (0)	Female	0% (0)
		Male	27% (5)		Male	0% (0)
4–6	53%	Female	56% (28)	5% (5)	Female	4% (3)
		Male	44% (8)		Male	8% (2)
2–3	23% (16)	Female	28% (14)	46% (46)	Female	46% (35)
		Male	11% (2)		Male	48% (11)
0–1	3% (2)	Female	2% (1)	22% (22)	Female	21% (16)
		Male	5% (1)		Male	26% (6)
Unknown	3% (2)	Female	0% (0)	26% (26)	Female	29% (22)
		Male	11% (2)		Male	17% (4)

There were 50 females and 18 males in the intervention group, and 76 females and 23 males in the control group.

- CASP was effective in determining the patient's level of CVD risk.

Ninety-one percent (91%) or 62 patients seen by the NPs in the intervention group had their risk of having a CV event in the next 10 years assessed using the Framingham Risk Score (FRS) available on the CASP website. The risk for having a CV event was largely unknown for 96% (92 patients) in the control group because the FRS was documented on only seven (7) patients (4%).

Table 3. Recalculated FRS in 68 Intervention Group Patients at High, Moderate, or Low CVD Risk By Sex

Framingham Risk Score (FRS)	Intervention	Male (N=18)	Female (N=50)
High Risk (>20%)	28% (19)	55% (10)	18% (9)
Moderate Risk (10–20%)	37% (25)	22% (4)	43% (21)
Low Risk (<10%)	27% (18)	5% (1)	34% (17)
Unknown Risk	9% (6)	16.6% (3)	6% (3)

- CASP was effective for identifying NP and patient priorities for heart health.

All NPs in the intervention group identified two to three patient priorities for at least 75% of the patients. Over three quarters (80%) of the patients identified two or more priorities for improving heart health. Personalized goals were developed in collaboration with patients.

Conclusions

1. Integration of CASP as a useful clinical tool into daily practice can assist clinicians to identify CVD risk factors early and provide guidance for patient management.

2. Engagement of patients in making decisions and setting priorities for heart health can promote patient-centred care and healthy aging.

3. Future research will endeavour to follow-up with patients who participated in this RCT to determine the effect of participating in CASP on health outcomes.

Optimizing Medication Therapy Outcomes for High Risk Patients Transitioning From Acute to Primary Care

Objective

To assess whether a pharmacist-provided medication therapy management (MTM) assessment, designed to manage the complex medication needs of patients transferring from acute to primary care, will improve health outcomes, measured by hospital utilization and mortality rates, compared to usual care.

Practice Points

1. In Canada's health care system, different sectors operate largely in silos with little integration, hindering communication, coordination, and information sharing.

2. A lack of coordinated care is particularly problematic for "medically complex patients" (i.e. those managing multiple chronic conditions and/or medications) who may interact with a number of health care providers and face significant challenges in the transition from acute to primary care.

3. Approximately 20% of patients discharged from hospital experience an adverse event, nearly two-thirds being medication-related. Such preventable medication-related hospitalizations cost the Canadian health care system approximately $2.6 billion annually.

Methods (Dr. D. Kelly)

4. Patients admitted to general medicine services at the Health Sciences Centre or St. Clare's Hospital were screened for eligibility and enrolled while still in hospital. Immediately following discharge, participants were randomized to either the intervention (MTM assessment at the Medication Therapy Service Clinic) or control group (usual care).

5. During the MTM assessment, the pharmacist conducted a comprehensive medical and medication history, assessed barriers to medication adherence, defined individualized clinical targets (e.g. blood pressure or blood glucose), and determined participant expectations for disease management. Education regarding medications, with a focus on changes made in hospital, was provided as appropriate.

6. Following the assessment, medication-related issues were identified and the pharmacist developed a care plan to address these issues, which was shared with the primary care provider, relevant specialists and the participant's community pharmacy.

7. Participants were encouraged to see their primary care provider within two weeks to review the care plan. The pharmacist followed up with the participant as required.

8. Health outcome data including re-hospitalizations, ER visits and number of deaths was obtained through MEDITECH and HEALTHeNL. Number, type, and severity of medication related issues as well as implementation of pharmacist recommendations were determined through MTS Clinic chart review.

Results

- 90 participants were enrolled in the study with an additional 92 participants enrolled using a modified "referral-based" recruitment strategy. A total of 27 participants received the intervention.

- Median age and sex distribution were similar in the group receiving MTM services and the control group (69 years in both groups; 59% and 55% male, respectively).

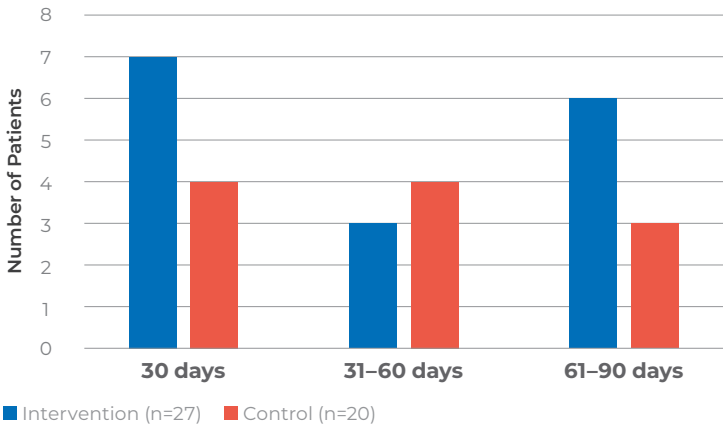


Figure 1. Composite Health Care Utilization (Hybrid of ER Visit and Hospital Admission)

- Participants who received MTM services had a median of 7 comorbidities, were taking a median of 11 unique medications at baseline and had an average of 3.8 drug therapy problems identified per person.
- No significant difference was seen in hospital utilization rates for participants who received MTM services and controls (25.9% and 20.0% at 30 days; 11.1% vs. 20.0% at 31-60 days; 22.2% vs. 15.8% at 61-90 days, respectively).
- At 90 days, 1 intervention participant (3.7%) and 2 control participants (10%) had died.
- MTM consultations were heavily focused on education and deprescribing with 77.8% of participants having at least one deprescribing recommendation.
- All respondents reported they were satisfied with their MTM assessment, and a majority indicated they felt their health improved as result of the service. All participants indicated they would recommend the service to others.

Conclusions

1. Significant recruitment barriers limited the power of this study to demonstrate the impact of MTM assessments compared to usual care.
    - ◇ Hospital staff priorities and workload limited their ability to support the study by identifying eligible patients who might benefit from MTM assessments.
    - ◇ Study design changed from randomized controlled trial to referral-based enrollment; however, only half of the referral forms were faxed to the MTS Clinic on patient discharge from hospital.
    - ◇ Many patients withdrew from the study after discharge or could not be reached. Major reasons for withdrawal included being burdened with too many other appointments, feeling too unwell for an appointment and lack of family/friend availability to support in scheduling an appointment.
2. Systemic barriers must be overcome to support patients throughout their transitions of care and encourage them to avail of post-discharge support services, like MTM assessments.
3. Despite barriers, the experience of the intervention group suggests that MTM assessments can improve patient understanding about their medications and identify opportunities to improve medication use and safety.

Development of a 3D-Printed Testicular Cancer Model for Testicular Examination Education

Objective

To develop a set of 3D-printed models to facilitate teaching testicular examination and improving understanding of testicular malignancies amongst patients and medical learners.

Practice Points

1. Testicular cancer is the most commonly diagnosed malignancy in young males, it is highly amenable to treatment when caught at an early stage, with a five-year survival approaching 100% in patients diagnosed at stage I.

2. Testicular examination is a non-invasive and inexpensive means of detecting testicular cancer at an early stage.

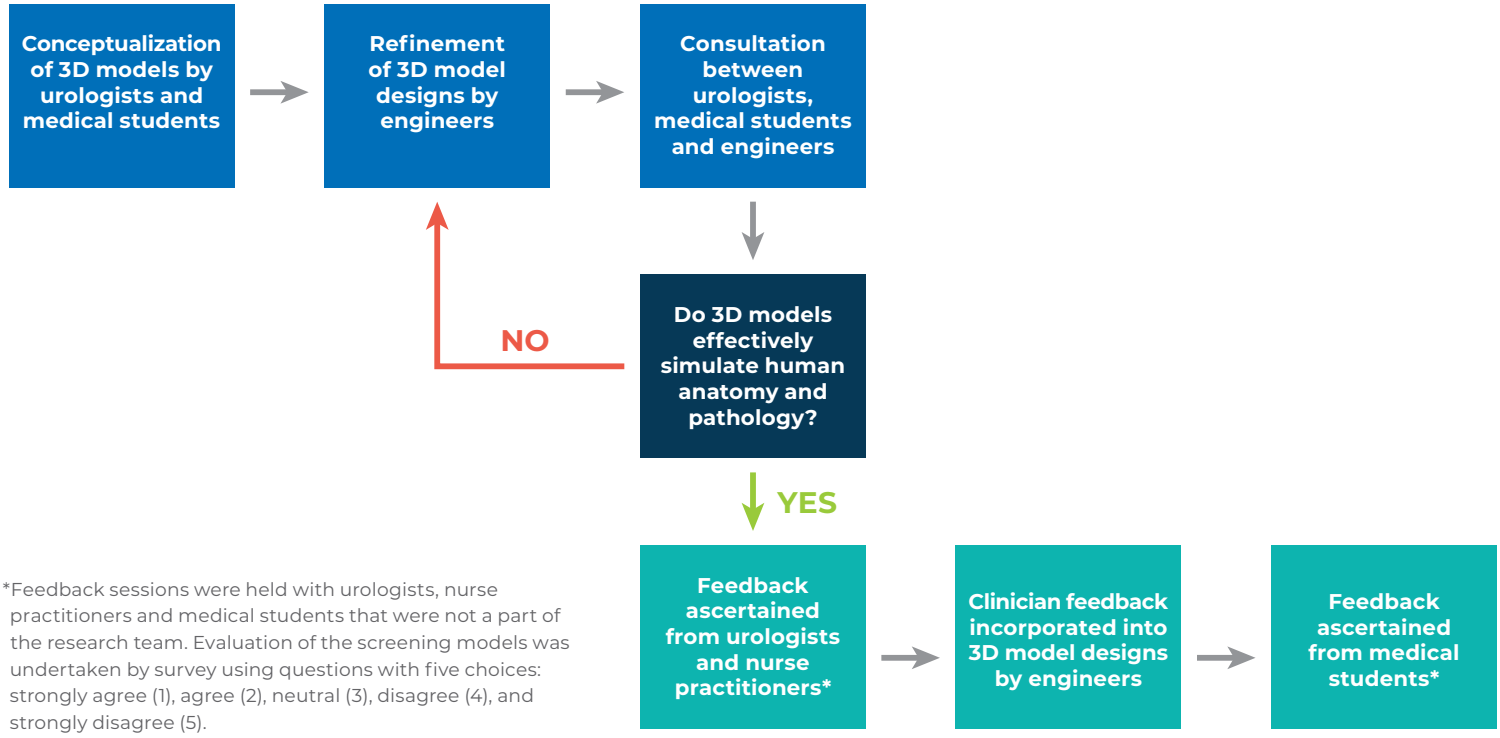
3. 3D-printed technology allows for anatomically-accurate models to be made at a fraction of the cost of traditional models; thus, mitigating the financial barriers currently associated with testicular cancer education.

Methods (PI: Drs. M. Organ, D. Harvey, R. Power)

1. A multidisciplinary team comprising urologists, engineers, and medical students used an iterative design process to develop a set of 3D-printed testicular cancer models.

2. Five models were developed, with each simulated scrotum containing either a) two healthy testicles, or b) one healthy testicle and one testicle with an endophytic lesion of varying size.

3. Once the set of testicular cancer models had been developed, two separate sessions were held to ascertain feedback from both clinicians and medical learners.



*Feedback sessions were held with urologists, nurse practitioners and medical students that were not a part of the research team. Evaluation of the screening models was undertaken by survey using questions with five choices: strongly agree (1), agree (2), neutral (3), disagree (4), and strongly disagree (5).

Figure 1. Iterative Design Process Used for the Design and Completion of the 3D-Printed Testicular Cancer Models

Results

- Clinicians reported that the models enabled accurate simulation of a testicular examination involving both healthy and pathologic testes (mean= 4.3 ± 1.0).
- Clinicians agreed that the models would be useful teaching tools for both medical learners (mean = 4.8 ± 0.5) and patients (mean = 4.8 ± 0.7).
- Following an educational session with the models, medical learners reported significant improvements in confidence and skill in performing a testicular examination.

Table 1. Results of Evaluation of Testicular Cancer Screening Models by Urologists (N=4) and Urology Nurse Practitioners (N=4)

Questions on model evaluation survey	Mean ± SD	% Agree	% Neutral
This model is anatomically accurate	4.5 ± 0.5	100	0
On palpatation, the testical with no mass feels like an accurate representation of a healthy testicle	4.6 ± 0.5	100	0
On palpatation, the simulated testicle pathology feels like an accurate representation of pathology required for further investigation	4.4 ± 0.5	100	0
This model allows for an accurate simulation of a testicular exam	4.3 ± 1.0	71.4	28.5
This model would be a useful teaching tool for patients who are learning testicular self-examination	4.8 ± 0.7	87.5	12.5
This model would be a useful teaching tool for medical learners who are learning testicular examination	4.8 ± 0.5	100	0
This model is an improvement over existing models for testicular cancer	4.6 ± 0.5	100	0

SD = Standard deviation.
7 of 8 answered questions 4 and 7

Table 2. Results of Evaluation of Testicular Cancer Screening Models by 32 First- and Second-Year Medical Students

Questions on model evaluation survey	Mean ± SD	% Agree	% Neutral	% Disagree
At the beginning of the session, I possessed the skills to perform a testicular examination	1.8 ± 0.9	6.3	12.5	81.3
At the end of the session, I possessed the skills to perform a testicular examination	4.2 ± 0.4	100	0	0
At the beginning of the session, I felt confident performing a testicular examination	1.6 ± 0.9	6.3	6.3	87.5
At the end of the session, I felt confident performing a testicular examination	3.9 ± 0.4	84.4	15.6	0
This model is anatomically accurate	4.4 ± 0.6	96.8	3.2	0
This model allows for an accurate simulation of a testicular exam	4.3 ± 0.5	96.7	3.3	0
This model would be a useful teaching tool for patients who are learning testicular self-examination	4.7 ±0.5	100	0	0
This model would be a useful teaching tool for medical learners who are learning testicular examination	4.8 ± 0.4	100	0	0
This model would be a useful addition to existing urology curriculum	4.7 ± 0.4	100	0	0

31 answered questions 5, and 30 answered questions 6 and 9

Conclusions

1. 3D-printed models can effectively simulate palpation of both healthy and pathologic testes.
2. The developed models have the potential to be a useful adjunct in teaching testicular examination and in demonstrating abnormal findings that require further investigation.

Engaging Patients as Partners: Developing a Post-Operative Total Joint Surgery Rehabilitation Resource

Objective

In the current study, we examined how we can better understand the patient challenges related to recovery post joint replacement and developed ideas for interventions with our patients to address these challenges.

Practice Points

1. Providing a clear timeline for patients to better understand the requirements that must be met before total joint replacement surgery.
2. Offering additional physiotherapy to patients who struggle with mobility after surgery.

Methods (PI: M. MacDonald, Dr. L. Twells)

1. Patients who have undergone total joint replacement surgery were recruited within the last two years via the Total Joint Assessment Clinic (TJAC) staff.
2. Two focus groups of 6 participants each were hosted in St. John's and in Carbonear.
3. Common themes were sought from the discussion.
4. Common themes were discussed with TJAC staff and knowledge translation ideas with graphic designer.

Results

- Many patients felt that the timeline for getting surgery was confusing and felt like they needed more physiotherapy than what they were originally given.

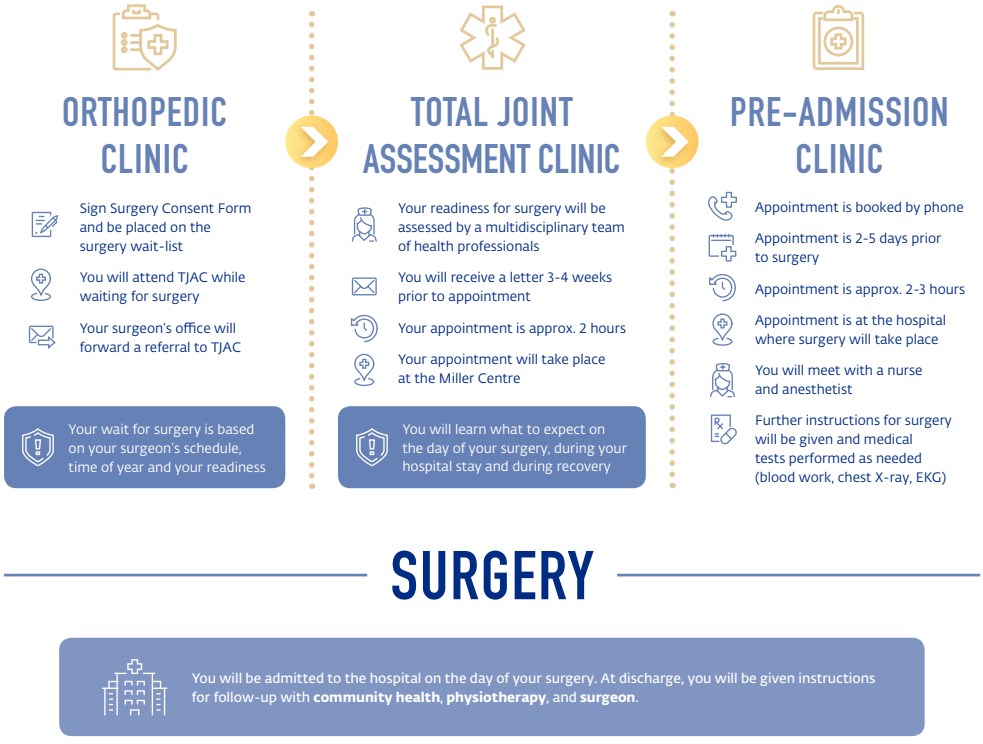


Figure 1. Timeline Excerpt from TJAC Patient Pamphlet Created as a Result of Focus Group Discussions

Conclusions

1. An easy-to-read timeline was created using the results from the focus groups.
2. The timeline has been posted on the wall at the TJAC as well as provided to patients at their initial consult with their orthopedic surgeon.
3. Additional physiotherapy is being offered for patients who request it.

Effectiveness of a Foot Self-Management Intervention that Utilized Commercially Available Infrared Thermometers: A Patient-Oriented Research and Mixed Methods Research Study

Objective

To determine the effectiveness of a foot self-management intervention that utilized commercially available infrared thermometers for patients with diabetes who were at risk for diabetic foot ulcers (DFUs).

Practice Points

1. There are over 70,000 people diagnosed with diabetes in Newfoundland and Labrador (NL) and this number is continuing to increase (NLCHI, 2017).

2. Patients with diabetes are at risk for DFUs, which results in negative physical, psychological, and social impacts for patients and increased costs for the health care system.

3. For NL in 2018 the prevalence estimates were 760–1,260 cases for DFUs and 160 for amputations (Diabetes Canada, 2018).

4. It is important to develop strategies to support foot health and prevent DFUs. Education and a commercially available infrared thermometer (CAIT) are promising strategies.

5. The CAIT can help identify plantar inflammation by detecting a >4° F temperature difference between the two feet. Once the individual has identified the inflammation they can take action, such as resting, to relieve pressure until the temperature normalizes and the inflammation is reduced, thus preventing skin breakdown, which could lead to formation of a DFU.

Methods (PI: Dr. K. Stevens)

1. A sequential mixed methods research study with three phases was conducted from 2016–2019 in areas served by Eastern Health.

2. In Phase 1, qualitative interviews were completed with 11 patients, 9 health care providers, and 4 support persons to explore foot self-management. What was learned in Phase 1 informed the development of the intervention.

3. In Phase 2, a six-month randomized controlled trial (RCT) pilot was conducted that tested the intervention (thermometer and education group, n=34, and an education-only group, n=26).

4. In Phase 3, interviews were conducted with RCT participants to gain an understanding of the Phase 2 findings (n=9). At the end of the study, data from all three phases were integrated.

5. Two patient representatives were part of the research team and provided feedback on the data collection and analysis throughout the study.

Results

- Phase 1: Findings showed that patients experienced personal challenges, encountered system barriers, and utilized resources to support foot self-management. Patients were unsure of what to do if they had a foot wound. Therefore, the contact number for self-referral to community health was provided to participants in the intervention.

- Phase 2: There was no difference between the two groups for DFUs but the study had low power to assess this outcome.

    - ***Improved foot assessment***. The thermometer and education group (n=34) had significantly more days with any assessment completed than the education-only group (n=26) (151/180 vs. 120/180, p =0.02).

    - ***Use of the thermometer***. 96.8% of participants said they would continue to use the thermometer. However, 37.9% said this would be sometimes or rarely. Reasons given to continue to use the CAIT were: to identify inflammation and any issues; to have a baseline assessment; to keep track; and because it was part of their routine.

- Phase 3: Phase 2 findings were further assessed.

    - ***Improved foot assessment***. Participants would often record the temperature reading but not their foot assessment. However, participants were also completing a visual assessment when they took their temperature and one participant described the two assessments as going "hand in hand".

    - ***Improved action based on the foot assessment***. A temperature check with a <4°F difference led patients to conclude that their feet were fine to do what they planned. However, temperature readings with a >4°F difference prompted action such as completing a further assessment, resting, and seeing their health care provider.

    - ***Use of the thermometer***. Participants indicated that the CAIT made them more aware of their feet, offered reassurance about foot health status, and made them feel more involved in their assessment.

Conclusions

1. Integration of the data from Phases 2 and 3 showed that the CAIT engaged participants in foot assessment, prompted action to address foot concerns, and offered reassurance about foot health.

2. A CAIT is an available tool that could support foot self-management for people with diabetes and the use of a CAIT may offer several benefits such as promoting and providing structure for a foot assessment and direction for action.

Quality of Care NL

Our Partners

Our innovative approach enables us to work closely with all our partners, including:

Newfoundland Labrador

MEMORIAL UNIVERSITY

Choosing Wisely Canada

IBM

Canada

NEWFOUNDLAND AND LABRADOR MEDICAL ASSOCIATION

CRNNL College of Registered Nurses of Newfoundland & Labrador
Setting the Standard for Nursing Excellence.

PANL PHARMACISTS' ASSOCIATION OF NEWFOUNDLAND AND LABRADOR

Newfoundland & Labrador Nurse Practitioner Association NLNPA Caring beyond

NEWFOUNDLAND AND LABRADOR COLLEGE OF FAMILY PHYSICIANS
LE COLLÈGE DES MÉDECINS DE FAMILLE DE TERRE-NEUVE-ET-LABRADOR
A CHAPTER OF THE COLLEGE OF FAMILY PHYSICIANS OF CANADA
UNE SECTION DU COLLÈGE DES MÉDECINS DE FAMILLE DU CANADA

Eastern Health

Western Health

Central Health

Labrador-Grenfell Health

NEWFOUNDLAND AND LABRADOR SUPPORT
Support for People and Patient Oriented Research and Trials

Newfoundland & Labrador Centre for Health Information

PATIENTS

Quality of Care NL

Visit our website featuring
an extensive resource library!
www.qualityofcarenl.ca

Follow us on social media