

# The Impact of Integrated Primary Care Delivery on Health Care Costs:

## Quebec's Groupes de médecine de famille

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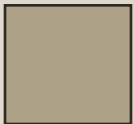
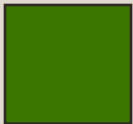
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# Goals of This Research Agenda

- Our broader agenda seeks to understand how policies to improve primary care affect:
  - Health care services utilization and costs
  - Health outcomes
  - Equity in the above outcomes by health status and socioeconomic status
- This analysis is focused on the costs of health care services



# “Integrated” Primary Care

- “Integrated” or “advanced” primary care models are team-centered approaches based on:
  - Multidisciplinary teams of health professionals (physicians, nurses, dietitians, etc)
  - Patients enrolling with a specific group of physicians for a fixed time period (rostering)
  - 24/7 access to a comprehensive range of primary care services for enrolled patients
  - Specialist referrals by primary care physicians
  - Physician payment methods that blend elements of capitation and fee-for-service
  - Integration of health promotion and illness prevention strategies
  - Integration of electronic medical records



# Groupes de médecine de famille

- Improve delivery and quality of primary care services
  - Provide all Quebecers with access to a primary care physician and accessible, continuous, comprehensive care
  - Increase ties and complementarities to services provided by CLSCs and specialists
- 6-12 full-time equivalent physicians, working in close collaboration with nurses and other health professionals
- 1,000-2,200 registered patients per FTE physician
- Physicians maintain the same remuneration policy (i.e., fee-for-service)\*

\*Additional payments for registering patients in the GMF, time spent on non-clinical work related to the GMF, and time spent on-call; financing for renting extra space and administrative staff  
Beaulieu 2006; Québec Ministère de la Santé et des Services sociaux 2002a, 2002b



# Existing Research

- Systematic literature review by Starfield et al (2005)
  - Health is better in areas with more primary care physicians
  - People who receive care from primary care physicians are healthier
  - Characteristics of primary care are associated with better health
- Performance of the primary care delivery system: accessibility of services, continuity of care, and patient perceptions of their care experiences (vulnerable subgroups) (Haggerty et al 2004; Haggerty et al 2007b; Haggerty et al 2008; Hamel et al 2007; Levesque et al 2006; Lamarche et al 2006; Ionescu-Ittu et al 2007)
- Taxonomies of primary care organizations and how different types of organizations perform (Beaulieu et al 2008; Pineault et al 2004; Pineault et al 2008; Russell et al 2009)
- Physician productivity in the context of different payment methods, financial incentives, and pay-for-performance regimes (Devlin and Sarma 2008; Kantarevic et al 2010; Li et al 2010, Sarma, Devlin and Hogg 2010)



# Measuring the Causal Effect of GMFs

- Participation is voluntary, so we need to address the potential for selection bias
- Utilization and cost data with non-normal distributions and longitudinal data create additional challenges and opportunities
- Our previous work examined the impact on hospital and ED utilization
  - Preliminary results suggested no impact on hospital admissions, very small decrease in ED use
- This analysis seeks to understand the impact of joining a GMF on:
  - Outpatient health care service costs
  - Hospital costs
  - Total costs



# Cohort Administrative Database

## ■ Patients

- Administrative data on about 800,000 vulnerable patients from 2000-2010
  - 7-year panel for each individual
- Primary and specialty outpatient care, inpatient care; associated costs; mortality information
- Geographic, demographic and socioeconomic characteristics

## ■ Physicians

- These patients' primary care physicians (~5,000)
- Practice characteristics, income sources, demographics



# Selection Criteria for the Cohorts

Patients registered in a GMF (cohort 1: ~110,000 patients)

GMF physicians who care for vulnerable patients (group A – 906 physicians)

Patient  $T_0$ : date vulnerable and registered in GMF (Nov 1, 2002 – Jan 31, 2005)

MD  $T_0$ : date registered first GMF patient

Patients followed outside a GMF (cohort 2: ~700,000 patients)

Non-GMF physicians who care for vulnerable patients (group B – 3,968 physicians)

Patient  $T_0$ : date registered as vulnerable (Nov 1, 2002 – Jan 31, 2005)

MD  $T_0$ : date registered first vulnerable patient

Patients classified as vulnerable in the RAMQ data for purposes of differential payment: age 70+, psychoses, chronic obstructive pulmonary disease, asthma, coronary atherosclerotic disease, cancer, diabetes, HIV/AIDS, degenerative nerve disease, severe drug/alcohol abuse





# Calculating Health Care Service Costs

- Outpatient costs are available based on physician billing to the RAMQ
- Inpatient costs must be calculated based on relative resource intensity weights (NIRRU) and an average total cost per NIRRU
  - NIRRUs included in RAMQ data
  - Average total cost from the QC Ministère de la Santé et des Services sociaux (fiscal year); doesn't include cost of physician services
- Individuals who die, enter a long-term care facility, move to a different region (4 types), or live in very remote regions of QC are not included in the analysis



# Health Care Costs: Skewed Distributions with Many Zeros

	Mean	SD	Minimum	Maximum	% zero
Hospital cost	\$1,027	\$4,145	0	\$274,037	87.70
Outpatient Health Service cost	\$679	\$925	0	\$63,677	1.68
Total cost	\$1,705	\$4,885	0	\$331,523	1.68



T-2 to T+5, 4,214,413 observations. Mean, min and max are per year, % zero is over entire period but very stable year-to-year.

# Methods

## ■ Propensity score weighting

- Predicted probability of GMF participation based on pre-period characteristics:
  - Demographics and geography
  - Health status indicators
  - Health service utilization
- Weight by inverse probability of “treatment” actually received

## ■ Difference-in-differences regressions

- Compare utilization changes for GMF patients relative to controls
- Robust standard errors to account for intra-person correlation over time

## ■ Generalized linear models

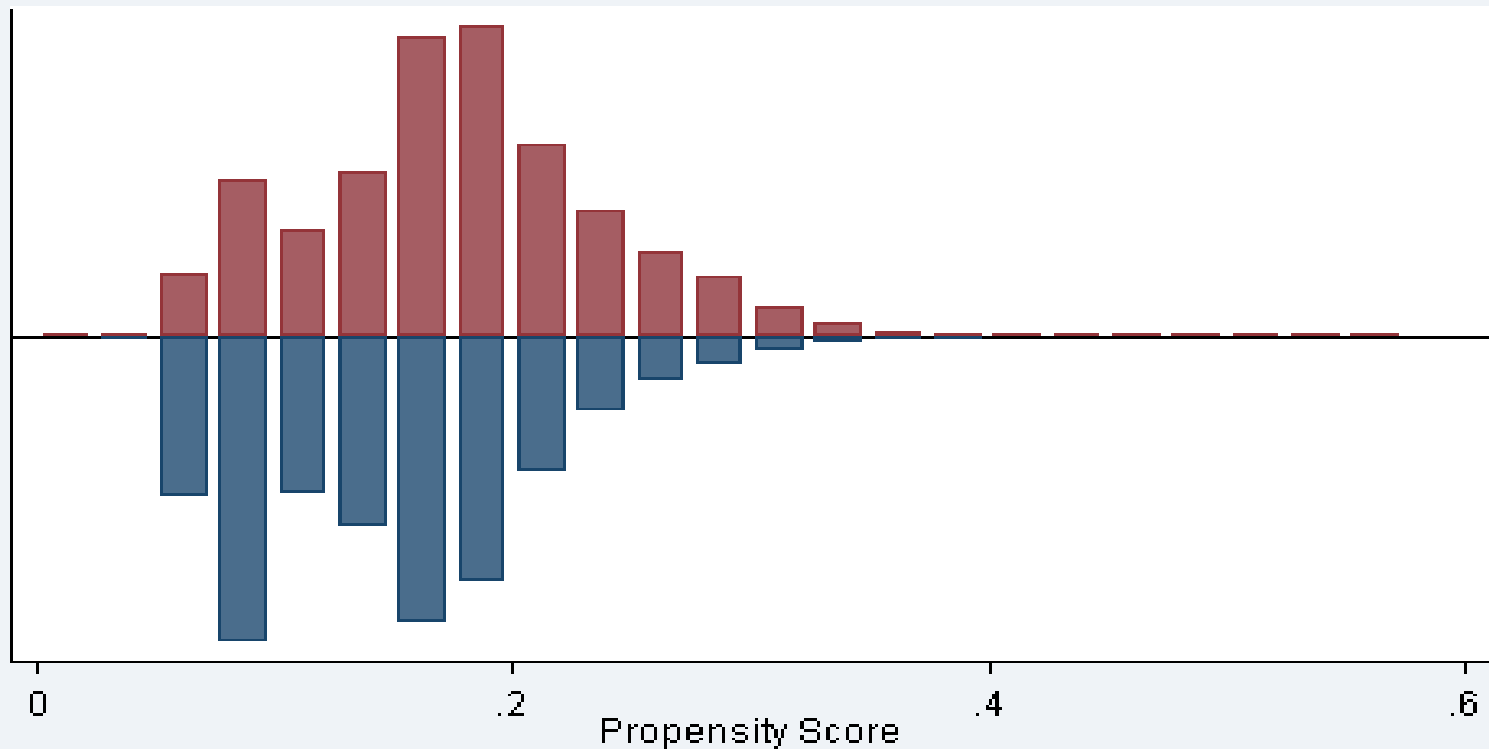
- Accommodate over-dispersed cost data
  - Gamma family, log link function



# Patient Propensity Scores

$Pr(GMF) = \text{Geographic region} + \text{Age} + \text{Sex} + \text{SES} + \text{comorbid conditions} + \text{RUB} + \text{ER utilization} + \text{ambulatory care utilization} + \text{hospital utilization} + \text{UPC} + \text{geography} * \text{all variables} + \text{sex} * \text{all variables}$

Distribution of patients' propensity scores



■ Non-FMG Patients ■ FMG Patients

Common support:  
(.001, .552)



# Assessment of Patient Covariate Balance

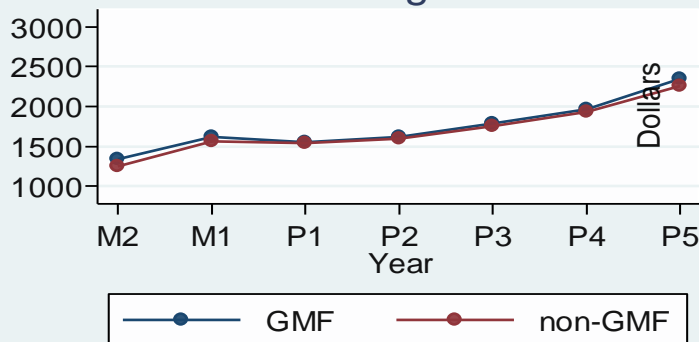
Variable	Cohort	Unweighted	Weighted			
		Mean	Mean	Std. Err	95% Conf. Interval	
Percent in the University Region	Non-GMF	39.42%	37.10%	0.00059	36.98%	37.21%
	GMF	24.29%	37.14%	0.00173	36.80%	37.48%
Percent in the Intermediate Region	Non-GMF	18.86%	20.04%	0.00051	19.95%	20.14%
	GMF	26.60%	19.97%	0.00113	19.75%	20.19%
Percent Male	Non-GMF	43.62%	43.68%	0.00061	43.56%	43.80%
	GMF	44.01%	43.82%	0.00177	43.47%	44.17%
Age Group	Non-GMF	15.25	15.24	0.00336	15.23	15.24
	GMF	15.14	15.24	0.00842	15.22	15.25
Pampalon Deprivation Index	Non-GMF	3.01	3.02	0.00185	3.02	3.02
	GMF	3.07	3.02	0.00560	3.01	3.04
Resource Utilization Band	Non-GMF	3.01	3.01	0.00127	3.00	3.01
	GMF	2.96	3.02	0.00421	3.01	3.02
Percent with UPC	Non-GMF	63.02%	61.69%	0.00060	61.57%	61.81%
	GMF	54.38%	61.65%	0.00158	61.34%	61.96%
Number of consultations in ambulatory setting	Non-GMF	8.86	8.68	0.00999	8.66	8.70
	GMF	7.67	9.03	0.31604	8.41	9.65

Unmatched means are all statistically significantly different at  $p \leq .05$ . No significant differences remain after inverse probability weighting.

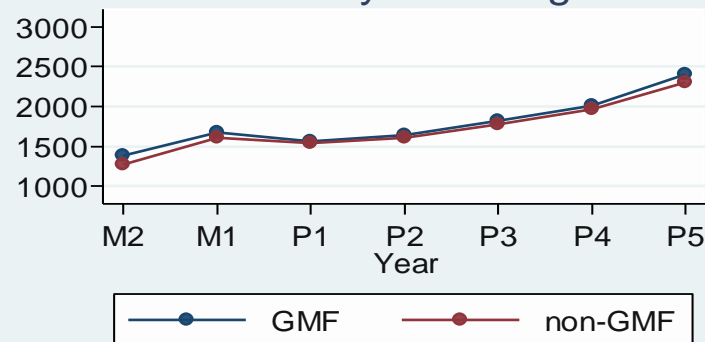


# Average Total Costs

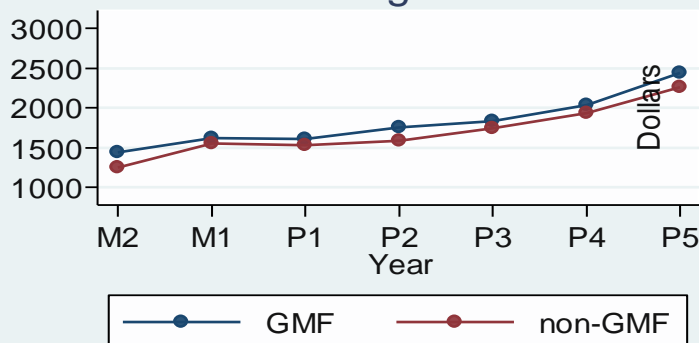
## Average total costs Unweighted



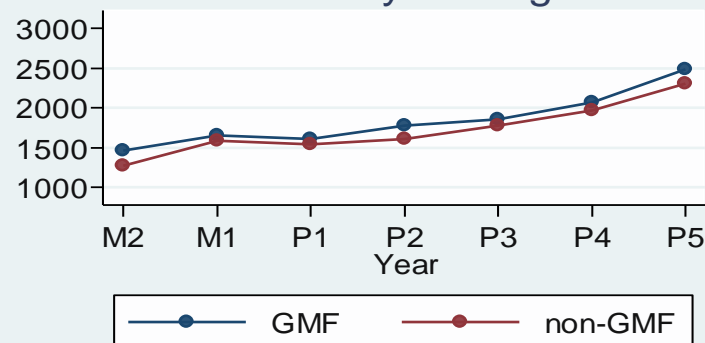
## Average total costs Users Only - Unweighted



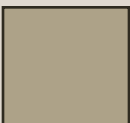
## Average total costs Weighted



## Average total costs Users Only - Weighted

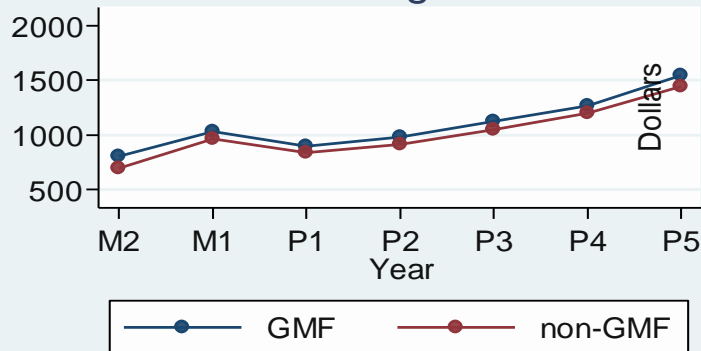


\*does not include individuals who died or enter LTC or moving

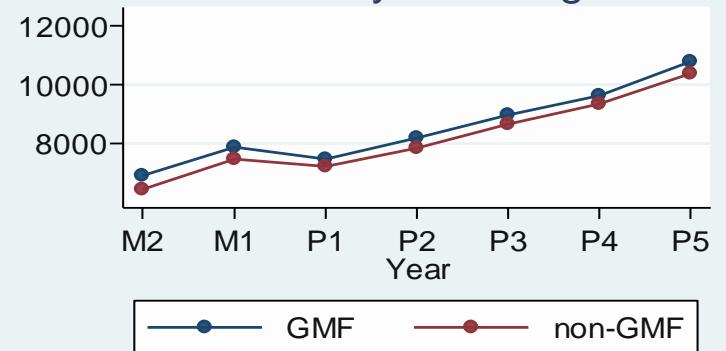


# Average Hospital Costs

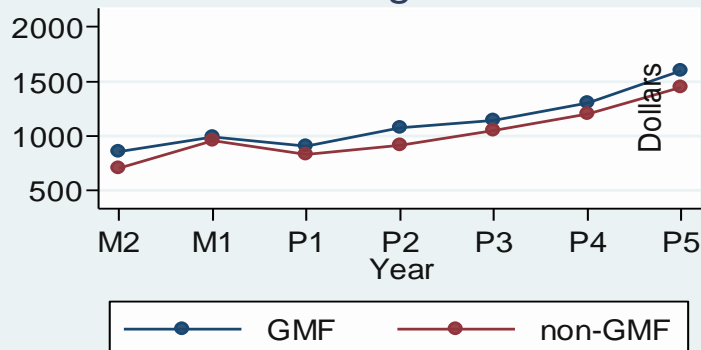
## Average Hospital costs Unweighted



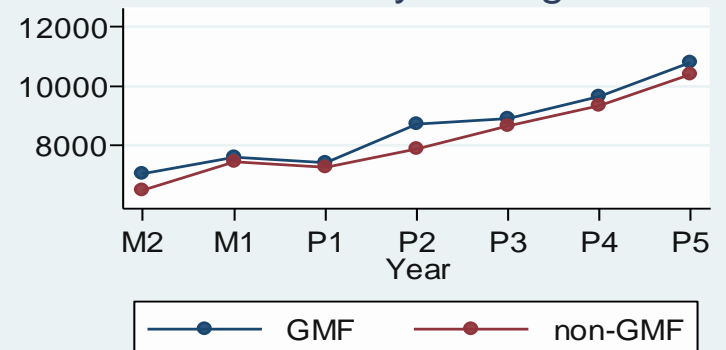
## Average Hospital costs Users Only - Unweighted



## Average Hospital costs Weighted



## Average Hospital costs Users Only - Weighted

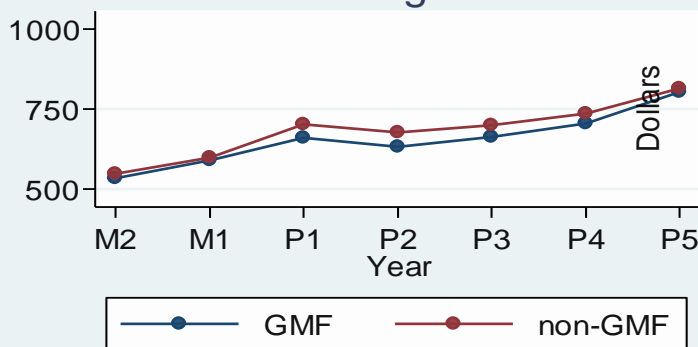


\*does not include individuals who died or enter LTC or moving

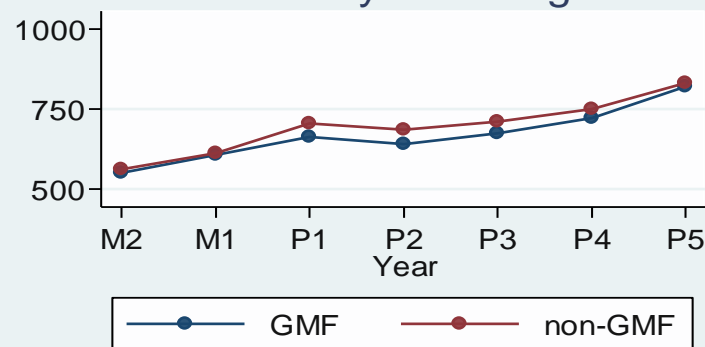


# Average Outpatient Health Service Costs

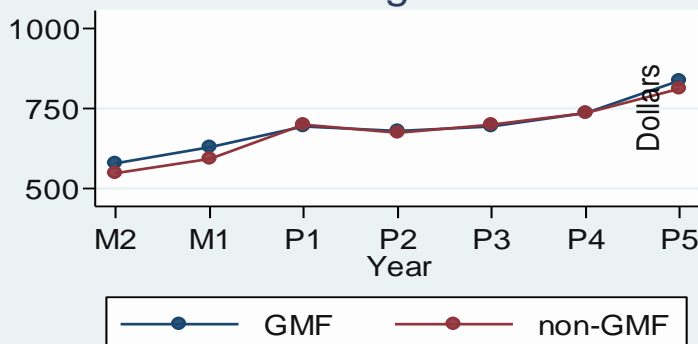
## Average Health Serv Costs Unweighted



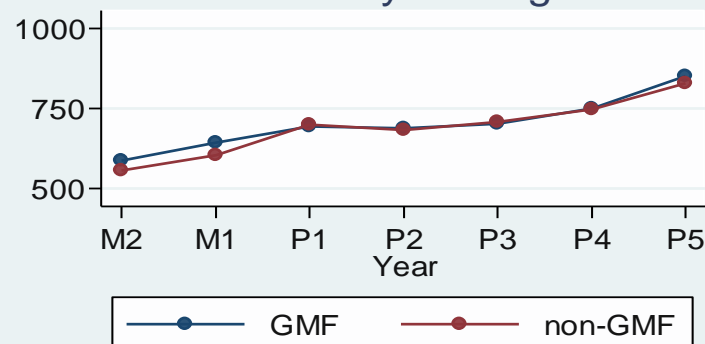
## Average Health Serv Costs Users Only - Unweighted



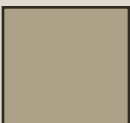
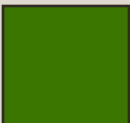
## Average Health Serv Costs Weighted



## Average Health Serv Costs Users Only - Weighted



\*does not include individuals who died or enter LTC or moving





# Impact of GMF on Total Health Services Costs

	Unweighted		Weighted	
No Controls	Coef.	Robust SE	Coef.	Robust SE
<b>GMF*post</b>	<b>-.015</b>	<b>(.008)</b>	<b>-.009</b>	<b>(.015)</b>
GMF	.070***	(.007)	.101***	(.012)
post	.349***	(.003)	.347***	(.003)
<b>Full Controls</b>				
<b>GMF*post</b>	<b>-.003</b>	<b>(.008)</b>	<b>-.021*</b>	<b>(.009)</b>
GMF	.062***	(.007)	.096***	(.007)
post	.794***	(.005)	.779***	(.007)
<b>Predicted Mean GMF*post</b>				
GMF	\$2057	(14.51)	\$2114	(15.26)
Non-GMF	\$2063	(3.76)	\$2159	(10.51)
N	4,394,732		4,394,711	

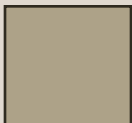
Full controls include year, sex, age group, Pampalon index, RSS, RUB



# Impact of GMF on Hospital and Outpatient Health Service Costs

	Hospital		Outpatient	
	Weighted		Weighted	
No Controls	Coef.	Robust SE	Coef.	Robust SE
<b>GMF*post</b>	<b>.009</b>	<b>(.019)</b>	<b>-.053***</b>	<b>(.009)</b>
GMF	.122***	(.015)	.069***	(.007)
post	.397***	(.005)	.268***	(.002)
<b>Full Controls</b>				
<b>GMF*post</b>	<b>-.014</b>	<b>(.013)</b>	<b>-.056***</b>	<b>(.005)</b>
GMF	.122***	(.011)	.070***	(.004)
post	.968***	(.010)	.470***	(.004)
<b>Predicted Mean GMF*post</b>				
GMF	\$1460	(14.52)	\$707*	(2.92)
Non-GMF	\$1481	(10.80)	\$748	(1.97)
N	4,394,711		4,476,199	

Full controls include year, sex, age group, Pampalon index, RSS, RUB



# Preliminary Results

- Vulnerable patients' costs for outpatient services appear to be somewhat lower after GMF enrollment
  - Somewhat surprising given the reform's emphasis on access to primary care
- No impact is observed for hospital costs
  - Consistent with our earlier finding of no impact on hospital-based utilization



# Next Steps

- Impacts of GMFs on outpatient service utilization?
  - Heterogeneous effects across different outpatient services (e.g., primary vs. specialty care)?
- Incorporate patient-level fixed effects to control for unobserved confounding
- Investigate costs associated with ED use, ACSC hospitalizations
- Measure impacts of GMFs on utilization and costs:
  - Individuals with multimorbidities
  - Guideline-recommended preventive services



# Acknowledgements

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IRSC CIHR

Québec 

- Agence de la santé et des services sociaux de Montréal
- Institut national de santé publique