

CAN PATTERNS OF HEALTHCARE USE PREDICT POSTOPERATIVE EMERGENCY ROOM VISITS IN SENIORS WITH COLON CANCER?

Aliya Ramjaun, BHSc, MSc Epidemiology (Candidate)

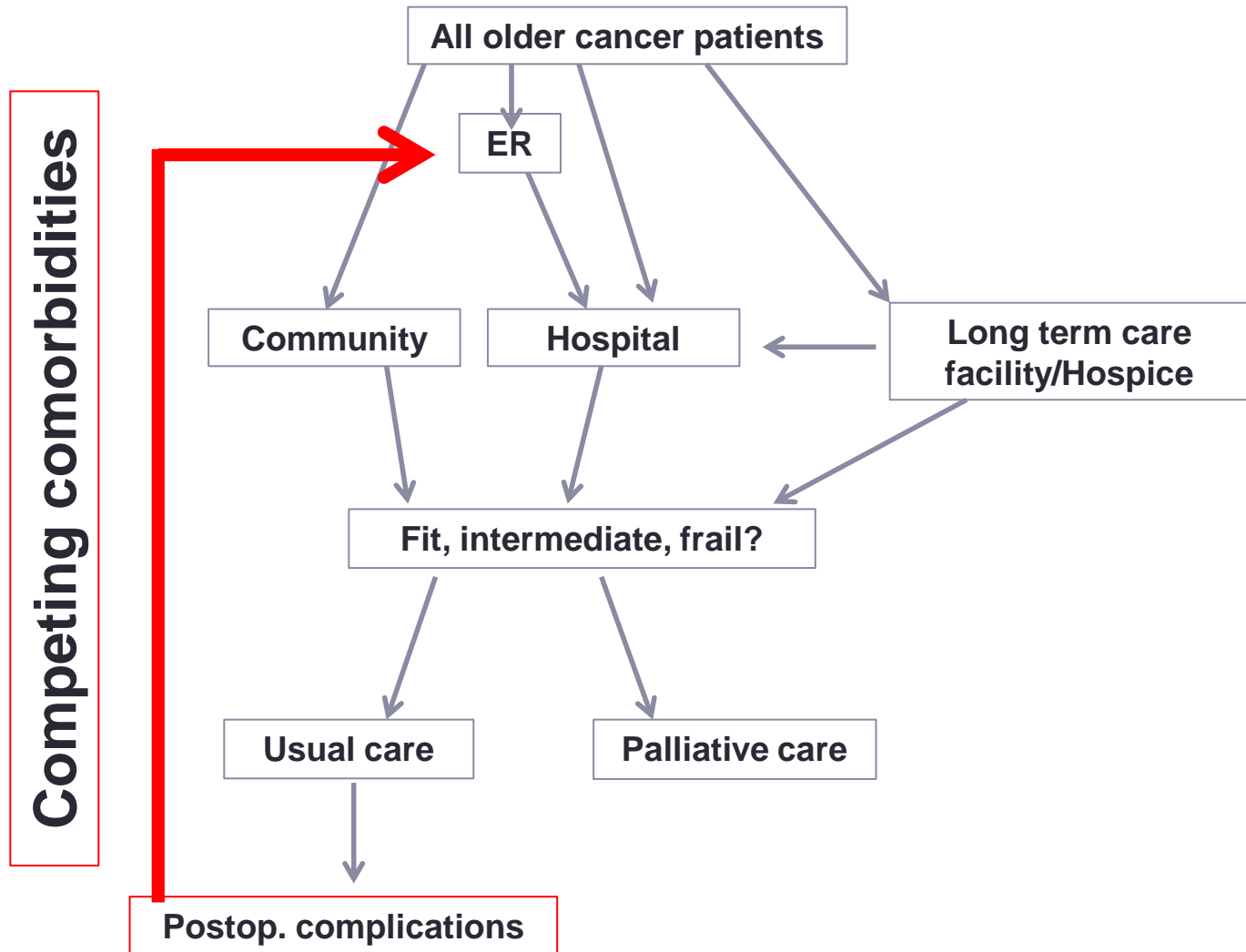
McGill Clinical and Health Informatics Research Group

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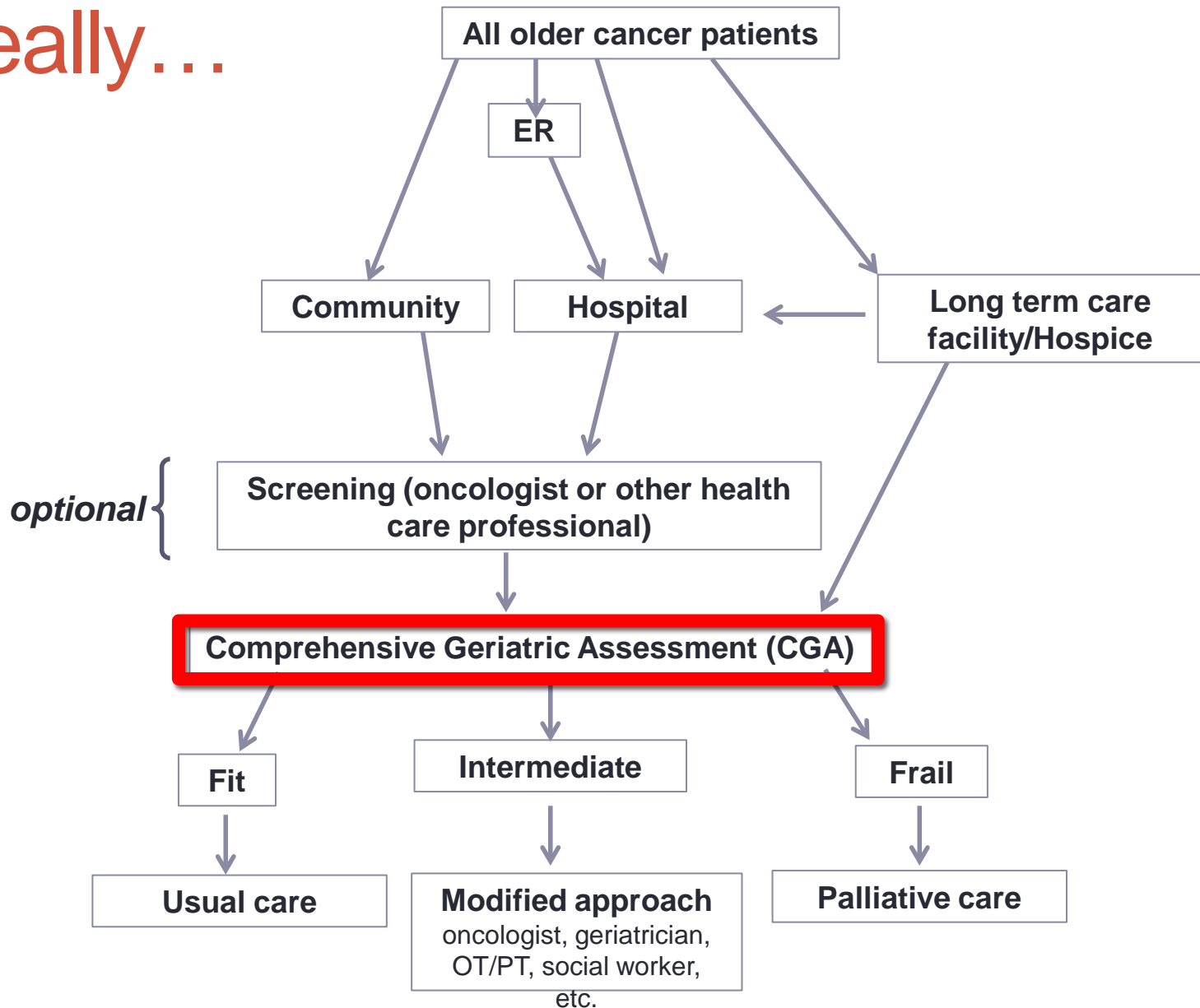
The problem

- Clinician concerns surrounding **patient frailty**
 - Chronological age vs. physiological age
- **Lack of evidence-based knowledge**
- **Postoperative complications**
 - 60% in patients over the age of 70 (Kristjansson et al., 2010)
- **ER visits are costly** and associated with high morbidity
 - The average cost an ER visit for a recently discharged patient is nearly 50% higher than the overall average ER visit cost (Canadian Institute for Health Information)

The current patient trajectory



Ideally...



Comprehensive Geriatric Assessment (CGA)

- “Comprehensive geriatric assessment (CGA) provides...objective information on comorbidity, functional status, nutritional status and psychosocial status. **CGA can therefore disclose the existence of geriatric syndromes which may complicate cancer treatment**” (Aaldriks et al., 2011)
- Documented impact of CGA (Caillet et al., 2011)
 - Change in prescribed medications
 - Social support
 - Physiotherapy
 - Nutritional care
 - Psychological care

CGA domains (1)

- **Comorbidities**

- The underlying physical and mental diseases, besides the disease that the patient is currently receiving care for

- **Functional status**

- The ability to perform self-care activities and carry out activities of daily living independently

- **Nutritional status**

- Indicates whether or not a patient is malnourished and has experienced significant weight loss, either due to their condition or age-related processes (i.e. reduced appetite, dry mouth and dysphagia, teeth loss, alteration of flavours, etc.)

- **Cognitive status**

- Indicates whether or not a patient displays symptoms of dementia or a loss of thinking operations, including memory loss, the function of retraction and recognition for verbal and optical information, and language fluency

CGA domains (2)

- **Polypharmacy**
 - The use of a large number of medications
- **SES ± social environment/function**
 - Social support (assistance provided through their social network)
 - Subjective well-being and satisfaction, caregiver burden, values and preferences
 - Social resources (income, assets, housing)
- **Geriatric syndromes**
 - Common clinical conditions faced [almost exclusively] by older adults
 - e.g. osteoporosis, depression and dementia

CGA limitations

- Not specifically targeted specifically at cancer patients
- Time-consuming
- Cross-sectional assessment
- Lack of standardization
- Lack of adoption and/or implementation
 - “Elderly patients were less likely to receive adjuvant chemotherapy **even when deemed appropriate by guidelines** ($p < .001$)” (Barthelemy et al., 2011)

The opportunity

- Nearly all CGA risk factors can be assessed through administrative healthcare data
 - Medical service and prescription claims, hospital discharge data
- More accurate risk factor ascertainment
 - Reduced patient recall bias
 - Public drug insurance plan
- Longitudinal vs. cross-sectional assessment
 - Patterns of past healthcare use

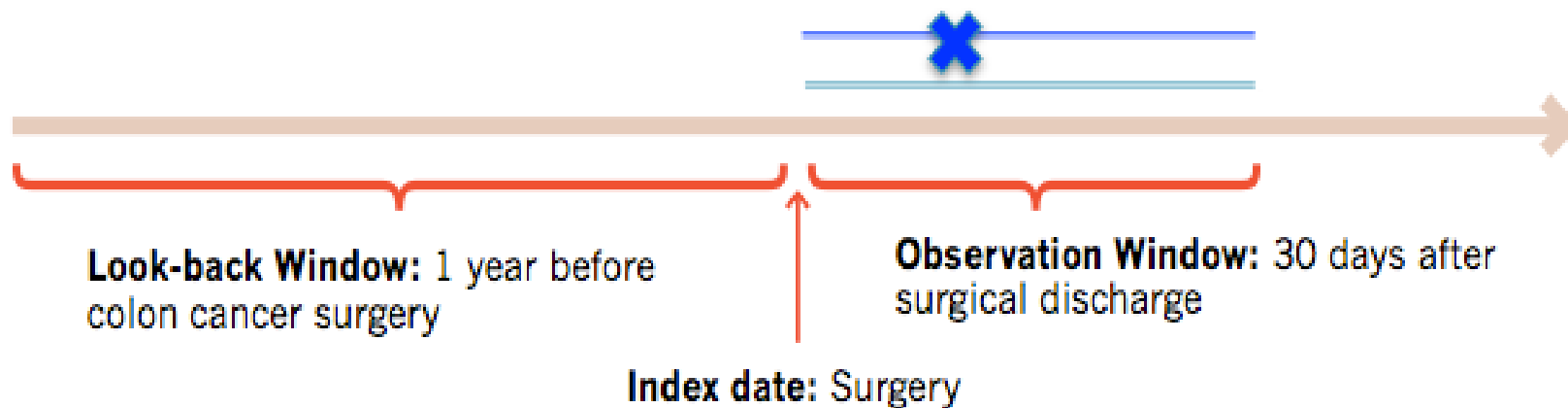
Objective

- We aimed to identify predictors of postoperative emergency room visits (PERVs) in patients age 65 years and older, undergoing colon cancer surgery.

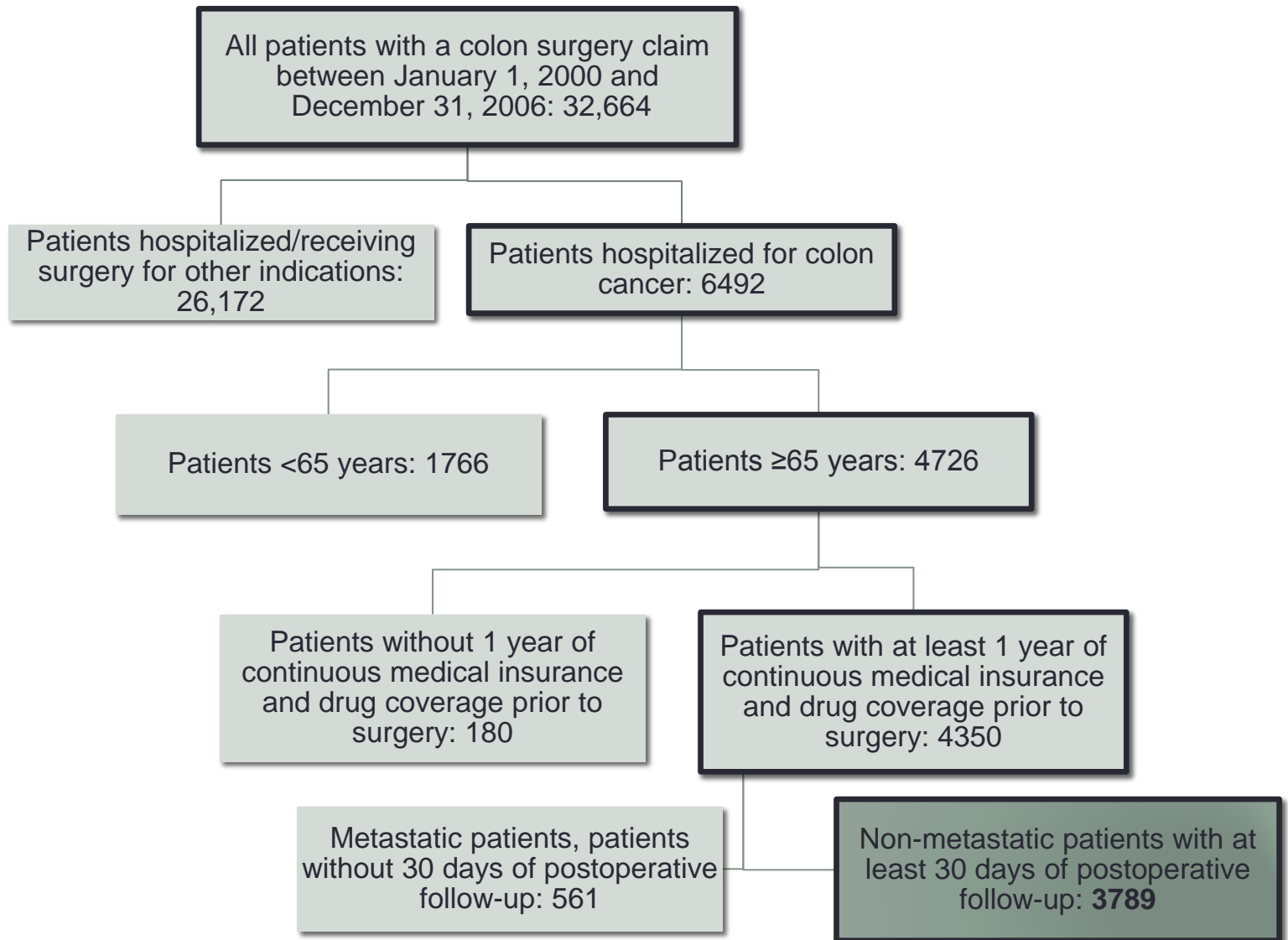
Methods

- **Context:**

- Quebec, Canada
- Ideal setting: single payer, all services, all patients
- Data derived from administrative healthcare data
 - Medical service claims, prescription claims, hospital discharge data



Cohort selection



Variable construction

CGA risk factor	Variable(s)	Data source(s)
Comorbidities	- Arthritis, urinary incontinence, diabetes, respiratory illness, renal insufficiency, cardiovascular disease	- Medical service claims - Prescription claims
Functional status	- History of fall-related ER visits	- Medical service claims
Cognitive status	- Dementia	- Medical service claims - Prescription claims
Polypharmacy	- No. of unique medications used in the 6 months prior to colon cancer surgery	- Prescription claims
Socioeconomic status	- Sex - Revenue (average household income of patient's residential area) - Education (% of individuals in residential area with high school diploma)	- RAMQ registrants' database - Statistics Canada
Geriatric syndromes	- Osteoporosis - Depression	- Medical service claims - Prescription claims

Variable construction cont'd: Patterns of past healthcare use

Variable	Description	Data source(s)
Cognition-altering drug use	<ul style="list-style-type: none"> - yes/no - e.g. benzodiazepines, antipsychotics 	- Prescription claims
History of ER visits	<ul style="list-style-type: none"> - 1 year look-back window - yes/no 	- Medical service claims
Frequency of ER visits	<ul style="list-style-type: none"> - 1 year look-back window 	- Medical service claims
History of colon cancer-related ER visits	<ul style="list-style-type: none"> - 30 days prior to surgery - yes/no 	- Medical service claims
Frequency of colon cancer-related ER visits	<ul style="list-style-type: none"> - 30 days prior to surgery 	- Medical service claims
Number of previous hospitalizations	<ul style="list-style-type: none"> - 1 year look back window 	- Hospital discharge database
Annual exam performed by a general practitioner	<ul style="list-style-type: none"> - 1 year look back window 	- Medical service claims

Results

Table 1A. Sociodemographic characteristics of the 3,789 patients meeting cohort eligibility

AGE	Frequency	%
65-70	804	21.22
71-75	973	25.68
76-80	989	26.10
81-84	566	14.94
≥ 85	457	12.06
SEX	Frequency	%
Female	2058	54.32
Male	1731	45.68

Results

Table 1B. Sociodemographic characteristics of the 3,789 patients meeting cohort eligibility

REVENUE (K)	Frequency	%
< 20	46	1.21
20-39	1432	37.81
40-59	1701	44.89
60-79	430	11.35
> 80	180	4.75

Results

Table 2. Descriptive statistics for CGA risk factors

CGA DOMAIN	Mean	SD	No. affected (%)
Geriatric syndromes			
Depression			602 (15.89)
Osteoporosis			526 (13.88)
Functional status			
History of fall-related ER visits			160 (4.22)
Comorbidities			
Arthritis			926 (24.44)
Urinary incontinence			55 (1.45)
Diabetes			748 (19.74)
Respiratory illness			323 (8.52)
Renal insufficiency			82 (2.16)
Cardiovascular disease			1270 (33.52)
Cognitive status			
Dementia			125 (3.30)
Polypharmacy			
Number of unique medications used in the past 6 months	6.70	4.72	
≥ 5 medications			2411 (63.63)
< 5 medications			1378 (36.37)

Results

Table 3. Descriptive statistics for patterns of healthcare risk factors

PATTERNS OF HEALTHCARE USE	Mean	SD	Frequency (%)
Cognition-altering drug use			1774 (46.82)
History of having an ER visit			1763 (46.53)
Number of previous ER visits	0.91	1.41	
Number of previous hospitalizations	0.53	0.90	
0 hospitalizations			2466 (65.08)
1-2 hospitalizations			1166 (30.77)
≥ 3 hospitalizations			157 (4.14)
History of having a colon cancer-related ER visit			1419 (37.45)
Number of colon cancer related ER visits in the 30 days before the surgery date	0.43	0.62	
Annual exam performed by general practitioner			860 (22.70)

Table 4. Results of the univariate and multivariate logistic regressions

PREDICTORS	UNIVARIATE ANALYSIS		MULTIVARIATE ANALYSIS	
	OR	95% CI	OR	95% CI
Sociodemographic characteristics				
Sex	1.06	0.90, 1.26	1.08	0.90, 1.30
Age ^a	0.99	0.98, 1.00	0.98	0.97, 1.00
Urbanicity	1.12	0.90, 1.39	1.12	0.89, 1.41
Revenue (CAD, per 10K increase)	1.00	0.97, 1.04	1.02	0.97, 1.07
Education (per 25% increase) ^b	0.97	0.82, 1.14	0.98	0.80, 1.21
CGA domains				
Geriatric syndromes - Osteoporosis	1.14	0.90, 1.44	1.07	0.83, 1.39
Geriatric syndromes - Depression	0.97	0.77, 1.22		
Functional status - History of fall-related ER visits	0.89	0.57, 1.38	0.78	0.50, 1.22
Comorbidity - Arthritis	1.10	0.91, 1.34	1.03	0.84, 1.26
Comorbidity - Urinary incontinence	0.82	0.38, 1.74	0.80	0.37, 1.72
Comorbidity - Diabetes	1.41	1.16, 1.73		
Comorbidity - Cardiovascular disease	1.40	1.18, 1.67		
Comorbidity - Diabetes or cardiovascular disease	1.49	1.26, 1.76	1.30	1.07, 1.57
Comorbidity - Respiratory illness	1.57	1.07, 2.30	1.29	0.96, 1.75
Comorbidity - Renal insufficiency	1.79	1.09, 2.95	1.41	0.84, 2.35
Cognitive status - Dementia	0.65	0.38, 1.12		
Polypharmacy ^c	1.05	1.03, 1.07	1.03	1.01, 1.06
Past patterns of healthcare use				
Cognition-altering drug use	1.11	0.94, 1.32	0.92	0.77, 1.12
History of ER visits ^d	1.38	1.16, 1.63	1.24	1.03, 1.50
Number of previous ER visits ^d	1.13	1.07, 1.19		
History of colon cancer-related ER visits	1.16	0.97, 1.38	1.23	1.04, 1.48
Number of colon cancer-related ER visits (30 days before surgery)	1.12	0.98, 1.28		
Number of previous hospitalizations	1.06	0.97, 1.16		
2 or more hospitalizations	1.23	0.96, 1.58	0.87	0.66, 1.15
Annual exam performed by general practitioner (yes/no)	0.99	0.81, 1.20	0.98	0.79, 1.20

Results

PREDICTORS	UNIVARIATE ANALYSIS		MULTIVARIATE ANALYSIS	
	OR	95% CI	OR	95% CI
Comorbidity - Diabetes or cardiovascular disease	1.49	1.26, 1.76	1.30	1.07, 1.57
Comorbidity - Respiratory illness	1.57	1.07, 2.30	1.29	0.96, 1.75
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Findings

- Past healthcare use may predict PERVs
 - Tracked through claims
- **24% increase for individuals that had made an ER visit in the past year**
- **23% increase if initially seen for colon cancer (and/or related symptoms) in the ER**
- Age-specific risk factors demonstrated utility in predicting PERVs
- **Polypharmacy:** 3% increase with each additional medication
- **Cardiovascular disease/diabetes:** 30% increase if a patient has a history health service use for treatment of cardiovascular disease/diabetes

Limitations

- Older data (2000-2006)
- Misclassification bias
 - ICD-9 codes used in identifying individuals with specific comorbidities (varying levels of accuracy)
- Lack of data on patient nutritional status (CGA risk factor)
 - Potential availability in the future

Future directions

- These findings may have important implications in the development of future electronic risk-profiling tools
- Integration of biological data (lab results)
- Development of strategies to address patterns of healthcare use
 - Alerts
 - Pre-, perioperative planning
 - Discharge planning

Thank you

Supervisors:

Ari-Nareg Meguerditchian, MD MSc FRCS

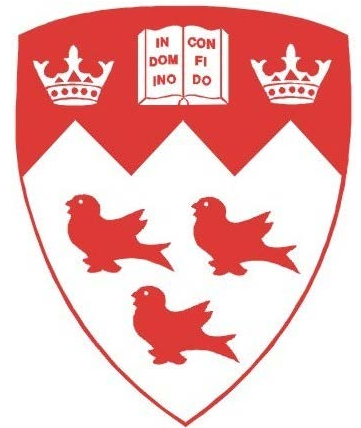
Robyn Tamblyn, PhD

Research team:

Stanimira Krotneva, MSc

Haytham Alabbas, MBBS

Régie de
l'assurance maladie
Québec 



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