



Total and attributable healthcare costs of hypertension: Historic and projected costs in Alberta, Canada

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Outline

Rationale

Study methods

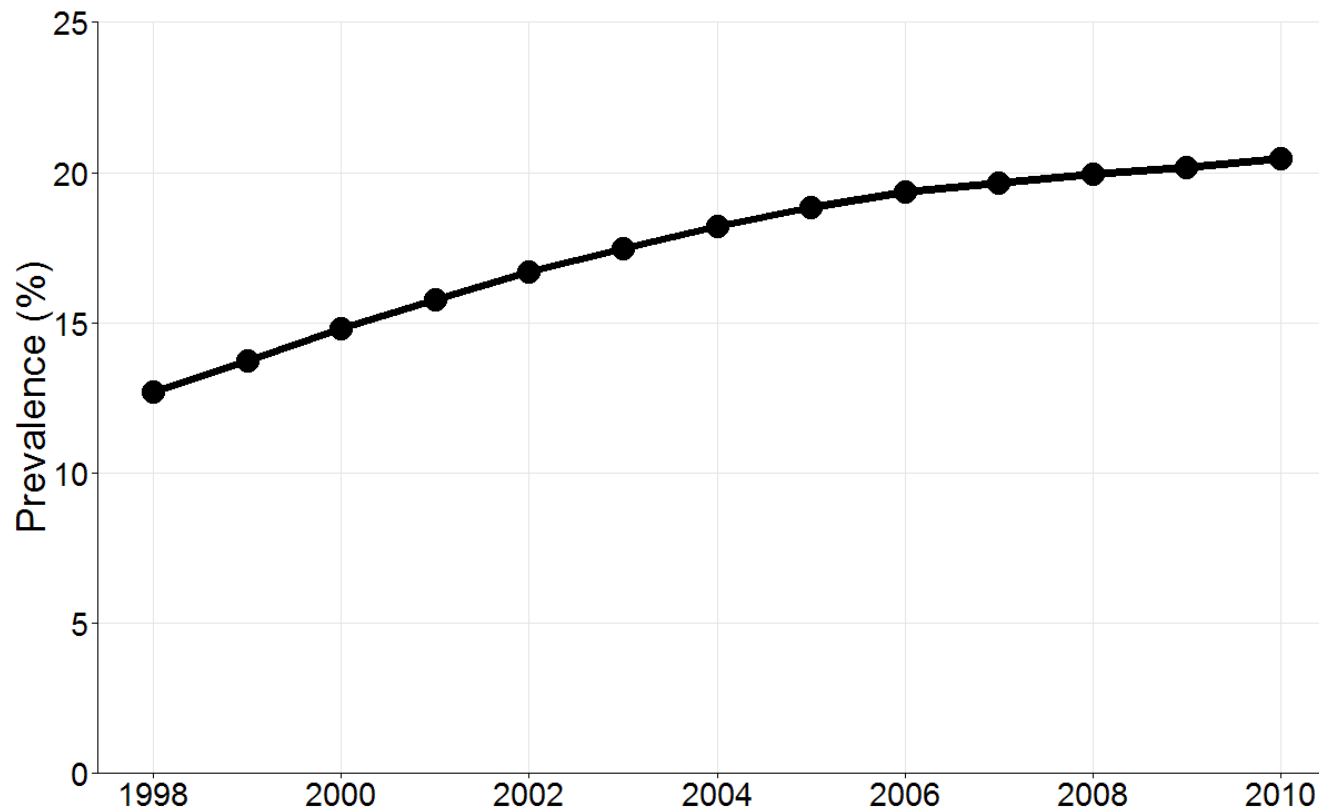
Results

Future directions



Why study the costs of hypertension?

Hypertension is common



20% of adults
70% of 65+

Age and sex standardized to the 2006 AB population

The cost attributable to hypertension in Canada is unknown

Cardiovascular diseases resulted in ~\$11.7 billion in direct health care costs in Canada in 2008

(PHAC, 2014)



Cost of hypertension = ?

Interventions to lower blood pressure exist



Reducing dietary salt by 3g
(1200mg sodium) per day was
estimated to save between **\$10 and
\$24 billion** annually in the US
(cost = \$1/person annually)

(Bibbins-Domingo et al., 2010)

Other interventions:

- ❑ Guideline-adherent treatment
- ❑ Weight loss and exercise
- ❑ Smoking cessation

Study objectives

- 1) Determine the attributable cost of hypertension in Alberta using historic data
- 2) Project the cost of hypertension in Alberta and Canada to 2020

Methods

Attributable costs of hypertension in AB

Study population:

- Alberta population-based administrative data, 2002-2010
- Adults >18 years of age
- nearly 3 million in 2010

Hypertension:

- 2 or more outpatient visits in two years or 1 hospitalization

Costs:

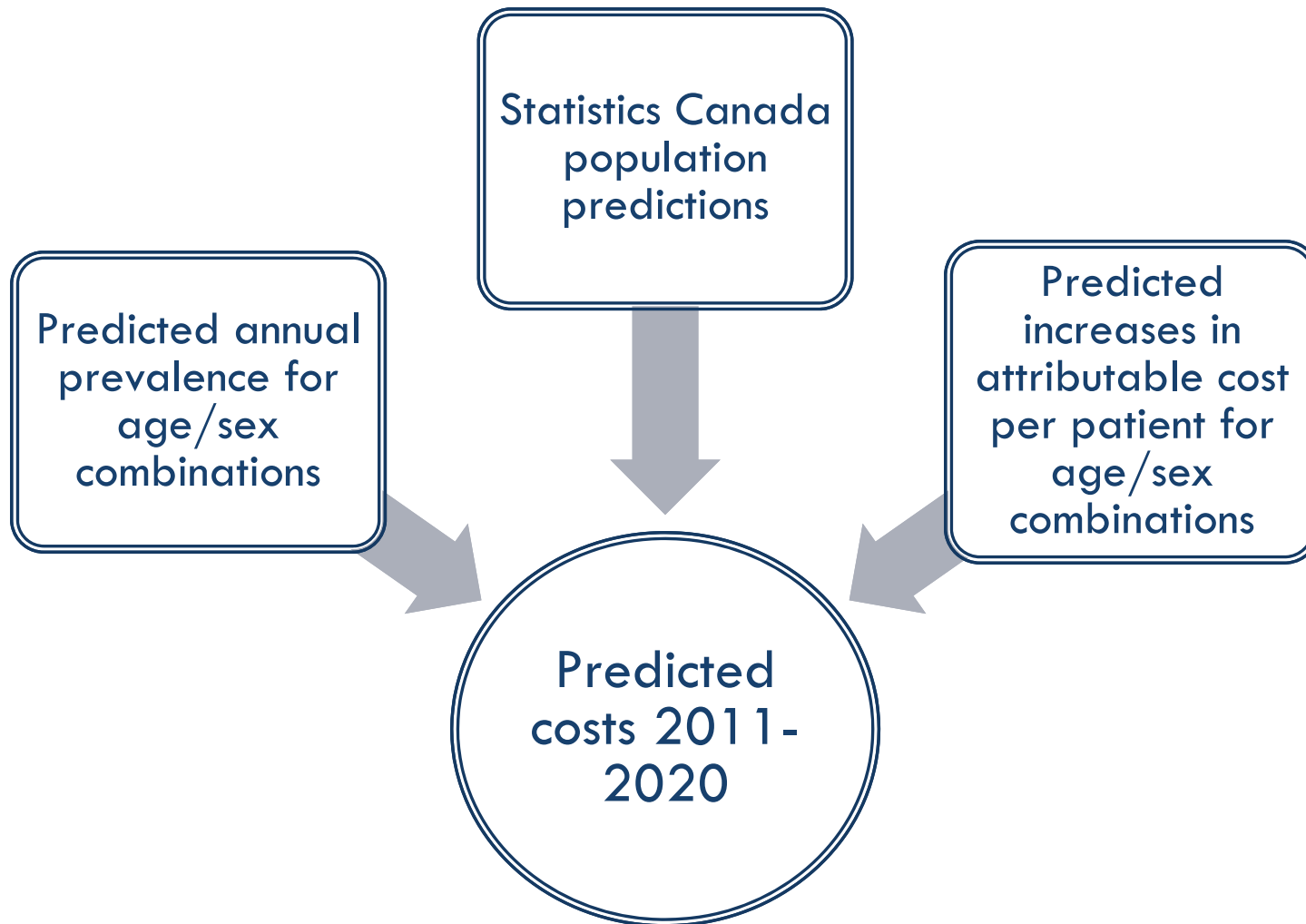
- Annual costs for hospital, physician claims, ambulatory care

Calculation of hypertension-attributable costs:

- Two-part gamma regression (by year and age group)
- Adjusted for:
 - Age, sex
 - Rural status, neighbourhood income quintile, FN status
 - Charlson comorbidities



Prediction of costs to 2020



Canada-wide estimation

Extrapolation took into account:

- Population composition and growth (age and sex)
- Prevalence rates (by age and sex)
- Health care costs and cost growth (National Health Expenditures – CIHI)

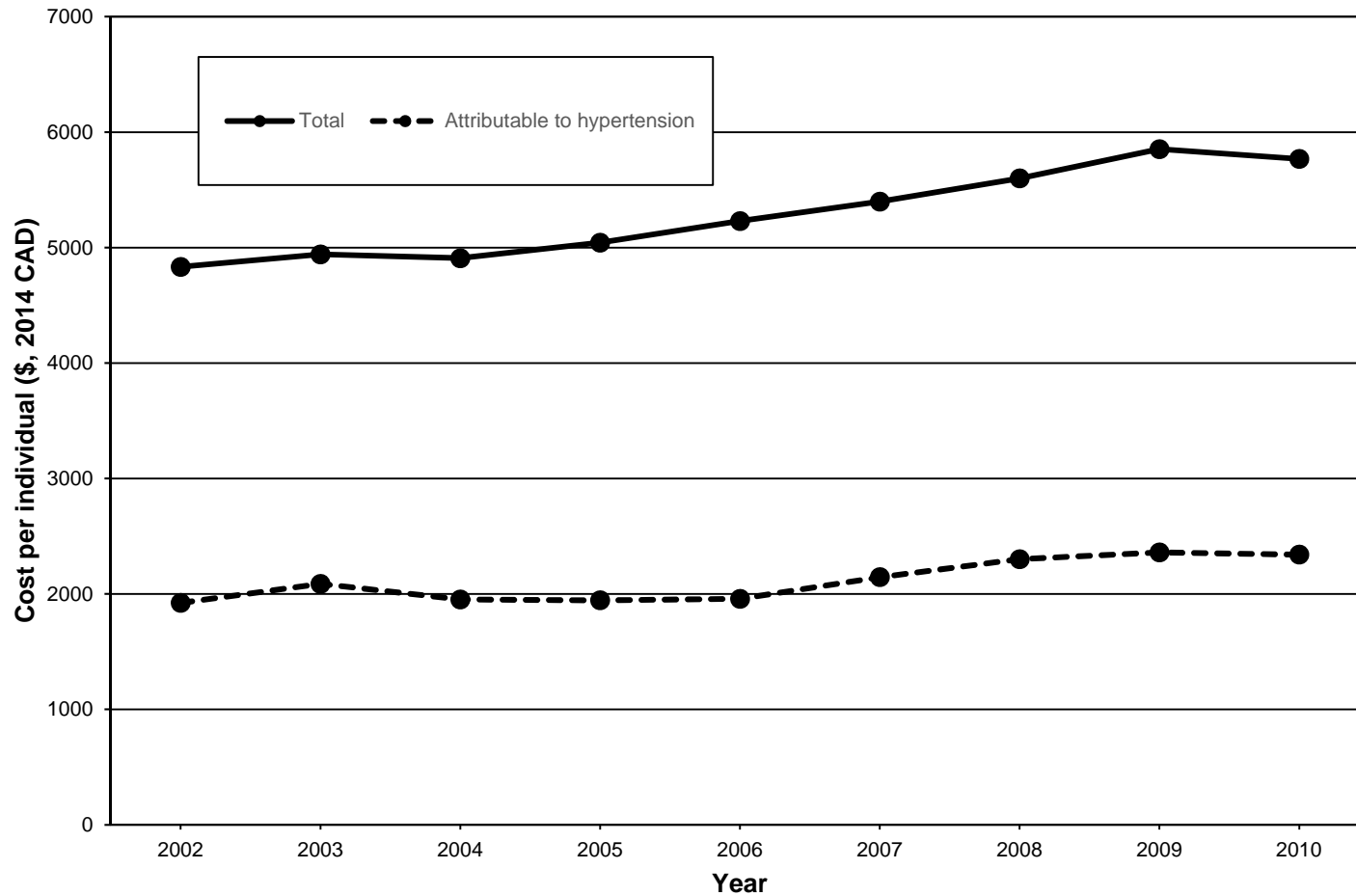


Results

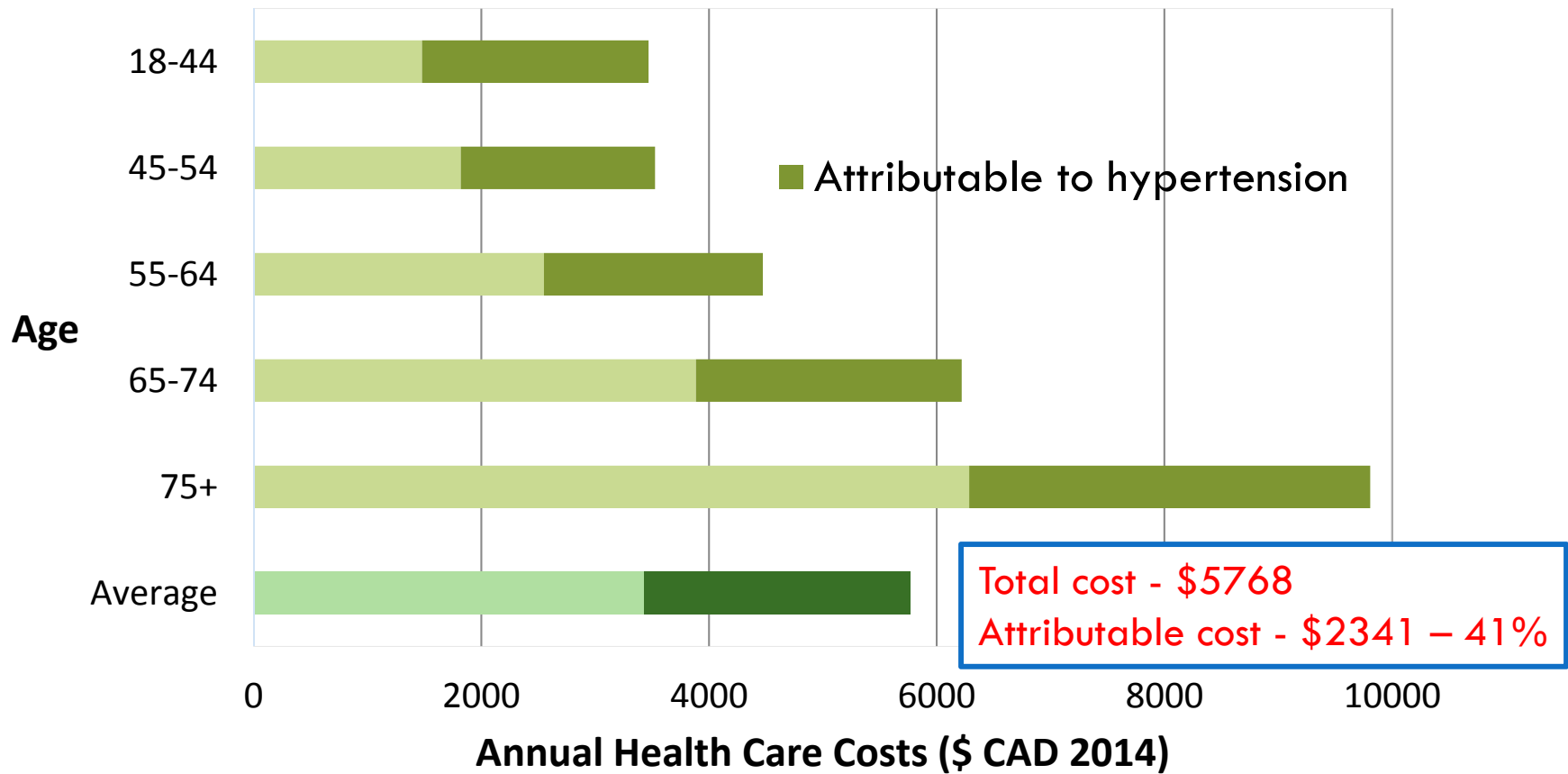
Alberta cohort (2010)

| | No Hypertension | Hypertension |
|------------------------------|-----------------|--------------|
| N | 2.2 million | 0.6 million |
| Mortality rate (%) | 0.3 | 2.3 |
| Age [mean (SD)] | 39.4 (14.4) | 62.3 (14.7) |
| Age > 65 (%) | 5.2 | 44.1 |
| Sex (% F) | 49.9 | 51.4 |
| No. of comorb. (mean) | 0.19 | 0.85 |
| Aboriginal (%) | 3.3 | 2.3 |
| Rural (%) | 11.3 | 14.2 |
| Lowest \$ quintile (%) | 19.9 | 20.0 |

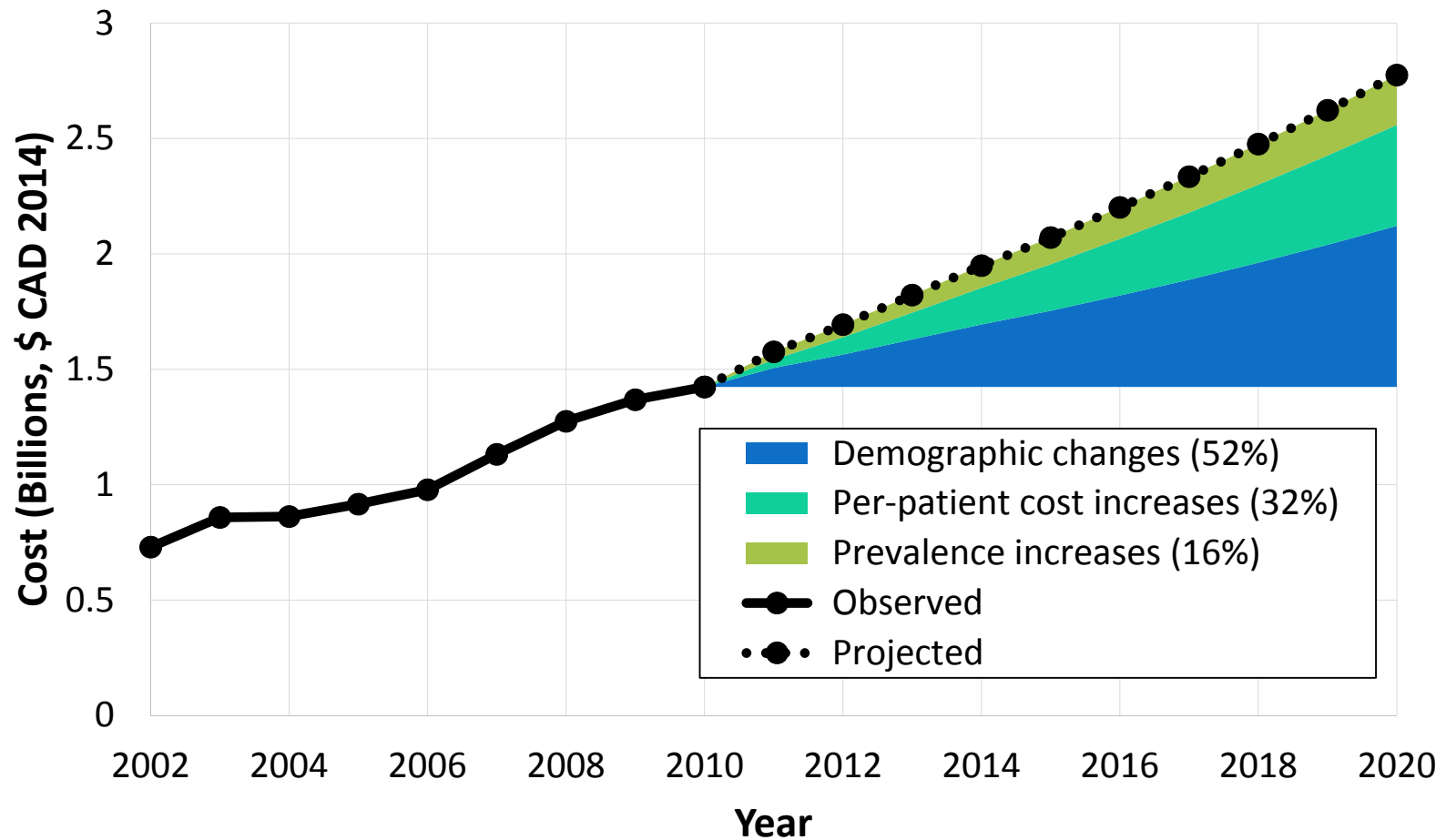
Attributable costs of hypertension in Alberta over time



Health care costs of those with hypertension (Alberta, 2010)



Health care costs attributable to hypertension (Alberta)



Canada-wide extrapolation

| | 2010 | 2020 |
|---|------|------|
| Adult prevalence, % | 25.0 | 29 |
| Number with hypertension, millions | 6.8 | 8.6 |
| Estimated per-patient cost of hypertension (\$, 2014 CAD) | 2053 | 2400 |
| Population cost (billions \$, 2014 CAD) | 13.9 | 20.5 |

\$13.9 = 10.2% of total health care spending

If age/sex specific prevalence kept constant:
\$20.5 billion → \$18.0 billion

Sensitivity analyses



Propensity score matching (hard match on age):

\$2072/hypertensive (11% less)

Not adjusting for hypertension-related comorbidities (MI, stroke, CHF, PVD, renal disease):

\$2581/hypertensive (10% greater)

(Primary analysis: \$2341 attributable cost/hypertensive patient)

Strengths



Large population-based administrative data (2.8 million adults)

Linked data: clinical, cost, sociodemographic, residency

Longitudinal data allowed projections to the future

Individual-level data

Limitations



Residual confounding (observational study):

No data for BMI, dyslipidemia, smoking, alcohol consumption, ethnicity

Some misclassification of hypertensives/non-hypertensives:

~0.75 sensitivity, ~0.94 specificity (Quan et al., 2009)

Undiagnosed and suboptimal blood pressure not included

Some costs not available

Long-term care, drug costs (<65), indirect costs

Future directions

- 1) Dissemination of results to local and national policy makers
- 1) Estimating hypertension costs over disease time

Summary

Hypertension is:

Common

Preventable & treatable

Costly (and costs are rising)

...a public health policy priority?





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Extras

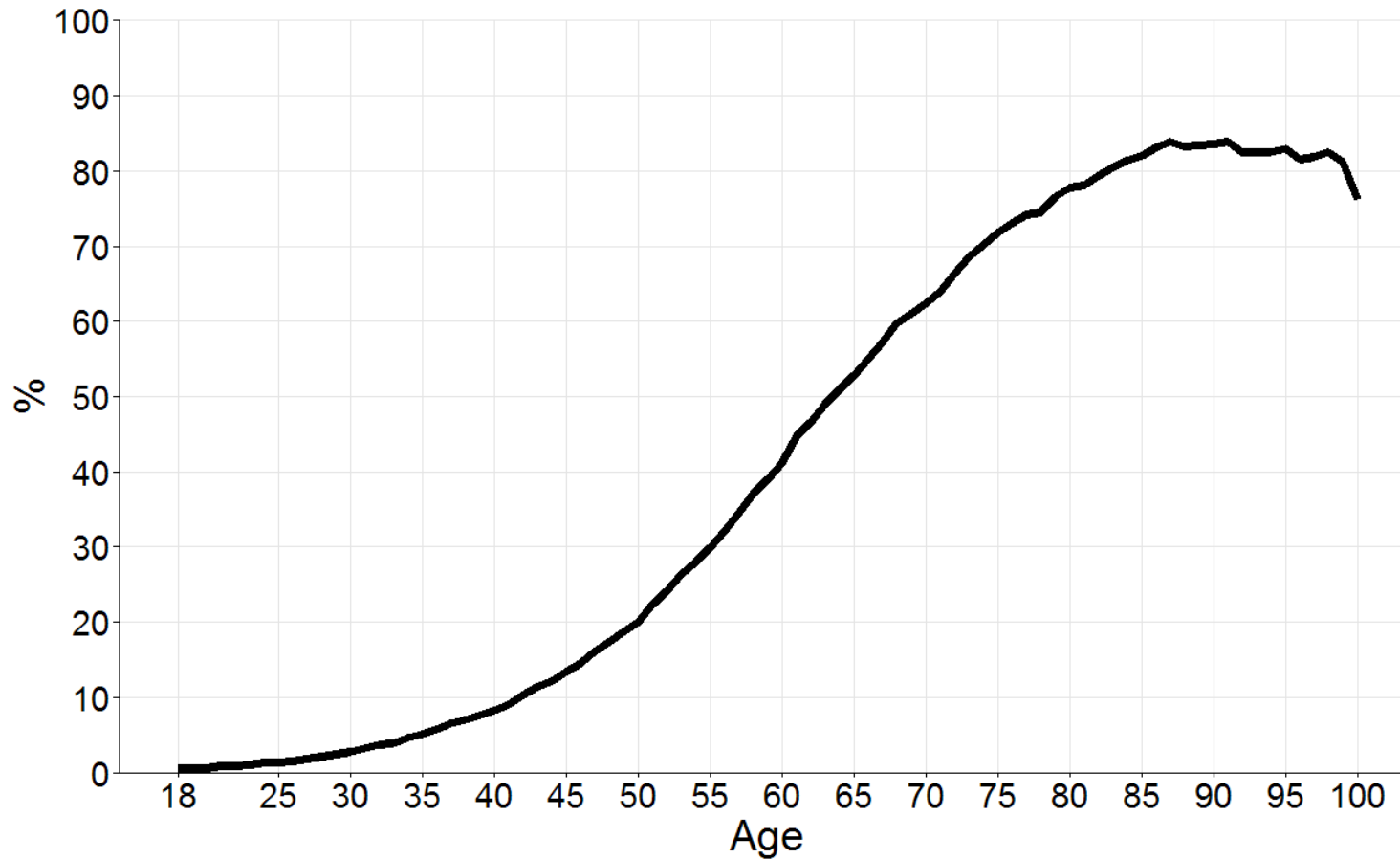
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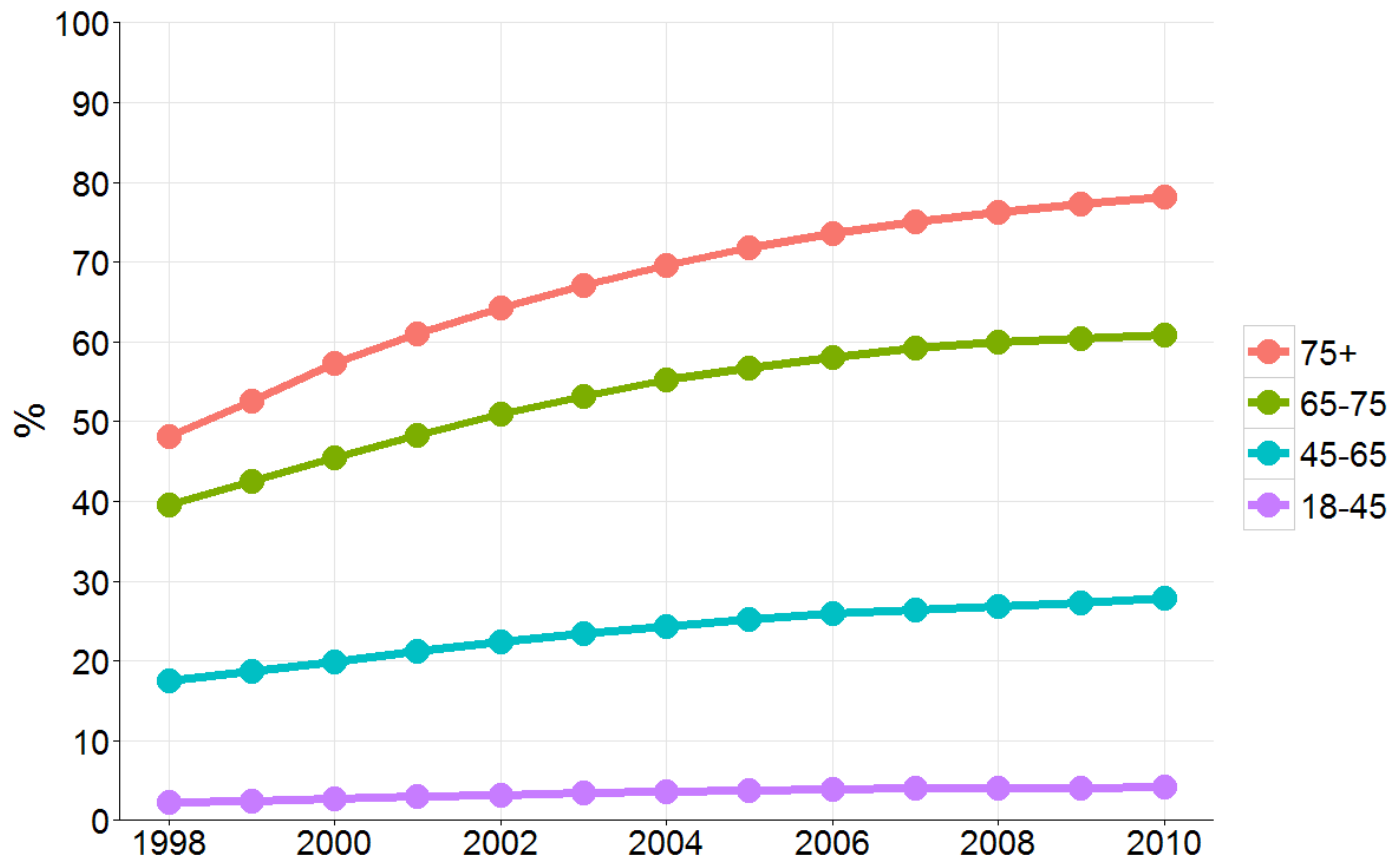
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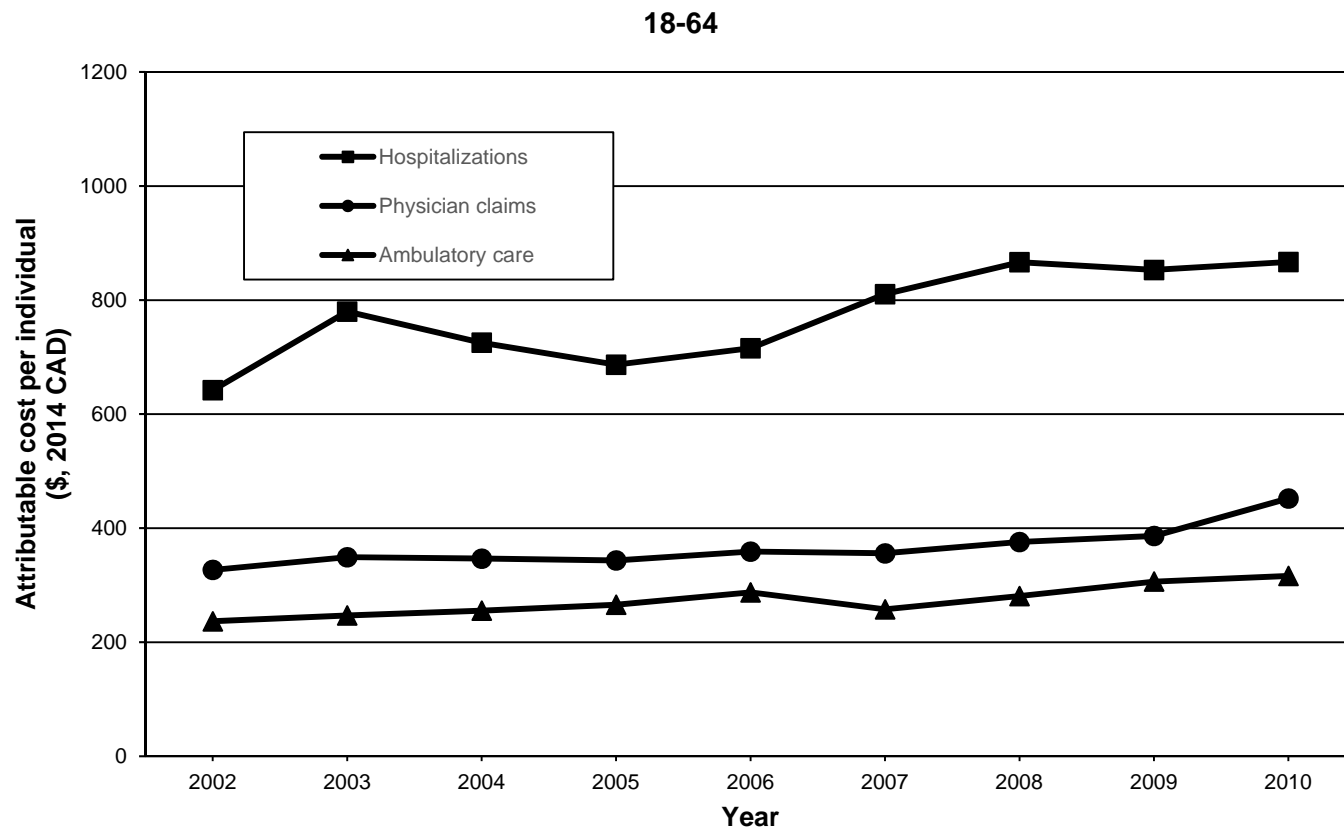
Hypertension prevalence by age



Hypertension prevalence by age group



Attributable costs by cost type



Attributable costs by cost type

