The Cost-Effectiveness of Lung Cancer Screening in Saskatchewan
Rachel Bethune, B.Sc., MPH candidate
Royal University Hospital Lung Cancer Screening Program, University of Saskatchewan

Discussion and Conclusion
Lung cancer screening is not cost-effective in Saskatchewan using current three annual LDCT scan recommendations. The NLST study design is not optimized to identify high-risk individuals who would benefit most from screening, leading to improved screening and cost-effectiveness outcomes. A Saskatchewan screening program could improve cost-effectiveness and outcomes by isolating higher-risk participants with a 40 pack-year smoking history, expanded eligible age, or using a predicted risk threshold. Screening cost-effectiveness improves using continuous screening, reducing the cost of screening and adding a smoking cessation program. As a limitation, the CRMM primarily uses Ontario-based costs, so Saskatchewan specific cost estimates are needed. Directions for future research should include exploring a population-based screening program in Saskatchewan. Implementation should take into consideration equitable access to screening for all eligible groups (rural, First Nations, lower socioeconomic status) and understand opportunity costs to other health care areas.

Acknowledgements
Thank you to:
- Dr. Erika Penz, MD – Practicum Supervisor
- Dr. Donna Goodridge, RN PhD – Secondary Supervisor
- Dr. Michael Szafrozn, PhD – Practicum Coordinator
- Canadian Partnership Against Cancer (CPAC) – CRMM use

Methods
The Canadian Partnership Against Cancer (CPAC) Cancer Risk Management Model (CRMM) was used to generate lung cancer screening estimates for Saskatchewan.

The CRMM is a dynamic microsimulation model that simulates 32 million people from birth to death. Aggregate results are fit to Canadian demographic, disease, and economic parameters. Outcomes are produced by filtering simulated lung cancer patients through probabilistic decision trees based on real Canadian treatment and cost data.

The reference population scenario is based on Canadian recommendations under an ideal. NLST-based screening scenario between 2016 to 2035. More than 50 sensitivity analyses were conducted. Costs and QALYs are discounted at 3% and analyses are from the public health system perspective.

Results
Reference Scenario Reference Scenario

Scenario | Incremental Cost | QALY saved | ICER ($/QALY) | LYG gained
--- | --- | --- | --- | ---
No Screening | | | | |
Saskatchewan 2018 | | | | |
Saskatchewan 2016-2035 | | | | |

Screening Age Eligibility

- 55-79: 76,600,000 690 111,000 2,600
- 55-64: 47,400,000 555 85,400 1,500
- 65-74: 59,000,000 660 89,400 2,700

Continuous Screening Interval

- 5 Annual: 105,300,000 1,110 94,800 3,700
- Annual: 232,200,000 3,255 71,300 10,000
- Biennial: 123,300,000 4,780 32,500 2,900

- 3-Year Risk of Developing Lung Threshold
- 0.5%: 71,000,000 540 131,300 2,200
- 2%: 62,400,000 560 111,400 2,700

Cost lung cancer screening

- 0.5: 41,000,000 570 72,000 2,200
- 2: 132,400,000 570 232,300 2,200

Smoking Cessation Program Success Rate

- 5%: 95,000,000 1,845 51,500 4,100
- 22.5%: 85,800,000 7,565 11,300 12,200

References
7. Goodridge, RN PhD – Practicum Coordinator

Background
Lung cancer causes more deaths than any other cancer in Canada. The majority of cancers are diagnosed at late, incurable, stages.

The randomized control National Lung Screening Trial (NLST) found that lung cancer screening with low-dose computed tomography (LDCT) can identify more lung cancers at earlier stages. Screening is more effective in high-risk individuals and can be optimized by changing population and protocol parameters.

Current Canadian screening recommendations are based on the NLST study design. Both suggest three annual LDCT scans for high-risk asymptomatic adults ages 55-74 with ≥30 pack-year smoking history and less than 15-years since quitting smoking for former-smokers. Currently, there are no organized lung cancer screening programs implemented in Canada.

Screening is projected to be cost-effective in Canada since the estimated incremental cost-effectiveness ratio (ICER) is below the typically accepted threshold of $100,000/quality-adjusted life year (QALY). The cost-effectiveness and impact of lung cancer screening on cancer outcomes is unknown in Saskatchewan.

This study aims to describe how different lung cancer screening variables influence health outcomes (QALYs and life-years (LY) gained) and cost-effectiveness outcomes (incremental cost; ICER) in Saskatchewan.