Improving the Quality of Cancer Diagnosis

Chair: Dr. Christian Finley

Innovative Approaches to Optimal Cancer Care in Canada

April 7-8, 2017
The Westin Harbour Castle
Toronto, Ontario
CPAC – IACCC
Expanding the role of primary care in cancer control

Eric Wasylenko MD CCFP (PC) MHSc (bioethics)
April 7, 2017
Disclosure

No financial COI

- no industry support

- not on a speaker’s bureau

No funded research

Contracted to Health Quality Council of Alberta

- attribution of work of the team from HQCA
Objectives

• Referring to a tragic outcome arising from systemic challenges in continuity of care, understand elements of health systems that will improve continuity of care

• Describe opportunities for systematic introduction of closed loop referral mechanisms, clinical information systems, patient access to records and advance care planning as tools for optimal cancer care in Canada
One man’s tragic journey
- used with permission from Greg’s family

Greg Price
Claims about fatal flaws in the system

• Good people can work around fatal system flaws – but good outcomes often depend on good luck

• Less than diligent care exposes system weaknesses

• System weakness always confounds the efforts of providers and the experience of patients
Analysis and report 2013, follow-up report 2016

• In-depth study of the experience of an individual patient
  ‣ Info from:
    ▪ Patient health records
    ▪ Interviews
    ▪ Detailed flow mapping
    ▪ Literature review
    ▪ Review of leading practices (Mayo, Geisinger, Kaiser)
    ▪ Information technology experts
    ▪ Published documents (e.g., CPSA Standards of Practice)
  ‣ Analysis to broadly inform recommendations that will improve continuity of patient care
  ‣ Focus was the system
Experience of continuity of care

Definitions

- A series of healthcare events is experienced as coherent, connected, and consistent with healthcare needs and personal context (Haggerty et al., 2003)

- Perceived quality of patient care over time and how patient care is connected across healthcare events and between providers (Gulliford et al., 2006)
Experience of a seamless patient journey

- International literature reviews:
  - Three subtypes of continuity across healthcare settings:
    - **Relationship continuity:** Relationship with trusted provider(s)
    - **Information continuity:** Timely availability of relevant information
    - **Management continuity:** Communication of patient information
Experience of a seamless patient journey

- Literature on continuity of care suggests a strong link to primary healthcare generally, and primary care medical homes more specifically.

- The medical home is an entry point and central hub for providing and coordinating care including needed access to healthcare services.
CanIMPACT

• Canadian Team to Improve Community-Based Cancer Care along the Continuum
  – Several articles published in *Can Fam Physician* 2016;62 (Easley *et al* and Brouwer *et al*)
Dynamic mixed-methods study (Jackson)

- Literature review
- Qualitative information:
  - Conversational interviews with patients
  - Interactive feedback sessions and focus groups with more than 50 primary care professionals
  - Conversations with HQCA’s Patient/Family Safety Advisory Panel, and with 10 individuals in leadership roles
- Provincial patient experience survey (N=4424)
  - Cognitive testing
  - Psychometric testing
  - Structural equation modelling
Patients and their caregivers were often described as the only source of information continuity. Patients and their caregivers were often described as the only source of information continuity.

- Timely access to their own information
- Online access to test results
Management continuity:
Communication of patient information

Ideally this includes a partnership or shared responsibility (continuum)
Patients and caregivers feel ill prepared to take on more responsibility.

- Cost and travel from rural and remote areas
Continuity of care hub: process & people

Relationship Continuity: Relationship with trusted provider(s)

Information continuity: Timely availability of relevant information

Management continuity: Communication of patient information
Improve patient access to family doctors and to team-based care

Improve coordination and teamwork between the family doctor and specialists

Relationship continuity: Relationship with trusted provider(s)
Ensure access to information through the implementation of a single universal EHR

Facilitate active patient engagement through a patient portal
Summary of key strategies (1)

• Medical home/hub concept
  – Organize the medical home
  – Connect it to specialty services

• All patients registered with a primary care team

• Practice standards
  – Direct hand-off of patient care responsibilities
Summary of key strategies (2)

- Integrated clinical information system
- Provider Registry, continuously updated
Summary of key strategies (3)

• Closed loop referral system to specialty care
• Personal health portal (including access to the closed loop referral system)
• Critical test results management system
Cancer in 2017

• For many people, cancer is now a chronic disease
• Cancer diagnosis and treatment intersects a person’s overall health journey
• Coordinated and cooperative care provision must entail both primary care and cancer care as a starting assumption for improved outcomes, optimal experience and for most resource-appropriate care
HQCA Report references

• Health Quality Council of Alberta. Understanding patient and provider experiences with relationship, information and management continuity. Calgary, Alberta, Canada: Health Quality Council of Alberta; August 2016 (accessible from info@hqca.ca)

• Health Quality Council of Alberta. Improving continuity of care: key opportunities and a status report on recommendations from the 2013 continuity of patient care study. Calgary, Alberta, Canada: Health Quality Council of Alberta; April 2016 (accessible from info@hqca.ca)
Discussion

Promoting and improving patient safety and health service quality across Alberta
Improving the Quality of Cancer Diagnosis
Chair: Dr. Christian Finley

Innovative Approaches to Optimal Cancer Care in Canada
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Cancer diagnosis and beyond: a Canadian perspective

Eva Grunfeld, MD, DPhil, FCFP

Director, Knowledge Translation Research Network, Ontario Institute for Cancer Research
Giblon Professor and Vice-Chair (Research) Dept. Family and Community Medicine, University of Toronto
Chair, Chronic Conditions Institute Advisory Board, Canadian Institutes for Health Research
Conflicts of Interest and Acknowledgements

No conflicts of interest to disclose.

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These datasets were linked using unique encoded identifiers and analyzed at the Institute for Clinical Evaluative Sciences (ICES).

This study was approved by the institutional review board at Sunnybrook Health Sciences Centre, Toronto, Canada. (Add other REB approvals, as applicable.)

CCO Acknowledgement: “Parts of this material are based on data and information provided by Cancer Care Ontario (CCO). The opinions, results, view, and conclusions reported in this paper are those of the authors and do not necessarily reflect those of CCO. No endorsement by CCO is intended or should be inferred.”

CIHI Acknowledgement: “Parts of this material are based on data and information compiled and provided by CIHI. However, the analyses, conclusions, opinions and statements expressed herein are those of the author, and not necessarily those of CIHI.”

This study was approved by the University of Manitoba’s Health Research Ethics Board and Manitoba Health’s Health Information and Privacy Committee.

Manitoba Acknowledgements: This study was approved by the University of Manitoba’s Health Research Ethics Board and Manitoba Health’s Health Information and Privacy Committee. We gratefully acknowledge CancerCare Manitoba for their on-going support and Manitoba Health for the provision of data.
Objectives of Presentation

- Compare findings from studies examining diagnostic intervals in Canada
- Explore complexities of diagnosing cancer
- Present some Canadian initiatives to improve cancer diagnosis
Objectives of Presentation

- Compare findings from studies examining diagnostic intervals in Canada
  - ICBP
  - CanIMPACT
  - CCE

- Explore complexities of diagnosing cancer

- Present some Canadian initiatives to improve cancer diagnosis
ICBP: International Cancer Benchmarking Project

- ICBP Objective: To investigate differences in cancer outcomes and factors that affect them in 10 comparable jurisdictions
- Module 4: Focuses on diagnostic time intervals for breast, colorectal, lung and ovarian.
- Ontario: patients diagnosed between April 2014 and Oct 2015 drawn from cancer registry; within 3 to 6 months from diagnosis
  - Consenting through CCO’s patient contact process
  - Also asked for consent to contact their PCP and secondary care provider
CanIMPACT: Canadian Team to Improve Community-based Cancer Care along the Continuum

- Multidisciplinary, pan-Canadian team studying how to improve cancer care to patients in the primary care setting.
- Funded by CIHR: April 2013 to April 2020
- PI: Eva Grunfeld; Leads: Patti Groome and Marcy Winget
- Design: Population-based retrospective cohort study
- Provinces: BC, Manitoba, Ontario, Nova Scotia
- Study Population: All women diagnosed with incident invasive breast cancer from 2007 to 2011/2012
Dr. Patti Groome and colleagues:

- Breast Cancer Diagnostic Intervals:
  - Understanding Diagnostic Episodes of Care. PI, Patti Groome
  - Ontario Diagnostic Assessment Units and the Breast Cancer Diagnostic Interval. MSc thesis, Li Jiang

- Colorectal Cancer Diagnostic Intervals
  - Availability and Quality of Colonoscopy Resources and the Colorectal Cancer Diagnostic Interval. PhD Thesis: Colleen Webber
  - The Diagnostic Interval of Colorectal Cancer Patients in Ontario by Degree of Rurality. MSc Thesis: Leah Hamilton
Legend and study samples

- **ICBP** = International Cancer Benchmarking Partnership
  - Sample: from cancer registries April 2014 to Oct 2015;
    - 3 to 6 months from diagnosis;
    - self-completed survey from patients and their physicians
    - Ontario patient contact process: 22.7% consenting, variation by disease site
    - Ontario Breast: N=403; Manitoba N=368
    - Ontario Colorectal: N=321; Manitoba N=258

- **CanIMPACT** = Canadian Team to Improve Community-based Cancer Care along the Continuum
  - Ontario Sample: population-based sample
    - breast cancer from registries 2007 to 2012
    - N=46,966
Legend and samples con’t

- CCE = Cancer Diagnosis Research Program, Cancer Care and Epidemiology, Cancer Research Institute, Queen’s University
  - Breast samples: population-based from Ontario cancer registry
    - Patti Groome – 2007 to 2011; N=33,752
    - Li Jiang – 2011; N=6,880
  - Colorectal samples: population-based from Ontario cancer registry
    - Colleen Webber – 2009 to 2012; N=23,961
    - Leah Hamilton – 2007 to 2012; N=27,942
ICBP: Time intervals

ICBP Breast: Patient interval (non-screened route)

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Definition: First symptom to first presentation to primary care

**Primary care interval**

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Definition: First presentation to primary care to first referral to secondary care
ICBP Breast: Diagnostic interval
(non-screened route)

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Definition: First presentation to primary care to diagnosis.

Treatment interval (all patients)

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<td>41</td>
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</table>

Definition: From diagnosis to first treatment date (usually biopsy or lumpectomy for breast)
ICBP Breast: Total interval (non-screened route)

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<th>D</th>
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<th>Median</th>
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Total interval (all patients)

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Possible interpretations

- Small sample size
- Selection bias – CCO patient contact process
- Recall bias

- Are these results an accurate representation of the diagnostic intervals in Ontario?
Breast Diagnostic Intervals: comparison of ICBP to CCE and CanIMPACT

Weller D et al. BJC 2012;106:1262–7
## Breast Diagnostic Intervals: median (days)

<table>
<thead>
<tr>
<th>Diagnostic Interval</th>
<th>ICBP Ontario</th>
<th>CCE/PG</th>
<th>CanIMPACT</th>
<th>CCE/LJ DAU</th>
<th>CCE/LJ NON-DAU</th>
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<tr>
<td>Screened</td>
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<td>85</td>
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ICBP Colorectal Cancer: Patient interval (non-screened route)

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Primary care interval

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*Manitoba: N = 258
*Ontario: N = 321
## ICBP Colorectal Cancer: Diagnostic interval (non-screened route)

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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G Manitoba</th>
<th>H Ontario</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>60</td>
<td>48</td>
<td>38</td>
<td>64</td>
<td>27</td>
<td>37</td>
<td>76</td>
<td>54</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>75&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>155</td>
<td>86</td>
<td>91</td>
<td>111</td>
<td>66</td>
<td>85</td>
<td>148</td>
<td>147</td>
<td>66</td>
<td>82</td>
</tr>
<tr>
<td>90&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>284</td>
<td>201</td>
<td>164</td>
<td>238</td>
<td>129</td>
<td>222</td>
<td>298</td>
<td>312</td>
<td>200</td>
<td>196</td>
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</tbody>
</table>

## Treatment interval (all patients)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G Manitoba</th>
<th>H Ontario</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>41</td>
<td>34</td>
<td>37</td>
<td>27</td>
<td>14</td>
<td>18</td>
<td>35</td>
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<td>15</td>
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<tr>
<td>75&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>63</td>
<td>47</td>
<td>63</td>
<td>42</td>
<td>19</td>
<td>28</td>
<td>60</td>
<td>54</td>
<td>29</td>
<td>53</td>
</tr>
<tr>
<td>90&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>80</td>
<td>61</td>
<td>87</td>
<td>59</td>
<td>27</td>
<td>43</td>
<td>88</td>
<td>82</td>
<td>44</td>
<td>65</td>
</tr>
</tbody>
</table>
### ICBP Colorectal: Total interval (non-screened route)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G Manitoba</th>
<th>H Ontario</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>168</td>
<td>145</td>
<td>120</td>
<td>138</td>
<td>77</td>
<td>108</td>
<td>153</td>
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<td>127</td>
</tr>
<tr>
<td>75th percentile</td>
<td>304</td>
<td>248</td>
<td>184</td>
<td>235</td>
<td>146</td>
<td>203</td>
<td>262</td>
<td>251</td>
<td>182</td>
<td>224</td>
</tr>
<tr>
<td>90th percentile</td>
<td>365</td>
<td>365</td>
<td>326</td>
<td>365</td>
<td>248</td>
<td>312</td>
<td>365</td>
<td>365</td>
<td>357</td>
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</table>

### Total interval (all patients)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G Manitoba</th>
<th>H Ontario</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>128</td>
<td>112</td>
<td>103</td>
<td>111</td>
<td>77</td>
<td>105</td>
<td>151</td>
<td>104</td>
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<tr>
<td>75th percentile</td>
<td>239</td>
<td>201</td>
<td>159</td>
<td>211</td>
<td>146</td>
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<td>260</td>
<td>230</td>
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<td>224</td>
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<tr>
<td>90th percentile</td>
<td>365</td>
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<td>365</td>
<td>248</td>
<td>307</td>
<td>365</td>
<td>365</td>
<td>320</td>
<td>365</td>
</tr>
</tbody>
</table>
Colorectal Diagnostic Intervals: Comparison of ICBP with CCE

## Colorectal Diagnostic Intervals: median (days)

<table>
<thead>
<tr>
<th>Category</th>
<th>ICBP Ontario N=321</th>
<th>CCE/CW N=23,961</th>
<th>CCE/LH N=27,942</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Primary care</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unscreened</td>
<td>1</td>
<td>24</td>
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</tr>
<tr>
<td><strong>Diagnostic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unscreened*</td>
<td>54</td>
<td>92</td>
<td>64</td>
</tr>
<tr>
<td>Screened</td>
<td></td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>84</td>
<td></td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unscreened</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screened</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</tr>
<tr>
<td>Unscreened</td>
<td>124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screened</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>104</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*In CW and LH studies we were unable to definitively assign screening status. Symptomatic presentation labelled ‘unscreened’ versus screen-related test labelled ‘screened.*
## Colorectal: Diagnostic Interval* by Stage (days)

<table>
<thead>
<tr>
<th>Overall:</th>
<th>CCE/CW (median)</th>
<th>CCE/CW (90th)</th>
<th>CCE/LH (median)</th>
<th>CCE/LH (90th)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>104</td>
<td>329</td>
<td>98</td>
<td>315</td>
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<tr>
<td>Stage II</td>
<td>83</td>
<td>319</td>
<td>60</td>
<td>284</td>
</tr>
<tr>
<td>Stage III</td>
<td>80</td>
<td>318</td>
<td>60</td>
<td>283</td>
</tr>
<tr>
<td>Stage IV</td>
<td>62</td>
<td>305</td>
<td>37</td>
<td>252</td>
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</table>
## ICBP Comparison by Cancer Site: total interval (days)

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Ontario Median</th>
<th>Ontario 75th</th>
<th>Ontario 90th</th>
<th>Manitoba Median</th>
<th>Manitoba 75th</th>
<th>Manitoba 90th</th>
<th>Best Jurisdiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>76</td>
<td>116</td>
<td>209</td>
<td>76</td>
<td>116</td>
<td>182</td>
<td>44*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>68</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>119</td>
</tr>
<tr>
<td>Colorectal</td>
<td>104</td>
<td>230</td>
<td>365</td>
<td>151</td>
<td>260</td>
<td>365</td>
<td>74**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>153</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>320</td>
</tr>
<tr>
<td>Lung</td>
<td>130</td>
<td>216</td>
<td>339</td>
<td>127</td>
<td>216</td>
<td>365</td>
<td>67*</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>116</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>210</td>
</tr>
<tr>
<td>Ovarian</td>
<td>117</td>
<td>176</td>
<td>282</td>
<td>90</td>
<td>172</td>
<td>299</td>
<td>57**</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>261</td>
</tr>
</tbody>
</table>

• *Jurisdiction E  
• **Jurisdiction I  

Source: ICBP unpublished data, 2017
Objectives of Presentation

- Compare findings from studies examining diagnostic intervals in Canada
- Explore complexities of diagnosing cancer
- Present some Canadian initiatives to improve cancer diagnosis
**FIGURE 1.2** Percent distribution of estimated new cancer cases, by sex, Canada, 2016

<table>
<thead>
<tr>
<th>Males 102,900 New cases</th>
<th>Females 99,500 New cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>Breast</td>
</tr>
<tr>
<td>21.0%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Lung and bronchus</td>
</tr>
<tr>
<td>14.1%</td>
<td>14.1%</td>
</tr>
<tr>
<td>Lung and bronchus</td>
<td>Colorectal</td>
</tr>
<tr>
<td>14.0%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Bladder</td>
<td>Body of uterus and uterus NOS</td>
</tr>
<tr>
<td>6.4%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>Thyroid</td>
</tr>
<tr>
<td>4.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Kidney and renal pelvis</td>
<td>Non-Hodgkin lymphoma</td>
</tr>
<tr>
<td>4.0%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Melanoma</td>
</tr>
<tr>
<td>3.6%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>Ovary</td>
</tr>
<tr>
<td>3.4%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Oral</td>
<td>Pancreas</td>
</tr>
<tr>
<td>3.1%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Leukemia</td>
</tr>
<tr>
<td>2.5%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Stomach</td>
<td>Kidney and renal pelvis</td>
</tr>
<tr>
<td>2.1%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>Bladder</td>
</tr>
<tr>
<td>1.7%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Liver</td>
<td>Cervix</td>
</tr>
<tr>
<td>1.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Brain/CNS</td>
<td>Oral</td>
</tr>
<tr>
<td>1.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Multiple myeloma</td>
<td>Stomach</td>
</tr>
<tr>
<td>1.6%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Brain/CNS</td>
</tr>
<tr>
<td>1.5%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Testis</td>
<td>Multiple myeloma</td>
</tr>
<tr>
<td>1.1%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Larynx</td>
<td>Liver</td>
</tr>
<tr>
<td>0.9%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Hodgkin lymphoma</td>
<td>Esophagus</td>
</tr>
<tr>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Breast</td>
<td>Hodgkin lymphoma</td>
</tr>
<tr>
<td>0.2%</td>
<td>0.5%</td>
</tr>
<tr>
<td>All other cancers</td>
<td>Larynx</td>
</tr>
<tr>
<td>10.7%</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td>All other cancers</td>
</tr>
<tr>
<td></td>
<td>8.9%</td>
</tr>
</tbody>
</table>

CNS=central nervous system, NOS=not otherwise specified

**Note:** The complete definition of the specific cancers listed here can be found in Table A8.

**Analysis by:** Surveillance and Epidemiology Division, CCDP, Public Health Agency of Canada

**Data sources:** Canadian Cancer Registry and National Cancer Incidence Reporting System databases at Statistics Canada
FIGURE 2.2 Distribution of new cancer cases for selected cancers by age group, Canada, 2006–2010

N is the total number of cases over 5 years (2006–2010) for each age group; CNS = central nervous system; PNC = peripheral nervous cell tumours.

* Cancers in children (ages 0–14 years) are classified according to ICCC-3. The complete definition of the specific cancers listed here can be found in Table A8.

Analysis by: Surveillance and Epidemiology Division, CCDC Public Health Agency of Canada
Data source: Canadian Cancer Registry database at Statistics Canada
Prospective cohort study of patients with suspected cancer

<table>
<thead>
<tr>
<th></th>
<th>Colorectal(^1)</th>
<th>Prostate(^1)</th>
<th>Lung(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Confirmed Cancer</strong></td>
<td>9 (6.8%)</td>
<td>41 (35%)</td>
<td>81 (79%)</td>
</tr>
<tr>
<td><strong>Time to Diagnosis(^2), days (SD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Cancer</td>
<td>85 (68)</td>
<td>77 (45)</td>
<td>52 (35)</td>
</tr>
<tr>
<td>Cancer</td>
<td>34 (49)</td>
<td>91 (37)</td>
<td>43 (32)</td>
</tr>
<tr>
<td><strong>Time to Surgery(^2), days (SD)</strong></td>
<td>65 (42)</td>
<td>134 (62)</td>
<td>55 (39)</td>
</tr>
</tbody>
</table>

1. Overall acceptance rate = 80%
2. From date of referral to diagnosis communicated to the patient; closes to ICBP secondary care interval

Grunfeld et al, Brit J Cancer 2009
Caution: cancer is not the only problem

Source: K Emslie Public Health Agency of Canada 2015
Health Services Accessed Each Day: ICES Primary Care Atlas

Exhibit 1.1  Average number* of various health care services accessed each day in Ontario, 2002/03

- 137,000 General practitioner/family physician visits
- 54,000 Specialist visits
- 41,000 X-rays taken
- 12,000 Emergency department visits
- 2,000 Computerized tomography/magnetic resonance imaging scans
- 3,000 Hospital admissions
- 50 Hip and knee replacements

*Values rounded to the nearest thousand with the exception of hip and knee replacements, which were rounded to the nearest 10.
Issues for sustainability: workforce

Physicians/100,000 population in Family medicine* in Canada, 1995 to 2015

114 per 100,000
111 per 100,000
59 per 100,000

40,517 family physicians in Canada in 2015

*Includes General practitioners
Source: CMA Masterfile

Canadian Medical Association 2015
Percentage of family doctors who report their patients can get a same- or next-day appointment

- Canada: 22%
- Germany: 56%
- Australia: 38%
- France: 86%
- U.K.: 55%
- U.S.: 47%

(Source: The Commonwealth Fund, 2012 International Health Policy Survey)

Percentage of Canadians without a regular doctor

- 2003: 14%
- 2014: 15%

(Source: Statistics Canada)

Family doctors per 100,000 Canadians

- 2003: 96
- 2014: 114

but the percentage of Canadians with a regular doctor has not improved

(Source: CIHI, 2014)

Income and sex gap

- Richer women: 91%
- Poorer women: 85%
- Richer men: 84%
- Poorer men: 74%

(Source: CCHS, Statistics Canada, 2011)
Cancer Care Pathways

Primary Care – Diagnostic Phase
CanIMPACT Qualitative Studies with Patients, Primary Care Physicians, Oncologists
Theme: Communication Issues

- incompatible EMRs
- hard to access patient info
- unclear roles
- not kept "in the loop"
- delays in transcription
- FP not copied on reports
- duplication of tests
- miscommunication
- lack of communication

Source: Easley et al. Curr Oncol 2017
Objectives of Presentation

- Compare findings from studies examining diagnostic intervals in Canada
- Explore complexities of diagnosing cancer
- Present some Canadian initiatives to improve cancer diagnosis
CanIMPACT: pan-Canadian environmental scan of initiatives

- CASE BOOK - Demographics
  - Most Canadian regions represented
  - Most target survivorship phase
  - Most target breast cancer and/or CRC
  - Intensity of engagement
    - Moderate > Low > High

Source: Melissa Brouwers and Jennifer Tomasone
CanIMPACT: Significant Findings & Insights

- CASE BOOK – Types of initiatives
  - Nurse navigator
  - Multidisciplinary team
  - Information system/communication system
  - Education for primary care
  - Multicomponent
- High quality robust evaluation is lacking
Initiatives across Canada to improve integration
Applying risk thresholds for urgent cancer diagnostic tests

Explicit 3% risk of undiagnosed cancer as threshold for urgent referral

Suspected cancer:
recognition and referral

NICE Guideline
Full guideline
June 2015
Diagnostic pathways and risk assessment tools
Manitoba: cancer patient journey

- Initiative to reduce delays
- Goal: Interval from suspicion to first treatment in 60 days
- See presentation by Oliver Bucher (Session:CS2)
eOncoNote: Facilitating rapport between providers
CanIMPACT: Trial of eOncoNote

- Personalized medicine/genetics
- Diagnosis, treatment, survivorship

If you have any questions, please ask via eOncoNote.
CanIMPACT Dedicated Issue of Can Family Physician

Table of Contents

Grunfeld E. It takes a team: CanIMPACT: Canadian team to improve community-based cancer care along the continuum.

Heisey R & Carroll JC. Identification and management of women with a family history of breast cancer. Practical guide for clinicians.


Jiang L et al. Primary care physician use across the breast cancer care continuum: CanIMPACT study using Canadian administrative data

Barisic A et al. Family physician access to and wait times for cancer diagnostic investigations: Regional differences among 3 provinces.

Easley J et al. Coordination of cancer care between family physicians and cancer specialists: Importance of communication

Brouwers M et al. Documenting coordination of cancer care between primary care providers and oncology specialists in Canada

Carroll J et al. Primary care providers’ experiences with and perceptions of personalized genomic medicine

Easley J et al. Patients’ experiences with continuity of cancer care in Canada: Results from the CanIMPACT study
Visit related posters:

P.040 - Factors associated with screen-detected breast cancer across five provinces (Groome)

P.079 – Phase 1 results from CanIMPACT

P.080 – Phase 2 intervention from CanIMPACT

P.103 – Synthesis maps of patient cancer journeys (Matthias)
THANK YOU

http://canimpact.utoronto.ca
Improving the Quality of Cancer Diagnosis

Chair: Dr. Christian Finley

Innovative Approaches to Optimal Cancer Care in Canada

April 7-8, 2017
The Westin Harbour Castle
Toronto, Ontario
Health Technology Evaluation of Diagnostic Processes: The Case for Pathway Modelling

Stirling Bryan, PhD

Professor, School of Population & Public Health UBC

Director, Centre for Clinical Epidemiology & Evaluation, VCH
Disclosures and Acknowledgements

• I am not aware of any actual or potential conflicts of interest in relation to this presentation

• Some of my relevant current activities:
  – Chair, CADTH’s Health Technology Expert Review Panel
  – Member, CADTH’s Economic Evaluation Guidelines Working Group
  – Scientific Director, BC SPOR SUPPORT Unit

• Lung cancer screening evaluation
  – Funding: BC Ministry of Health
  – Colleagues: Tanya Conte, Mohsen Sadatsafavi
Proposition

• **Decisions to adopt new technologies, or to change clinical pathways, should be based on high quality evidence, synthesized as a pathway model**

• Case-study:
  – Screening for lung cancer

• Model of choice:
  – OncoSim, developed by the Canadian Partnership Against Cancer (formerly the Cancer Risk Management Model, CRRM)
BREAKING THE ADDICTION TO TECHNOLOGY ADOPTION

STIRLING BRYAN\textsuperscript{abc,d}, CRAIG MITT\textsuperscript{ab} and CAM DONALDSON\textsuperscript{d}
\textsuperscript{a}School of Population & Public Health, University of British Columbia, Canada
\textsuperscript{b}Centre for Clinical Epidemiology & Evaluation, Vancouver Coastal Health Research Institute, Canada
\textsuperscript{c}Health Economics Research Unit, University of Aberdeen, UK
\textsuperscript{d}Yuma Centre for Social Business & Health, Glasgow Caledonian University, UK

ABSTRACT
A major driver of cost growth in health care is the rapid increase in the utilisation of existing technology and not simply the adoption of new technology. Health economists and their health technology assessment colleagues have become obsessed by technology adoption questions and have largely ignored ‘technology management’ questions. Technology management

Our argument is that, in order to achieve the goals of efficiency and equity through technology use, much greater analytic emphasis is required on the technology management issue, with analysts breaking out of the adoption ‘addiction’. This issue will grow more and more in importance as entities, such as clinical care groups

1. BACKGROUND

The focus of this paper is healthcare technology (drugs, devices, procedures and screening) and, specifically, its adoption and use in the system. Our premise is that health economists and their colleagues in the health technology assessment (HTA) ‘industry’ have become obsessed by adoption questions — that is, should a new technology be available for routine use in the healthcare system? — and have largely ignored the ‘technology management’ questions — that is, once in the system, how do we ensure cost-effective utilisation? Our argument is that, in order to achieve the goals of efficiency and equity through technology use, much greater analytic emphasis is required on the technology management issue, with analysts breaking out of the adoption ‘addiction’. This issue will grow more and more in importance as entities, such as clinical care groups in England and integrated care networks more globally, find that budget restrictions mean that service developments cannot simply be ‘added-on’ to their portfolios without consideration of from where, within such budgets, the required resources will come.
Pathway modelling

• Clinical pathway: defined sequence(s) of use of alternative health technologies

• Pathway modelling becomes the foundation of HTA activity

Barton et al, 2004
Pathway modelling and ‘resource stewardship’

• ‘Resource stewardship’
  – A culture where resource scarcity is openly acknowledged and recognized as a shared responsibility

• Pathway model development must be a collaborative effort
  – Active engagement of, and ownership by, key stakeholders, including clinical leaders, policy makers, patients and analysts
Stewardship facilitated through pathway modelling

Clinical leaders and care teams

HTA analysts

Policy makers and managers

Industry

Patients and carers
Pathway modelling and ‘resource stewardship’

• ‘Resource stewardship’
  – A culture where resource scarcity is openly acknowledged and recognized as a shared responsibility

• Pathway model development must be a collaborative effort
  – Active engagement of, and ownership by, key stakeholders, including clinical leaders, policy makers, patients and analysts

• The reference pathway model defines the resource envelope
  – Constraints on pathway reconfiguration are transparent

• Proposed changes to the clinical pathway, including diagnostic technologies, evaluated using the reference model
  – Opportunity cost considered explicitly
Figure 2: Family tree of analyzed publications. Background colors represent the different modeling techniques (blue = decision trees, yellow = Markov models, orange = ISM, green = DES) and bold letters and bright colors indicate an independently developed model.

Scholz & Mittendorf, 2014
Case-study: LDCT for lung cancer screening

- Lung cancer is the leading cause of cancer-related death worldwide
- Studies have shown screening with is associated with decreased mortality
- LDCT screening programs can be formulated in different ways:
  - Screening frequency
  - with/without smoking cessation interventions
  - use of risk stratification tools pre- or post-screening
- Aim: to assess cost-effectiveness and budget impact of alternative options in BC
Methods

• Used OncoSim, a previously developed and validated Canadian model

• Parameterized for BC, and some updates

• Estimated outcomes of 22 alternative LDCT-based screening scenarios
  – Scenarios based on: frequency/number of screening rounds, concomitant smoking cessation, pre-/post-screening risk stratification

• Calculated incremental cost, quality-adjusted life years (QALYs), and cost-effectiveness ratios

• Time horizon: 20 years
Appendix E.A: Algorithms of LDCT Screening and Lung Cancer Management

FIGURE E.A.1: ALGORITHM OF LDCT SCREENING

- Person
  - Eligible for LDCT screen? (age, year, smoking history)
    - YES
      - Invite to participate (participation rate)
        - Participant? (apply participation rate)
          - YES
            - Perform LDCT scan
              - Positive result
                - $ Cost of Positive Test Consultation
              - Negative result
                - $ Cost of Positive Test Consultation
          - NO
            - Could re-invite later in x years
              - NO
                - Possibly check again next year
              - YES
                - $ Cost of recruitment (per eligible person)

- $ Unit Cost of LDCT scan (per scan) includes extra physician visit, cost of scan, cost of processing/interpreting scan

- $ Cost of Positive Test Consultation

May 2014
Appendix E.A: Algorithms of LDCT Screening and Lung Cancer Management

FIGURE E.A.1: ALGORITHM OF LDCT SCREENING

- $ Cost of Positive Test Consultation
- Positive result
  - $ Cost of non-invasive diagnostic evaluation
  - radiation (increased risk of cancer)
  - Non-invasive diagnostic procedures (subject to compliance)
  - Invasive procedure performed (subject to compliance):
    1. Thoracotomy, Thoracoscopy, Mediastinoscopy, or
    2. Bronchoscopy, or
    3. Needle biopsy
  - Result of non-invasive or invasive procedure
    - True Positive for cancer
      - Nodules may also be found: none, low risk, medium risk, high risk
    - Pre-clinical diagnosis of lung cancer
    - Assign stage (based on NLST stage shift)
    - Assign within-stage survival benefit (relative risk)
    - Enter Cancer Risk Management
    - False Positive for cancer
      - Nodules may be found: none, low risk, medium risk, high risk
    - Perform additional LDCT scan(s)
      - if medium or high risk nodules found at recommended time intervals within year
      - more than one scan during year may be recommended;
        compliance parameter allows for any recommended scan to occur or be missed
  - $ Unit Cost of LDCT scan (per scan)
    - includes extra physician visit, cost of scan, cost of processing/interpreting scan**
  - $ stage-specific treatment costs*
  - Complications:
    - Minor
    - Intermediate
    - Major
    - Death
  - radiation (increased risk of cancer)

**Note: In reality, cancer could be detected (confirmed) at these follow-ups; in the Model, the evidence comes from the NLST and represents the overall outcome for the annual scan (what happens between annual scans is not reported). Consequently, we can use the follow-up for costing and resource impact but not for pre-clinical detection - we leave that to the annual scans.
OncoSim conceptual framework
Cost Effectiveness of Different Scenarios for the Implementation of LDCT for Lung Cancer Screening

- Up to 10 biennial screenings + Post-risk stratification tool + Smoking cessation Intervention ICER/QALY $41,229
- 3 biennial screenings + Post-risk stratification tool + Smoking cessation intervention ICER/QALY $26,976
- Single screening + Post-risk stratification tool ICER/QALY $12,059

Difference in Costs (in millions) vs. Difference in QALYs
In conclusion

• *Decisions to adopt new technologies, or to change clinical pathways (including diagnostics), should be based on high quality evidence, synthesized as a pathway model*

• We encourage analysts to:
  – Use modelling to help identify/highlight inefficiencies in current care pathways
  – Adopt a broader analytic perspective to inform the efficient reconfiguration of clinical pathways
  – Move to working with ‘reference’ pathway models

• Model of choice:
  – OncoSim, developed by the Canadian Partnership Against Cancer
  – [www.cancerview.ca/](http://www.cancerview.ca/)
thank you

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Improving the Quality of Cancer Diagnosis
Chair: Dr. Christian Finley

Innovative Approaches to Optimal Cancer Care in Canada

April 7-8, 2017
The Westin Harbour Castle
Toronto, Ontario
Alberta Thoracic Oncology Program

Expediting Lung Cancer Diagnosis and Management for Patients with Suspected Lung Cancer

Nadine Strilchuk
April 7, 2017
I have no conflicts of interest associated with my presentation
Alberta Thoracic Oncology Program (ATOP)

Primary Goal:

To address time delays:

- developed innovative approaches to expedite the detection, diagnosis, and speciality consultation for patients with suspected lung cancer.
ATOP aims to improve the efficiency & accuracy of lung cancer diagnosis and treatment

- **Coordination** of lung cancer diagnosis
  - Provincial development of rapid access clinics → ATOP

- **Timely access** to critical diagnostic tests
  - EBUS bronchoscopy, PET/CT, CT/US guided bx, sx staging

<table>
<thead>
<tr>
<th>Lung cancer 1 year</th>
<th>Canada</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Manitoba</th>
<th>Ontario</th>
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<tr>
<td>1995–99</td>
<td>38.7%</td>
<td>36.4%</td>
<td>36.6%</td>
<td>41.7%</td>
<td>39.6%</td>
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<td>2000–02</td>
<td>39.7%</td>
<td>36.3%</td>
<td>37.5%</td>
<td>44.1%</td>
<td>40.5%</td>
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<td>2005–07</td>
<td>43.1%</td>
<td>41.5%</td>
<td>43.0%</td>
<td>42.7%</td>
<td>43.4%</td>
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<thead>
<tr>
<th>Lung cancer 5 years</th>
<th>Canada</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Manitoba</th>
<th>Ontario</th>
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<tr>
<td>1995–99</td>
<td>15.7%</td>
<td>13.8%</td>
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<tr>
<td>2000–02</td>
<td>15.9%</td>
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<td>16.7%</td>
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<tr>
<td>2005–07</td>
<td>18.4%</td>
<td>15.1%</td>
<td>17.7%</td>
<td>20.1%</td>
<td>19.1%</td>
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</tbody>
</table>
International guidelines suggest target of 60 days from referral to surgery.
Delays in Diagnosis

- **Reducing delays** between lung cancer diagnosis to treatment
  - may increase the number of resectable lung tumors and may ultimately improve prognosis (Salomaa, et. al., 2005).

- Dx in late stage of lung cancer = poor prognosis
**Expediting Lung Cancer Diagnosis in Alberta**

- NP led triage to ATOP
- Increase availability
  - PET CT scans
  - CT/US guided biopsy
- Radiology referral process
- SCM order set
- Development of a provincial database
PET/CT scans

- 2011 - evaluated delays in obtaining timely scans
- Limited access
  - 38% of Calgary surgical patient had a PET (62% did not!)
  - Median wait time was 40 days, (90th 65)²

Problem:
- One scanner/one shift/no local isotope
- 500 additional scans required for lung cancer (only 300 scans possible/year).
Diagnostic Imaging: PET/CT Scan

PET/CT Wait Times
PET CT Requested to PET CT Performed (Target 7 days)

- Improvement from median of 40 days to < 20.
- Initially we had an additional shift added, now we have 2 PET scanners.
- Downtime for maintenance of cyclotron leads to increased wait times.
CT/US guided biopsies

- Significant delay in Calgary patients
- Median 17 days / 90th P 23 days (2011)

Primary choke point → unstaffed Day Surgery beds

- Funded 0.4 nurse to recover patients post-biopsy.
Diagnostic Imaging: US/CT Guided Biopsies

Diagnostic Imaging - Interventional Radiology Biopsy Wait times
US/CT Guided Biopsy Request to US/CT Guided Biopsy Performed (7 days)

Median Days to Biopsy

Month

Median
Target
Radiologist Initiated Specialty Referral for Patients Suspected of Having a Thoracic Malignancy

Alain Tremblay\textsuperscript{1}, MDCM, Nadine Strilchuk\textsuperscript{1}, NP, Niloofar Taghizadeh\textsuperscript{1}, DVM, Marc Fortin\textsuperscript{1}, MDCM, Paul Burrowes\textsuperscript{2}, MD, Laura Hampton\textsuperscript{1}, NP, Alex Chee\textsuperscript{1} MD, Paul MacEachern\textsuperscript{1} MD, Rommy Koetzler\textsuperscript{1}, MD-PhD, Sean McFadden\textsuperscript{3}, MD.

- CT to ATOP referral $\rightarrow$ too long.
  - $\sim$ 35 days
- Radiologists are “first to know” of potential lung cancer
- Can we reduce the time interval from CT scan interpretation to referral?
- Reduce multiple points of delay
Radiologist Initiated Specialty Referral for Patients Suspected of Having a Thoracic Malignancy

Our study:

- Group 1: 75 patients in radiology referral group
- Group 2: 836 patients in standard referral group

The radiographic criteria for radiology initiated referrals:

- CT scan with non-calcified nodule > 8 mm without prior evidence of stability
- Growing nodule of any size
- Persistent (≥ 2 CTs) focal ground glass opacification
- Mediastinal mass or mediastinal adenopathy not typical for sarcoidosis.
**Results: Radiologist Initiated Specialty Referral**

Table 1. Subjects demographics and main results

<table>
<thead>
<tr>
<th></th>
<th>Radiology referral (n=75)</th>
<th>Standard referral (n=836)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years, median (range)</td>
<td>70 (37-89)</td>
<td>66 (17-94)</td>
</tr>
<tr>
<td>CT –R, days, median (75-90(^{th}) p)*</td>
<td>4 (8-13)</td>
<td>8 (19-37)</td>
</tr>
<tr>
<td>CT –A, days, median (75-90(^{th}) p)*</td>
<td>14 (19-26.4)</td>
<td>20 (32-52.3)</td>
</tr>
<tr>
<td>CT –D, days, median (75-90(^{th}) p)*</td>
<td>26 (40-63)</td>
<td>32 (48.8-71)</td>
</tr>
</tbody>
</table>

\(p\) represents percentile
CT-R: Time from CT scan to receipt of referral.
CT-A: Time from CT scan to 1\(^{st}\) appointment
CT-D: Time from CT scan to treatment decision.

*\(p<0.05\). Calculated by Mann-Whitney U test.
SCM (EMR) Process

- Ordering provider in ER or hospital $\rightarrow$ direct referral at discharge to ATOP

- Developed to address potential patients lost to follow-up
  - No family physician
  - Admitting for another non-malignancy related issue

- Rec’d in ATOP via fax
Take Home Message

We can expedite lung cancer diagnosis for patients:

- NP driven triage
- Timely access to dx investigations
  - PET and CT/US guided bx
- Patients seen sooner
  - a radiology driven referral process
- Novel use of Electronic Medical Record
Thank you!
| **Integrating Clinical Pathway**  
<table>
<thead>
<tr>
<th>(Navigation, Availability, Monitoring)</th>
</tr>
</thead>
</table>
| **Pre-Treatment Phase**  
| Target: 4 weeks (measured, evaluated and improved through performance management) |
| **Central Intake**  
| **Review Referral**  
| **Diagnosis and Staging**  
| **Decision for Definitive Therapy** (Supported by Care Navigation)  
| **Monitor / Assign Prognosis**  
| **Surgery**  
| **Radiation**  
| **Chemotherapy**  
| **Palliative care**  
| **Start of Treatment**  
| **Entry point into clinical pathway**  
| **CT Scan or Suspicious x-ray**  
| **Primary Care Physician**  
| **Symptoms**  
| **Incidental Finding**  
| **Benign**  
| **Standard referral form**  
| **Co-morbid Disease**  
| **Demographics**  
| **Psychosocial Issues**  
| **Performance Status**  
| **Patient Factors**  
| **Multidisciplinary Consultation**  
| **Nurse Practitioner**  
| **Responsible Physician**  
| **Med Onc**  
| **Rad Onc**  
| **Suspicion of lung cancer**  
| **Suspicion of lung cancer**