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The Cost of Waiting: The Economic Benefit of Reduction in Waiting for Early Breast Cancer Radiotherapy

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Acknowledgments

- Dr. Ana Johnson and Dr. William Mackillop
- Terry Fox Foundation Training Program in Transdisciplinary Cancer Research at CIHR
- CIHR New Emerging Teams grant
- Queen's University Centre for Health Services and Policy Research (CHSPR)





Research Question

“Will reducing waiting times for radiotherapy be accompanied by downstream cost savings? If so, how much?”



Presentation

- Background
- Methodology
- Summary of Assumptions
- Results
- Sensitivity Analysis
- Conclusion
- Discussion
- Acknowledgements

Background

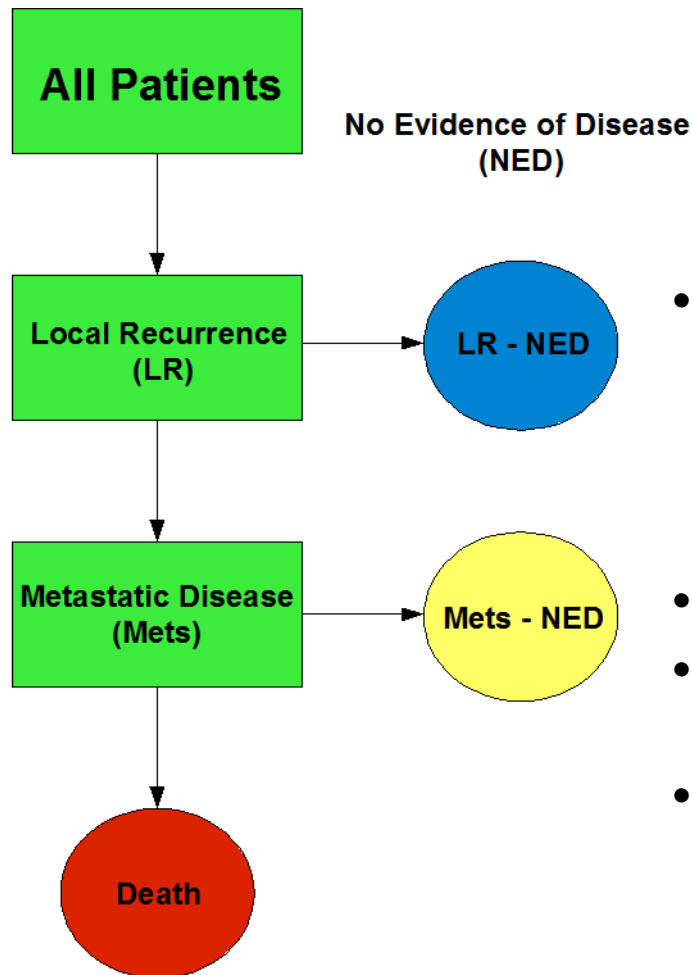
- Post-surgical delay in radiotherapy is associated with an increased risk of local recurrence
- Local recurrence is more expensive to treat than first-line breast cancer
 - Downstream disease events (i.e., metastatic disease, terminal illness) are more expensive still
- It follows that reductions in local recurrence will be followed by reductions in spending on local recurrence treatment



Methods

1. Estimate likelihood of patients experiencing health events
2. Estimate cost associated with each event
3. Determine probability-weighted cost of each event
4. Determine total weighted cost of a local recurrence
5. Multiply cost by per-week incremental risk reduction associated with waiting

Methods – cont...



- All patients move from being treated to either “cured” (no evidence of disease) or experience a downstream event
- Time horizon is 10 years
- Health Care System perspective chosen
- All costs in 2008 Canadian dollars, adjusted for inflation using CPI

Assumptions

- All patients are early breast cancer patients (stage I, IIa – tumours with no nodal involvement)
- All patients experience identical clinical trajectory
- All recurrences are detected during follow-up
- Patients who die do so within one year of metastatic diagnosis

Results

Event	Probability	Cost	Weighted Cost
LR - NED	0.56	\$19,000	\$10,640
Mets - NED	0.04	\$47,000	\$1,880
Mets - death	0.40	\$59,300	\$23,720
		Total	\$36,240

Results – cont...

- Weekly incremental risk of recurrence
 - $0.088 - (1.025 * 0.088) = -0.0022$
- Per-week benefit of reducing waiting
 - $\$36,240 * 0.0022 = \79.75

Sensitivity Analysis

- Parameters in the calculation are adjusted above and below baseline values to determine extent to which benefit is “sensitive” to changes to inputs

Parameter	Baseline	Value	Benefit
Risk of recurrence	0.088	0.044 - 0.132	\$39.87 - \$119.61
Incremental risk of LR due to waiting	0.0022	0.0008 - 0.003	\$28.99 - \$108.72
Cost of Recurrence	\$36,240	\$27,860 - \$41,594	\$61.29 - \$91.51
Cost of End-of-Life	\$58,000	\$47,600 - \$74,300	\$64.16 - \$85.54

Conclusion

- If a patient's post-surgical waiting time can be reduced by one week, the health care system will experience a reduction in downstream spending of \$79.75
- This value is highly contingent on the cost of treatment (especially dying of metastatic disease) and the risk of recurrence



Discussion

- Strengths
- Limitations
- Generalizability

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Waiting in Ontario

- 2008 Breast Radiotherapy waiting (90th percentile)
 - 7.0 weeks Referral - Consult
 - 5.4 weeks Ready-to-Treat - Treatment
 - 12.4 weeks in total
- Reduce to 4 weeks = $8.4 * \$79.75 = \$670/\text{pt}$
 - ~2400 breast cancer cases annually, ~240 in 90th percentile
 - Resulting benefit = \$160,000 /yr
- Using non-linear estimate (quadratic), benefit of 12.4 weeks to 4 weeks = \$7017.03/pt, or \$1.7 million/yr
 - Discounted over 10 years = \$1.25 m
 - Rough calculation, based on 10% of early breast patients



Estimation issues

- Likely an *underestimate* rather than an overestimate
 - Cost of drugs are higher
 - Patient population in clinical trials
 - No indirect costs included
 - Cost of follow-up and clinic visits
 - Symptomatic presentation of recurrence