Institute of Health Policy, Management & Evaluation
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A Cost-Effectiveness Study of Toronto Public Health's Preventing Overdose in Toronto (POINT) Program

Dima Saab, Lady Bolongaita, Jennifer Innis

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IHPME

Overview

- Background: Opioid Overdose in Toronto
- Study Objective
- Design: Decision Analytic Model
  - Model Parameters (Proportions)
  - Model Parameters (Costs)
- Results
- Limitations & Future Directions
- Conclusion

Background

- 79 opioid overdose deaths in Toronto (Coroner's Report, 2009)
- Majority (85%) in the company of others (Darke, Ross & Hall, 1996)
- Overdose deaths occur 1 -3 hours after drug use (Sporer et al., 2003)
  - Opportunity for intervention
- Reluctance to contact EMS
- Probability of death increases with later intervention

The POINT Program

- Preventing Overdose in Toronto- Toronto Public Health's 'The Works'
- 20-40 min training, 'prescribed' naloxone
- Since August 2011: 725 kits distributed, 85 reported administrations
- Successful naloxone distribution program programs in Europe, US, Edmonton
- Coffin & Sullivan (2013)
  - Worst case scenario: ICER = $14,000/ QALY

POINT Program Naloxone Kit

Study Objective

To ascertain whether the POINT program is a cost-effective strategy for reducing avoidable mortality from opioid overdose in drug users in Toronto as compared to the standard EMS and ED intervention.

Study Design: Decision Analysis

- "Simulates individual decision-making and various chance events…to identify outcomes of specific courses of action" (PRA, 2011)
- Outcome: Cost / Avoidable Mortality
- Perspective: Ontario's MOHLTC and Toronto Public Health

Model Parameters (Proportions)

Parameter	Base Value
Proportion of cases where witnesses administer naloxone	62.9 %
Proportion of patients who respond to witness-administered naloxone	96.0 %
Proportion of witnesses who call EMS (no naloxone)	67.7 %
Proportion who call EMS after administering naloxone	41.0 %
Proportion of EMS who administer naloxone	66.0 %
Proportion of patients who respond to EMS-administered naloxone	94.0 %
Proportion transported to the emergency department	88.8 %
Proportion who survive at the emergency department (following use of naloxone kit)	99.6%

Model Parameters (Costs)

Parameter	Base Value (range)
Naloxone kit	$ 25.00
Training session	$ 14.71
EMS treatment	$ 240.00
Pronouncing death by EMS	$ 196.60
One ampoule of naloxone	$ 11.35
Opioid overdose treatment in ED	$ 1,000
Physician consult fee for ED services	$ 97.60
Pronouncing death in ED	$ 3,974

Results

- POINT= cost-effective
- ICER = Δ cost / Δ avoidable mortality
  = ($314.58 - $508.32) / (0.879 – 0.717)
  = - $193 / 0.162
  = $1,193 / avoidable mortality
- Sensitivity Analysis
  - 1% Witnesses Administer Naloxone
    - ICER= $14,323 / avoidable mortality
  - 100% Witnesses Administer Naloxone
    - ICER= $1,283 / life saved

Limitations & Future Directions

- Cost-Utility Analysis
- Distribution Parameter ('Contact Probability')
- Underestimation of Start-Up Costs

Conclusion

- Preliminary results show cost-effectiveness from perspective of public payers (MOHTLC and TPH)
- No evidence to support moral hazard concerns (Sporer et al., 2007; Seal et al., 2005)
- Policy Challenges
  - Ontario Harm Reduction Distribution Program and Health Canada
  - Only 15% of individuals who received naloxone were those with prescription (Seal, Thawley, Gee et al., 2005)

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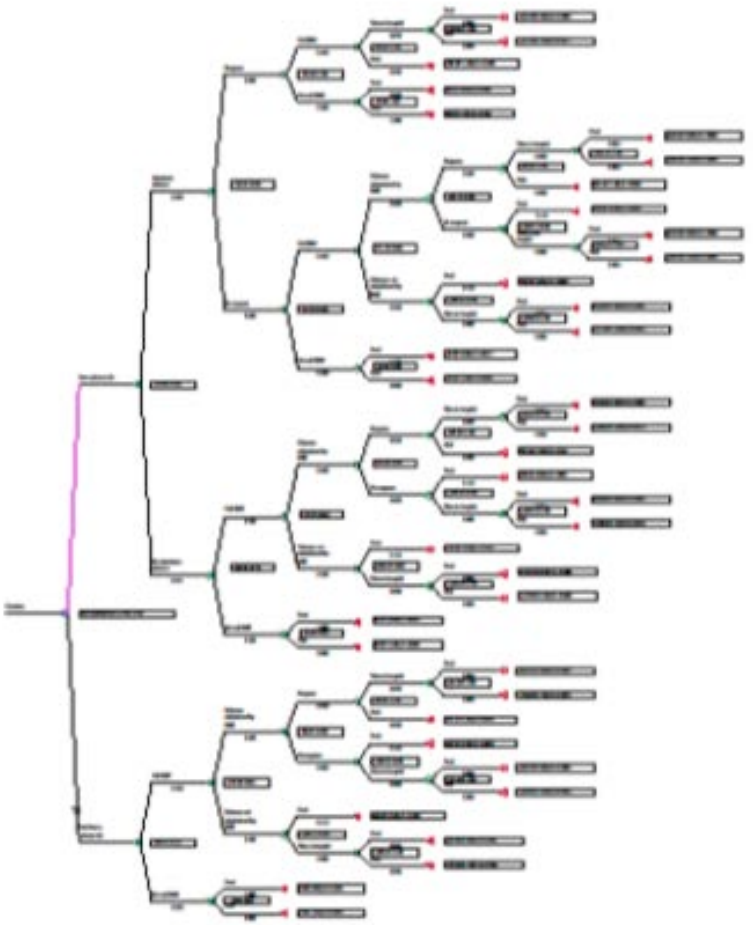
Questions/Comments?

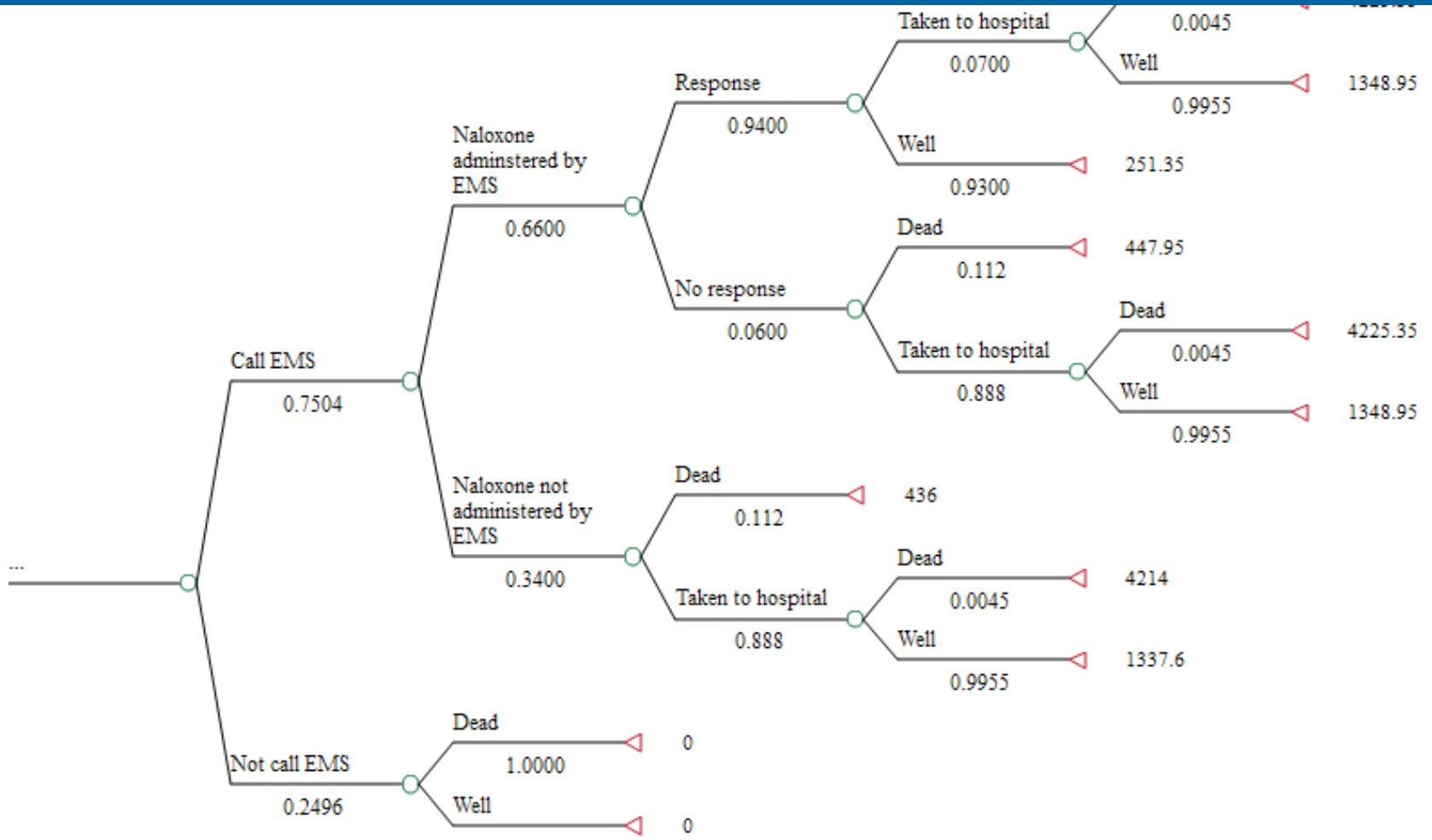
Thank You.

Decision Tree

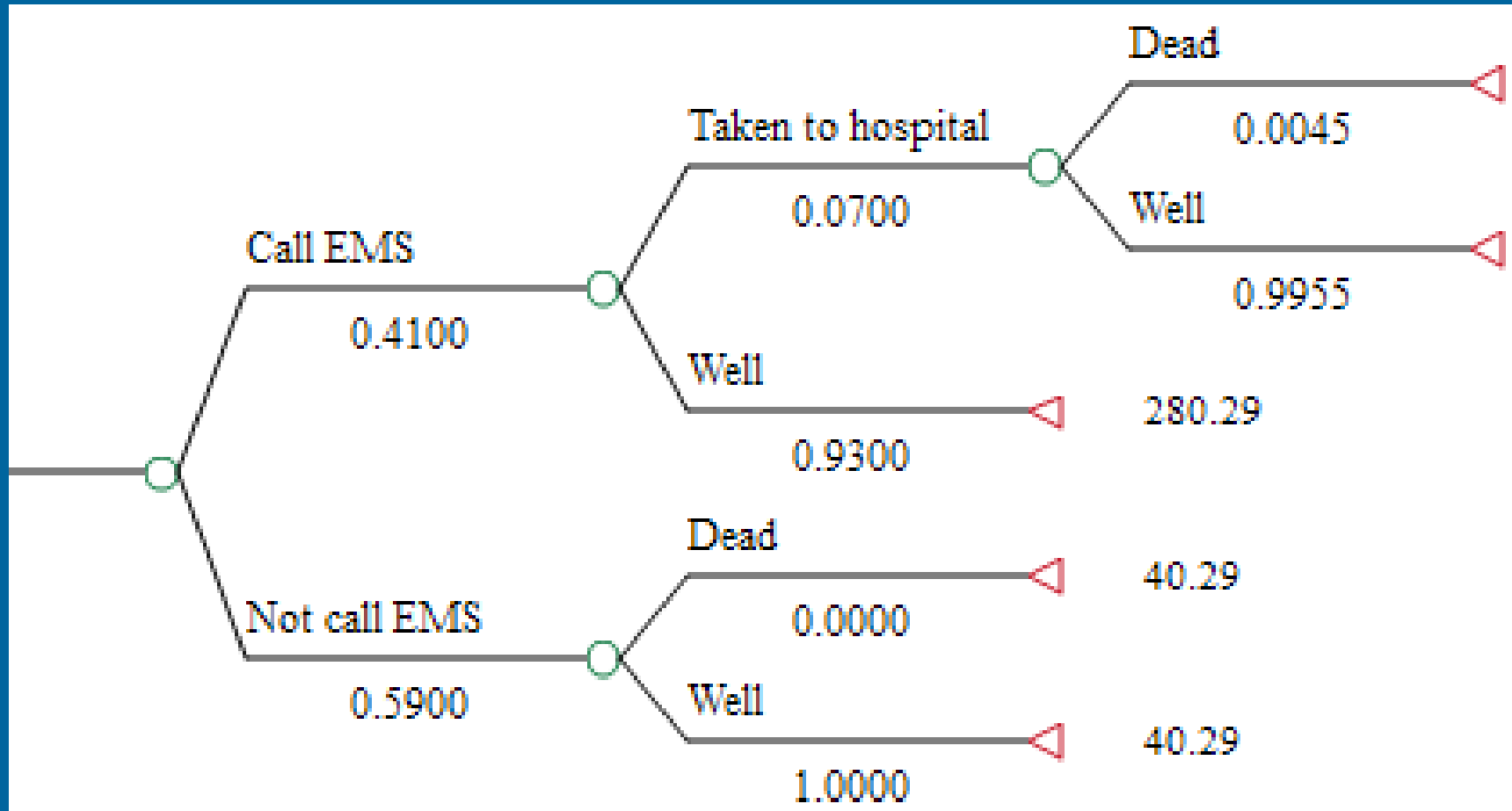
- Had a naloxone kit or not
- Injected naloxone or not
- Call EMS or not
- EMS injected naloxone or not
- Taken to hospital or not
- Final outcome: alive or dead



Decision Tree (repeated branch)



Decision Tree – Top Branch



Sensitivity Analyses (Highlights)

- Kit used 0.01: ICER= $14,323/life saved
- Kit used 1.00: ICER= -$1,283/life saved
- Controlling for EMS calling behaviours: ICER = - $721/ life saved
- All kit users called EMS: ICER = -$400/life saved
- EMS gives naloxone 1.00: ICER = -$404/ life saved

Table 1. Sensitivity Analysis: Probability of peers administering naloxone

Administer	Do not administer	Intervention		Standard treatment		ICER
0	1	549.00	0.72	508.33	0.72	-3.67×10^{17}
0.01	0.99	545.38	0.72	508.33	0.72	14323.02
0.03	**0.97**	**537.93**	**0.72**	**508.32**	**0.72**	**3814**
0.05	0.95	530.47	0.73	508.32	0.72	1712
0.07	0.97	523.02	0.73	508.32	0.72	811.21
0.09	0.91	515.56	0.74	508.32	0.72	310.77
0.1	0.9	511.83	0.74	508.32	0.72	136
0.11	0.89	508.11	0.75	508.32	0.72	-7.7
0.13	0.87	500.65	0.75	508.32	0.72	-228
0.23	0.77	463.38	0.78	508.32	0.72	-755
0.33	0.67	426.1	0.8	508.32	0.72	-963
0.43	0.57	388.82	0.83	508.32	0.72	-1074
0.53	0.47	351.55	0.85	508.32	0.72	-1143
0.63	**0.37**	**314.27**	**0.88**	**508.32**	**0.72**	**-1193**
0.73	0.27	277	0.91	508.32	0.72	-1225
0.83	0.17	239.72	0.93	508.32	0.72	-1251
0.93	0.07	202.45	0.96	508.32	0.72	-1271
1	0	176	0.98	508.32	0.72	-1283

Table 2. Sensitivity Analysis: Probability of peers calling EMS

Call	Do not call EMS	Intervention		Standard treatment		ICER
0	1	229.05	0.87	508.32	0.72	-1830.49
0.01	0.99	231.12	0.87	508.32	0.72	-1813.99
0.11	0.89	251.99	0.87	508.32	0.72	-1651.7
0.21	0.79	272.85	0.87	508.32	0.72	-1494.32
0.31	0.69	239.71	0.88	508.32	0.72	-1341.64
0.41	**0.59**	**314.56**	**0.88**	**508.32**	**0.72**	**-1193.44**
0.51	0.49	335.44	0.88	508.32	0.72	-1049.53
0.61	0.39	356.28	0.88	508.32	0.72	-909.72
0.71	0.29	377.16	0.89	508.32	0.72	-773.85
0.81	0.19	398.02	0.89	508.32	0.72	-641.75
0.91	0.09	418.88	0.89	508.32	0.72	-513.26
1	0	437.66	0.89	508.32	0.72	-400.6

Table 3. Sensitivity Analysis: EMS calling rate is held constant between treatment arms (with and without the naloxone kit)

Call EMS	Do not call EMS	Intervention		Standard treatment		ICER
0	1	40.27	0.6	0	0	66.74
0.05	0.95	62.29	0.62	33.89	0.05	51.17
0.15	0.85	109.32	0.67	101.67	0.14	14.81
0.175	0.825	120.83	0.67	118.83	0.17	4.41
0.185	**0.815**	**125.43**	**0.67**	**125.39**	**0.18**	**0.09**
0.2	0.8	132.33	0.68	135.55	0.19	-6.6
0.25	0.75	155.35	0.7	169.44	0.24	-30.69
0.35	0.65	201.38	0.74	237.22	0.33	-89.28
0.45	0.55	247.41	0.77	304.99	0.43	-167.6
0.55	0.45	293.44	0.81	372.77	0.53	-277.5
0.65	0.35	339.47	0.85	440.47	0.62	-443
0.75	**0.25**	**385.5**	**0.89**	**508.32**	**0.72**	**-720.6**
0.85	0.15	431.53	0.92	576.1	0.81	-1283
0.95	0.05	477.56	0.96	643.88	0.908	-3025
1	0	500.58	0.98	677.77	0.96	-6784

Table 4. Sensitivity Analysis: Probability of EMS administering naloxone

Administer	Do not administer	Intervention		Standard treatment		ICER
0	1	478.83	0.86	934.68	0.66	-2332
0.06	0.94	463.9	0.86	895.92	0.67	-2244.83
0.16	0.84	439.01	0.86	831.32	0.68	-2093.05
0.26	0.74	414.13	0.87	766.72	0.68	-1932.93
0.36	0.64	389.24	0.87	702.12	0.69	-1763.74
0.46	0.54	364.35	0.87	637.52	0.7	-1584.71
0.56	0.44	339.46	0.88	572.92	0.7	-1394.94
0.66	**0.34**	**314.58**	**0.88**	**508.32**	**0.72**	**-1193**
0.76	0.24	2889.69	0.88	443.73	0.72	-979.01
0.86	0.14	264.8	0.89	379.13	0.73	-750.609
0.96	0.04	239.91	0.89	314.53	0.74	-506.57
1	0	229.96	0.89	288.67	0.74	-404.23

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University of Toronto
Health Sciences Building, 155 College Street, Suite 425
Toronto, ON M5T 3M6 **Tel:** 416-978-4326 **Fax:** 416-978-7350
ihpme@utoronto.ca **www.ihpme.utoronto.ca**

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ihpme@utoronto.ca **www.ihpme.utoronto.ca**

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