



Institute of Health Policy, Management & Evaluation
UNIVERSITY OF TORONTO

A Cost-Effectiveness Study of Toronto Public Health's Preventing Overdose in Toronto (POINT) Program

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Overview

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

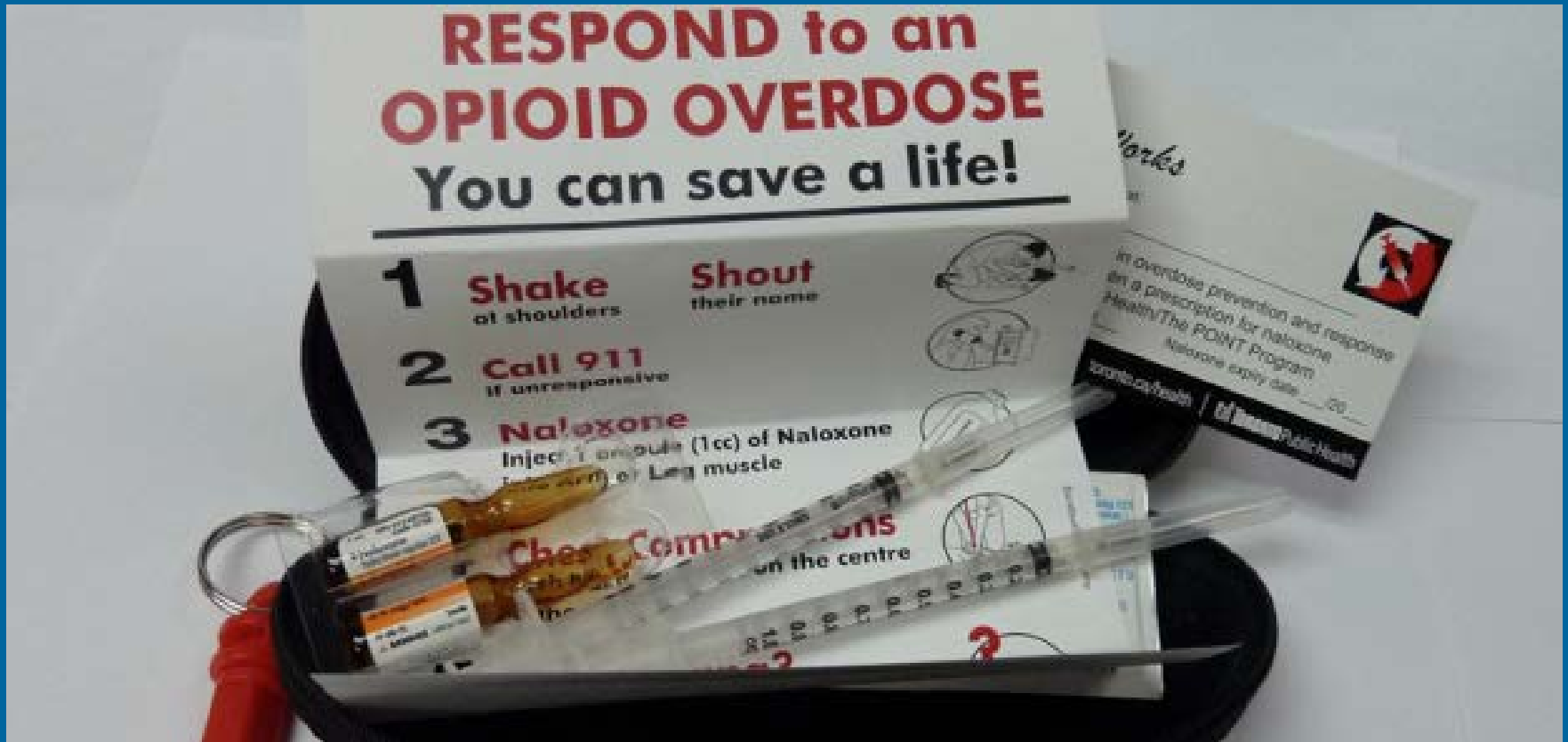
Background

- 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)

Acknowledgments

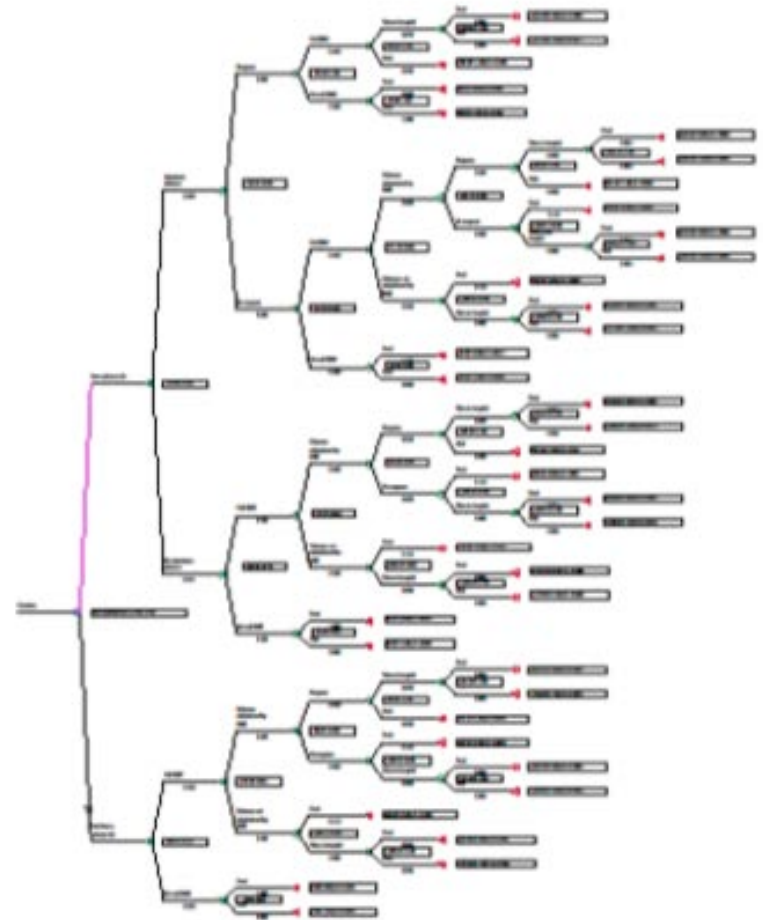
- Professor Audrey Laporte, IHPME
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Questions/Comments?

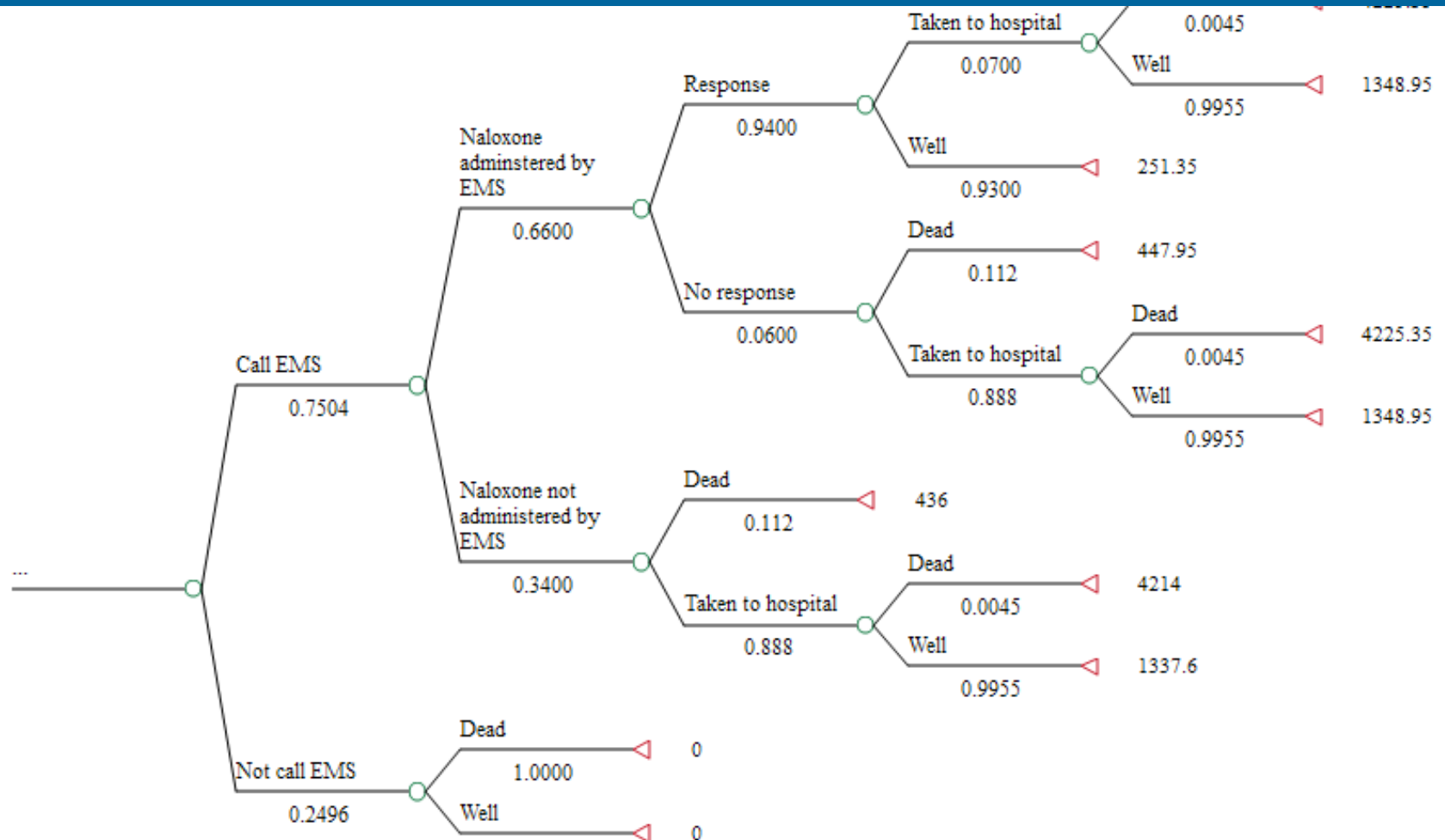
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Decision Tree

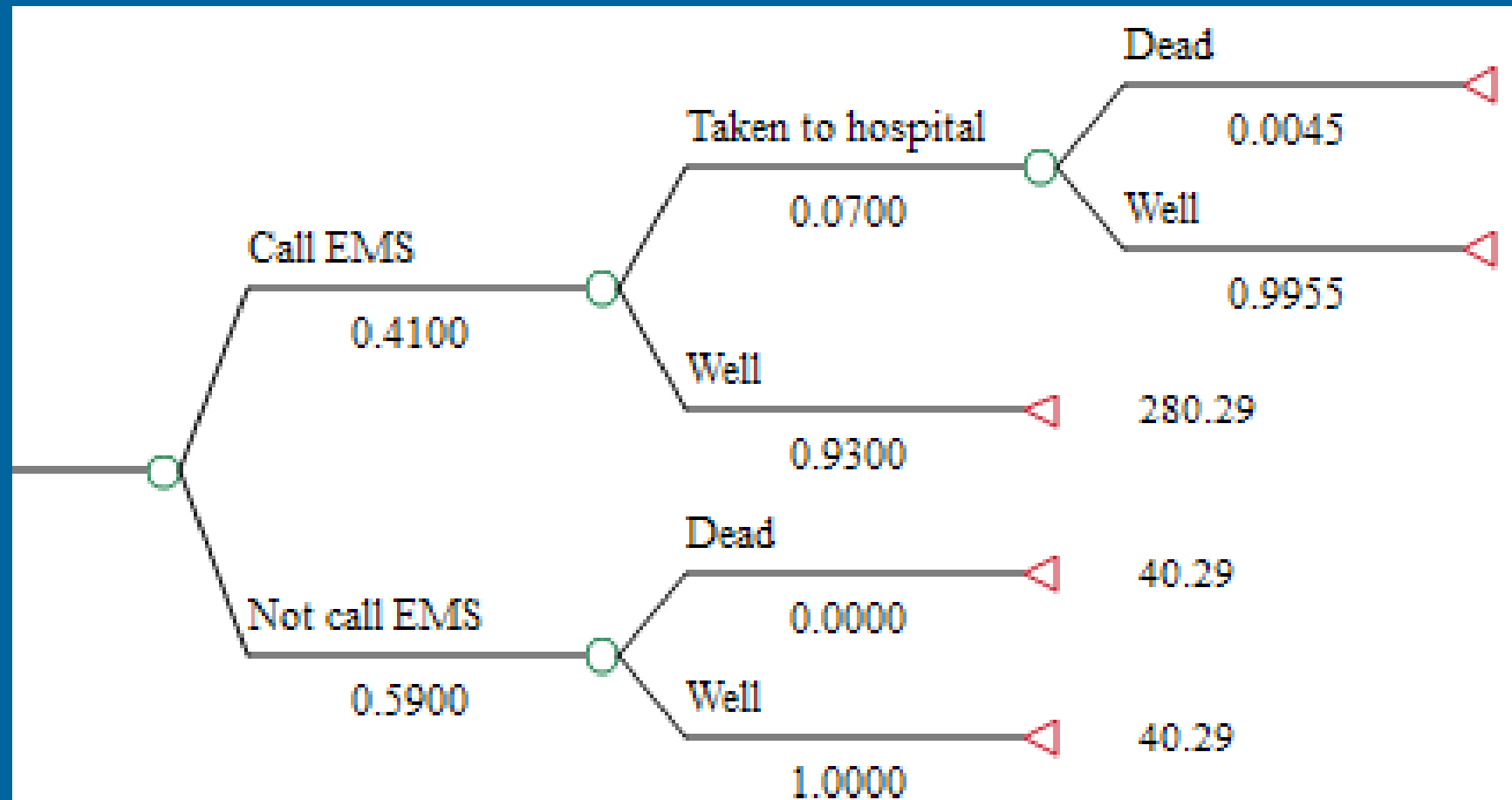
- Had a naloxone kit or not
- Injected naloxone or not
- Call EMS or not
- EMS injected naloxone or not
- Taken to hospital or not
- Final outcome: alive or dead



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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