



Considering criteria for active phase labor management of nulliparous women: a cost-effectiveness analysis

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Background

- Recommendations from ACOG for the safe prevention of primary cesarean delivery propose that cervical dilation of 6 cm should be considered the threshold for the active phase of labor.
- This is a change from considering 4 cm. ACOG also now considers active phase labor arrest after 4 hours of no cervical progression, a change from 2 hours.

Objective

This study seeks to evaluate differences in maternal and neonatal outcomes based on updated criteria for defining active labor and to determine if these recommendations are cost effective.

Materials & Methods

- A model was created using TreeAge software.
- We compared outcomes and costs associated with defining active phase at 6 cm versus 4 cm and considering arrest after 2 hours versus 4 hours of no cervical progression. It was assumed that women with active phase arrest were delivered via cesarean.
- All model inputs were obtained from the literature.
- A willingness-to-pay (WTP) threshold was set at \$100,000 per quality adjusted life-year (QALY).
- Sensitivity analyses were performed to determine the robustness of the baseline assumptions.

Table 1. Probability of Continued Cervical Dilation in Nulliparous Women

Cervical Dilation	Probability of progressing in 2 hours	Probability of progressing in 4 hours
3 cm to 4 cm	52.4%	75.5%
4 cm to 5 cm	60.6%	85.3%
5 cm to 6 cm	95.2%	99.9%
6 cm to 7 cm	96.0%	99.9%
7 cm to 8 cm	99.7%	99.9%
8 cm to 9 cm	99.9%	99.9%
9 cm to 10 cm	99.0%	99.9%

Adapted from Zhang et. al., 2018

Results

Table 2. Comparing active phase starting at 4 cm versus 6 cm, with 4 hour-time interval before calling arrest in a theoretical cohort of 1.4 million women

	Active Phase begins at 4 cm, wait 4 hours	Active Phase begins at 6 cm, wait 4 hours	Difference
Cesarean Delivery	462,702	308,080	- 154,622
Maternal Death	12	9	- 3
Postpartum Hemorrhage with Transfusion	23,601	23,542	- 59
Endometritis	47,595	33,865	- 13,730
Shoulder Dystocia	1,164	1,364	+ 200
Permanent Brachial Plexus Injury	40	47	+7
Cost (in thousands, USD)	16,314,005	16,248,831	- 65,174
Effectiveness (in thousands, QALYs*)	77,306	77,315	+ 9
Strategy	Dominated	Dominant +	

+ In cost-effectiveness analysis, dominant strategies result in lower cost and higher effectiveness.

Table 3. Comparing active phase starting at 4 cm versus 6 cm, with 2 hour-time interval before calling arrest in a theoretical cohort of 1.4 million women

	Active Phase begins at 4 cm, wait 2 hours	Active Phase begins at 6 cm, wait 2 hours	Difference
Cesarean Delivery	784,955	411,287	- 373,668
Maternal Death	18	11	- 7
Postpartum Hemorrhage with Transfusion	23,725	23,582	- 143
Endometritis	76,210	43,030	- 33,180
Shoulder Dystocia	746	1,231	+ 485
Permanent Brachial Plexus Injury	26	42	+ 16
Cost (in thousands, USD)	17,244,556	16,263,264	- 981,292
Effectiveness (in thousands, QALYs*)	77,287	77,309	+ 22
Strategy	Dominated	Dominant +	

+ In cost-effectiveness analysis, dominant strategies result in lower cost and higher effectiveness.

Figure 1. Schematic of Tree Diagram

All branches not terminating in a triangle are collapsed to facilitate display and are the same as branches already open.

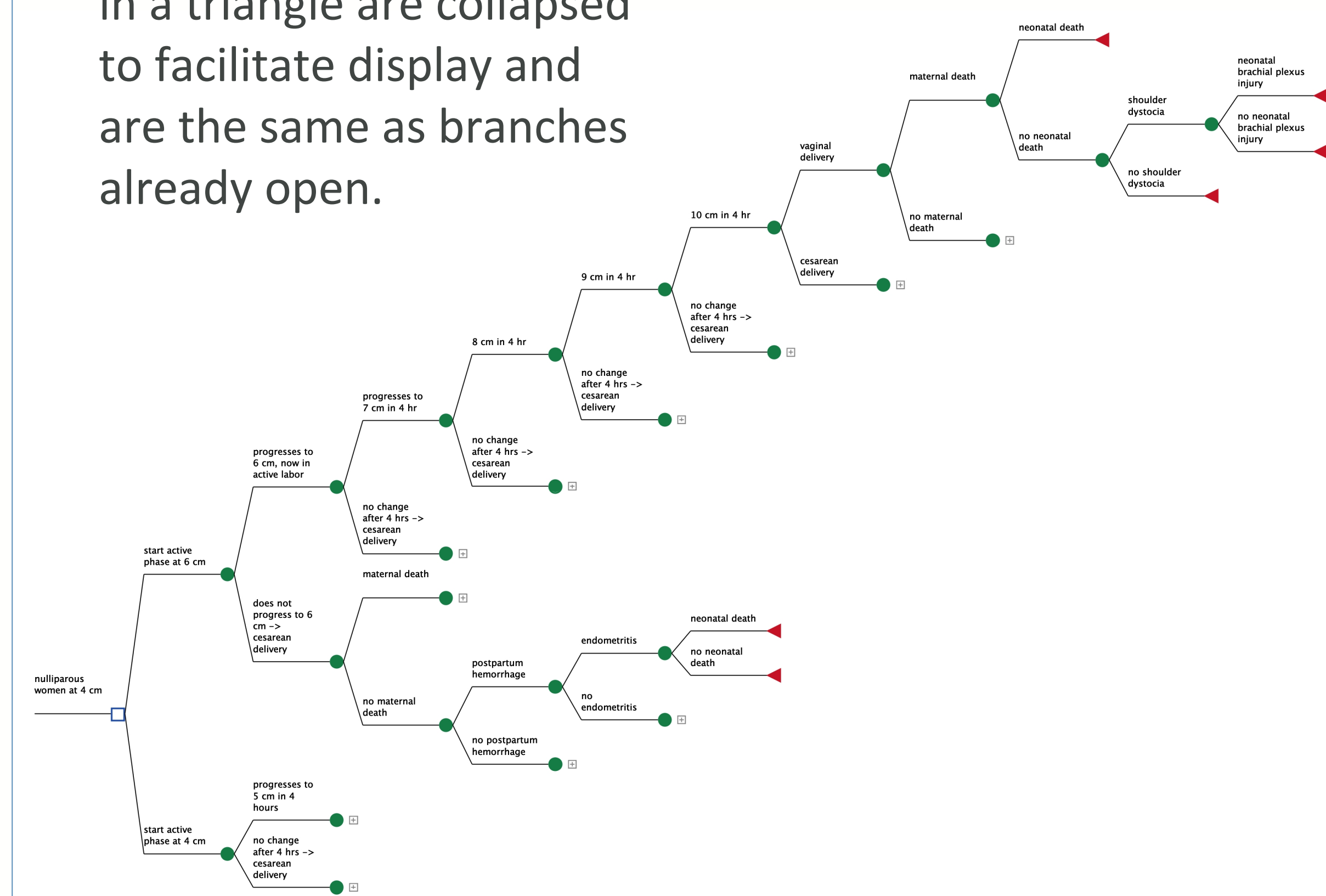
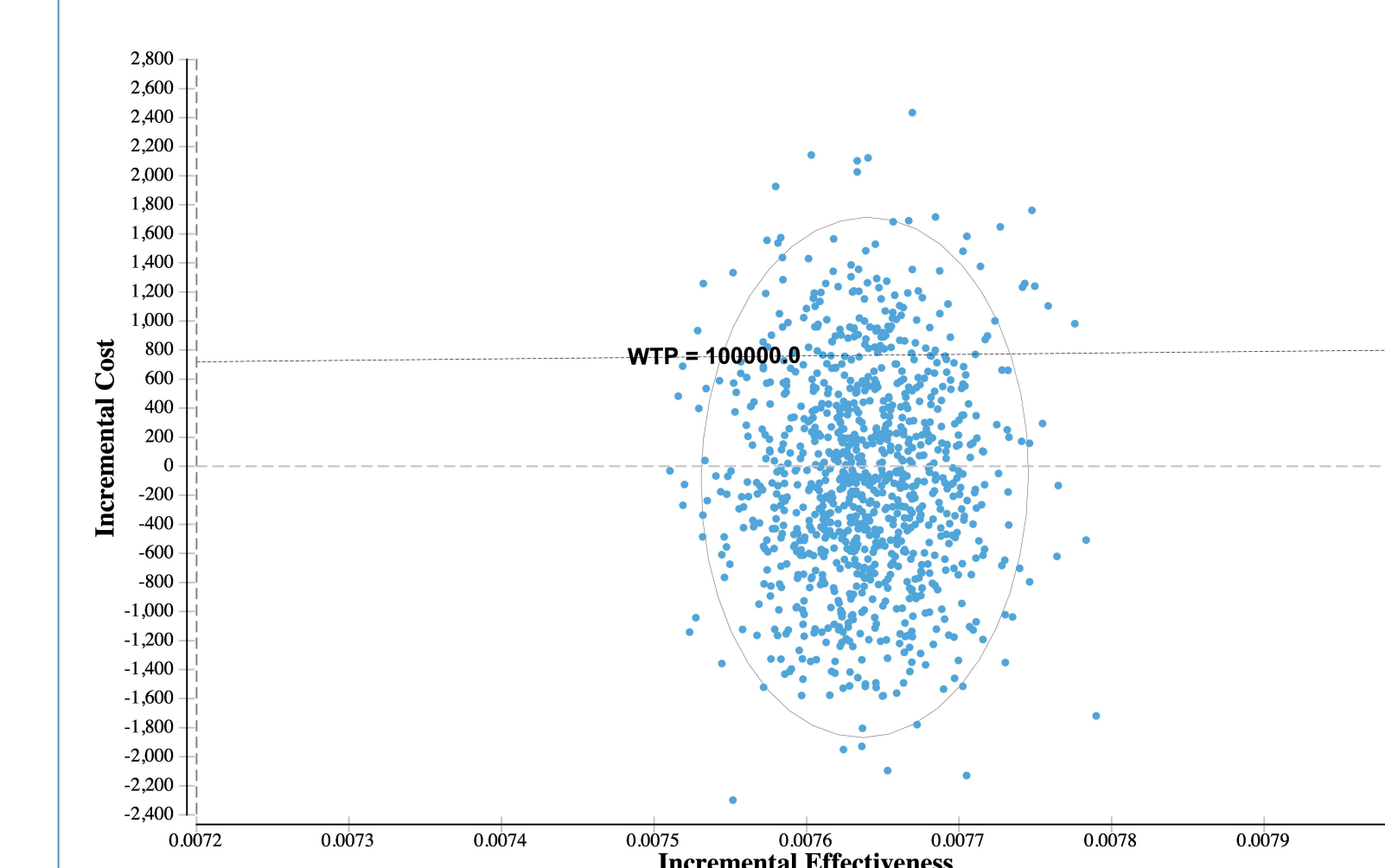


Figure 2. Monte Carlo analysis



When variation was incorporated, considering 6 cm as the threshold for the active phase was the cost-effective strategy 87% of the time.

Conclusion

Both considering 6 cm of cervical dilation as the threshold for the active phase of labor and increasing the time threshold for diagnosing active phase labor arrest are cost-effective strategies for decreasing primary cesarean rates and improving overall outcomes.