Appendix 1. References Used for the Priors

References	Country	Context	N	OR (IC95%)
Gynecol Obstet Invest 2009;67:113-7. (Ennen)	USA	Preterm, Term and Post-Term Patients Undergoing Induction of Labor with an Unfavorable Cervix	613 vaginal deliveries 292 cesarean sections	Nulliparity: OR = 4.4 [2.8-7.0] Primiparity: OR = 0.9 [0.5-1.7] Hypertension: OR = 1.2 [0.9-1.6] Diabete: OR = 2.0 [1.3-3.0] Intrauterine growth restriction: OR = 1.7 [1.0-2.9] Oligohydramnios: OR = 1.1 [0.8-1.6] Nonreassuring fetal status : OR = 1.6 [0.8-3.0]
Obstet Gynecol 2015;126:1059-68. (Tolcher)	USA	Induction of Labor Among Nulliparous Women at Term	554 vaginal deliveries 231 cesarean sections	Nonmedical indication: OR = 1.1 [0.5-2.6] Hypertension: OR = 1.4 [1.0-2.1] Diabete: OR = 1.9 [1.1-3.5] Oligohydramnios: OR = 1.1 [0.6-1.9] Nonreassuring fetal status: OR = 0.8 [0.3-2.5] Rupture of membranes: OR = 1.6 [1.0-2.5] Initial cervical dilation: OR closed = 3.1 [1.8-5.2]

Jochum F, Le Ray C, Blanc-Petit Jean P, Langer B, Meyer N, Severac F, et al. Externally validated score to predict cesarean delivery after labor induction with cervical ripening. Obstet Gynecol 2019;134.

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OR 1 to 2 cm = 2.1 [1.3-3.2]

Initial cervical effacement:

OR above 2cm = 2.0 [1.4-3.0]

OR 1 to 2 cm = 1.1 [0.7-1.6]

Initial fetal head station:

OR mobile = 1.7 [1.1-2.9]

OR applied = 1.2 [0.9-1.7]

Obstet Gynecol. 2009
Aug;114(2 Pt 1):261-7
(Pevzner)

USA

Induction With
Dinoprostone and
Misoprostol Vaginal
Inserts

916 vaginal deliveries
358 cesarean sections

Nonmedical indication: OR = 2.9 [1.9-4.6]

Hypertension: OR = 1.4 [1.0-1.9]

Diabete: OR = 1.2 [0.8-1.8]

Oligohydramnios: OR = 1.0 [0.6-1.4]

Rupture of membranes: OR = 1.6 [0.8-3.2]

Am J Obstet
Gynecol. 2018
Feb;218(2):254.e1-254.e7.
(Levine)

USA

Induction of labor with
an unfavorable cervix

355 vaginal deliveries
136 cesarean sections

Hypertension: OR = 1.1 [0.7-1.7]

Nonmedical indication: OR = 2.0 [1.0-4.4]

Diabete: OR = 1.6 [0.8-3.0]

Gestational age at delivery:

OR 38+0-38+6 weeks = 0.8 [0.4-1.6]

OR 39+0-39+6 weeks = 0.9 [0.5-1.8]

OR 40+0-40+6 weeks = 1.8 [1.0-3.4]

OR >41 weeks = 4.2 [2.2-7.9]

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Body mass index:

OR overweight = 1.0 [0.4-2.8]

OR class 1 obesity = 1.0 [0.4-2.8]

OR class 2 and 3 obesity = 2.2 [0.9-5.7]

Height:

OR < 160cm = 1.6 [0.9-2.9]

OR 160-165cm = 1.7 [1.0-2.9]

OR 165-170cm = 0.9 [0.5-1.5]

Obstet Gynecol. 2005 Apr;105(4):690-7. (Vrouenraets)	Netherlands	Induction of Labor in Nulliparous Women	1441 vaginal deliveries 239 cesarean sections	Nonmedical indication: OR = 1.0 [0.7-1.5]
Cochrane Database of Systematic Reviews 2003;Issue 1. (Hofmeyr)	South Africa Switzerland	Induction of labor with an unfavorable cervix	28 studies 5832 participants	Misoprostol vs vaginal prostaglandin: RR = 1.0 [0.9-1.1]
Cochrane Database of Systematic Reviews 2012, Issue 3. Art. No.: CD001233. (Jozwiak)	Netherlands United Kingdom Switzerland	Induction of labor in all women	19 studies 3302 participants	Balloon catheter vs prostaglandin: RR = 1.0 [0.9-1.1]

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Appendix 2. Method of Constructing Priors

The prior was constructed using a Gaussian distribution with average “ μ ” and standard deviation “ σ ,” denoted $N(\mu; \sigma)$. The average corresponded to the $\log(\text{OR})$ originating from the literature, and the standard deviation was calculated based on the published confidence interval and weighted by a fixed parameter (between 2 and 8) determining the amount of historical data to be included in the analysis of current data. If necessary, hierarchical models were used to combine the effects from different publications.

When no information was available, we used non-informative priors centered on the value 0 with a wide standard deviation, $N(0; 2.6)$: this corresponded to a prior distribution indicating an OR with 95% probability in the interval $[1/152; 152]$.

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Appendix 3. Maternal and Induction Characteristics in the Derivation and Internal Validation Sets

Characteristic	Derivation set (n=1024)	Missing data	Internal validation set (n=668)	Missing data
Median maternal age, years	30 (27-34)	0 (0%)	31 (27-34)	0 (0%)
Median height, cm	165 (160-169)	30 (2.9%)	165 (160-169)	18 (2.7%)
Median BMI, kg/m2	23 (21-28)	44 (4.3%)	24 (21-28)	24 (3.6%)
Median parity	0 (0-1)	0 (0%)	0 (0-1)	0 (0%)
Median gestational age at delivery, weeks	40.0 (38.7-41.3)	0 (0%)	40.1 (38.9-41.3)	0 (0%)
Indication for induction		1 (0.1%)		0 (0%)
Non-medical	23 (2.3%)		12 (1.8%)	
Hypertensive disorder	115 (11.2%)		80 (12.0%)	
Premature rupture of membranes	258 (25.2%)		158 (23.7%)	
Suspicion of macrosomia	38 (3.7%)		26 (3.9%)	
Anomaly of fetal vitality	161 (15.7%)		114 (17.1%)	
Other	429 (41.9%)		278 (41.6%)	
Cervical dilation at induction, cm		29 (2.8%)		22 (3.3%)
Closed	23 (23.2%)		189 (29.3%)	
1 to 2	738 (74.2%)		447 (69.2%)	
3 to 4	26 (2.6%)		10 (1.6%)	
Station at induction		42 (4.1%)		24 (3.6%)
Mobile	426 (43.4%)		273 (42.5%)	
Applied	485 (49.4%)		324 (50.5%)	
Fixed	71 (7.2%)		45 (7.0%)	

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Effacement at induction, cm		31 (3.0%)		26 (3.9%)
Above 2	288 (29.0%)		182 (28.3%)	
1 to 2	641 (64.6%)		430 (66.8%)	
Lower than 1	64 (6.5%)		32 (5.0%)	
Cervical position at induction, cm		33 (3.2%)		23 (3.4%)
Posterior	780 (78.7%)		510 (79.1%)	
Mild-position	189 (19.1%)		128 (19.8%)	
Anterior	22 (2.2%)		7 (1.1%)	
Cervical consistency at induction		43 (4.2%)		28 (4.2%)
Firm	411 (41.9%)		278 (43.4%)	
Medium	424 (43.2%)		276 (43.1%)	
Soft	146 (14.9%)		86 (13.4%)	
Method of cervical ripening		0 (0%)		0 (0%)
Prostaglandin (PGE2)	906 (88.5%)		591 (88.5%)	
Misoprostol	68 (6.6%)		42 (6.3%)	
Mechanical	50 (4.9%)		35 (5.2%)	

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Appendix 4. Discriminative Performance of the Model With Sensitivity Analysis for Priors

	AUC Derivation set	AUC Internal validation set	AUC External validation set
Score with no informative priors	0.77 [0.73-0.80]	0.73 [0.69-0.77]	0.80 [0.78-0.81]
Score with poor informative priors	0.76 [0.73-0.80]	0.73 [0.69-0.77]	0.81 [0.79-0.82]
Score with strong informative priors	0.76 [0.73-0.79]	0.74 [0.70-0.78]	0.81 [0.79-0.82]

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