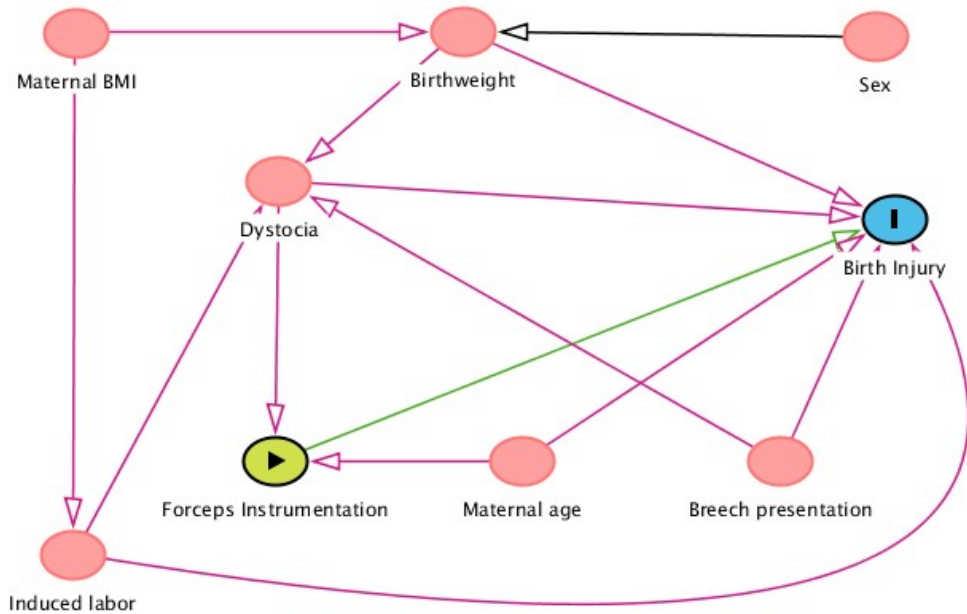**Supplementary Figure S1. Directed Acyclic Graphs (DAG) for causal inference and codes.** Directed Acyclic Graphs and codes for the study of causal inference for potential risk factors. Other variables of interest that finally showed not significant influence on results are not showed, but are available to readers on request.

1a. Instrumentation (Forceps).

Minimal sufficient adjustment sets for estimating the total effect of Forceps Instrumentation on Birth Injury:
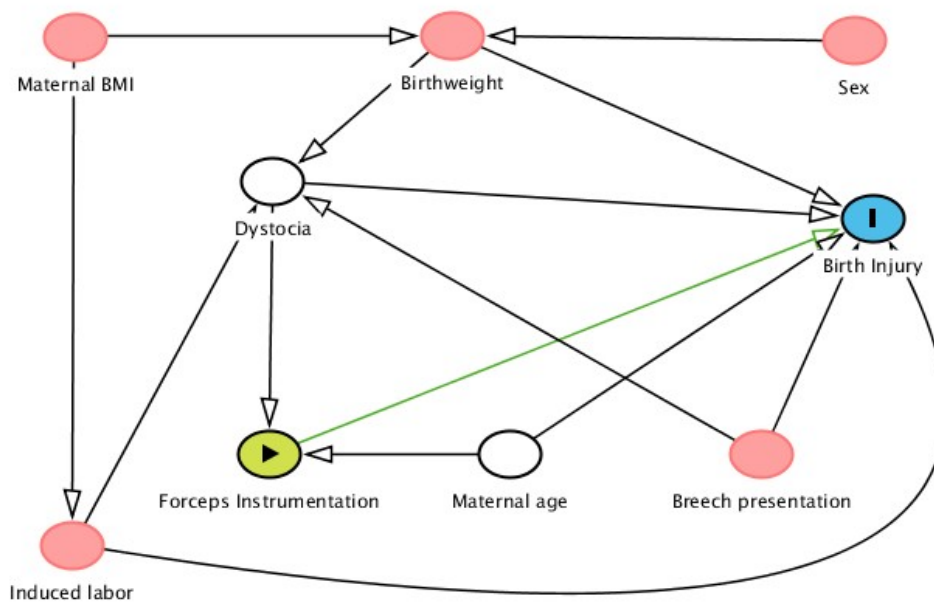
- Dystocia, Maternal age

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [exposure,pos="0.289,0.614"]
"Induced labor" [pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
```

1

"Maternal age" -> "Birth Injury"

"Maternal age" -> "Forceps Instrumentation"

Birthweight -> "Birth Injury"

Birthweight -> Dystocia

Dystocia -> "Birth Injury"

Dystocia -> "Forceps Instrumentation"

Sex -> Birthweight

}

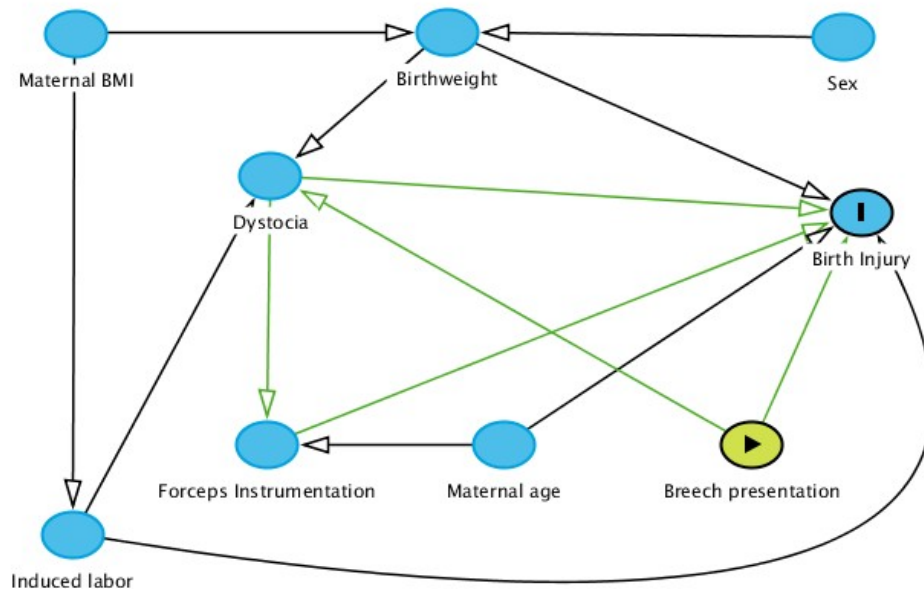**1b. Instrumentation (Forceps) adjusted.**

Code:
```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [exposure,pos="0.289,0.614"]
"Induced labor" [pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [adjusted,pos="0.454,0.614"]
Birthweight [pos="0.415,0.258"]
Dystocia [adjusted,pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
```

Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
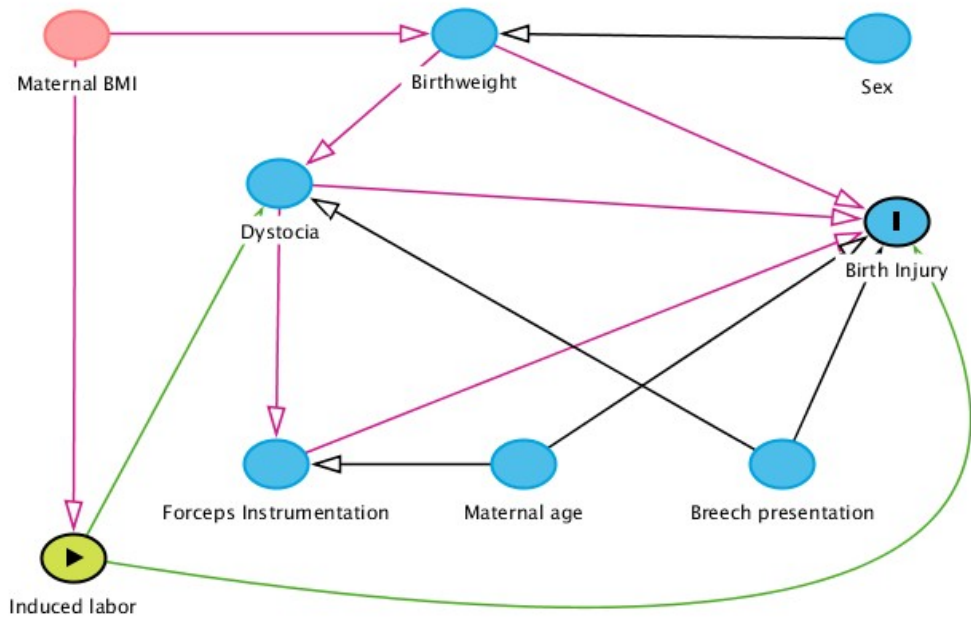}

2a. Breech presentation.

No adjustment is necessary to estimate the total effect of Breech presentation on Birth Injury.

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [exposure,pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```
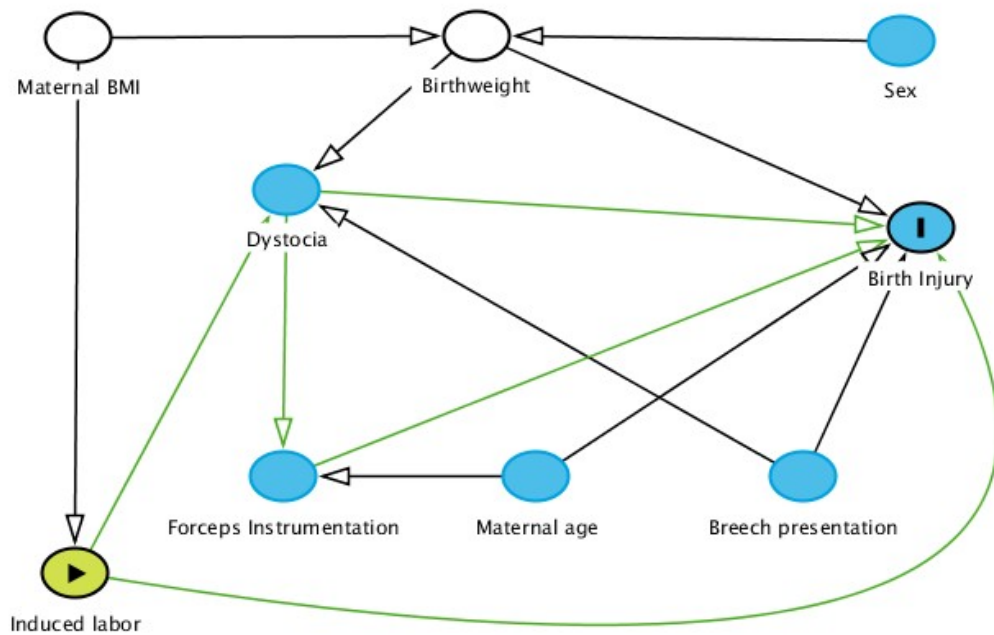
3a. Induced labor.

Minimal sufficient adjustment sets for estimating the total effect of Induced labor on Birth Injury:

- Birthweight
- Maternal BMI

Code:
```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [exposure,pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```
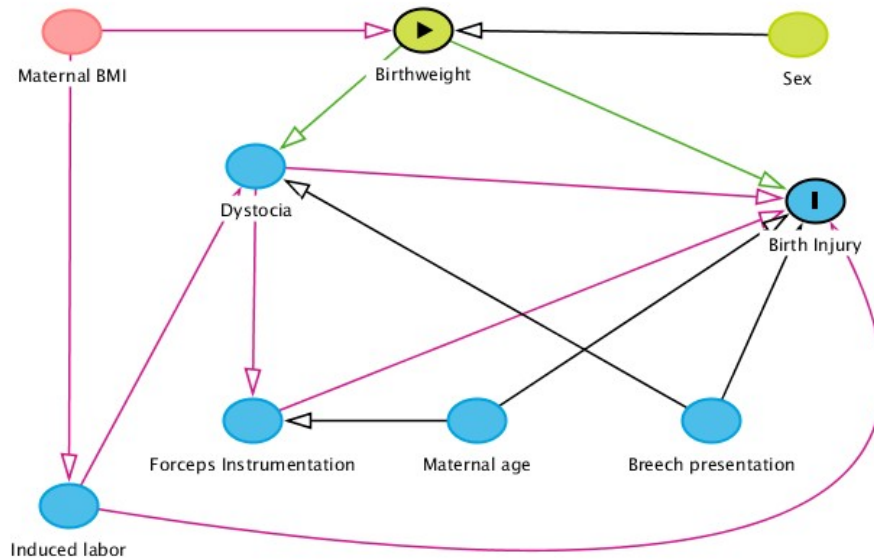**3b. Induced labor adjusted.**

Code:
```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [exposure,pos="0.154,0.692"]
"Maternal BMI" [adjusted,pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [adjusted,pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```
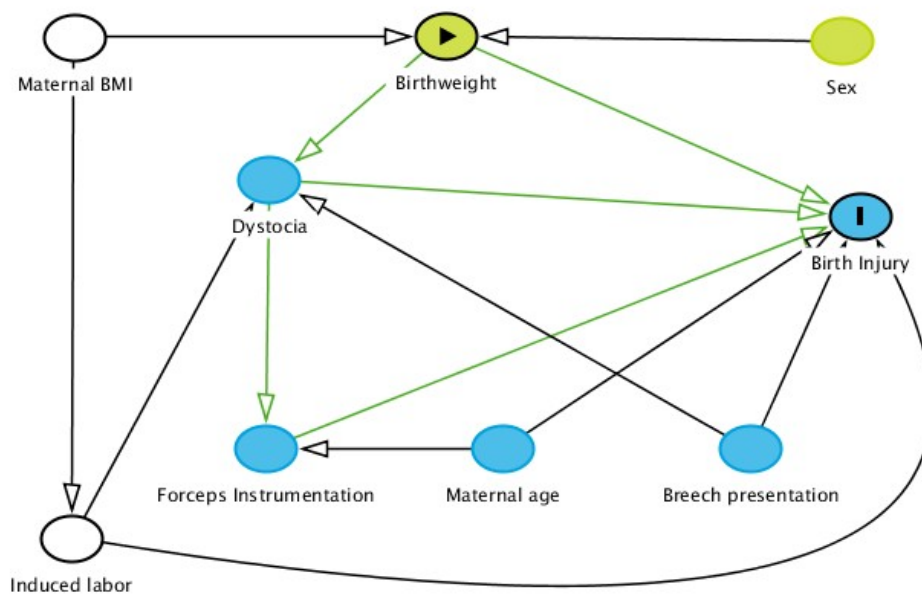**4a. Birthweight.**

Minimal sufficient adjustment sets for estimating the total effect of Birthweight on Birth Injury:

- Induced labor
- Maternal BMI

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [exposure,pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```
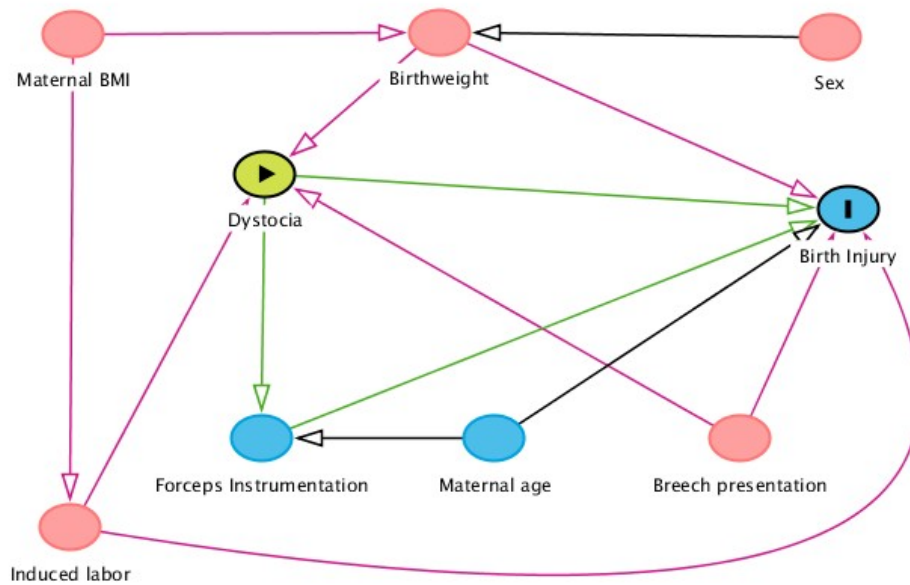
4b. Birthweight adjusted.

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [adjusted,pos="0.154,0.692"]
"Maternal BMI" [adjusted,pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [exposure,pos="0.415,0.258"]
Dystocia [pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```

5a. Dystocia.

Minimal sufficient adjustment sets for estimating the total effect of Dystocia on Birth Injury:
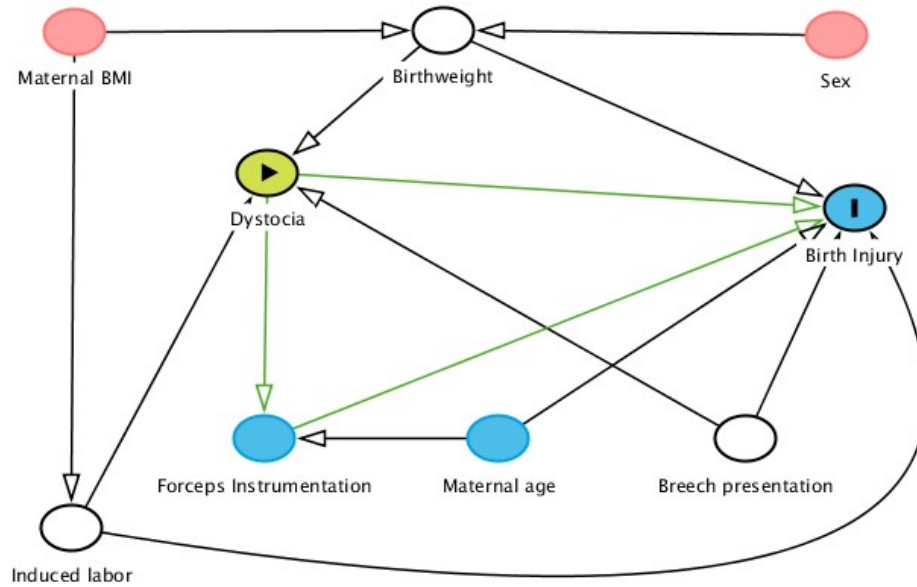
- Birthweight, Breech presentation, Induced labor.

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [pos="0.415,0.258"]
Dystocia [exposure,pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```

5b. Dystocia adjusted.

Code:

```
dag {
bb="0,0,1,1"
"Birth Injury" [outcome,pos="0.704,0.413"]
"Breech presentation" [adjusted,pos="0.627,0.614"]
"Forceps Instrumentation" [pos="0.289,0.614"]
"Induced labor" [adjusted,pos="0.154,0.692"]
"Maternal BMI" [pos="0.156,0.259"]
"Maternal age" [pos="0.454,0.614"]
Birthweight [adjusted,pos="0.415,0.258"]
Dystocia [exposure,pos="0.292,0.382"]
Sex [pos="0.691,0.262"]
"Breech presentation" -> "Birth Injury"
"Breech presentation" -> Dystocia
"Forceps Instrumentation" -> "Birth Injury"
"Induced labor" -> "Birth Injury" [pos="0.901,0.840"]
"Induced labor" -> Dystocia
"Maternal BMI" -> "Induced labor"
"Maternal BMI" -> Birthweight
"Maternal age" -> "Birth Injury"
"Maternal age" -> "Forceps Instrumentation"
Birthweight -> "Birth Injury"
Birthweight -> Dystocia
Dystocia -> "Birth Injury"
Dystocia -> "Forceps Instrumentation"
Sex -> Birthweight
}
```

Legend of Figures:

exposure

outcome

ancestor of exposure

ancestor of outcome

ancestor of exposure *and* outcome

adjusted variable

unobserved (latent)

other variables

causal path

biasing path

Supplementary Table S1. Risk of Birth Trauma for different variables and/or interventions. Adjusted Odds Ratios (aOR) are shown together with the E-values for point estimate and the limit of the confidence interval closest to null. For Breech presentation the unadjusted OR is shown (see text and Table 4).

Survival and Survival without morbidity	Adjusted Odds Ratio (95% CI)	E-value for point estimate	E-value for the limit of the CI closest to null
Breech presentation [a]	10.6 (1.2, 92.6) *	20.69	1.69
Forceps instrumentation	3.1 (1.0, 9.1)	5.59	1.24
Dystocia	7.8 (3.8, 16.2)	15.14	7.02
Induced labour	3.0 (1.6, 5.5)	5.41	2.64
Birthweight (for each 100 g)	1.1 (1.0, 1.2)	1.43	1.21

[*] No true confounders for Breech presentation were found, so the unadjusted OR is shown.1