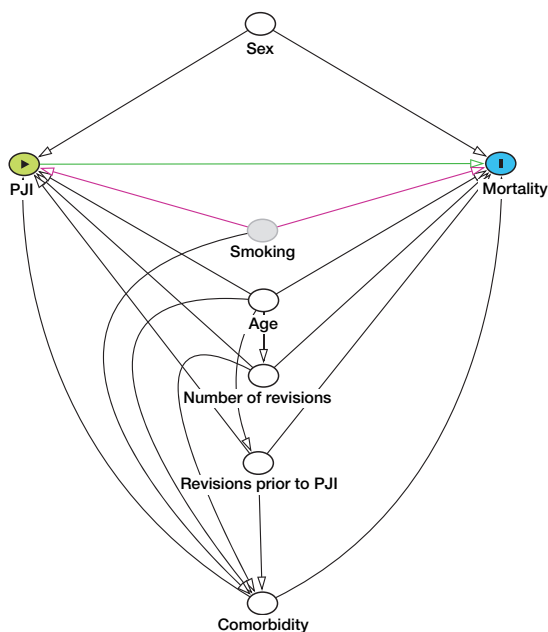# Supplementary data

The directed acyclic graph (DAG) that was used to justify the selection and definition of confounder variables.

Mediation analysis

```
library(mediation)
> library(survival)
> clean_data <- clean_data |>
+  mutate(infection_exposure = Revision_type == "Prosthetic Joint
Infection")
>
> sfit <- survreg(Surv(FupTime, Dead) ~ infection_exposure + Age_
decade +  Comorbidity_GRP +
+          Sex + prior_revisions + Revisions,
+          data = clean_data,
+          dist = "loglogistic")
>
> age_med_fit <- glm(Age_decade ~ infection_exposure + Sex +
+          Comorbidity_GRP + prior_revisions + Revisions,
+          data = clean_data)
>
> mediation <- list()
> mediation$age <- mediate(model.m = age_med_fit,
+          model.y = sfit,
+          treat = "infection_exposure",
+          mediator = "Age_decade",
+          sims = 1000)
>
> cmrbdt_med_fit <- MASS::polr(Comorbidity_GRP ~ infection_
exposure + Sex + Age_decade + prior_revisions + Revisions,
```

```
+                 data = clean_data,
+                 method = "probit",
+                 Hess = TRUE)
>
> mediation$comorbidity <- mediate(model.m = cmrbdt_med_fit,
+                 model.y = sfit,
+                 treat = "infection_exposure",
+                 mediator = "Comorbidity_GRP",
+                 sims = 1000)
>
> lapply(mediation, summary)
$age
```

Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

	Estimate	(CI)	P value
ACME (control)	-1.294	-2.250 to -0.39	0.002 **
ACME (treated)	-1.188	-2.077 to -0.36	0.002 **
ADE (control)	-1.910	-3.524 to -0.38	0.016 *
ADE (treated)	-1.805	-3.332 to -0.36	0.016 *
Total Effect	-3.098	-4.813 to -1.39	<0.001 ***
Prop. Mediated (control)	0.423	0.154 to 0.82	0.002 **
Prop. Mediated (treated)	0.385	0.136 to 0.80	0.002 **
ACME (average)	-1.241	-2.148 to -0.37	0.002 **
ADE (average)	-1.858	-3.402 to -0.37	0.016 *
Prop. Mediated (average)	0.404	0.144 to 0.81	0.002 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Sample Size Used: 16467

Simulations: 1000

$comorbidity

Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

	Estimate	(CI)	P value
ACME (control)	-2.700	-3.343 to -2.13	<0.001 ***
ACME (treated)	-2.475	-3.098 to -1.94	<0.001 ***
ADE (control)	-2.366	-4.289 to -0.42	0.026 *
ADE (treated)	-2.141	-3.925 to -0.38	0.026 *
Total Effect	-4.841	-6.814 to -2.89	<0.001 ***
Prop. Mediated (control)	0.557	0.398 to 0.89	<0.001 ***
Prop. Mediated (treated)	0.511	0.338 to 0.87	<0.001 ***
ACME (average)	-2.587	-3.184 to -2.03	<0.001 ***
ADE (average)	-2.253	-4.107 to -0.40	0.026 *
Prop. Mediated (average)	0.534	0.367 to 0.88	<0.001 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Sample Size Used: 16467

Simulations: 1000