**Can vertical integration reduce hospital readmissions? A difference-in-differences approach**

**Supplementary Digital Content**

**Appendix 2 – Difference-in-differences model**

**In our study we used a difference-in-differences technique to estimate the independent effect of the change to a vertically integrated unit on hospital readmissions. We studied the impact of vertical integration at an overall level (all institutions, all conditions), at each unit of intervention (each hospital, all conditions), and for specific groups of patients (all institutions, each of 5 selected conditions). We used a logistic regression, admission was the unit of observation and our models were estimated with robust standard errors clustered at the hospital level. The difference-in-differences model is represented by the equation below.**

$$logit [Prob(Readmission\_{itj}=1)]= b\_{0}+ b\_{1} Post\_{t}+ b\_{2} VertInt\_{j}+ b\_{3} Post\_{t}\*VertInt\_{j}+ Covariates\_{i}+ ε\_{itj}$$

***Readmissionitj* denotes if admission *i* admitted in the period before or after vertical integration *t* to providers where vertical integration occurred or not *j* was readmitted (1: readmitted; 0: otherwise).**

***Postt* indicates if admission occurred after vertical integration (value 1) or not (0), for admissions in hospitals transitioned to a vertically integrated unit. For admissions in the control group, we used date of vertical integration as reference date whenever possible (individual hospital analyses), otherwise we used the dataset midpoint.**

***VertIntj* denotes if admission occurred at a hospital transitioned to a vertically integrated unit (value 1) or not (0).**

***Postt\*VertIntj* is the interaction of the two indicator variables (*Postt* and *VertIntj*). The coefficient for this variable (*b3*) gives an estimate of the independent effect of vertical integration on readmissions.**

***Covariatesi* includes 3 variables on admission *i* to address potential sources of bias. For each admission, it includes the individual risk of readmission, hospital of admission, and a continuous time variable. The individual risk of readmission was based on age, disease, and comorbidities, a detailed description of this variable can be found at Appendix 3. Hospital of admission is a vector of hospital indicators (12 institutions included). The continuous time variable was computed by the difference in months between date of admission and date of vertical integration (or dataset midpoint, when applicable).**

***εitj* is the error term.**

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