

Appendix Model

Below is the generalized linear mixed model used in analysis.

$$\begin{aligned} \text{logit}(y_{krmlnij}) = & \beta_0 + \beta_1 \text{female} + \beta_k \text{age}_k + \beta_r \text{race}_r + \beta_m \text{payor}_m + \beta_l \text{LOS}_l + \beta_n \text{year}_n \\ & + \gamma_0 H_RISK + \gamma_n \text{year}_n \times H_RISK + h_j + \varepsilon_{ij}, \end{aligned}$$

where $k = 1,2,3,4$; $r = 1,2$; $m = 1,2,3,4$; $l = 1,2,3$;

$n = 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019$.

In this model, *H-RISK* is a continuous variable, and *female*, *age_k*, *race_r*, *payor_m*, *LOS_l*, and *year_n* are indicator variables representing gender, age, race, payor, LOS, and year as categorical data. On the left side of the model, *y_{krmlnij}* is a binary response variable representing observation status for patient *i* who is in age group *k*, race group *r*, payor group *m*, LOS group *l*, year group *n*, and treated at hospital *j*. White males with In-State Medicaid (Managed Care) who are 1-5-year-old, and have 1 day as LOS in 2010 serve as the reference group. The association of resource intensity scores with observation admission in 2010 is denoted by γ_0 . When γ_0 is estimated to be a negative value, it can be interpreted as “one unit increase in *H-RISK* is associated with an $\exp(\hat{\gamma}_0)$ lower odds of being an observation stay in 2010”. The interaction terms between *year_n* and *H-RISK* are employed to assess if the association of resource intensity scores and observation admission is consistent across years. When a specific interaction term (γ_n) is statistically significant, it indicates that the association of resource intensity scores with observation admission in *year_n* is significantly different from the association in 2010.