Supplemental Digital Content 4 GEE models for the association between insulin initiation and within-person change in inpatient stays within 12 months before and after insulin initiation stratified by under vs. over 45 years of age

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| --- | --- | --- |
| Parameter  | Univariate Model | Multivariable model |
| RR (95% CI) | p-value | RR (95% CI) | p-value |
| **Inpatient stays, aged ≤ 45 years**‡ |  |  |  |  |
| Non-insulin users\*: After vs. before insulin initiation  | 0.89 (0.80, 0.98) | 0.02 | 1.51 (0.98, 2.32) | 0.06 |
| Before insulin initiation: Insulin user vs. non-insulin users\* | 1.99 (1.73, 2.29) | <0.01 | 2.08 (1.84, 2.36) | <0.01 |
| Interaction term of within-person change and insulin initiation†  | 1.20 (1.04, 1.39) | 0.01 | 1.25 (1.07, 1.45) | <0.01 |
| **Inpatient stays, aged > 45 years**‡ |  |  |  |  |
| Non-insulin users\*: After vs. before insulin initiation  | 0.33 (0.31, 0.35) | <0.01 | 1.14 (0.62, 2.08) | 0.68 |
| Before insulin initiation: Insulin user vs. non-insulin users\* | 2.56 (2.32, 2.83) | <0.01 | 2.36 (2.16, 2.59) | <0.01 |
| Interaction term of within-person change and insulin initiation†  | 0.92 (0.84, 1.03) | 0.14 | 0.93 (0.84, 1.04) | 0.24 |

RR: Rate ratio

\* For non-insulin users, the referent was healthcare utilization before the matched date.

† RR for interaction terms were interpreted as the ratio of within-person change rates in healthcare utilization between insulin and non-insulin users

‡ Final model for rate of inpatient stays adjusted for race, sex, modified Elixhauser index, hypertension, psychosis, congestive heart failure, nephropathy, neuropathy, micro/macro-vascular complications, use of anticoagulant agents and lipid lowering agents, as well as interaction terms between within-person change and Medicaid eligibility categories (disabled or chronic conditions/others), depression, metabolic complications.