

## The impact of mechanical ventilation duration on the readmission to intensive care unit

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**Background/Aims:** Whether the duration of mechanical ventilation (MV) is related with intensive care unit (ICU) readmission needs to be more clarified. This study was conducted to elucidate whether prolonged MV duration increases ICU readmission rate.

**Methods:** The present observational cohort study analyzed national healthcare claims data from 2006 to 2015. Critically ill patients who received MV in the ICU were divided into five groups according to MV duration: MV for <7 d, 7–13 d, 14–20 d, 21–27 d, and ≥28 d. Rate and risk of ICU readmission were estimated according to MV duration using unadjusted and adjusted analyses.

**Results:** We found that 12,929 patients had at least one episode of MV in the ICU. There was a significant linear relationship between MV duration and ICU readmission ( $R^2=0.85$ ,  $P\text{-value}=0.025$ ). Total readmission rate was significantly higher as MV duration is prolonged (MV for <7 d, 13.9%; for 7–13 d, 16.7%; for 14–20 d, 19.4%; for 21–27 d, 20.4%; for ≥28 d, 35.7%;  $P\text{-value}<0.001$ ). The analyses adjusted by covariables and weighted with multinomial propensity scores showed similar results. In adjusted regression analysis with a Cox proportional hazards model, MV duration was significantly related to ICU readmission (hazard ratio 1.058 [95% CI 1.047–1.069],  $P\text{-value}<0.001$ ).

**Conclusions:** The rate of readmission to the ICU was significantly higher in patients who received longer durations of MV in the ICU. In the clinical setting, closer observation of patients who are discharged from the ICU after prolonged periods of MV is required.

Comparison of unadjusted and adjusted incidence rates of intensive care unit readmission according to mechanical ventilation duration

	MV for <7 d (n=8,915)	MV for 7-13 d (n=2,171)	MV for 14-20 d (n=868)	MV for 21-27 d (n=378)	MV for ≥28 d (n=597)
<b>ICU readmission</b>					
Total events	1236	362	168	77	213
Total person-time (person-year)	17903	3445	1120	458	507
Incidence rate (per 1000 person-years)	69	105	150	168	420
Incidence rate ratio [95% CI]	1.00	1.30 [1.24-1.35]	1.63 [1.53-1.74]	1.75 [1.60-1.93]	2.82 [2.62-3.03]
Adjusted incidence rate ratio <sup>a)</sup> [95% CI]	1.00	1.01 [1.00-1.03]	1.03 [1.01-1.06]	1.04 [1.00-1.07]	1.15 [1.11-1.18]

CI, confidence interval; ICU, intensive care unit; MV, mechanical ventilation

Incidence rate ratio was estimated based on the incidence rate of the patients with MV for <7 d.

<sup>a)</sup> Poisson regression analysis was conducted with variables, including age, sex, income, admission to tertiary referral hospital, Charlson comorbidity index, main diagnosis at the initiation of MV, and follow-up duration.