

Effects of the Korean National Health Insurance Coverage Policy on Mortality of Ventilated Patients

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Background/Aims: Critically ill patients required mechanical ventilation have greater out-of-pocket medical expenses during hospital stays. This study aimed to investigate the effect of Korean national health insurance coverage reinforcing policy on in-hospital mortality in patients who received ventilator care owing to respiratory diseases.

Methods: Data from 616 ventilated patients (male, 69.8%; median age, 71 years; in-hospital mortality rate, 28.7%) who were hospitalized in the respiratory intensive care unit of a regional center for respiratory diseases were retrospectively analyzed over five years.

Results: Total enrolled patients were classed as National Health Insurance (NHI, n=515 [83.6%]) and Medical Aid (MA, n=101 [16.4%]) beneficiaries. Of NHI beneficiaries, 356 (69.1%) had one benefit items under this policy during their hospital stay, and these patients had significantly higher medical expenditure (total [median 23,683 vs 12,742 USD, p<0.001] and out-of-pocket (median 5,932 vs 4,081 USD, p=0.008)), a lower percentage of out-of-pocket medical expenditure relative to total medical expenditure (median 26.0% vs. 32.2%, p<0.001), and lower in-hospital mortality (24.7% vs. 36.5%, p=0.008) than patients without benefit items. The families or surrogates of NHI beneficiaries without benefit items had significantly more discussions with their attending physicians about life-sustaining therapy (43.4% vs. 27.8%, p=0.001). However, 30 (29.7%) MA beneficiaries had one benefit items, and this did not affect in-hospital mortality (33.8% vs. 23.3%, p=0.351).

Conclusions: The national health insurance coverage reinforcing policy improved survival of NHI beneficiaries requiring ventilator care.

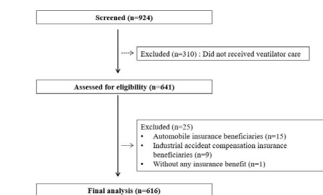


Figure 1. Flowchart of screened and enrolled study participants.

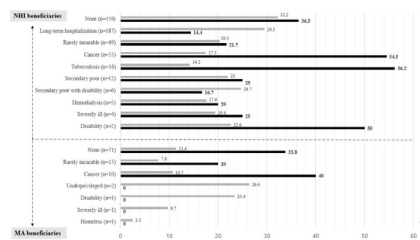


Figure 2. Percentage of out-of-pocket medical expenditure relative to total medical expenditure and in-hospital mortality according to benefit items under the health insurance coverage reinforcing policy. Gray bars show the median percentage of out-of-pocket medical expenditure relative to total medical expenditure according to benefit items. Black bars show in-hospital mortality according to benefit items.

Abbreviations: NHI, National Health Insurance; MA, Medical Aid.

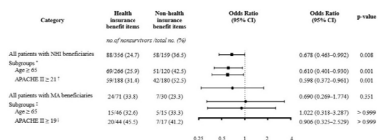


Figure 3. Effect of health insurance benefit items on in-hospital mortality.

The subgroup analyses of NHI beneficiaries, data were from 380 and 288 patients aged ≥65 years and with APACHE II scores ≤21, respectively. The cut-off level was based on Youden's index (AUC: 0.648; 95% CI, 0.483-0.688; p<0.001), sensitivity, 54.7%; specificity, 69.7%. The subgroup analyses of MA beneficiaries, data were from 61 and 40 patients aged ≥65 years and with APACHE II scores ≤19, respectively. The cut-off level was based on Youden's index (AUC: 0.734; 95% CI, 0.636-0.817; p=0.001), sensitivity, 51.4%; specificity, 87.1%.

Abbreviations: NHI, National Health Insurance; MA, Medical Aid; APACHE, Acute Physiology and Chronic Health Evaluation II.

Table 1. Clinical characteristics of all patients and comparison of outcome between insurance coverage					Table 2. Comparison of clinical characteristics and outcome between NHI and MA patients and between NHI and MA patients with and without additional insurance				
	Total	NHI	MA	p-value		NHI		MA	
						Total	Additional insurance	Total	Additional insurance
Age (yr)	70.8 (10.2)	70.8 (10.2)	70.8 (10.2)	0.998	Age (yr)	70.8 (10.2)	70.8 (10.2)	70.8 (10.2)	70.8 (10.2)
Male (%)	69.8	69.8	69.8	0.998	Male (%)	69.8	69.8	69.8	69.8
Insurance (%)					Insurance (%)				
NHI	515 (83.6)	515 (83.6)	515 (83.6)	0.998	NHI	515 (83.6)	515 (83.6)	515 (83.6)	515 (83.6)
MA	101 (16.4)	101 (16.4)	101 (16.4)	0.998	MA	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Benefit items (%)					Benefit items (%)				
None	259 (42.0)	259 (42.0)	259 (42.0)	0.998	None	259 (42.0)	259 (42.0)	259 (42.0)	259 (42.0)
One	356 (58.0)	356 (58.0)	356 (58.0)	0.998	One	356 (58.0)	356 (58.0)	356 (58.0)	356 (58.0)
Two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ten	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ten	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eleven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eleven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twelve	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twelve	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fourteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fourteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventeen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventeen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Nineteen	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Nineteen	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Twenty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Twenty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Thirty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Thirty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Forty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Forty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Fifty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Fifty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Sixty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Sixty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Seventy-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Seventy-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-seven	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-seven	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-eight	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-eight	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Eighty-nine	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Eighty-nine	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-one	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-one	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-two	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-two	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-three	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-three	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-four	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-four	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-five	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-five	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-six	101 (16.4)	101 (16.4)	101 (16.4)	0.998	Ninety-six	101 (16.4)	101 (16.4)	101 (16.4)	101 (16.4)
Ninety-seven	101 (16.4)	101 (16.4)</							