



Table S1. Associations between violations and ED mortality according to the logistic regression analyses.

	Univariable			Multivariable		
	OR	95% CI	P value	OR	95% CI	p value
Violation	1.07	0.89–1.29	0.45	1.04	0.85–1.27	0.70
Reaction time	1.01	1.01–1.01	<0.01	1.01	1.00–1.01	<0.01
Scene time	1.03	1.01–1.06	0.02	1.04	1.01–1.07	0.01
Dispatch time	1.04	1.02–1.06	<0.01	1.05	1.03–1.07	<0.01
Age	1.03	1.02–1.03	<0.01	1.02	1.02–1.03	<0.01
Female sex	1.22	1.00–1.48	0.046	0.94	0.76–1.16	0.57
Witnessed	0.57	0.47–0.69	<0.01	0.71	0.57–0.88	<0.01
Location						
Public	ref			ref		
Private	1.95	1.46–2.60	<0.01	1.20	0.87–1.66	0.26
Medical	1.49	0.97–2.30	0.07	1.05	0.65–1.69	0.86
Others	0.96	0.67–1.39	0.84	0.94	0.64–1.39	0.75
Bystander CPR	1.02	0.85–1.23	0.81	1.23	1.00–1.51	0.06
Initial rhythm						
VF/pVT	ref			ref		
PEA	1.65	1.25–2.20	<0.01	1.27	0.93–1.73	0.13
Asystole	3.96	3.02–5.18	<0.01	2.57	1.90–3.47	<0.01
Others	1.66	0.91–3.04	0.10	1.38	0.72–2.63	0.33
EMS advanced airway	1.20	0.72–1.99	0.49			
EMS IV access	0.83	0.68–1.00	0.049	0.80	0.65–0.99	0.04
EMS epinephrine	1.03	0.79–1.35	0.82			
Major region						
Northwestern	ref			ref		
Northeastern	1.14	0.88–1.48	0.32	1.05	0.79–1.39	0.73
Southeastern	1.06	0.82–1.38	0.67	1.08	0.82–1.44	0.59
Southwestern	1.48	1.14–1.93	<0.01	1.69	1.28–2.25	<0.01
Off time transfer	0.97	0.80–1.17	0.73			
Multiple cardiac arrest	1.26	0.60–2.67	0.54			
High-capacity hospitals	0.99	0.82–1.19	0.90			
Hypertension	1.42	1.17–1.73	<0.01	1.11	0.89–1.39	0.34
Diabetes	1.03	0.84–1.26	0.80			
Cerebrovascular disease	1.18	0.85–1.63	0.32			
Pulmonary disease	1.06	0.76–1.48	0.74			
Cardiac disease	1.09	0.85–1.40	0.51			

Tuberculosis	2.29	0.30–17.62	0.43			
Hepatitis	1.71	0.07–44.51	0.75			
Liver cirrhosis	0.95	0.46–1.95	0.89			
Allergy	0.38	0.03–4.20	0.43			
Malignancy	1.43	1.07–1.92	0.02			
Chronic kidney disease	0.75	0.54–1.06	0.11			
Hemodialysis	0.57	0.38–0.84	<0.01	0.63	0.41–0.98	0.04

CI, confidence interval; CPR, cardiopulmonary resuscitation; ED, emergency department; EMS, emergency medical service; IV, intravenous; OR, odds ratio; PEA, pulse-less electrical activity; pVT, pulseless ventricular tachycardia; VF, ventricular fibrillation.

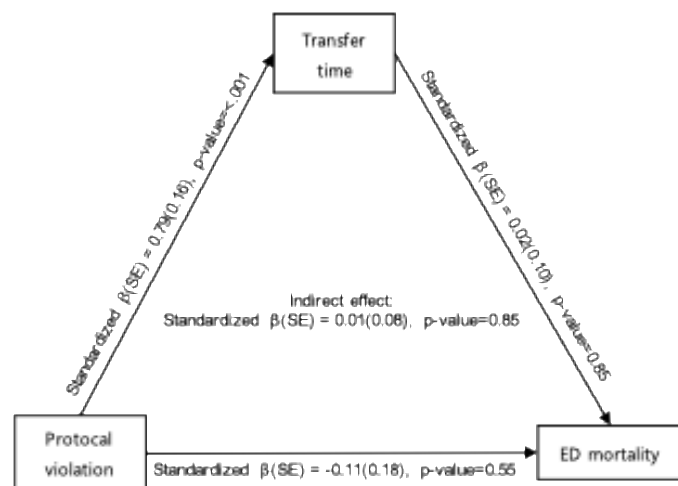
Table S2. Association between violation and poor neurological outcome in the logistic regression analyses.

	Univariable			Multivariable		
	OR	95% CI	P value	OR	95% CI	p value
Violation	0.98	0.51–1.86	0.94	1.00	0.45–2.18	0.99
Reaction time	1.04	1.00–1.08	0.07			
Scene time	1.08	0.97–1.20	0.18			
Dispatch time	1.07	0.99–1.15	0.08			
Age	1.05	1.03–1.07	<0.01	1.03	1.00–1.06	0.03
Female sex	1.61	0.78–3.32	0.20			
Witnessed	0.28	0.13–0.61	<0.01	0.59	0.24–1.50	0.27
Location						
Public	ref			ref		
Private	1.70	0.58–4.97	0.34	0.31	0.09–1.08	0.07
Medical	3.17	0.35–28.58	0.30	0.81	0.08–8.34	0.86
Others	0.39	0.12–1.21	0.10	0.30	0.08–1.12	0.07
Bystander CPR	0.36	0.16–0.83	0.02	0.50	0.18–1.37	0.18
Initial rhythm						
VF/pVT	ref			ref		
PEA	10.17	4.35–23.76	<0.01	2.44	0.83–7.718	0.11
Asystole	63.40	19.03–211.25	<0.01	9.27	2.34–36.79	<0.01
Others	1.93	0.57–6.57	0.29	0.91	0.18–4.73	0.07
EMS advanced airway	0.88	0.12–6.50	0.90			
EMS IV access	0.98	0.50–1.90	0.94			
EMS epinephrine	0.70	0.31–1.59	0.39			
PCI	0.02	0.01–0.03	<0.01	0.07	0.02–0.18	<0.01
TTM	0.05	0.03–0.10	<0.01	0.29	0.12–0.70	<0.01
Major region						
Northwestern	ref					
Northeastern	2.19	0.64–7.52	0.21			
Southeastern	0.52	0.21–1.28	0.15			

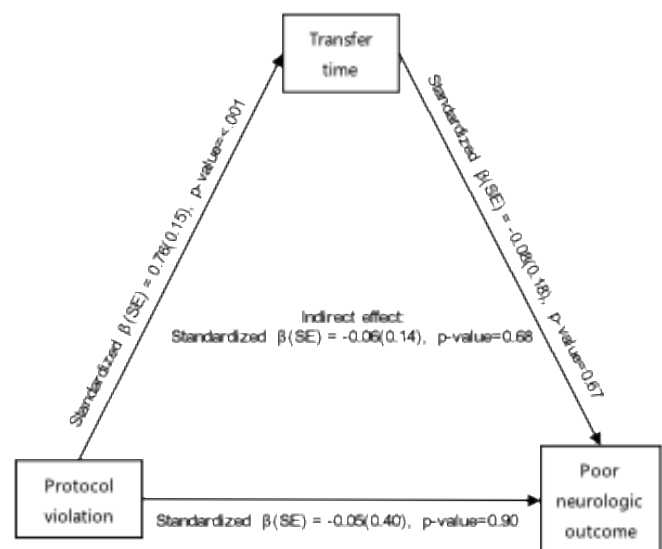
Southwestern	0.95	0.37–2.46	0.91
Off time transfer	1.03	0.53–2.00	0.93
Multiple cardiac arrest	1.40	0.08–23.61	0.81
High-capacity hospitals	1.35	0.71–2.57	0.35
Hypertension	1.23	0.62–2.44	0.56
Diabetes	1.29	0.60–2.71	0.52
Cerebrovascular disease	1.88	0.45–7.85	0.39
Pulmonary disease	0.77	0.27–2.17	0.62
Cardiac disease	0.84	0.37–1.91	0.67
Tuberculosis	0.30	0.02–5.78	0.43
Hepatitis	0.10	0.00–2.70	0.17
Liver cirrhosis	1.24	0.07–20.99	0.88
Allergy	0.08	0.00–2.44	0.15
Malignancy	11.47	0.70–187.54	0.09
Chronic kidney disease	2.54	0.35–18.60	0.36
Hemodialysis	3.25	0.20–53.71	0.41

CI, confidence interval; CPR, cardiopulmonary resuscitation; ED, emergency department; EMS, emergency medical service; IV, intravenous; OR, odds ratio; PCI, percutaneous coronary intervention; PEA, pulseless electrical activity; pVT, pulseless ventricular tachycardia; TTM, targeted temperature management; VF, ventricular fibrillation.

A) ED mortality



B) Poor neurologic outcome



Effect	Estimate	SE	95%CI lower	95%CI upper	p-value	Effect	Estimate	SE	95%CI lower	95%CI upper	p-value
Total effect	0.12	0.22	-0.31	0.56	0.58	Total effect	0.11	0.37	-0.62	0.84	0.78
Mediation effect	0.01	0.08	-0.14	0.17	0.85	Mediation effect	-0.06	0.14	-0.32	0.21	0.68
Direct effect	-0.11	0.18	-0.46	0.25	0.55	Direct effect	-0.05	0.4	-0.82	0.73	0.9
Proportion mediated	0.12	0.51	-0.88	1.12	0.82	Proportion mediated	0.54	2.28	-3.93	5.03	0.81

Figure S1. Mediation analysis for patient group with prehospital shockable rhythm
ED, emergency department.