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Table S1. International Classification of Diseases for Oncology, 3rd edition (ICD-O-3) codes for definition of cancer type

Cancer Type	ICD-O-3 code
Oral cavity cancer	C000-C009,C020-C023,C028-C029,C030-C031,C039,C040-C041,C048-C049,C050,C058-C059,C060-C062,C068-C069
Oropharynx cancer	C019,C024,C051,C052,C090-C091,C098-C099,C100-C104,C108-C109,C142,C148
Hypopharynx cancer	C129, C130-C132, C138-C139, C140
Esophageal cancer	C150-C155, C158-C159
Stomach cancer	C160-C166,C168,C169
Colon cancer	C180-C189
Rectum cancer	C199,C209
Liver cancer	C220, C221
Lung cancer	C340-C343,C348-C349
Breast cancer	C500-C509
Cervical cancer	C530-C531, C538-C539
Prostate cancer	C619
Bladder cancer	C670-C679
Other Cancer*	C779, C119, C778, C569, C112, C541, C118, C079, C770, C772, C251, C321, C250, C252, C809, C422, C110, C111, C449, C649, C774

*Only those with patient number ≥ 4 were listed

Table S2. Acute organ dysfunction codes and infection-related codes used in this study. These codes were adapted from three previous studies (Chest 2010; 138(2): 298-304, Critical Care Medicine,2001; 29(7): 1303-10 and PloS One 2013;8(10):e77414)

Diagnosis	International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes
Cardiovascular: Shock with trauma	785.5
Cardiovascular: Hypotension	458
Respiratory: Mechanical ventilation	96.7
Neurologic: Encephalopathy	348.4
Neurologic: Transient organic psychosis	293
Neurologic: Anoxic brain damage	348.1
Hematologic: Secondary thrombocytopenia	287.4

Hematologic: Thrombocytopenia, unspecified	287.5
Hematologic: Other/unspecified coagulation defect	286.9
Hematologic: Defibrination syndrome	286.6
Hepatic: Acute and subacute necrosis of liver	570
Hepatic: Hepatic infarction	573.4
Renal: Acute renal failure	584
Bacterial or fungal infection code	
Cholera	001.x
Typhoid/paratyphoid fever	002.x
Other salmonella infection	003.x
Shigellosis	004.x
Other food poisoning	005.x

Intestinal infection not otherwise classified	008.x
Ill-defined intestinal infection	009.x
Primary tuberculosis infection	010.x
Pulmonary tuberculosis	011.x
Other respiratory tuberculosis	012.x
Central nervous system tuberculosis	013.x
Intestinal tuberculosis	014.x
Tuberculosis of bone and joint	015.x
Genitourinary tuberculosis	016.x
Tuberculosis not otherwise classified	017.x
Miliary tuberculosis	018.x
Late effect of tuberculosis	137.x
Plague	020.x
Tularemia	021.x

Anthrax	022.x
Brucellosis	023.x
Glanders	024.x
Melioidosis	025.x
Rat-bite fever	026.x
Other bacterial zoonoses	027.x
Leprosy	030.x
Other mycobacterial disease	031.x
Diphtheria	032.x
Whooping cough	033.x
Streptococcal throat/scarlet fever	034.x
Erysipelas	035.x
Meningococcal infection	036.x
Tetanus	037.x

Septicemia	038.x
Actinomycotic infections	039.x
Other bacterial diseases	040.x
Bacterial infection in other diseases not otherwise specified	041.x
Congenital syphilis	090.x
Early symptomatic syphilis	091.x
Early syphilis latent	092.x
Cardiovascular syphilis	093.x
Neurosyphilis	094.x
Other late symptomatic syphilis	095.x
Late syphilis latent	096.x
Other and unspecified syphilis	097.x
Gonococcal infections	098.x
Leptospirosis	100.x

Vincent's angina	101.x
Yaws	102.x
Pinta	103.x
Other spirochetal infection	104.x
Dermatophytosis	110.x
Dermatomycosis not otherwise classified or specified	111.x
Candidiasis	112.x
Coccidioidomycosis	114.x
Histoplasmosis	115.x
Blastomycotic infection	116.x
Other mycoses	117.x
Opportunistic mycoses	118.x
Bacterial meningitis	320.x
Cryptococcal meningitis	321.x

Meningitis	322.x
Central nervous system abscess	324.x
Phlebitis of intracranial sinus	325.x
Acute pericarditis	420.x
Acute or subacute endocarditis	421.x
Thrombophlebitis	451.x
Acute sinusitis	461.x
Acute pharyngitis	462.x
Acute tonsillitis	463.x
Acute laryngitis/ tracheitis	464.x
Acute upper respiratory infection of multiple sites/not otherwise specified	465.x
Pneumococcal pneumonia	481.x
Other bacterial pneumonia	482.x

Bronchopneumonia with organism not otherwise specified	485.x
Pneumonia	486.x
Acute exacerbation of obstructive chronic bronchitis	491.21
Bronchiectasis	494.x
Empyema	510.x
Lung/mediastinum abscess	513.x
Acute appendicitis	540.x
Appendicitis not otherwise specified	541.x
Other appendicitis	542.x
Diverticulitis of small intestine without hemorrhage	562.01
Diverticulitis of small intestine with hemorrhage	562.03
Diverticulitis of colon without hemorrhage	562.11
Diverticulitis of colon with hemorrhage	562.13
Anal and rectal abscess	566.x

Peritonitis	567.x
Intestinal abscess	569.5x
Perforation of intestine	569.83
Abscess of liver	572.0x
Portal pyemia	572.1x
Acute cholecystitis	575.0x
Kidney infection	590.x
Urethritis/ urethral syndrome	597.x
Urinary tract infection not otherwise specified	599.0x
Prostatic inflammation	601.x
Female pelvic inflammation disease	614.x
Uterine inflammatory disease	615.x
Other female genital inflammation	616.x
Cellulitis	681.x

Other cellulitis or abscess	682.x
Acute lymphadenitis	683.x
Other local skin infection	686.x
Pyogenic arthritis	711.0x
Osteomyelitis	730.x
Bacteremia	790.7x
Infection or inflammation of device/graft	996.6x
Postoperative infection	998.5x
Infectious complication of medical care not otherwise classified.	999.3x

Table S3. The medical utilizations including artificial organ support, cardiopulmonary resuscitation and palliative care in the study population

	Before PS Matching				After PS Matching			
	Overall Patients (n=11825)	No ICU admission (n=5736)	ICU admission (n=6089)	STD	Overall Patients (n=7186)	No ICU admission (n=3593)	ICU admission (n=3593)	STD
Type of artificial organ support								
Invasive MV	5067(42.8)	413 (7.2)	4654 (76.4)	1.970	3178 (44.2)	411 (11.4)	2767 (77.0)	1.528
Non-invasive MV	1570(13.3)	622 (10.8)	948 (15.6)	0.14	1022 (14.2)	411 (11.4)	611 (17.0)	0.16
CRRT	367(3.1)	0 (0.0)	367 (6.0)	0.357	93(1.3)	0 (0.0)	93 (2.6)	0.227
iNO	27(0.2)	0 (0.0)	27 (0.4)	0.094	14(0.2)	0 (0.0)	14 (0.4)	0.088
ECMO	16(0.1)	0 (0.0)	16 (0.3)	0.073	5(0.1)	0 (0.0)	5 (0.1)	0.053
CPR	972(8.2)	284 (5.0)	688 (11.3)	0.234	227(3.2)	227 (6.3)	292 (8.1)	0.070
Palliative care	1490(12.6)	946 (16.5)	544 (8.9)	0.228	600(8.3)	600 (16.7)	362 (10.1)	0.195

Abbreviations: CPR, cardiopulmonary resuscitation; CRRT, continuous renal replacement therapy; ECMO, extracorporeal membrane oxygenation; ICU, intensive care unit; iNO, inhaled nitric oxide; MV, mechanical ventilation; PS, propensity score; STD, standardized difference.

Table S4. Association between ICU admission and in-hospital mortality evaluated by logistic regression stratified by quintiles of the propensity score and in PS-matched population

PS Matched	Patients without admission to ICU		Patients with admission to ICU		OR (95% CI)
	Death	Survival to Discharge	Death	Survival to Discharge	
	2610	983	2253	1340	0.61 (0.55-0.68)
Stratified by PS Quintiles					
Quintiles of PS					
1	298	46	1670	351	0.74 (0.53-1.02)
2	561	191	984	629	0.53 (0.44-0.65)
3	950	328	722	365	0.68 (0.57-0.82)
4	1001	565	445	354	0.71 (0.60-0.84)
5	1208	588	360	236	0.84 (0.69-1.02)
Pooled					0.69 (0.63-0.75)

Abbreviations: CI, confidence interval; ICU , intensive care unit; OR, odds ratio; PS, propensity score.

Table S5. The medical utilizations including artificial organ support, cardiopulmonary resuscitation and palliative care in the study population who survived to discharge from the index hospitalization

	Before PS Matching				After PS Matching			
	Overall (n=3626)	No ICU admission (n=1718)	ICU admission (n=1908)	STD	Overall (n=2194)	No ICU admission (n=1097)	ICU admission (n=1097)	STD
Type of Artificial Organ Support*								
Invasive MV	1500(41.4)	56(3.3)	1444(75.7)	2.206	797(36.3)	50(4.6)	747(68.1)	1.760
Non-invasive MV	304(8.4)	67(3.9)	237(12.4)	0.315	198(9.0)	50(4.6)	148(13.5)	0.316
CRRT	28(0.8)	0(0.0)	28(1.5)	0.173	9 (0.4)	0(0.0)	9(0.8)	0.129
iNO	4(0.1)	0(0.0)	4(0.2)	0.065	3 (0.1)	0(0.0)	3(0.3)	0.074
CPR	95(2.6)	16(0.9)	79(4.1)	0.205	56 (2.6)	11(1.0)	45(4.1)	0.197
Palliative care	335(9.2)	207(12.0)	128(6.7)	0.184	222 (10.1)	136(12.4)	86(7.8)	0.152

Abbreviations: CPR, cardiopulmonary resuscitation; CRRT, continuous renal replacement therapy; ICU, intensive care unit; iNO, inhaled nitric oxide; MV, mechanical ventilation; PS, propensity score; STD, standardized difference.

*The number of patients receiving extracorporeal membrane oxygenation was less than 3 and thus was unable to be present in the table due to the regulations of national health insurance database.

Table S6. Association between ICU admission and long-term survival after discharge among septic shock survivors evaluated by Cox proportional hazards model with stratification on quintiles of the propensity score

Quintiles of PS	Patients without admission to ICU			Patients with admission to ICU			HR (95% CI)
	Mortality rate (/person-day)	Death	Follow-up person-day	Mortality rate (/person-day)	Death	Follow-up person-day	
1	0.003	105	31066	0.002	465	203968	0.66(0.52-0.82)
2	0.003	179	56725	0.001	333	272370	0.51(0.42-0.63)
3	0.004	304	76489	0.003	311	110293	0.77(0.65-0.90)
4	0.003	386	121280	0.003	222	72138	0.93(0.79-1.09)
5	0.003	473	157837	0.003	127	40620	1.03(0.84-1.26)
Pooled							0.73(0.68-0.80)

Abbreviations: CI, confidence interval; HR, hazard ratio; ICU, intensive care unit; PS, propensity score

Table S7. Clinical characteristics of stage IV cancer patients with septic shock who survived to discharge after excluding those who died within 7 days after discharge from the index hospitalization

	Before PS Matching				After PS Matching			
	Overall (n=3,070)	No ICU admission (n=1,394)	ICU admission (n=1,676)	STD	Overall (n=1,788)	No ICU admission (n=894)	ICU admission (n=894)	STD
Age (mean ±SD)	63.4±13.7	63.6±14.0	63.2±13.4	0.025	63.9±13.9	63.6±14.1	64.2±13.6	0.020
Gender								
Male	2286(74.5)	979(70.2)	1307(78.0)	0.178	1314 (73.5)	661(73.9)	653(73.0)	0.020
Female	784(25.5)	415(29.8)	369(22.0)		474 (26.5)	233(26.1)	241(27.0)	
Socioeconomic status								
Low income	89(2.9)	54(3.9)	35(2.1)	0.105	60 (3.4)	29(3.2)	31(3.5)	0.012
≤Q1	989(32.2)	459(32.9)	530(31.6)	0.028	565 (31.6)	286(32.0)	279(31.2)	0.017
Q1-Q3	1357(44.2)	594(42.6)	763(45.5)	0.059	790 (44.2)	392(43.8)	398(44.5)	0.014
>Q3	635(20.7)	287(20.6)	348(20.8)	0.004	373 (20.9)	187(20.9)	186(20.8)	0.003
Cancer type								
Oral Cavity	603(19.6)	157(10.3)	446(23.8)	0.399	271 (15.2)	155(15.7)	116(11.7)	0.122
Oropharynx	223(7.3)	101(6.6)	122(6.5)	0.001	137 (7.7)	70(7.1)	67(6.8)	0.013
Hypopharynx	196(6.4)	102(6.7)	94(5.0)	0.070	135 (7.6)	69(7.0)	66(6.7)	0.013
Esophagus	86(2.8)	28(1.8)	58(3.1)	0.089	54 (3.0)	27(2.7)	27(2.7)	0.000
Stomach	116(3.8)	52(3.4)	64(3.4)	0.005	77 (4.3)	39(3.9)	38(3.8)	0.006
Colon	204(6.6)	78(5.1)	126(6.7)	0.078	132 (7.4)	64(6.5)	68(6.9)	0.017

Rectum	119(3.9)	42(2.8)	77(4.1)	0.083	78 (4.4)	37(3.7)	41(4.1)	0.022
Liver	137(4.5)	74(4.8)	63(3.4)	0.075	102 (5.7)	49(4.9)	53(5.4)	0.019
Lung	811(26.4)	471(30.9)	340(18.1)	0.308	459 (25.7)	217(21.9)	242(24.5)	0.064
Breast	78(2.5)	44(2.9)	34(1.8)	0.071	35 (2.0)	15(1.5)	20(2.0)	0.040
Cervix	48(1.6)	28(1.8)	20(1.1)	0.065	29 (1.6)	15(1.5)	14(1.4)	0.009
Prostate	163(5.3)	78(5.1)	85(4.5)	0.023	104 (5.8)	51(5.2)	53(5.4)	0.010
Bladder	40(1.3)	14(0.9)	26(1.4)	0.049	22 (1.2)	13(1.3)	9(0.9)	0.041
Other	246(8.0)	125(8.2)	121(6.5)	0.064	153 (8.6)	73(7.4)	80(8.1)	0.028
Use of PET	331(10.8)	132(9.5)	199(11.9)	0.078	191 (10.7)	96(10.7)	95(10.6)	0.004
CCI	9.1±1.4	9.0±1.3	9.1±1.4	0.050	9.1±1.4	9.1±1.4	9.1±1.4	0.032
Anti-cancer therapy								
Chemotherapy	1365(44.5)	636(45.6)	729(43.5)	0.043	881 (49.3)	439(49.1)	442(49.4)	0.007
Radiotherapy	856(27.9)	409(29.3)	447(26.7)	0.059	536 (30.0)	277(31.0)	259(29.0)	0.044
TKI	173(5.6)	87(6.2)	86(5.1)	0.048	108 (6.0)	52(5.8)	56(6.3)	0.019
Antibody	182(5.9)	80(5.7)	102(6.1)	0.015	102 (5.7)	48(5.4)	54(6.0)	0.029
Interval Between Admission to ICU and Cancer Diagnosis (mean ±SD)	200.7±298.2	212.2±310.1	191.2±287.6	0.070	213.0±296.0	213.1±294.5	212.9±297.6	0.001
Inotropic Agents								
Epinephrine	1722(56.1)	879(63.1)	843(50.3)	0.260	864 (48.3)	442(49.4)	422(47.2)	0.045
Dopamine	1069(34.8)	375(26.9)	694(41.4)	0.310	657 (36.7)	317(35.5)	340(38.0)	0.053
Norepinephrine	912(29.7)	217(15.6)	695(41.5)	0.599	458 (25.6)	216(24.2)	242(27.1)	0.067
Vasopressin	33(1.1)	9(0.6)	24(1.4)	0.078	11 (0.6)	5(0.6)	6(0.7)	0.014

Abbreviations: CCI, Charlson comorbidity index; ICU, intensive care unit; PET, positron emission tomography; PS, propensity score; Q1, first quartile; Q3, third quartile; SD, standard deviation; STD, standardized difference; TKI, tyrosine kinase inhibitor.

Table S8. Association between ICU admission and long-term survival after discharge among septic shock survivors evaluated by proportional hazards model with stratification on quintiles of the propensity score with exclusion of patients who died within 7 days after discharge

Quintiles of PS	Patients without admission to ICU			Patients with admission to ICU			HR (95% CI)
	Mortality rate (/person-day)	Death	Follow-up person-day	Mortality rate (/person-day)	Death	Follow-up person-day	
1	0.003	76	29084	0.002	381	204547	0.68(0.52-0.88)
2	0.002	112	52354	0.001	300	268181	0.65(0.52-0.83)
3	0.003	240	83569	0.002	261	107540	0.87(0.73-1.04)
4	0.003	312	118899	0.002	182	78729	0.90(0.75-1.07)
5	0.002	387	158734	0.003	104	39827	1.06(0.85-1.32)
Pooled							0.83(0.75-0.91)

Abbreviations: CI, confidence interval; HR, hazard ratio; ICU, intensive care unit; PS, propensity score