Supplemental Table S1. ICD-10 codes for extracted diseases

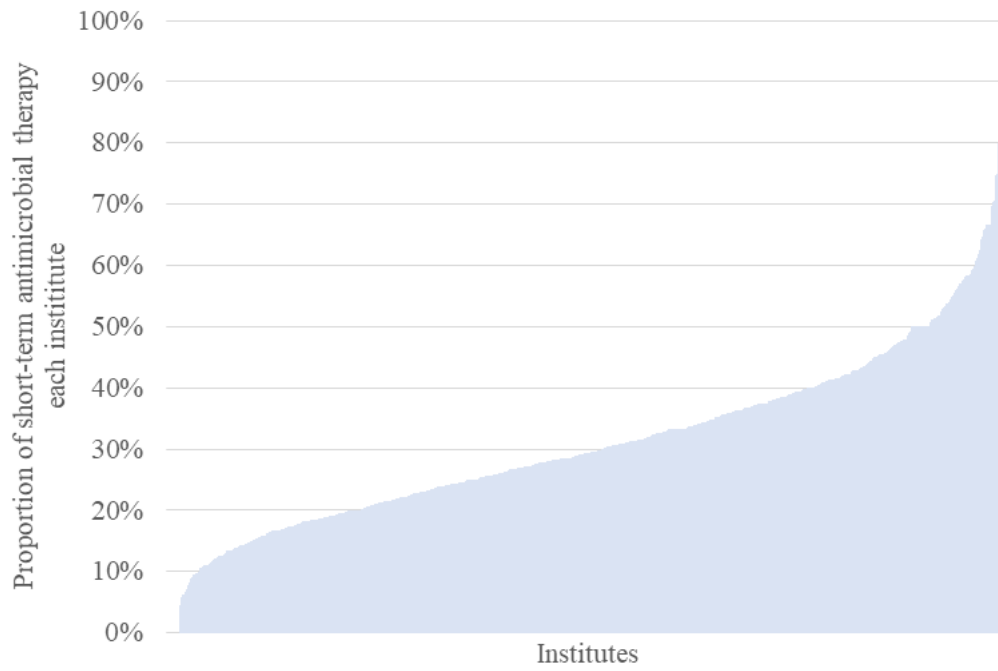| Diseases	ICD-10 code
Pneumonia	J13, J14, J150, J151, J152, J153, J154, J155, J156, J158, J159, J180, J181, J182, J188, J189
Aspiration pneumonia	J690, J698, O290
Pyothorax Pulmonary pyogenic disease	J869, J852, J860, J851
Bacteremia	A400, A401, A408, A402, A408, A411, A410, A411, A490, A499, A413, A282, A410, A499, B377, A392, A499, A415, A415, A418, A414, A411, A021, B49, P360, P368, P362, P368, P363, P368, P364, P368, P368, A499, A394, A394, A418, A227, A418, P361, A403, A412, A207, A427, A393, A409, A327, A548, A267, A241, A409
Myocardial infarction	I21, I210, I211, I212, I213, I214, I215, I216, I217, I218, I219, I22, I220, I221, I222, I223, I224, I225, I226, I227, I228, I229, I252
Congestive heart failure	I099, I110, I130, I132, I255, I420, I425, I426, I427, I428, I429, I43, I430, I431, I432, I433, I434, I435, I436, I437, I438, I439, I50, I500, I501, I502, I503, I504, I505, I506, I507, I508, I509, P290
Peripheral arterial disease	I70, I700, I701, I702, I703, I704, I705, I706, I707, I708, I709, I71, I710, I711, I712, I713, I714, I715, I716, I717, I718, I719, I731, I738, I739, I771, I790, I792, K551, K558, K559, Z958, Z959
Cerebrovascular disease	G45, G450, G451, G452, G453, G454, G455, G456, G457, G458, G459, G46, G460, G461, G462, G463, G464, G465, G466, G467, G468, G469, H340, I60, I600, I601, I602, I603, I604, I605, I606, I607, I608, I609, I61, I610, I611, I612, I613, I614, I615, I616, I617, I618, I619, I62, I620, I621, I622, I623, I624, I625, I626, I627, I628, I629, I63, I630, I631, I632, I633, I634, I635, I636, I637, I638, I639, I64, I640, I641, I642, I643, I644, I645, I646, I647, I648, I649, I65, I650, I651, I652, I653, I654, I655, I656, I657, I658, I659, I66, I660, I661, I662, I663, I664, I665, I666, I667, I668, I669, I67, I670, I671, I672, I673, I674, I675, I676, I677, I678, I679, I68, I680, I681, I682, I683, I684, I685, I686, I687, I688, I689, I69, I690, I691, I692, I693, I694, I695, I696, I697, I698, I699
Dementia	F00, F000, F001, F002, F003, F004, F005, F006, F007, F008, F009, F01, F010, F011, F012, F013, F014, F015, F016, F017, F018, F019, F02, F020, F021, F022, F023, F024, F025, F026, F027, F028, F029, F03, F030, F031, F032, F033, F034, F035, F036, F037, F038, F039, F051, G30, G300, G301, G302, G303, G304, G305, G306, G307, G308, G309, G311
Chronic pulmonary disease	I278, I279, J40, J400, J401, J402, J403, J404, J405, J406, J407, J408, J409, J41, J410, J411, J412, J413, J414, J415, J416, J417, J418, J419, J42, J420, J421, J422, J423, J424, J425, J426, J427, J428, J429, J43, J430, J431, J432, J433, J434, J435, J436, J437, J438, J439, J44, J440, J441, J442, J443, J444, J445, J446, J447, J448, J449, J45, J450, J451, J452, J453, J454, J455, J456, J457, J458, J459, J46, J460, J461, J462, J463, J464, J465, J466, J467, J468, J469, J47, J470, J471, J472, J473, J474, J475, J476, J477, J478, J479, J60, J600, J601, J602, J603, J604, J605, J606, J607, J608, J609, J61, J610, J611, J612, J613, J614, J615, J616, J617, J618, J619, J62, J620, J621, J622, J623, J624, J625, J626, J627, J628, J629, J63, J630, J631, J632, J633, J634, J635, J636, J637, J638, J639, J64, J640, J641, J642, J643, J644, J645, J646, J647, J648, J649, J65, J650, J651, J652, J653, J654, J655, J656, J657, J658, J659, J66, J660, J661, J662, J663, J664, J665, J666, J667, J668, J669, J67, J670, J671, J672, J673, J674, J675, J676, J677, J678, J679, J684, J701, J703
Connective tissue disease	M05, M050, M051, M052, M053, M054, M055, M056, M057, M058, M059, M06, M060, M061, M062, M063, M064, M065, M066, M067, M068, M069, M315, M32, M320, M321, M322, M323, M324, M325, M326, M327, M328, M329, M33, M330, M331, M332, M333, M334, M335, M336, M337, M338, M339, M34, M340, M341, M342, M343, M344, M345, M346, M347, M348, M349, M351, M353, M360
Peptic ulcer diseases	K25, K250, K251, K252, K253, K254, K255, K256, K257, K258, K259, K26, K260, K261, K262, K263, K264, K265, K266, K267, K268, K269, K27, K270, K271, K272, K273, K274, K275, K276, K277, K278, K279, K28, K280, K281, K282, K283, K284, K285, K286, K287, K288, K289
Mild liver disease	B18, B180, B181, B182, B183, B184, B185, B186, B187, B188, B189, K700, K701, K702, K703, K709, K713, K714, K715, K717, K73, K730, K731, K732, K733, K734, K735, K736, K737, K738, K739, K74, K740, K741, K742, K743, K744, K745, K746, K747, K748, K749, K760, K762, K763, K764, K768, K769, Z944
Diabetes	E100, E101, E106, E108, E109, E110, E111, E116, E118, E119, E120, E121, E126, E128, E129, E130, E131, E136, E138, E139, E140, E141, E146, E148, E149
Diabetes with end organ damage	E102, E103, E104, E105, E107, E112, E113, E114, E115, E117, E122, E123, E124, E125, E127, E132, E133, E134, E135, E137, E142, E143, E144, E145, E147
Hemiplegia	G041, G114, G801, G802, G81, G810, G811, G812, G813, G814, G815, G816, G817, G818, G819, G82, G820, G821, G822, G823, G824, G825, G826, G827, G828, G829, G830, G831, G832, G833, G834, G839
Moderate or severe renal disease	I120, I131, N032, N033, N034, N035, N036, N037, N052, N053, N054, N055, N056, N057, N18, N180, N181, N182, N183, N184, N185, N186, N187, N188, N189, N19, N190, N191, N192, N193, N194, N195, N196, N197, N198, N199,

	N250, Z490, Z491, Z492, Z940, Z992
Any malignant tumor	C00, C000, C001, C002, C003, C004, C005, C006, C007, C008, C009, C01, C010, C011, C012, C013, C014, C015, C016, C017, C018, C019, C02, C020, C021, C022, C023, C024, C025, C026, C027, C028, C029, C03, C030, C031, C032, C033, C034, C035, C036, C037, C038, C039, C04, C040, C041, C042, C043, C044, C045, C046, C047, C048, C049, C05, C050, C051, C052, C053, C054, C055, C056, C057, C058, C059, C06, C060, C061, C062, C063, C064, C065, C066, C067, C068, C069, C07, C070, C071, C072, C073, C074, C075, C076, C077, C078, C079, C08, C080, C081, C082, C083, C084, C085, C086, C087, C088, C089, C09, C090, C091, C092, C093, C094, C095, C096, C097, C098, C099, C10, C100, C101, C102, C103, C104, C105, C106, C107, C108, C109, C11, C110, C111, C112, C113, C114, C115, C116, C117, C118, C119, C12, C120, C121, C122, C123, C124, C125, C126, C127, C128, C129, C13, C130, C131, C132, C133, C134, C135, C136, C137, C138, C139, C14, C140, C141, C142, C143, C144, C145, C146, C147, C148, C149, C15, 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C915, C916, C917, C918, C919, C92, C920, C921, C922, C923, C924, C925, C926, C927, C928, C929, C93, C930, C931, C932, C933, C934, C935, C936, C937, C938, C939, C94, C940, C941, C942, C943, C944, C945, C946, C947, C948, C949, C95, C950, C951, C952, C953, C954, C955, C956, C957, C958, C959, C96, C960, C961, C962, C963, C964, C965, C966, C967, C968, C969, C97, C970, C971, C972, C973, C974, C975, C976, C977, C978, C979
Moderate or severe liver disease	I850, I859, I864, I982, K704, K711, K721, K729, K765, K766, K767

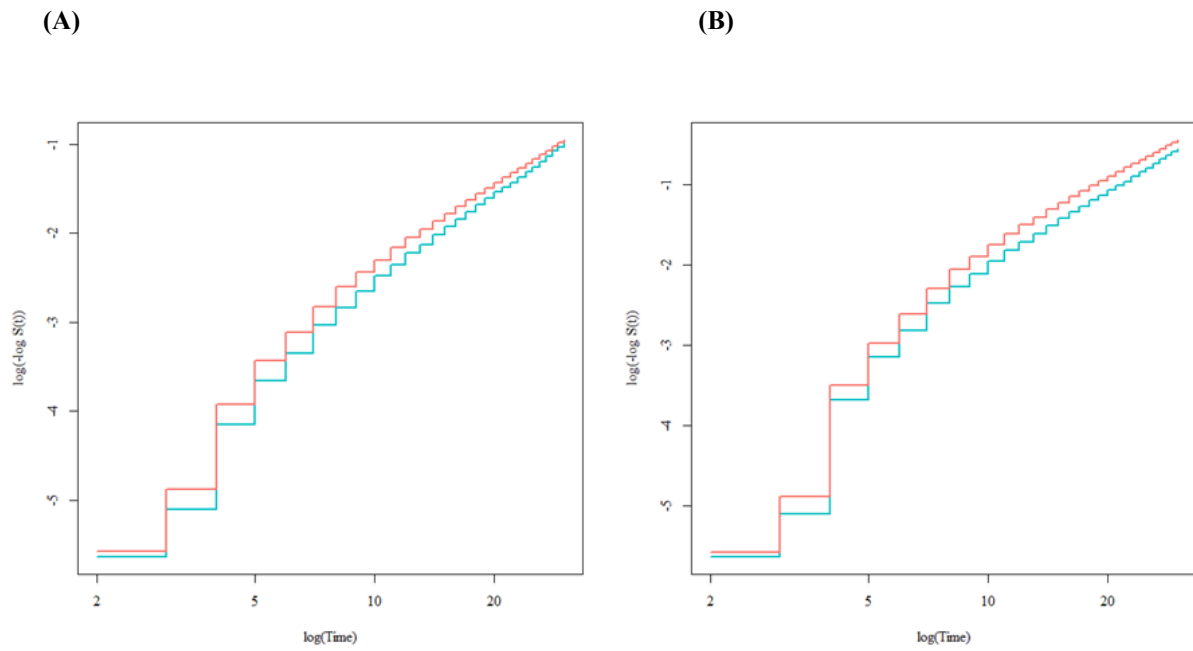| Metastatic solid tumor	C77, C770, C771, C772, C773, C774, C775, C776, C777, C778, C779, C78, C780, C781, C782, C783, C784, C785, C786, C787, C788, C789, C79, C790, C791, C792, C793, C794, C795, C796, C797, C798, C799, C80, C800, C801, C802, C803, C804, C805, C806, C807, C808, C809
HIV infection	B20, B200, B201, B202, B203, B204, B205, B206, B207, B208, B209, B21, B210, B211, B212, B213, B214, B215, B216, B217, B218, B219, B22, B220, B221, B222, B223, B224, B225, B226, B227, B228, B229, B24, B240, B241, B242, B243, B244, B245, B246, B247, B248, B249
Myofascial junction diseases	M332, M339, G724, G700, G710, G711
Parkinson's disease	G20
Parkinson's syndrome	G211, G213, G214, A521, G219
Cranial nerve palsy	G520, G521, G522, G523, G527, G528, G529
Brain stem encephalitis	G610
Hyperthyroidism	E058, E059
Systemic amyloidosis	E859
Wilson disease	E830
Arnold-Chiari malformation	Q070
Esophageal stenosis	C151, C152, C153, C154, C155, C159, C140 , C320, C321 , C322, C323, C329, K222
Esophageal achalasia	K220
Dysphagia	R13
Vocal cord paralysis	J380
Clostridioides difficile infection	A047

Supplemental Table S2. Balance assessment of covariates by absolute using standardized mean difference before and after inverse probability of treatment weighting

	Absolute standardized mean difference	
	Unadjusted	Adjusted
feeding	0.120	0.008
transfers (bed to chair and back	0.122	0.007
grooming	0.084	0.003
getting on and off toilet	0.118	0.007
bathing self	0.076	0.002
walking on a level surface	0.116	0.007
ascend and descend stairs	0.094	0.006
dressing	0.109	0.007
controlling bowels	0.114	0.007
controlling bladder	0.114	0.007
age	0.015	<0.001
sex (female	0.109	<0.001
ambulance use	0.068	0.002
Japan coma scale	0.069	0.008
Body mass index	0.080	0.004
most advanced respiratory support therapy within three days of admission	0.246	0.023
catecholamine use within three days of admission	0.101	0.003
admission history of pneumonia	0.016	< 0.001
admission history of aspiration pneumonia	0.006	< 0.001
surgical history of gastrostomy	0.007	< 0.001
diseases with dysphagia	0.015	< 0.001
corticosteroid	0.006	< 0.001
angiotensin-converting enzyme inhibitors	0.016	< 0.001
hemodialysis	0.008	< 0.001
nasal tube feeding	0.017	< 0.001
cilostazol	0.007	< 0.001
antiemetic agents (metoclopramide and domperidone)	0.009	< 0.001
antitumor agents	0.009	< 0.001
psychiatric agents	0.004	< 0.001
Hange-koboku-to (Kampo)	0.011	< 0.001
immunosuppressants	0.003	< 0.001
combination antimicrobial therapy	0.071	0.002
anti-pseudomonal agents	0.157	0.002
anti-anaerobic agents	0.148	< 0.001
anti-MRSA agents	0.037	< 0.001
Charlson comorbidity index	0.016	< 0.001

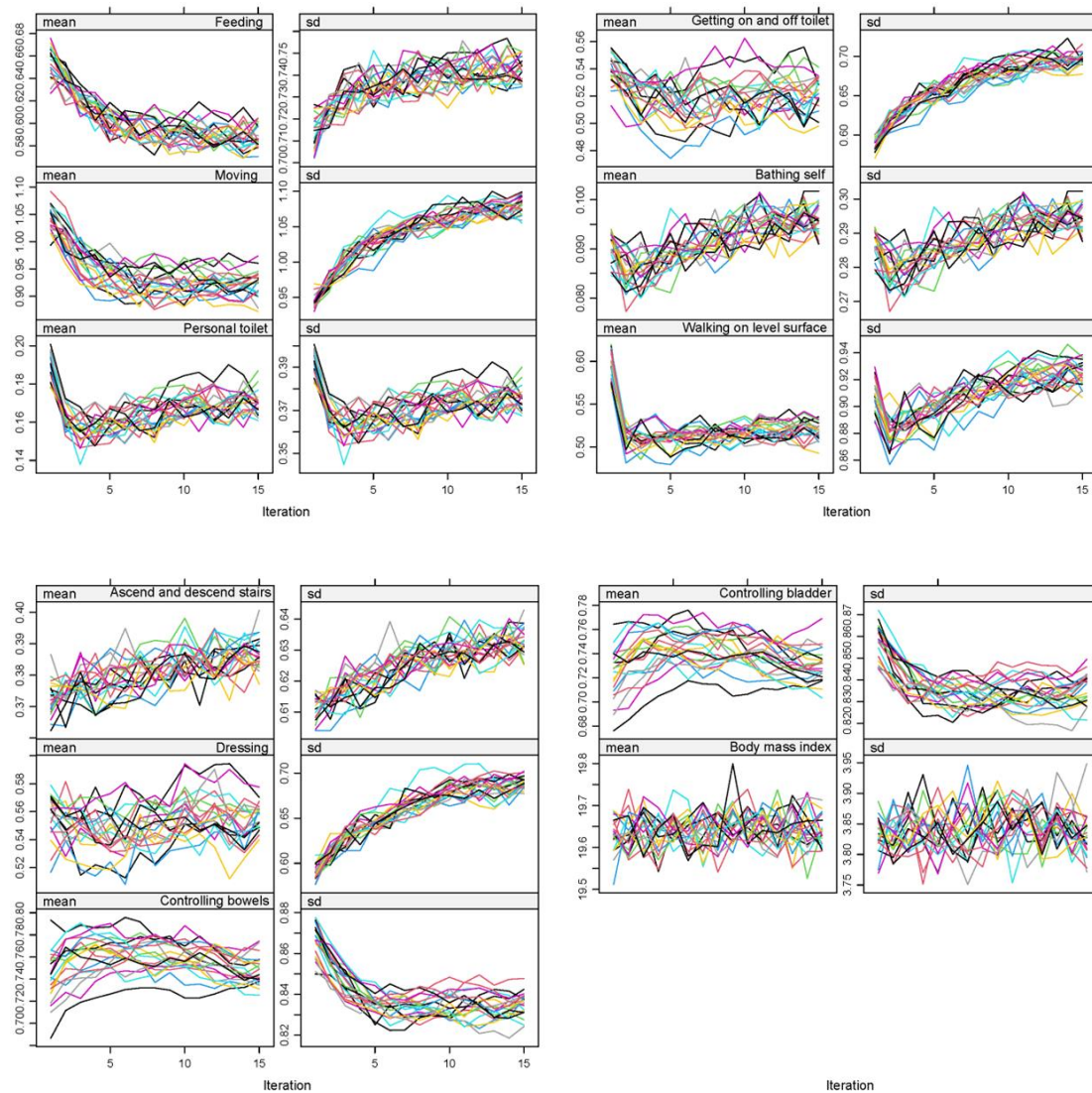MRSA, methicillin-resistant *Staphylococcus aureus.*

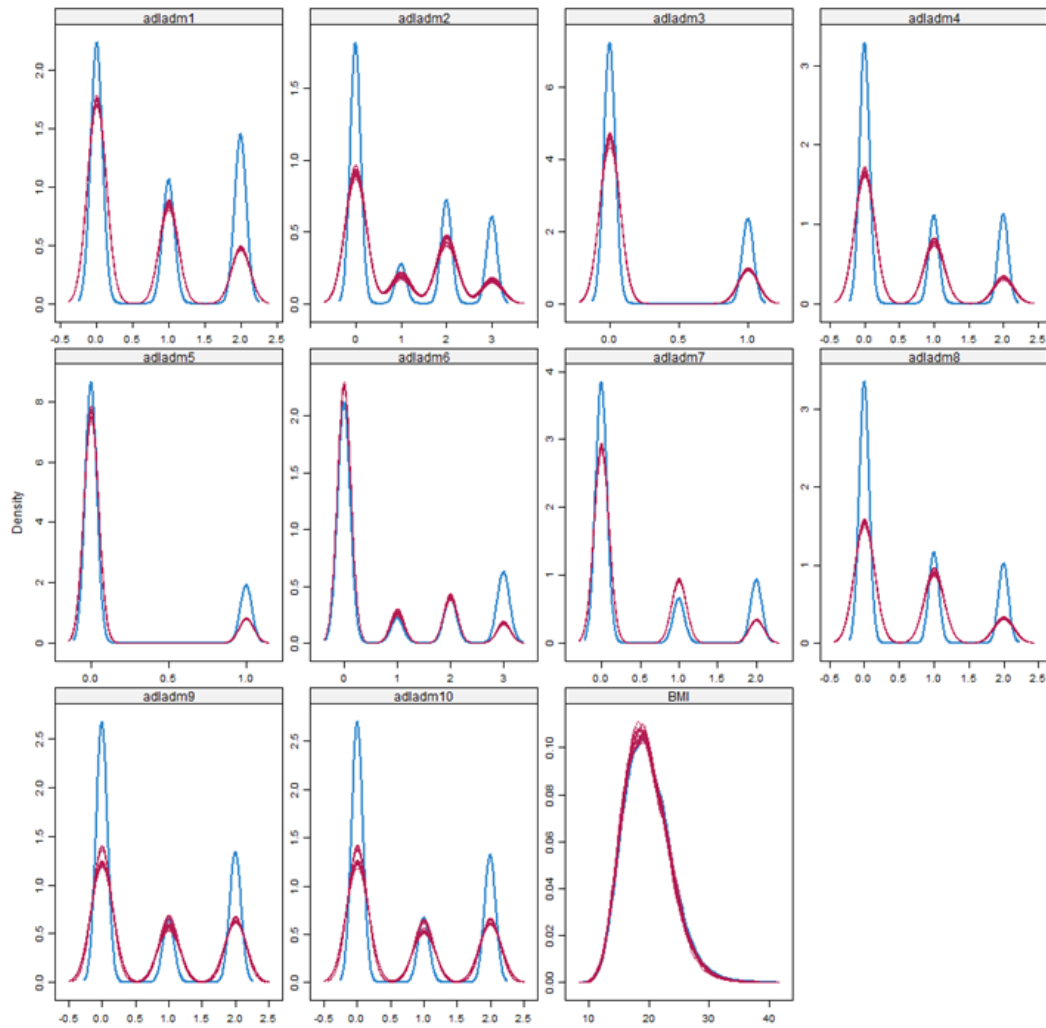**Supplemental Figure S1. Proportion of short-term antimicrobial therapy each institute.**

(A)   **(B)**

Supplemental Figure S2. The log minus log plot. (A) Relapse defined as resumption of antimicrobial therapy and oxygen supply; **(B)** Relapse defined as resumption of antimicrobial therapy.
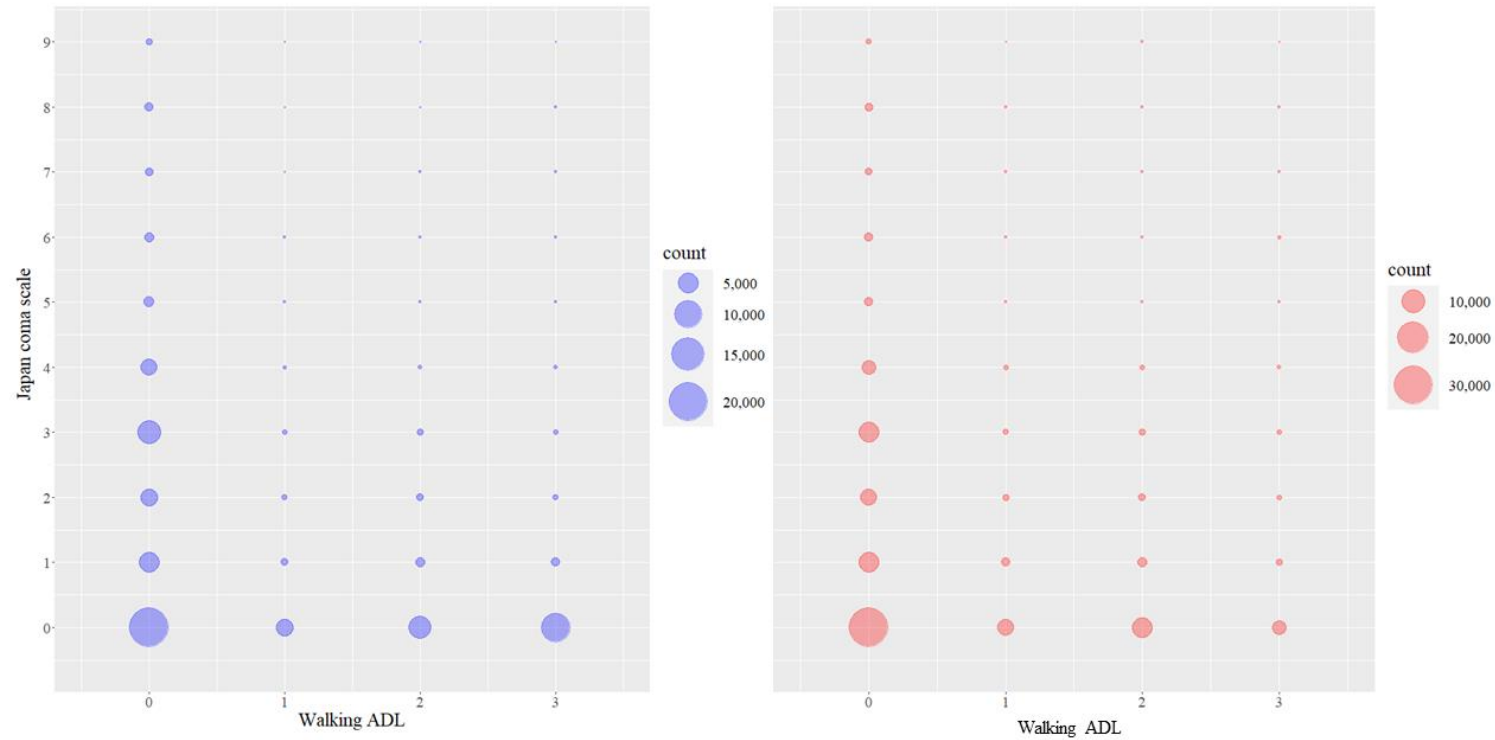
Supplemental Figure S3. Verification of imputed data after multiple imputation method.

(A)

(A) Mean and standard deviation per imputed dataset. The X-axis represents the iterations, and each imputed dataset is drawn using a different colored broken line.
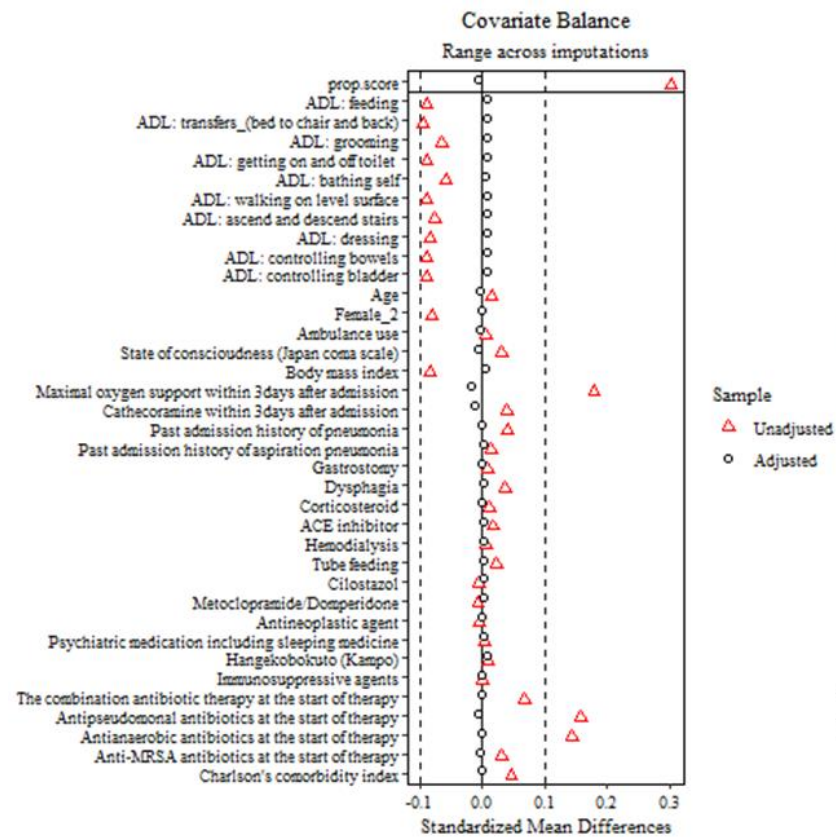
(B)

(B) Comparison of the distribution of the original data with that of the imputed data. The blue line shows the distribution of the data without imputation, and the red line shows the distribution of the imputed data.
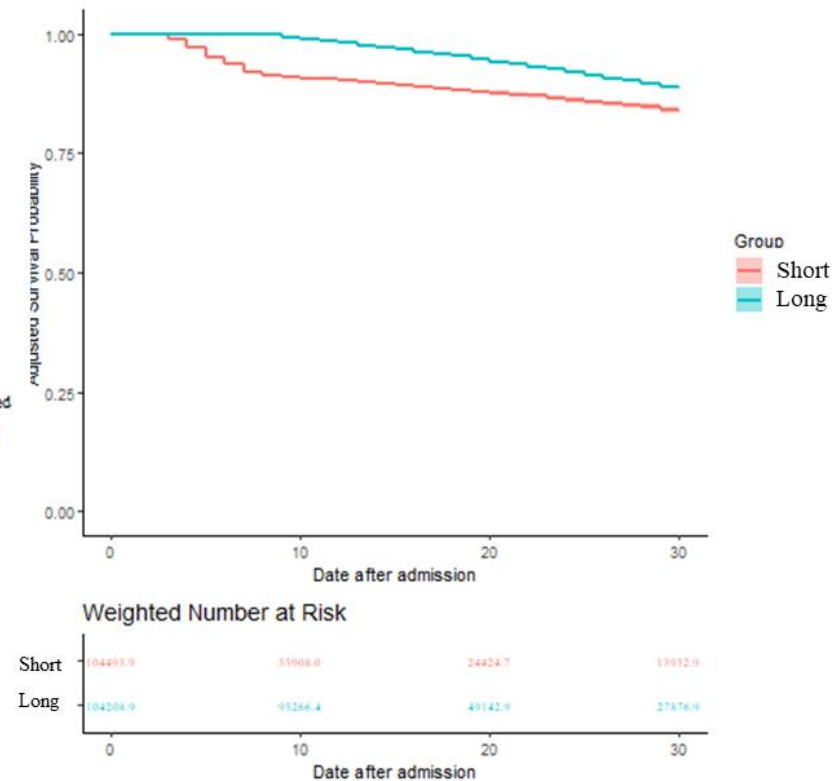
(C)

(C) Comparison of Japan coma scale on admission without missing variables and the activity daily living on walking on admission with some missing data, related to Japan coma scale on admission. The Japan coma scale (JCS) assesses the state of consciousness on admission on the y-axis and the Berthal index on the x-axis. In the JCS, the state of consciousness is evaluated in the order 0, 1, 2, 3, 10, 20, 30, 100, 200, and 300, whereas in this report, each of these in turn was replaced by 0 to 10. (i) Balloon plot made with blue indicates the number of data that were not missing, and (ii) balloon plot made with red indicates the number of imputed data for every dataset.

(A)

(B)

Supplemental Figure S4. Sensitivity analysis including patients discharged before the end of antimicrobials. (A) Balance evaluation after inverse probability of treatment weighting; **(B)** Kaplan-Meier survival curve for death.