Critical Care Medicine around the Globe:

Extended Prevalence of Infection in Intensive Care (EPIC) III

Authors to be defined

Introduction

The World Health Organization recognizes sepsis as "as a major threat to patient safety and global health",[1] with annual estimates of 30 million episodes of sepsis around the world and 6 million associated deaths.[2] Sepsis is particularly common in the intensive care unit (ICU); indeed, it is probably the most common cause of death among ICU patients. Recent years have seen several studies providing important national and international epidemiological data on the frequency, associated factors and costs of sepsis.[3-6] However, most of the large epidemiological studies on infection and sepsis have been conducted in North America, Europe and Australia, with relatively few data from low and middle-income countries.[7]

Because sepsis is "life-threatening organ dysfunction caused by a dysregulated host response to infection",[8] detailed data on the types of infection and on its management as well as on the use and availability of different diagnostic and treatment options around the world are key to understanding the global burden of sepsis. Such data can help increase and maintain awareness of the impact of infection and sepsis, help in the development of focused local and international policies for diagnosis and treatment, facilitate adequate and appropriate resource allocation, and assist in the design of interventional studies. These data are also important to be able to provide a baseline against which we can assess changes in patient demography and the effects of new treatments or management programs over time.

In 1995, we published the results of the European Prevalence of Infection in Intensive Care (EPIC) study conducted over a 24-hour period in 1992.[9] A total of 10,038 adult patients from 1417 intensive care units (ICUs) in 17 countries in Western Europe were included. On the study day, 4501 patients (44.8%) had one or more infections. Microbiological culture results were positive in 85% of patients and some 62% of patients were receiving antimicrobials. In 2007, we updated our results, performing a study of similar design but extending inclusion to ICUs worldwide (Extended Prevalence of Infection in Intensive Care [EPIC II]).[10] A total of 13,796 adult patients from 1265 ICUs in 75 countries were included. On the study day, 7087 (51%) of the patients had an infection and 9084 (71%) were receiving antibiotics. Microbiological culture results were positive in 70% of the infected patients with 62% of the positive isolates being Gram-negative organisms, 47% Gram-positive and 19% fungi.

Given the importance of having up-to-date epidemiological data, in 2017, we conducted EPIC III to evaluate the current prevalence of infection in ICU patients around the world, the resources available for diagnosis and treatment, and the associated outcomes. We hypothesized that the prevalence of infection would vary among geographic regions and that this variability would be determined by patient-related factors, process of care at the institutional level, and local factors at the country level. We also hypothesized that outcome from infections would be determined by factors related to the severity of illness and to the nature of the underlying infection irrespective of the process of care and regional related factors.

Methods

This was an observational 24-h point-prevalence study. An international steering committee of 12 intensivists representing the 5 continents was established and invitations to participate in EPIC III sent by email to members of national intensive care societies, with the support of the World Federation of Societies in Intensive and Critical Care Medicine, contacts of the steering committee members, and the more than 35,000 contacts in the database of the International Symposium of Intensive Care and Emergency Medicine. The initiative was also announced during various international meetings and shared on social media.

Physicians interested in participating were asked to register their ICU on a secure website and received a login and password. All interested ICUs could participate except those caring only for neonates. The study protocol was submitted to local ethics committees for approval where required by local legislation or regulation. In most countries, informed consent was not required due to the observational nature of the study.

Participants were asked to record data for all patients present on or admitted to their ICU between September 13, 2017, at 08:00 and September 14, 2017, at 07:59 (local time zone). There were no exclusion criteria. Data were collected on pre-printed case report forms (CRFs) by the attending intensivist or delegate (other physician or a trained research nurse/coordinator) and then entered electronically by the local investigators. Centers with limited internet access were able to send completed paper forms to the coordinating center for data entry. The CRF included four sections:

- center demography (hospital/ICU characteristics, availability of certain diagnostic, monitoring and therapeutic techniques and antibiotics);
- individual patient demography (age, sex, height, weight, date of hospital and ICU admission, source of admission, primary and co-morbid diagnoses);

- study day variables (24-h minimum and maximum hemodyamic, respiratory and laboratory parameters; therapeutic interventions; presence of infection; type of infection and isolated microorganisms; antibiotic prescriptions; end-of-life decisions);
- follow-up data on November 13, 2017 (date of ICU and hospital discharge, and date of death).

Data were not monitored. Feasible limits for each variable were set to prevent erroneous values being entered and investigators were queried in case of outliers or excessive numbers of missing values. A dedicated email address was available to all participants for any queries during data collection and follow-up.

Definitions were provided in the CRF. Closed ICUs were defined as those in which only ICU physicians could write orders. ICU volume was defined as the number of ICU admissions on the year prior to inclusion in the study (2016). If an infection was present, investigators were asked to indicate whether it was definite, probable or possible as per the International Sepsis Forum definitions,[11] and its mode of acquisition. Hospital-acquired infections were considered as those evident at least 48 hours after hospitalization. Healthcare- associated-infection referred to infections in a patient who was receiving intravenous therapy at home; had received wound care or specialized nursing care through a health care agency, family, or friends in the 30 days prior to hospital admission; had attended a hospital or hemodialysis clinic or received intravenous chemotherapy in the 30 days prior to hospital admission; had been admitted to an acute care hospital for 2 or more days in the 90 days prior to hospital admission, resided in a nursing home or a long-term care facility. ICU-acquired infections were defined as those occurring at least 24 hours following admission to the ICU.

For the purposes of this study, the world was divided into 7 geographical regions: North America; Central and South America; Western Europe; Eastern Europe; Asia/Middle East; Oceania; and Africa. Individual countries were also classified into three income groups according to the 2017 gross national income (GNI) per capita, using thresholds defined by the World Bank Atlas method[12]: GNI ≤$3,895 = low and lower middle income; GNI $3896–12,055 = upper middle income; and GNI >$12,055 = high income.

Statistical analysis

Statistical analysis was performed by the coordinating center using SPSS for windows version 24.0 (Chicago, USA) and R software, version 3.2.3 (CRAN project). Clinical characteristics were summarized by mean and standard deviation or median and interquartile range (IQR) or number and percentage for categorical factors. Comparisons between groups were assessed using analysis of

variance (ANOVA), Kruskal Wallis test, Student's t-test, Mann-Whitney test, chi-square test or Fisher's exact test as appropriate.

For the binary outcomes, infection or in-hospital death, we used a three-level multilevel technique with the structure of a patient (level 1) admitted to a hospital (level 2) within a country (level 3). The variables considered in the model were age, sex, SAPS II score, type of admission, source of admission, duration of ICU stay prior to study day, treatment with mechanical ventilation or renal replacement therapy, comorbidities, mode of acquisition of infection, microorganisms, type of hospital, ICU volume and GNI. For parameter testing, the likelihood-ratio test was used. Co-linearity between variables was checked by inspection of the correlation between them, by looking at the correlation matrix of the estimated parameters. The results of fixed effects, measures of association, are given as odds ratios (OR) with their 95% confidence intervals. Random effects, measures of variation, included the variance (var) and its standard error (se). All reported p values are two-sided and a p value of less than 0.05 was considered to indicate statistical significance.

Results

Contributing centers

A total of 1150 centers participated in the EPIC III from 88 countries (Table 1 and Figure 1; Appendix). The countries that included the most patients were the UK, Brazil and China. Almost two thirds of the ICUs (n=750, 65%) were in university hospitals. The median number of ICU beds was 12 (IQR 8-20). Four out of five ICUs (n=922 [80%]) were closed. In 41% of cases (n=469), there was also a high dependency unit in the hospital. Almost three fourths of the ICUs were mixed medical/surgical units (n=852 [74.1%]).

Intermittent and continuous renal therapies were available in 82% and 79% of units, respectively, and ECMO in 34% (Table 2). An infectious disease specialist or a clinical microbiologist was available 24/7 in 59% of ICUs and not available at all in 10%. A pharmacist was assigned to the ICU team in 55% of units.

Patients

Data were obtained from 15302 adult (>18 years) patients. The mean age was 61 (±18) years and 55% were medical admissions (Table 3). One third of the patients (n=5034) were admitted through the emergency room. On the study day, 6696 patients (44%) were receiving invasive mechanical ventilation, 4251 (28%) a vasopressor and 1676 (11%) renal replacement therapy (RRT). The median length of stay (LOS) in the ICU was 10 days (3-28). ICU and hospital mortality rates were 17.1 and 22.4%, respectively.

Prevalence and characteristics of infections

The infection pages of the CRF had been completed for 15264 patients (99%). A total of 8182 patients (54%) had an infection on the study day (Table 3). Infection was considered as definite in 5444 patients (67.0%), probable in 1891 (23.3%) and possible in 795 (9.8%) (Table S1).

The prevalence of infection ranged from 43% in Oceania to 60% in Asia (Table S2). Prevalence rates were higher in countries with low and middle GNI compared to those with high GNI but were similar between university and non-university hospitals. The prevalence of infection was higher with increasing duration of stay in the ICU prior to the study inclusion day and with higher SAPS II scores on the study day (Table S2). Infection was more commonly community-acquired (44%) than hospital/healthcare-acquired (34%), and was ICU-acquired in 22% of cases (Table S1); ICU-acquired infections were lower in North America (13%) and Oceania (12%) than in other regions (Table S3). As expected, the lungs were the most common site of infection, responsible for 60% of all infections, followed by the abdomen (18%) and bloodstream (15%). Altough respiratory infections were the most common across all geographic areas, the prevalence of other infections varied (Table S3).

Of the 8182 infected patients, 5288 (65%) had a positive microbiological culture (Table S4). Gram-negative microorganisms were almost twice as common as Gram-positive organisms (67% vs. 37%) and 16% of the isolates were fungal species. Gram-negative organisms were most prominent in Eastern Europe (78%) and Africa (77%). Among the Gram-negative isolates, Klebsiella species (18%), *Escherichia coli* (17%), *Pseudomonas* species (16%) and Acinetobacter (11%) were the most commonly isolated. Gram-positive organisms were most prominent in North America (46%). MRSA was isolated in 4.5% of cases overall, with the highest rates in North America (10%) and lowest rates in Western Europe (2.3%). Gram-positive isolates were more frequent and Gram-negative isolates less frequent in patients admitted to ICUs in countries with high GNI than those admitted to ICUs in countries with middle and lower GNI (Table S4).

In a multi-level analysis with occurrence of infection as the dependent variable, male sex, admission for medical reasons or trauma (compared to surgical admissions), comorbid conditions and longer ICU stay prior to the study day were independently associated with a higher risk of acquiring infection (Table S5). Higher ICU volume (>500 admissions compared to <250 admissions) and high GNI compared to low GNI were associated with a lower risk of infection. The country-to-country variance in the occurrence of infection was statistically significant (variance: 0.04, p=0.049), indicating that country-related factors significantly influenced the occurrence of infection after adjustment for patient-related factors, severity of illness, and process of care-related factors.

Outcome and risk factors

Patients with an infection had much longer ICU (15 [6-35]) and hospital (5 [2-17]) lengths of stay than patients without infection (both p<0.001) and the ICU mortality rate increased from 9.6% in patients without infection to 23.5% when infection was present (Table 3). ICU and hospital mortality rates were higher and lengths of stay were longer according to the degree of certainty in establishing the diagnosis of infection (definite>probable>possible) and according to the mode of acquisition of infection (ICU acquired>hospital acquired> community acquired infections) (Table S1)

In a multilevel analysis with hospital death as the dependent variable in infected patients with positive isolates and all microorganisms as independent variables (Table S6), older age, higher SAPS II score on the study day, metastatic cancer, heart failure (NYHA III-IV), HIV infection, cirrhosis, ICU-acquired compared to community-acquired infections, mechanical ventilation or RRT on the study day, and referral from the hospital ward compared to the OR, were independently associated with a higher risk of death. Infections due to *Streptococcus pneumoniae* were associated with a lower risk of death (OR 0.48, 95% CI 0.29-0.78, p=0.003). In a multilevel analysis in infected patients with positive isolates with hospital mortality as the dependent variable and resistant microorganisms as independent variables (Table S7), infection with Enterococcus resistant to vancomycin (OR 2.40, 95% CI 1.43-4.04, p<0.001), Klebsiella species resistant to beta lactams or carbapenems (OR 1.28, 95% CI 1.01-1.61, p=0.039), and Acinetobacter resistant to carbapenems (OR 1.43, 95% CI 1.10-1.85, p=0.007) were independently associated with a higher risk of death. The differences in the risk of death across hospitals and across countries were statistically significant after adjustment for other possible confounders.

Discussion

The present data provide a useful picture of the prevalence of infection in ICUs around the globe. Although the majority of our participating centers were from Europe, the rest of the world was fairly well represented with large numbers of centers from China and South America. Just over half the ICU patients had an infection on the study day and the ICU mortality rate of these patients was more than twice that of non-infected patients. As in other studies, the lungs were the most common site of infection and Gram-negative bacteria were more common than Gram-positive microorganisms.[13] Fungi, predominantly Candida species, were present in 16% of positive isolates, similar to the 19% reported in the EPIC II study.[10] Patients with fungal infections had higher mortality rates than patients with other infections. Interestingly, the proportion of patients with ICU-acquired infection was remarkably similar to that reported in EPIC I, 25 years ago.[9]

Our data confirm that the prevalence of infection varies widely among geographic regions. Interestingly, this variation was not merely explained by patient- and disease-specific factors.

Process of care and country-related factors were also important in determining the occurrence of infection in a specific ICU. Indeed, the prevalence of infection was lower in countries with high than in those with middle and low GNI, possibly because of variations in health-care (both primary and hospital-based) expenditure and availability. Other country-related factors may include local variations in living conditions, nutritional status, vaccination availability and uptake, and poor sanitation.[14] We are unable to evaluate the independent effects of each of these aspects from our data but this variation in the prevalence of infection should be taken into account when planning and interpreting the results of clinical trials.

The risk of death in infected patients was independently influenced by country-to-country variance and by variance across hospitals within a country, supporting a role of local process of care and ICU organization on outcomes. In all infected patients, no specific microorganisms were independently associated with a higher risk of death. When considering only resistant microorganisms, however, infections with Enterococcus resistant to vancomycin, Klebsiella species resistant to beta lactams or carbapenems, and Acinetobacter resistant to carbapenems were independently associated with an increased risk of death highlighting the importance of anitimicrobial resistance on mortality rates. These microorganisms have been reported to be associated with nosocomial infections and increasingly multidrug-resistant isolates are developing in which antibiotic choices may be quite limited.[15] Indeed, *Acinetobacter baumanii* has been listed as a critical-priority pathogen on the World Health Organization priority list of antibiotic-resistant bacteria for effective drug development.[16] Infection with multidrug-resistant *Acinetobacter baumanii* has been reported to be associated with an increased risk of death and longer hospital stay with a median estimated increase of 10 days (IQR: 6; 14).[17] These infections are associated with high morbidity and mortality and contribute to a prolonged hospital stay and high hospital costs.[18-21]

The study has several limitations. First, participation was entirely voluntary, with no financial incentive, so that monitoring of data input and accuracy was not possible. Moreover, even though a large number of centers participated, the representation of each country may be heterogeneous resulting in a 'patchwork' picture rather than complete global coverage. Second, geographical differences should be interpreted with caution because of the large differences in local infrastructure and facilities, including for microbiological cultures, and the small numbers of centers in some, particularly low- and middle income, regions. Indeed, we have no information on the impact on our results of fundamental contributors to the burden of infection in these low- and middle income countries, including poverty, political corruption, and poorly resourced health care systems.[14]

Importantly, despite improved communication facilitating center enrollment and more widespread access to the internet enabling easy, secure data, the conduct of such observational studies is becoming increasingly difficult. Of the more than 1800 centers that originally registered to participate, only 1150 finally included patients. Various reasons were cited, but many were related to increasingly strict administrative and legislative demands. Potential problems with data privacy laws mean that separate Data Use Agreements had to be negotiated and signed with individual hospitals, notably in the USA and Canada. Another recurring problem that discouraged center inclusion was that despite the observational, non-interventional nature of the study and the anonymous data collection, several ethics committees, notably in South America, required informed consent from patients, increasing the workload for local investigators and limiting the all-inclusive nature of the study. For these reasons, in the future, collating such data is likely to be unachievable, even with financial support.

In conclusion (TBC),

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Table 1. Characteristics of the participating centers

Characteristic	**N (%)**
No of centers per region	
Western Europe	478 (41.6)
Latin America	226 (19.7)
Asia	217 (18.9)
Eastern Europe/Russia	133 (11.6)
North America	46 (4.0)
Africa	35 (3.0)
Oceania	15 (1.3)
Total	1150 (100)
Top 10 participating countries in terms of numbers of centers	N (%)
United Kingdom	100 (8.7)
Brazil	94 (8.2)
China	90 (7.8)
France	57 (5.0)
Spain	54 (4.7)
Argentina	42 (3.7)
Italy	38 (3.3)
Germany	37 (3.2)
United States	36 (3.1)
Belgium	33 (2.9)
Mexico	32 (2.8)
GNI	
Low	73 (6.3)
Middle	432 (37.6)
Upper	645 (56.1)
Type of hospital	
University/academic	750 (65.2)
Non-university	400 (34.8)
Type of ICU	
Closed	922 (80.2)
Open	228 (19.8)
Presence of an HDU in the hospital, n (%)	469 (40.8)
Median number of HDU beds (IQR)	8 [6-16]
ICU specialty	
Mixed	852 (74.1)
Surgical	160 (13.9)
Medical	127 (11.0)
Other	11 (1.0)
Number of ICU beds, median (IQR)	12 (8-20)
Number of admissions (2016), median (IQR)	723 [430-1226]

GNI: gross national income (≤$3,895 = low and lower middle income; GNI $3896–12,055 = upper middle income; and GNI >$12,055 = high income); HDU: high dependency unit; ICU: intensive care unit

Table 2. Available resources in the participating ICUs

Resource	n (%)
Therapeutic and monitoring techniques	
Non-invasive mechanical ventilation	1140 (99.7)
Invasive mechanical ventilation	1139 (99.5)
Invasive monitoring (including CVP and arterial lines)	1100 (96.1)
Intermittent renal replacement therapy (dialysis)	932 (81.6)
Continuous renal replacement therapy	906 (79.2)
Echocardiography done by ICU team	878 (76.7)
High flow nasal oxygen	871 (76.1)
ECMO (VV and/or VA)	388 (33.9)
Infectious diseases specialist/clinical microbiologist, n (%)	
- 24/7	673 (58.8)
- Just during the week	357 (31.2)
- No	114 (10.0)
Pharmacist assigned to the ICU team, n (%)	627 (54.9)
Ability to perform antibiotic monitoring, n (%)	
- for vancomycin	918 (80.4)
- for voriconazole	408 (35.8)
- for beta-lactams	296 (26.0)
- for echinocandin	216 (18.9)
- for aminoglycosides	52 (4.6)

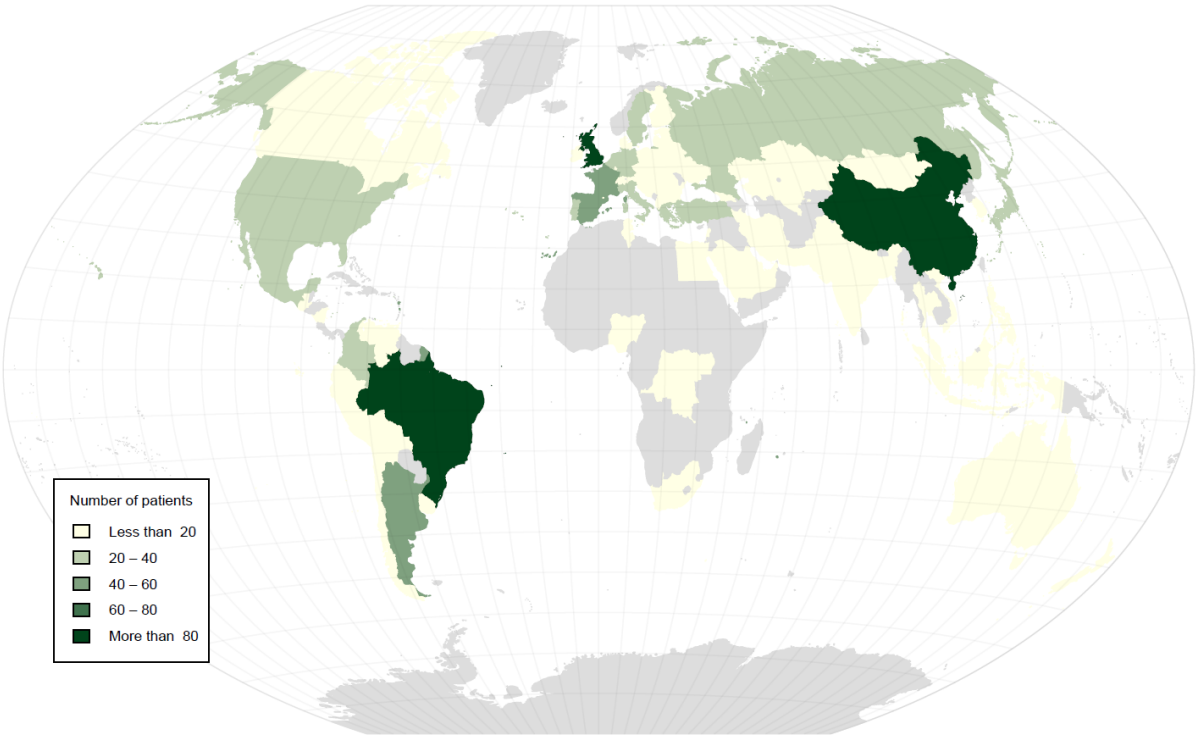
Table 3. Characteristics of the study cohort according to the presence of infection

	All	No Infection	Infection	p-value
	15264 (100)	7082 (46.4)	8182 (53.6)	
Male, n (%)	9214 (60.4)	4201 (59.3)	5013 (61.3)	0.01
Age, mean ± SD	60.8±17.6	60.4±17.6	61.2±17.5	< 0.01
Type of admission				<0.001
Medical	8326 (54.6)	3138 (44.3)	5188 (63.5)	
Elective surgery	3191 (20.9)	2343 (33.1)	848 (10.4)	
Emergency surgery	2565 (16.8)	969 (13.7)	1596 (19.5)	
Trauma	1170 (7.7)	627 (8.9)	543 (6.6)	
Admission source				<0.001
ER/ambulance	5034 (33.0)	2277 (32.2)	2757 (33.7)	
Hospital floor	4043 (25.4)	2462 (34.8)	1407 (17.2)	
OR/recovery	3869 (26.5)	1465 (20.7)	2578 (31.5)	
Other hospital	2115 (13.9)	751 (10.6)	1364 (16.7)	
Other	181 (1.2)	114 (1.6)	67 (.8)	
Reason for admission				<0.001
Surveillance/monitoring	1832 (12.2)	1427 (20.6)	405 (5.0)	
Neurological	2546 (17.0)	1282 (18.5)	1264 (15.6)	
Respiratory	3249 (21.7)	839 (12.1)	2410 (29.8)	
Cardiovascular	3345 (22.3)	1571 (22.7)	1774 (22.0)	
Renal	480 (3.2)	183 (2.6)	297 (3.7)	
Hematological	200 (1.3)	97 (1.4)	103 (1.3)	
Digestive/liver	1580 (10.5)	591 (8.5)	989 (12.2)	
Metabolic	283 (1.9)	142 (2.1)	141 (1.7)	
Ob/gyn	116 (.8)	75 (1.1)	41 (.5)	
Trauma	1368 (9.1)	713 (10.3)	655 (8.1)	
Comorbidities, n(%)				
Cancer (all)	2537 (16.6)	1175 (16.6)	1362 (16.6)	0.93
Solid cancer	2054 (13.5)	1031 (14.6)	1023 (12.5)	< 0.001
Non-metastatic cancer	448 (2.9)	209 (3.0)	239 (2.9)	0.91
Hematologic cancer	426 (2.8)	117 (1.7)	309 (3.8)	< 0.001
Non-insulin-dependent diabetes	2036 (13.3)	886 (12.5)	1150 (14.1)	< 0.01
Insulin-dependent diabetes	1144 (7.5)	462 (6.5)	682 (8.3)	< 0.001
COPD	1998 (13.1)	779 (11.0)	1219 (14.9)	< 0.001
Heart failure (NYHC III-IV)	1674 (11.0)	729 (10.3)	945 (11.5)	0.01
Chronic renal failure	1578 (10.3)	637 (9.0)	941 (11.5)	< 0.001
Immunosuppression	975 (6.4)	307 (4.3)	668 (8.2)	< 0.001
Chemotherapy/radiotherapy	942 (6.2)	386 (5.5)	556 (6.8)	< 0.001
Cirrhosis	481 (3.2)	186 (2.6)	295 (3.6)	< 0.001
HIV	125 (.8)	19 (.3)	106 (1.3)	< 0.001
Number of comorbidities, n (%)				<0.001
0	6964 (45.6)	3522 (49.7)	3442 (42.1)	
1	4533 (29.7)	2032 (28.7)	2501 (30.6)	

2	2407 (15.8)	1018 (14.4)	1389 (17.0)	
3	989 (6.5)	385 (5.4)	604 (7.4)	
4+	371 (2.4)	125 (1.8)	246 (3.0)	
Severity scores on study day				
SAPS II, mean ± SD	35.8±18.8	29.8±16.8	40.9±18.9	< 0.001
SOFA, median [IQR]	6 [3 - 9]	4 [2 - 7]	7 [4 - 11]	< 0.001
Procedures on the study day, n (%)				
Renal replacement therapy	1676 (11.2)	417 (6.0)	1259 (15.6)	< 0.001
Intermittent	835 (5.6)	240 (3.5)	595 (7.4)	<0.001
Continuous	899 (6.0)	187 (2.7)	712 (8.8)	<0.001
Mechanical ventilation				
Non-invasive	1549 (10.3)	595 (8.5)	954 (11.8)	<0.001
Invasive	6696 (44.4)	2291 (32.8)	4405 (54.4)	< 0.001
Vasopressor use	4251 (27.8)	1364 (19.3)	2887 (35.3)	< 0.001
Length of stay				
ICU, Median [IQR]	10 [3 - 28]	5 [2 - 17]	15 [6 - 35]	< 0.001
Hospital, Median [IQR]	23 [11-48]	16 [8-36]	30 [15-56]	< 0.001
Mortality, n(%)				
ICU	2544 (17.1)	666 (9.6)	1878 (23.5)	< 0.001
Hospital	3341 (22.4)	927 (13.4)	2414 (30.2)	< 0.001

SOFA: sequential organ failure assessment; IQR; interquartile range; ICU: intensive care unit; ER: emergency room; OR: operating room; COPD: chronic obstructive pulmonary disease; HIV: human immunodeficiency virus

Figure 1. World map showing the countries that participated in EPIC III



SUPPLEMENT

Table S1. Characteristics and outcome according to the type of infections and the isolated microorganism

	N (%)	SAPS II, mean ± SD	Mortality rates, n (%)		Length of stay, days, median (IQR)		SOFA score, median (IQR)
			ICU	Hospital	ICU	Hospital	
All infections	8182 (53.6)	40.9±18.9	1878 (23.5)	2414 (30.2)	15 [6-35]	30 [15-56]	7 [4-11]
Type of infection							
Definite[a]	5444 (67.0)	41.1±18.9	1299 (24.4)	1675 (31.5)	18 [8-40]	33 [17-59]	7 [4-11]
Probable	1891 (23.3)	40.9±18.9	416 (22.7)	522 (28.5)*	12 [5-28]*	24 [13-48]*	7 [4-11]
Possible	795 (9.8)	39.4±18.8*	154 (19.6)*	207 (26.4)*	9 [4-23]*	21 [10-41]*	7 [4-11]
Mode of acquisition							
Community-acquired[a]	3493 (43.9)	40.6±19.0	699 (20.5)	911 (26.8)	10 [4-22]	21 [11-40]	7 [4-11]
Hospital/healthcare-acquired	2736 (34.4)	41.7±19.0*	665 (24.9)*	872 (32.7)*	15 [7-35]*	34 [19-60]*	7 [4-11]
ICU-acquired	1722 (21.7)	40.0±18.3	463 (27.4)*	566 (33.5)*	31 [17-62]*	46 [26-73]*	7 [4-10]
Microorganisms							
Positive isolates	5288 (64.6%)						
Gram +ve	1974 (37.3)	40.7±18.6	463 (24.0)	591 (30.6)	18 [9-38]	34 [18-59]	7 [4-11]
Gram -ve	3547 (67.1)	41.8±18.8	895 (25.9)	1144 (33.0)	23 [10-48]	38 [21-65]	7 [4-11]
Anaerobes	183 (3.5)	39.6±20.2	43 (23.6)	51 (28.0)	17 [7-30]	36 [21-56]	7 [3-11]
Other organisms	92 (1.7)	44.8±19.4	22 (25.0)	27 (30.7)	12 [8-25]	27 [16-42]	8 [4-11]
Fungi	866 (16.4)	44.9±19.6	276 (32.4)	326 (38.2)	26 [13-51]	42 [23-69]	8 [5-13]
Viruses	198 (3.7)	43.2±20.1	52 (26.4)	60 (30.5)	18 [9-37]	33 [15-57]	7 [4-12]
Parasites	43 (0.8)	45.3±20.9	12 (27.9)	14 (32.6)	14 [10-25]	28 [15-50]	7 [4-12]
Mixed flora	91 (1.7)	40.5±17.2	25 (27.8)	30 (33.3)	13 [6-23]	22 [13-45]	7 [4-10]
Site of infection							
Respiratory	4920 (60.1)	42.3±18.7	1185 (24.8)	1526 (31.9)	18 [8-39]	31 [16-58]	7 [4-11]
Abdominal	1495 (18.3)	41.0±19.6	376 (25.7)	467 (31.9)	13 [6-31]	30 [15-54]	7 [4-12]
Bloodstream	1249 (15.3)	43.7±20.3	386 (31.6)	468 (38.3)	20 [9-44]	36 [19-63]	9 [5-13]

Renal	263 (3.2)	42.7±18.7	55 (21.5)	68 (26.6)	11 [5-36]	25 [13-60]	8 [5-11]
Skin	522 (6.4)	37.2±18.4	115 (22.6)	140 (27.5)	14 [6-36]	33 [16-61]	6 [4-10]
Catheter-related	256 (3.1)	43.8±19.6	79 (31.3)	99 (39.3)	28 [12-61]	47 [26-74]	8 [5-13]
Genitourinary	878 (10.7)	40.1±18.7	190 (22.3)	252 (29.6)	14 [5-42]	30 [14-61]	7 [4-10]
Central nervous system	322 (3.9)	40.0±18.6	67 (21.5)	89 (28.6)	16 [7-38]	31 [16-57]	6 [3-9]
Other site	531 (6.5)	37.9±18.8	110 (21.0)	142 (27.1)	17 [6-36]	33 [18-59]	7 [4-11]

a: the reference category. * Significant at 5% level versus the reference category.

Table S2. Prevalence of and outcome from infection

	Infection, n (%)	ICU mortality, n (%)		Hospital mortality, n (%)		ICU LOS, median (IQR)		Hospital LOS, median (IQR)		SOFA score, median (IQR)	
		Non	Infected	Non	Infected	Non	Infected	Non	Infected	Non	Infected
Geographic region											
Western Europe[a]	3181 (50.7)	293 (9.6)	675 (21.4)	420 (13.8)	893 (28.4)	4 [2-14]	14 [6-31]	16 [8-33]	29 [16-51]	4 [2-8]	7 [4-11]
Latin America	1481 (57.9)*	118 (11.5)	420 (30.2)*	158 (15.5)	511 (36.7)*	6 [2-22]*	17 [7-42]*	15 [7-39]	32 [16-60]*	3 [1-6]*	7 [4-10]*
Asia	1904 (60.0)*	102 (8.3)*	385 (20.9)	145 (11.8)	508 (27.5)	7 [2-26]*	17 [8-43]*	19 [10-46]*	31 [16-61]*	5 [3-8]*	8 [4.5-11]*
Eastern Europe	742 (54.6)*	91 (14.9)*	208 (28.7)*	114 (18.7)*	266 (36.6)*	6 [2-20]*	18 [8-38]	18 [9-36]*	30 [16-56]	5 [3-8]*	7 [4-11]
North America	567 (45.5)*	41 (6.0)*	117 (20.6)	61 (9.0)*	148 (26.1)	4 [2-11]	11 [4-25]*	10 [5-24]*	20 [10-40]*	4 [2-7]*	6 [3-10]*
Oceania	141 (42.6)*	9 (4.7)*	24 (17.0)	16 (8.4)*	33 (23.4)	3 [1-7]*	9 [3-21]*	13 [7-25]*	21 [12-35]*	5 [2-8]	8 [3-12]
Africa	166 (51.2)	12 (7.6)	49 (29.7)*	13 (8.2)*	55 (33.3)	42 [9-63]*	31 [12-68]*	59 [15-66]*	41 [22-71]*	4 [2-7]	8 [4-12]*
GNI											
Low	388 (57.8)*	32 (12.1)	99 (27.7)*	35 (13.2)	110 (30.8)	6 [2-13]*	15 [8-43]*	12 [7-26]*	25 [13-54]	4 [2-7]	7 [4-11]
Middle	3254 (58.8)*	240 (10.9)*	826 (26.3)*	322 (14.7)*	1025 (32.7)*	7 [2-28]*	19 [8-44]*	19 [9-46]*	32 [16-61]*	4 [2-7]	7 [4-11]
Upper[a]	4540 (50.1)	394 (8.8)	953 (21.2)	570 (12.7)	1279 (28.5)	4 [2-13]	13 [6-30]	15 [8-33]	28 [15-51]	4 [2-7]	7 [4-11]
Type of Hospital											
University/academic	5823 (53.6)	508 (10.2)*	1313 (22.9)*	687 (13.7)	1699 (29.6)*	6 [2-18]*	16 [7-36]*	17 [9-38]*	31 [16-57]*	5 [2-8]*	7 [4-11]*
Non-university[a]	2359 (53.7)	158 (8.2)	565 (25.2)	240 (12.4)	715 (31.9)	4 [2-13]	13 [6-32]	13 [7-30]	26 [13-51]	4 [2-6]	7 [4-10]
Type of admission											
Medical	5188 (62.3)*	434 (14.2)*	1307 (25.9)*	607 (19.9)*	1692 (33.6)	7 [3-24]*	14 [6-35]	17 [8-44]*	28 [14-55]*	4 [2-7]	7 [4-11]*
Surgical/elective[a]	848 (26.6)	59 (2.6)	151 (18.1)	91 (4.0)	184 (22.1)	2 [1-6]	14 [6-34]	13 [7-24]	33 [19-59]	4 [2-7]	6 [3-10]
Surgical/emergency	1596 (62.2) *	109 (11.4)*	336 (21.4)	153 (16.1)*	431 (27.5)	8 [2-21]*	16 [7-33]	20 [10-39]*	31 [17-53]*	5 [3-8]*	7 [4-11]*
Trauma	543 (46.4)*	64 (10.4)*	81 (15.2)	76 (12.3)*	103 (19.3)	11 [4-27]*	25 [13-46]*	22 [9-40]*	37 [22-60]	4 [2-7]	6 [4-9]
Quartiles of SAPS II											
<22[a]	1193 (31.7)	38 (1.5)	54 (4.7)	72 (2.9)	84 (7.2)	3 [1-9]	12 [4-30]	12 [6-26]	29 [15-55]	2 [1-4]	3 [1-4]
22-32	1882 (49.3)*	92 (4.8)*	164 (8.9)*	139 (7.3)*	273 (14.8)*	5 [2-15]*	13 [5-33]	17 [9-36]*	29 [15-55]	4 [2-6]*	4 [3-6]*
33-47	2390 (62.3)*	179 (12.6)*	475 (20.4)*	275 (19.4)*	692 (29.7)*	9 [3-27]*	17 [7-38]*	23 [11-48]*	32 [17-58]*	6 [5-9]*	7 [5-9]*
48+	2717 (70.7)*	357 (32.3)*	1185 (44.9)*	441 (39.9)*	1365 (51.7)*	8 [3-24]*	17 [8-37]*	19 [9-41]*	28 [14-54]	10 [8-13]*	12 [9-15]*
Duration of ICU stay pre-study day											
0-1[a]	1865 (34.0)	236 (6.7)	379 (20.8)	336 (9.5)	495 (27.2)	2 [1-5]	4 [2-10]	11 [6-21]	16 [8-32]	4 [2-7]	7 [4-11]
2-7	2972 (59.6)*	200 (10.2)*	609 (21.0)	294 (15.0)*	831 (28.6)	6 [3-11]*	10 [6-19]*	15 [9-29]*	22 [13-40]*	4 [2-7]	7 [4-11]
8-14	1456 (72.7)*	89 (16.6)*	351 (24.8)*	116 (21.7)*	444 (31.4)*	16 [12-24]*	19 [13-31]*	29 [18-48]*	32 [20-54]*	5 [3-8]*	7 [4-11]
>14	1889 (67.6)*	141 (15.8)*	539 (29.3)*	181 (20.2)*	644 (35.0)*	49 [30-88]*	47 [30-79]*	65 [42-101]*	62 [41-87]*	4 [2-7]*	7 [4-11]

a: the reference category. * Significant at 5% level versus the reference category.

Table S3. Mode of acquisition and site of infection according to geographic area and GNI.

	Geographic region							GNI		
Mode of acquisition	Western Europe[a]	Latin America	Asia	Eastern Europe	North America	Oceania	Africa	Upper[a]	Middle	lower
Community-acquired	1390 (44.7)	588 (41.4)	871 (47.4)	241 (33.2)*	279 (50.4)	67 (48.2)	57 (35.2)	1976 (44.5)	1331 (42.5)	186 (49.3)
Hospital/healthcare-acquired	1022 (32.8)	501 (35.2)	648 (35.3)	270 (37.2)	205 (37)	56 (40.3)	34 (21)*	1520 (34.2)	1100 (35.1)	116 (30.8)
ICU-acquired	700 (22.5)	333 (23.4)	317 (17.3)*	215 (29.6)*	70 (12.6)*	16 (11.5)*	71 (43.8)*	948 (21.3)	699 (22.3)	75 (19.9)
Site of infection										
Respiratory	1791 (56.3)	852 (57.5)	1324 (69.5)*	473 (63.7)*	318 (56.1)	83 (58.9)	79 (47.6)	2591 (57.1)	2092 (64.3)*	237 (61.1)
Abdominal	679 (21.3)	232 (15.7)*	306 (16.1)*	152 (20.5)	78 (13.8)*	19 (13.5)	29 (17.5)	901 (19.8)	550 (16.9)*	44 (11.3)*
Bloodstream	486 (15.3)	167 (11.3)*	280 (14.7)	122 (16.4)	119 (21)*	26 (18.4)	49 (29.5)*	761 (16.8)	410 (12.6)*	78 (20.1)
Renal	81 (2.5)	64 (4.3)*	46 (2.4)	43 (5.8)*	20 (3.5)	1 (0.7)	8 (4.8)	130 (2.9)	110 (3.4)	23 (5.9)*
Skin	193 (6.1)	104 (7)	105 (5.5)	65 (8.8)	36 (6.3)	9 (6.4)	10 (6)	290 (6.4)	207 (6.4)	25 (6.4)
Catheter-related	116 (3.6)	35 (2.4)	50 (2.6)	26 (3.5)	11 (1.9)	4 (2.8)	14 (8.4)*	153 (3.4)	86 (2.6)	17 (4.4)
Genitourinary	266 (8.4)	192 (13)*	212 (11.1)*	90 (12.1)*	83 (14.6)*	4 (2.8)	31 (18.7)*	434 (9.6)	369 (11.3)*	75 (19.3)*
Central nervous system	110 (3.5)	69 (4.7)	82 (4.3)	24 (3.2)	22 (3.9)	4 (2.8)	11 (6.6)	158 (3.5)	144 (4.4)	20 (5.2)
Other site	243 (7.6)	80 (5.4)	90 (4.7)*	49 (6.6)	50 (8.8)	11 (7.8)	8 (4.8)	357 (7.9)	151 (4.6)*	23 (5.9)

a: the reference category. * Significant at 5% level versus the reference category.

Table S4. Distribution of isolated microorganisms according to geographic region and GNI

	N (%)	Geographic region							GNI		
		Western Europe[a]	Latin America	Asia	Eastern Europe	North America	Oceania	Africa	Upper[a]	Middle	Lower
Culture +ve infections	5288 (64.6)	2154 (67.7)	750 (50.6)*	1212 (63.7)*	542 (73.0)*	401 (70.7)	107 (75.9)*	122 (73.5)	3138 (69.1)	1865 (57.3)*	285 (73.5)
Gram +ve	1974 (37.3)	884 (41.0)	263 (35.1)*	333 (27.5)*	224 (41.3)	185 (46.1)	47 (43.9)	38 (31.1)*	1318 (42.0)	569 (30.5)*	87 (30.5)*
MSSA	394 (7.5)	214 (9.9)	59 (7.9)	43 (3.5)*	36 (6.6)*	28 (7.0)	11 (10.3)	3 (2.5)*	292 (9.3)	89 (4.8)*	13 (4.6)*
MRSA	240 (4.5)	49 (2.3)	53 (7.1)*	58 (4.8)*	30 (5.5)*	40 (10.0)*	4 (3.7)	6 (4.9)	122 (3.9)	107 (5.7)*	11 (3.9)
S. aureus, sensitivity unknown	145 (2.7)	59 (2.7)	18 (2.4)	23 (1.9)	17 (3.1)	24 (6.0)*	3 (2.8)	1 (0.8)	88 (2.8)	41 (2.2)	16 (5.6)*
Staph coag -ve, sensitivity unknown	127 (2.4)	60 (2.8)	19 (2.5)	24 (2.0)	5 (0.9)	14 (3.5)	1 (0.9)	4 (3.3)	84 (2.7)	38 (2.0)	5 (1.8)
S. epiderm, methicillin sensitive	133 (2.5)	55 (2.6)	21 (2.8)	26 (2.1)	27 (5.0)*	2 (0.5)*	2 (1.9)	0 (0.0)	78 (2.5)	48 (2.6)	7 (2.5)
S. epiderm, methicllin resistant	174 (3.3)	74 (3.4)	35 (4.7)	29 (2.4)	23 (4.2)	5 (1.2)*	2 (1.9)	6 (4.9)	101 (3.2)	68 (3.6)	5 (1.8)
S. pneumoniae	146 (2.8)	66 (3.1)	17 (2.3)	24 (2.0)	16 (3.0)	10 (2.5)	6 (5.6)	7 (5.7)	97 (3.1)	35 (1.9)*	14 (4.9)*
Other strep	228 (4.3)	115 (5.3)	19 (2.5)*	39 (3.2)*	19 (3.5)	27 (6.7)	8 (7.5)	1 (0.8)*	169 (5.4)	46 (2.5)*	13 (4.6)
Enterococcus	358 (6.8)	201 (9.3)	26 (3.5)*	45 (3.7)*	49 (9.0)	25 (6.2)*	8 (7.5)	4 (3.3)*	279 (8.9)	76 (4.1)*	3 (1.1)*
Other Gram +ve	247 (4.7)	110 (5.1)	18 (2.4)*	52 (4.3)	18 (3.3)	38 (9.5)*	3 (2.8)	8 (6.6)	176 (5.6)	67 (3.6)*	4 (1.4)*
Gram -ve	3547 (67.1)	1308 (60.7)	540 (72.0)*	923 (76.2)*	420 (77.5)*	215 (53.6)*	47 (43.9)*	94 (77.0)*	1909 (60.8)	1438 (77.1)*	200 (70.2)*
Pseudomonas	858 (16.2)	292 (13.6)	126 (16.8)*	228 (18.8)*	123 (22.7)	51 (12.7)	9 (8.4)	29 (23.8)*	440 (14.0)	365 (19.6)*	53 (18.6)*
E. coli	905 (17.1)	413 (19.2)	118 (15.7)*	177 (14.6)*	96 (17.7)	70 (17.5)	15 (14.0)	16 (13.1)	570 (18.2)	276 (14.8)*	59 (20.7)
Klebsiella	975 (18.4)	279 (13.0)	170 (22.7)*	281 (23.2)*	167 (30.8)*	38 (9.5)	3 (2.8)*	37 (30.3)*	447 (14.2)	450 (24.1)*	78 (27.4)*
Acinetobacter	605 (11.4)	75 (3.5)	72 (9.6)*	310 (25.6)*	123 (22.7)*	4 (1.0)*	2 (1.9)	19 (15.6)*	137 (4.4)	414 (22.2)*	54 (18.9)*
Enterobacter	196 (3.7)	90 (4.2)	21 (2.8)	34 (2.8)	20 (3.7)	16 (4.0)	7 (6.5)	8 (6.6)	124 (4.0)	65 (3.5)	7 (2.5)
Proteus	199 (3.8)	73 (3.4)	25 (3.3)	34 (2.8)	40 (7.4)*	14 (3.5)	2 (1.9)	11 (9.0)*	113 (3.6)	70 (3.8)	16 (5.6)
Stenotrophomonas	148 (2.8)	53 (2.5)	21 (2.8)	49 (4.0)*	9 (1.7)	15 (3.7)	0 (0.0)	1 (0.8)	85 (2.7)	62 (3.3)	1 (0.4)*
Hemophilus	94 (1.8)	60 (2.8)	10 (1.3)*	8 (0.7)*	1 (0.2)*	10 (2.5)	5 (4.7)	0 (0.0)	80 (2.5)	12 (0.6)*	2 (0.7)*
Serratia	140 (2.6)	73 (3.4)	17 (2.3)	19 (1.6)*	11 (2.0)	11 (2.7)	1 (0.9)	8 (6.6)	101 (3.2)	34 (1.8)*	5 (1.8)
Citrobacter	68 (1.3)	43 (2.0)	10 (1.3)	6 (0.5)*	4 (0.7)*	3 (0.7)	1 (0.9)	1 (0.8)	54 (1.7)	12 (0.6)*	2 (0.7)
Other Gram -ve	676 (12.8)	309 (14.3)	77 (10.3)*	129 (10.6)*	73 (13.5)	48 (12.0)	13 (12.1)	27 (22.1)*	445 (14.2)	202 (10.8)*	29 (10.2)
Anaerobes	183 (3.5)	105 (4.9)	12 (1.6)*	9 (0.7)*	23 (4.2)	24 (6.0)	7 (6.5)	3 (2.5)	152 (4.8)	30 (1.6)*	1 (0.4)*
Other bacteria	92 (1.7)	42 (1.9)	12 (1.6)	20 (1.7)	7 (1.3)	10 (2.5)	0 (0.0)	1 (0.8)	59 (1.9)	26 (1.4)	7 (2.5)
Fungi	866 (16.4)	398 (18.5)	69 (9.2)*	206 (17.0)	89 (16.4)	60 (15.0)	17 (15.9)	27 (22.1)	555 (17.7)	256 (13.7)*	55 (19.3)
Candida alb.	512 (9.7)	237 (11.0)	41 (5.5)*	107 (8.8)*	69 (12.7)	28 (7.0)*	11 (10.3)	19 (15.6)	329 (10.5)	147 (7.9)*	36 (12.6)
Candida non alb.	267 (5.0)	123 (5.7)	23 (3.1)*	77 (6.4)	21 (3.9)	12 (3.0)*	3 (2.8)	8 (6.6)	159 (5.1)	91 (4.9)	17 (6.0)
Aspergillus	76 (1.4)	48 (2.2)	0 (0.0)*	17 (1.4)	6 (1.1)	4 (1.0)	1 (0.9)	0 (0.0)	64 (2.0)	10 (0.5)*	2 (0.7)
Other fungi	61 (1.2)	17 (0.8)	6 (0.8)	15 (1.2)	2 (0.4)	18 (4.5)*	3 (2.8)*	0 (0.0)	43 (1.4)	17 (0.9)	1 (0.4)
Viruses	198 (3.7)	83 (3.9)	16 (2.1)*	53 (4.4)	6 (1.1)*	16 (4.0)	20 (18.7)*	4 (3.3)	131 (4.2)	42 (2.3)*	25 (8.8)*
Parasites	43 (0.8)	27 (1.3)	5 (0.7)	6 (0.5)	1 (0.2)	3 (0.7)	0 (0.0)	1 (0.8)	34 (1.1)	7 (0.4)*	2 (0.7)
Mixed Flora	91 (1.7)	44 (2.0)	13 (1.7)	12 (1.0)*	5 (0.9)	13 (3.2)	3 (2.8)	1 (0.8)	64 (2.0)	25 (1.3)	2 (0.7)

a: the reference category. * Significant at 5% level versus the reference category.

Table S5. Multilevel analysis in the whole cohort with infection as the dependent variable

Variables	OR (95%CI)	p-value
Fixed-effects, varying within clusters		
Age	1.00 (1.00-1.00)	0.127
Sex, Male	1.12 (1.04-1.20)	0.004
Type of admission (%)		
Surgical	Ref	na
Medical	2.79 (2.44-3.19)	<0.001
Trauma	3.38 (2.96-3.85)	<0.001
Other	1.64 (1.37-1.96)	<0.001
Source of admission		
OR/recovery	Ref	na
Other hospital	1.63 (1.40-1.89)	<0.001
ER/ambulance	1.17 (1.03-1.34)	0.020
Hospital floor	1.77 (1.56-2.02)	<0.001
Other	0.56 (0.39-0.81)	0.002
Comorbidities		
COPD	1.39 (1.24-1.56)	<0.001
Metastatic cancer	1.09 (0.86-1.39)	0.464
Hematologic cancer	1.66 (1.29-2.14)	<0.001
Solid	1.15 (1.01-1.30)	0.033
Insulin-dependent diabetes mellitus	1.29 (1.12-1.49)	0.001
Non-insulin-dependent diabetes mellitus	1.15 (1.03-1.29)	0.014
Heart failure, NYHA III/IV	0.93 (0.82-1.06)	0.269
Chronic renalfailure	1.15 (1.01-1.30)	0.036
HIV infection	4.73 (2.76-8.08)	<0.001
Cirrhosis	1.19 (0.97-1.47)	0.102
Immunosuppression	1.39 (1.21-1.59)	<0.001
Duration of ICU stay prior to study day, days		
0-1	Ref	na
2-7	2.47 (2.26-2.70)	<0.001
8-14	4.19 (3.70-4.75)	<0.001
>14	3.17 (2.84-3.54)	<0.001
Fixed-effects, constant within clusters		
Type of hospital		
Non university	Ref	na
University/Academic	0.98 (0.87-1.12)	0.801
ICU volume		
<250	Ref	na
250-499	0.83 (0.62-1.10)	0.195
500-749	0.58 (0.43-0.77)	<0.001
750+	0.54 (0.42-0.71)	<0.001
GNI		
Low and lower middle	Ref	na
Upper middle	0.87 (0.63-1.21)	0.401

High	0.65 (0.47-0.88)	0.006
Random-effects		
Country		
Variance (se)	0.04 (0.02)	
p-value	0.049	
Hospital within country		
Variance (se)	0.40 (0.04)	
p-value	<0.001	

Table S6. Multilevel analysis in infected patients with positive isolates with hospital mortality as the dependent variable and all microorganisms as independent variables

Variables	OR (95%CI)	p-value
Fixed-effects, varying within clusters		
Age	1.01 (1.00-1.01)	0.004
Sex, Male	0.93 (0.81-1.07)	0.303
SAPS II	1.05 (1.04-1.05)	<0.001
Type of admission (%)		
Surgical	Ref	na
Medical	1.19 (0.90-1.56)	0.221
Trauma	0.89 (0.67-1.17)	0.396
Other	0.90 (0.60-1.34)	0.585
Source of admission		
OR/recovery	Ref	na
Otherhospital	0.92 (0.70-1.20)	0.540
ER/ambulance	0.94 (0.72-1.21)	0.617
Hospital floor	1.31 (1.03-1.67)	0.029
Other	0.86 (0.41-1.80)	0.685
Comorbidities		
COPD	0.99 (0.82-1.20)	0.904
Metastatic cancer	1.66 (1.11-2.49)	0.014
Hematologic cancer	1.26 (0.87-1.83)	0.221
Solid	1.16 (0.93-1.45)	0.183
Insulin-dependent diabetes mellitus	0.94 (0.74-1.20)	0.632
Non-insulin-dependent diabetes mellitus	0.97 (0.80-1.18)	0.769
Heart failure, NYHA III/IV	1.49 (1.21-1.84)	<0.001
Chronic renalfailure	1.06 (0.86-1.32)	0.587
HIV infection	0.44 (0.24-0.82)	0.009
Cirrhosis	1.58 (1.12-2.22)	0.009
Immunosuppression	1.16 (0.93-1.45)	0.183
Acquisition mode		
Community-acquired	Ref	na
Hospital-acquired	1.03 (0.87-1.22)	0.757
ICU acquired	1.31 (1.08-1.57)	0.005
Mircoorganisms		
S. aureus, MSSA	1.20 (0.93-1.56)	0.168
S. aureus, MRSA	1.05 (0.76-1.46)	0.757
S. epiderm, methicillin sensitive	0.85 (0.55-1.31)	0.452
S. epiderm, methicllin resistant	1.03 (0.71-1.50)	0.887
Enterococcus	1.31 (1.00-1.72)	0.053
S. pneumoniae	0.48 (0.29-0.78)	0.003
Pseudomonas	0.88 (0.73-1.07)	0.192
E coli	0.99 (0.82-1.20)	0.924
Klebsiella	1.12 (0.94-1.35)	0.210
Acinetobacter	1.25 (1.00-1.57)	0.051
Enterobacter	0.98 (0.67-1.43)	0.906
Candida	1.19 (0.98-1.44)	0.077

Aspergillus	1.50 (0.87-2.58)	0.143
Procedures		
Mechanical ventilation	1.29 (1.09-1.52)	0.003
Renal replacement therapy	1.50 (1.24-1.81)	<0.001
Fixed-effects, constant within clusters		
Type of hospital		
Non university	Ref	na
University/Academic	0.88 (0.74-1.06)	0.174
ICU admissions 2016		
<250	Ref	na
250-499	0.79 (0.55-1.15)	0.225
500-749	0.88 (0.60-1.28)	0.491
750+	0.88 (0.62-1.25)	0.471
Income		
Low and lower middle	Ref	na
Upper middle	1.08 (0.70-1.67)	0.737
High	0.75 (0.49-1.15)	0.185
Random-effects		
Country		
Variance (se)	0.07 (0.03)	
p-value	0.025	
Hospital within country		
Variance (se)	0.21 (0.06)	
p-value	<0.001	

Table S7. Multilevel analysis in infected patients with positive isolates with hospital mortality as the dependent variable and resistant microorganisms as independent variables

Variables	OR (95%CI)	p-value
Fixed-effects, varying within clusters		
Age	1.01 (1.00-1.01)	0.003
Sex, Male	0.92 (0.80-1.06)	0.248
SAPS II	1.05 (1.04-1.05)	<0.001
Type of admission (%)		
Surgical	Ref	na
Medical	1.21 (0.92-1.59)	0.172
Trauma	0.92 (0.69-1.21)	0.535
Other	0.93 (0.63-1.39)	0.738
Source of admission		
OR/recovery	Ref	na
Other hospital	0.91 (0.69-1.19)	0.482
ER/ambulance	0.91 (0.71-1.18)	0.489
Hospital floor	1.29 (1.01-1.64)	0.042
Other	0.84 (0.40-1.76)	0.637
Comorbidities		
COPD	0.99 (0.82-1.20)	0.955
Metastatic cancer	1.70 (1.13-2.55)	0.010
Hematologic cancer	1.25 (0.86-1.81)	0.240
Solid	1.16 (0.93-1.45)	0.181
Insulin-dependent diabetes mellitus	0.95 (0.74-1.21)	0.665
Non-insulin-dependent diabetes mellitus	0.96 (0.79-1.18)	0.719
Heart failure, NYHA III/IV	1.48 (1.20-1.82)	<0.001
Chronic renal failure	1.06 (0.85-1.31)	0.619
HIV infection	0.46 (0.25-0.84)	0.012
Cirrhosis	1.60 (1.13-2.25)	0.007
Immunosuppression	1.16 (0.93-1.44)	0.186
Acquisition mode		
Community-acquired	Ref	na
Hospital-acquired	1.04 (0.87-1.23)	0.691
ICU-acquired	1.29 (1.07-1.55)	0.007
Resistant microorganisms		
S. aureus	1.03 (0.75-1.42)	0.856
S. coagulase neg	1.01 (0.70-1.48)	0.944
Enterococcus	2.40 (1.43-4.04)	0.001
S. pneumoniae	0.51 (0.10-2.62)	0.422
E. coli	1.07 (0.78-1.48)	0.669
Klebsiella	1.28 (1.01-1.61)	0.039
Pseudomonas	1.16 (0.76-1.77)	0.502
Acinetobacter	1.43 (1.10-1.85)	0.007
Candida	1.39 (0.76-2.55)	0.286
Procedures		
Mechanical ventilation	1.30 (1.10-1.53)	0.002
Renal replacement therapy	1.51 (1.25-1.82)	<0.001

Fixed-effects, constant within clusters		
Type of hospital		
Non university	Ref	na
University/Academic	0.88 (0.73-1.05)	0.153
ICU admission, 2016		
<250	Ref	na
250-499	0.80 (0.55-1.17)	0.250
500-749	0.88 (0.60-1.28)	0.497
750+	0.89 (0.63-1.27)	0.518
Income		
Low and lower middle	Ref	na
Upper middle	1.08 (0.70-1.67)	0.716
High	0.79 (0.52-1.20)	0.268
Random-effects		
Country		
Variance (se)	0.07 (0.03)	
p-value	0.028	
Hospital within country		
Variance (se)	0.21 (0.06)	
p-value	<0.001	

Appendix 1. Contributing centers listed alphabetically per region with lead investigators

Africa

Democratic Republic Congo: Cliniques Unversitaires de Lubumbashi (R Kipenge, C Kakisingi)

Egypt: Ain Shams Specialized Hospital (N Elsharnouby); Ain Shams University Hospital Surgical and Trauma ICU (M Algendy); El Zaiton Specialized Hospital (H El Gendy, F Farid); Faculty of Medicine Ain Shams University (H El Gendy, G Elewa); Kasralainy Hospital (M Arafa)

Nigeria: National Hospital Abuja (M Salawu, M Osazuwa); University College Hospital Ibadan (B Osinaike, A Sanusi); University of Lagos (A Adeniyi)

Rwanda: Kigali University Teaching Hospital/University of Rwanda (J Mvukiyehe); Butare University Teaching Hospital (T Twagirumugabe, G Nyirigira)

South Africa: Chris Hani Baragwanath Academic Hospital (L Doedens); Ethekwini Hospital and Heart Center (R Ramdass, S Jailal); Groote Schuur Hospital (R Raine); Helen Joseph Hospital (M Mukansi, R Gani); Inkosi Albert Luthuli Central Hospital (T Hardcastle); Netcare Clinton Hospital (M Human); Netcare Milpark Hospital (R Grobler, M Human); Netcare Milpark Hospital Burns ICU (R Grobler); Netcare Union Hospital (M Human, R Grobler); Netcare Union Hospital Cardiac ICU (M Human); Tygerberg Academic Hospital (N Ahmed, E van der Merwe)

Tunisia: CAMU (N Brahmi, A Mrad); CHU Fattouma Bourguiba Monastir (L Besbes); Hôpital A. Mami-Ariana (M Besbes, S Ayed); Hôpital Militaire de Tunis (H Gharsallah, W Sammoud); Military Hospital of Instruction of Tunis (M Ben Salah, W Sellami); Military Hospital of Tunis (I Labbene); Mongi Slim University Hospital, La Marsa (M Mebazaa); Rabta Teaching Hospital (S Abdellatif); Taher Sfar Hospital Mahdia (S Elatrous, N Tilouche)

Uganda: Mulago National Referral Hospital (J Nakibuuka, C Ssendikadiwa)

Asia/Middle East

Bahrain: Salmanya Medical Complex (S Alkhawaja, M Elseirafi)

Bangladesh: Apollo Hospitals Dhaka (Z Iqbal, L Aziz); Asgar Ali Hospital (A Nooruzzaman, M Islam); Bangladesh Specialized Hospital (M Ahmed); Birdem General Hospital (F Ahmed, A Ahsan); Square Hospital, Dhaka (R Rabbani, A Anam)

China: 2nd Affiliated Hospital Zhejiang University School of Medicine (W Cui, Z Zhang); Affiliated Hospital of Hebei University (N Li, Z Yu); Affiliated Jiangsu Province Hospital of Traditional Chinese Medicine, Nanjing University of Traditional Chinese Medicine (X Lu); Airforce General Hospital (N Bo, M Yujie); Baoding No.1 Central Hospital (J Zhang); Beijing Aerospace General Hospital (C Yan, Y Sun); Beijing Friendship Hospital (M Duan); Beijing Hospital (T Liu); Beijing Luhe Hospital, Capital Medical University (W Yibing, W GUAN); Beijing Shijitan hospital,Capital Medical University (C Wei, Z Jie); Beijing Tongren Hospital Affiliated to Capital Medical University (J Qin); Beijing Tsinghua Changgung Hospital, Tsinghua Unniversity. (Y Xu, H Zhou); Cardiovascular and Cerebrovascular Hospital of General Hospital of Ningxia Medical University (M Xiaowei, Y Yanping); Chengde Medical University Affiliated Hospital (L Hua); China-Japan Friendship Hospital (L Yi, Q Zhan); Chinese PLA General Hospital Cardiology (F Cao, Y Li); Chinese PLA General Hospital Surgical ICU (L Pan, F Zhou); Chinese PLA General Hospital (H Zhu); Da Lian Central Hospital (G Dong, Y Rongli); Dalian Beihai Hospital (Y Liu, L Zhang); Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine (R Wang); Dong E Hospital (X Song, X Liu); Dongying People's Hospital (Y Wu); First Affiliated Hospital of China Medical University

(X Ma); First Affiliated Hospital of Dalian Medical University (J Zhang); First Affiliated Hospital Of Zhengzhou University (S Tongwen, D Xiaoguang); Fujian Provincial Hospital (L Wang, S Shi); Gansu Provincial Hospital (L Zhang, Y Yuan); Guangdong General Hospital (T Qin, S Wang); Hainan General Hospital (L NA); Hangzhou First People's Hospital (W Hu, Y Zhu); Guizhou Province's People Hospital (X Shi); Huaihe Hospital Affiliated To Henan University (L Lei, Q Guanbin); Huainan Chaoyang Hospital (Z Du, D Mu); Institute of Respiratory Diseases of PLA, Xinqiao Hospital, Third Military Medical University (Q Li); Institute of Surgery Research, Daping Hospital, Third Military Medical University, Chongqing 400042, China (Y Wang, J Zhou); Institution as Kaifeng Center Hospital (Z Fu, Z Mao); Kaifeng Hospital of Traditional Chinese Medicine (Y Lian, F Yan); Kaifeng Second People's Hospital (D Zhang); Kunming Third People's Hospital (Z Xuan, X JiaWei); Medical Institutions (W Chunmei, S Lipo); Navy General Hospital (Z Zhang); Pamela Youde Nethersole Eastern Hospital, Hong Kong (M Man, H Shum); Peiking University First Hospital (P Jiaxin); Peking Union Medical College Hospital (B Du, W Jiang); Penglai Hospital of TCM (Z Wang, J Xu); People's Hospital of Guangxi Zhuang Autonomous Region (X Bin, X Shulin); PLA General Hospital (L Liu, Y Chen); Qilu Hospital of Shandong University (H Wang); Qilu Hospital of Shandong University (Q Zhai); Qilu Hospital of Shandong University(Qingdao) (W Dawei, G Xi); Qinghai University Affiliated Hospital (H Ming, H Shengnian); Second Hospital of Jilin University (Y Yin, D Liu); Shandong Provincial Hospital affiliated to Shandong University (C Wang, J Zhang); Shanghai Jiaotong University School of Medince Renji Hosptial (Y Gao, Y Deng); Shanghai Tenth People's Hospital (L Gao, W Kong); Shenjing Hospital of China Medical University (B Zang, X Gong); Sir Run Run Shaw Hospital (M Jing, L Ling); Sir Run Run Shaw Hospital, Zhejiang University School of Medicine (J Zhou); The Affiliated Hospital Of Guizhou Medical University (D Wang, X Liu); The Affliated Hospital of Weifang Medical University (L Zhang); The Central Hospital of Wuhan, Tongji Medical College, Huazhong University of Science and Technology (L Yu, X Wu); The First Affiliated Hospital of Anhui Medical University (H Zhang, N Wang); The First Affiliated Hospital of Bengbu Medical College (Q Zou, S Qin); The First Affiliated Hospital of Chongqing Medical University (F Zhou, X Chen); The First Affiliated Hospital of Chongqing Medical University (F Zhou, X Chen); The First Affiliated Hospital of Guangzhou Medical University (Y LI, Y Xu); The First Affiliated Hospital of Henan University of Science and Technology (G Zhang, D Li); The First Affiliated Hospital of Kunming Medical University (L Jinglin); The First Affiliated Hospital of Wenzhou Medical University (J Pan, Z Dai); The First Affiliated Hospital of Zhengzhou University (Y Hongfu); The First Hospital of Yunnan Province (Z Li); The First Hospital of Harbin Medical University (M Zhao, S Yang); The First Hospital Of Jilin University (H Li); The Kailuan General Hospital, (L Xiao Lan, G Jing LI); The PLA General Hospital (L Wenning, G Dewei); The Second Affiliated Hospital of Hainan Medical University (K Fuxin); The Second Hospital of Anhui Medical University (S Yun, L Ang); The Second People'hospital of Liaocheng City Shandong Province (L Liu Qingyue, S Sun Jiajun); The Third Xiangya Hospital of Central South University (M Yang, M Gao); Union Hospital, Tongji Medical College, Huazhong University of Science and Technology (S Yuan, X Yang); West China Hospital (B Wang); Xi 'an Jiaotong University First Affiliated Hospital (Q Shi, Z Zhu); Xuzhou City Central Hospital (M Li, J Li); Zhejiang Provincial Hospital of TCM (L Huang); Zhejiang University (N Liu); Zhengzhou Orthopedic Hospital (Z Hou, Y); Zhong-da Hospital Affiliated To Southeast University (M Mo, Y Yang); Zhongnan Hospital of Wuhan University (Z Peng, Y Feng)

India: AMRI Hospitals, Bhubaneswar (S Sahu, S Dash); AMRI Hospitals, Kolkata, West Bengal (S Todi); AMRI Hospitals, Mukundapur, Kolkata, West Bengal (S Todi, S Basu); AMRI, Bhubaneswar (S Behera); Breach Candy Hospital Trust (J Mascarenhas); Care Institute Of Medical Sciences, Nampally, Hyderabad (M Jaju, S Gurugubelli); Chirayu Medical College and Hospital (P Bhattacharya); Columbia Asia Hospital, Hebbal (S Krishnamurthy, M Chandrashekar); Continental Hospitals, Hyderabad (P Gopal, B Chandrabhatla); Criticare Hospital & Research Instiute (D Jeswani, D Kshirsagar); Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital (P Kitey, A Verma); Kovai Medical Centre and Hospitals (L Saravanabavan, S Nandakumar); Manipal Hospital Whitefield (R Mohan Shetty, S Tarun); Medanta The Medicity (Y Mehta, Tariq); National Cancer Institute, Nagpur (D Buche, T Bawankar); Ozone Multispeiality Hospital Akola (P Patil, P Shekokar); Sir H N Reliance Foundation Hospital (D Rathod); Suretech Hospital (N Jaiswal, S Khsirsagar); Wockhardt Hospital (R Kaiche, R Baste)

Indonesia: Cipto Mangunkusumo Hospital, Universitas Indonesia (D Aditianingsih, R Sedono); Dr Soetomo Hospital (B Semedi, L Andriyanto); Faculty of Medicine UNPAD - Dr. Hasan Sadikin Hospital (T Maskoen, N Dian)

Iran: NRITLD (S Hashemian, H Jamaati); Shiraz University of Medical Sciences (F Zand); Tabriz University of Medical Sciences (A Mahmoodpoor); Tehran University of Medical Sciences Imam Khomeini Hospital Complex (M Beigmohammadi, S Fatah Ghazi); Tehran University of Medical Sciences (M Beigmohammadi, M Ramezani)

Israel: Soroka university Medical Center (L Fuchs, O Galante); Soroka University Medical Center, Beer Sheva (I Lazar); Wolfson Medical Center (A Soroksky)

Japan: Dokkyo Medical University (M Uchida); Fujita Health University School of Medicine (O Nishida, S Komatsu); Hiroshima University (N Shime); Itabashi Chuo Medical Center (R Kato); Jichi Medical School Saitama Medical Center (M Sanui); Jichi Medical University School of Medicine (S Katayama); Juntendo University Urayasu Hospital (T Abe); Kagoshima City Hospital (S Matsukubo, T Ueno); Kameda Medical Center (Y Hayashi); Kansai Medical University Hospital (T Umegaki, T Kamibayashi); Kochi Medical School Hospital (T Yatabe, B Aoyama); Kyoto Prefectural University of Medicine (S Hashimoto, Y Tabata); Nagasaki University Hospital (S Matsumoto); Nagoya City University Hospital (K Sobue, H Hirate); Ohta Memorial Hospital (Y Tomioka); St. Marianna University School of Medicine Hospital (S Fujitani); The Jikei University School of Medicine (T Hirasaki); Tokushima University Hospital (M Nishikawa, N Nakanishi); Tokyo Women's Medical University (A Yaguchi, M Kang); Tokyo Women's Medical University Yachiyo Medical Center (S Mizushima, T Sadahiro); Wakayama Medical University (K Miyamoto); Yokohama City Seibu Hospital (H Yoshida)

Kazakhstan: Astana Medical University (A Konkayev); Astana Medical University (M Konkayeva, S Kulzhanova); Medical University Astana Infectious Diseases (M Konkayeva, S Kulzhanova)

Kuwait: Amiri Hospital (A Murad, K Abdulmalek)

Lebanon: Bellevue Medical Center (BMC) (G Eid, M Matta); Hotel-Dieu University Hospital (P Yazbeck, V Chalhoub)

Malaysia: Hospital Raja Perempuan Zainab Ii, Kota Bharu, (M Ali, N Bahar); Hospital Selayang (A Yusof, L Kamalul Bahrin); Hospital Sultanah Aminah, Johor Bahru (M Kassim, T Cheng Cheng); Hospital Sultanah Nur Zahirah, Kuala Terengganu (N Nik Adib); Hospital Tengku Ampuan Rahimah Klang Selangor (L See Pheng, S Wahab); University Kebangsaan Medical Center (A Yusof); University Malaya Medical Centre (M Hasan)

Mongolia: Intermed hospital (T Begzjav)

Nepal: Grande International Hospital (A Koirala, S Acharya)

Pakistan: Aga Khan University (M hashmi); Bahria Town International Hospital (M Rana, M Hashmi)

Philippines: Cebu Doctors' University Hospital (R Bigornia, M Malazarte); Perpetual Succour Hospital (R Bigornia, P Blanco)

Qatar: Hamad Medical Corporation (A Alsheikhly, S Mahmood)

Saudi Arabia: Imam Abdulrahman University- King Fahad Hospital of the University (M Alshahrani, M Alshahrani); King Abdulaziz Medical City (M Aziz Mohamed); King Faisal Specialist Hospital and Research Centre - Riyadh (A Elhazmi, H Hawa); Prince Mohammed Bin Abdulaziz Hospital (A asiri, M Sammani); Prince Sultan Military Medical City (T Aldaghestani, S Moayad Awad); PSMMC (G Almekhlafi)

Singapore: KK Hospital (T Loh, J Lee); Tan Tock Seng Hospital Neurological ICU (Y Wong, L Li); Tan Tock Seng Hospital Surgical ICU (J Tan, Y Lau); Tan Tock Seng Hospital Cardiac ICU (Y Chia, L Li); Tan Tock Seng Hospital Medical ICU (S Lew, G Li)

South Korea: Samsung Medical Center (G Suh)

Thailand: Division of Respiratory Disease, Department of Medicine, Siriraj Hospital, Mahidol University (P Wongsurakiat); Phramongkutklao Hospital (P Wacharasint); Prince of Songkla Univeristy (B Khwannimit)

Turkey: Akdeniz University School of Medicine (O Dursun); Ankara Diskapi Yildirim Beyazit Research and Education Hospital (F Yildirim); Ankara Oncology Training and Research Hospital (G Iskender); Ankara2

University (G Ozsoy); Ataturk Research and Training Hospital (M Kizilkaya); Baskent University Hospital (E Gulay); Dokuz Eylul University (V Hanci); Dokuz Eylul University Department Of Pulmonary And Critical Care (B Ergan); Dokuz Eylul University Hospital (Y Savran); Duzce University, School of Medicine (T Akbas); Erciyes University (K Gundogan); Erzincan University (I Küpeli); Erzincan University (F Subasi); Gazi University School of Medicine, (M Türkoglu); Giresun University (U Turkmen, R Turan); Haydarpasa Numune Training and Research Hospital (R Yagmur Ateser, O Ekinci); Health Sciences University Kartal Dr. Lutfi Kirdar Training and Research Hospital (R Arslantas); Health Sciences, University Fatih Sultan Mehmet Hospital (G Turan, S Öztürk); Istanbul University, Cerrahpasa Medical School (Y Dikmen); Izmir Medicalpark Hospital (T Adanir, D Aslan); Kocaeli University (N Baykara, V Alparslan); Kocaeli University (V Alparslan); Marmara University (F Gül); Marmara University Hospital (H Arikan, S Karakurt); Necmettin Erbakan Univercity (B Caander, M Gul); Ondokuz Mayis University, School of Medicine (F Ülger); Pamukkale Üniverstesi Tip Fakültesi (S Serin, Y Bilir); Uludag University (E Cizmeci, F Kahveci)

United Arab Emirates: Clevelanda Clinic Abu Dhabi (B De Oliveira); Dubai Hospital (Z Alnassrawi); Dubai Hospital (N Elahi); Sheikh Khalifa Medical City (K Krishnareddy, K Ghorab)

Uzbekistan: Republican Specialized Center for Surgery named after Academician V.V. Vakhidov in Tashkent (R Ibadov, E Ablaeva)

Vietnam: Vinmec International Hospital (N Phung, N Nguyen)

Eastern Europe

Albania: University Hospital "Shefqet Ndroqi", Tirana (S Tafaj, A Cani)

Belarus: 9-th City Clinical Hospital (M Katsin, P Prylutski)

Bosnia and Herzegovina: University Clinical Centre of the Republic of Srpska (P Kovacevic, D Momcicevic); University Clinical Center Sarajevo (I Suljevic, H Kelle-Karavdic)

Bulgaria: Acibadem-City Clinic-Burgas (N Uvaliev, I Dovalyovska); Hospital Alexandrovska (A Temelkov, R Marinova)

Croatia: Clinical Hospital Sveti Duh (V Nesek Adam); Clinical Hospital Sveti Duh (N Maric); European Medical Center-General Hospital Dubrovnik (I Filipovic-Grcic, M Duper Handabaka); General Hospital Sveti Duh (M Karaman Ilic, V Nesek Adam); University Hospital Split Internal Medicine (M Mikacic, I Jerkovic); University Hospital Split Anesthesiology and Intensive Care (M Carev, L Saric); University hospital Zagreb (M Grgic Medic); Universizy Hospital Merkur (M Rehoric Krkusek)

Czech Republic: Centre of Cardovascular and Transplant Surgery (P Pavlik, M Rab); Charles University Medical School and Teaching Hospital in Pilsen (J Radej, J Horak); Dept. of Anesthesiology, Perioperative Medicine and Intensive Care, J.E. Purkinje University, Masaryk Hospital, Usti Nad Labem (R Skulec, J Benes); IKEM (P Piza); Municipal Hospital Havirov (I Satinsky); Regional Hospital Liberec (I Zykova, B Paldusova); St. Anne's University Hospital (P Suk); University Hospital (A Židková, M Hluchý); University Hospital in Pilsen (D Smíd); University Hospital of Ostrava (J Maca, F Bursa)

Estonia: North Estonian Medical Centre (K Libman)

Georgia: Georgian Critical Care Medicine Institute (Z Kheladze)

Hungary: Dr. Kenessey Albert Hospital (C Kopitko, L Medve); Health Centre of HDF, Military Hospital (L Keresztes, K Kelényi); Semmelweis University Budapest, Department of Anaethesiology and Intensive Therapy (J Gál, B Hauser); University of Pecs (L Bogar); University of Szeged (Z Molnár); Uzsoki Hospital (Z Szabó)

Kosovo: American Hospital (A Hasani, I Jusufi); University Clinical Center of Kosovo (A Gecaj-Gashi, V Shukriu)

Latvia: Hospital of Traumatology and Orthopaedics (I Golubovska, S Kazune); P. Stradinš University Clinical Hospital (E Strike, L Semcenko); Paul Stradins Clinical University Hospital (I Vanags); Pauls Stradins Clinical University Hospital (G Freijs, L Puceta); Riga East University Hospital (O Suba); The Latvian Centre of Infectious Diseases (I Krupnova, M Shuvalova)

Lithuania: Hospital of Lithuanian University of Health Sciences Kauno Klinikos (I Maraulaite); Republican Vilnius University Hospital (S Vosylius); The Hospital of Lithuanian University of Health Sciences (V Pilvinis); Vilnius University Hospital Santaros Clinics (J Sipylaite)

Macedonia: PHI - University Clinic of Anesthesiology, Reanimation and Intensive Care - Skopje (A Kartalov, F Naumovski); University Clinic of Surgey "Ss Naum Ohridski" (M Shosholcheva)

Poland: Clinical Hospital (P Smuszkiewicz, N Jawien); Medical University Hospital Wroclaw (B Mielczarek, P Lesnik); Medical University of Gdansk, Cardiac Anesthesia (M Lasinska-Kowara, L Hasak); Medical University of Gdansk, Anesthesiology (M Wujtewicz, R Owczukk); Medical University of Lublin (M Czuczwar, M Borys); Pomerania Medical University Medical/Surgical ICU (M Zukowski); Pomeranian Medical University Trauma Center (C Pakulski, T Surudo); Pomeranian Medical University, Teaching Hospital No 1 (J Biernawska, J Pastuszka); Poznan University of Medical Sciences (B Tamowicz, A Mikstacki); Samodzielny Publiczny Centralny Szpital Kliniczny (G Niewinski, P Walczak-Wieteska); Szpital Bielanski Warszawa (M Rój, J Markowski); University Hospital Warsaw (M Mikaszewska-Sokolewicz); Wojewódzki Szpital Specjalistyczny Olsztyn (Voivodal Specialist Hospital in Olsztyn) (R Goraj, D Onichimowski)

Romania: Carol Davila University Emergency Central Military Hospital (C Dan, T Narcis); Clinical Emergency Hospital of Bucharest (L Mirea); Elias University Clinical Hospital (N Silvius Ioan, D Madalina Alina); Emergency County Hospital Cluj (O Antal); Emergency County Hospital Pius Branzeu (O Bedreag, A Laskaratos); Emergency Institute for Cardiovascular Diseases C.C.Iliescu Anesthesia and Intensive Care 1 (S Bubenek-Turconi, L Valeanu); Emergency Institute of Cardiovascular Diseases C.C.Iliescu Anesthesia and Intensive Care 2 (D Filipescu, M Paunescu); Fundeni Clinical Institute (D Tomescu); Regional Institute of Oncology, Grigore T Popa University of Medicine and Pharmacy, Iasi (A Ristescu, E Patrascanu); Spital Clinic Judetean de Urgenta Tg.Mures (S Copotoiu, M Veres); Spitalul Clinic Judetean de Urgenta "Sfantul Apostol Andrei" Galati (M Lupu, M Sandu); University Hospital of Infectious Diseases (M Lupse)

Russia: Bachrushin's Brothers Hospital Moscow (K Oleg, P Irina); Bashkir State Hospital (K Zolotukhin, A Samorodov); City Clinical Hospital #4 (N ZUBAREVA); City Clinical Hospital #52 Moscow (S Guzhev, M Mazova); City Clinical Hospital #52 (G Arbolishvili, R Iskhakov); City Clinical N.I.Pirogov Hospital #1 (A Anderzhanova, J Marat Magomedov); City Hospital #40 (B Dmitrii); Clinica K+31 (B Tchuradze, N Gadzhibekov); Ekaterinburg Hospital #40 (V Rudnov); Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology (K Gorshkov, V Evstifeev); GKB Named after Zhadkevich (P Talyzin, T Chetverikova); Hospital City 40 Ekaterinburg (E Gayfutdinov); Moscow Regional Scientific Research Clinical Institute (A Lopatin, Y Skripkin); Municipal Clinical Hospital 17 by Health Department of Moscow`s Government (A Polunina, I Lysenko); Pirogov National Medical & Surgical Center (V Ivanova); Privolzhskiy District Medical Center (V Belskiy, M Furman); Regional Clinical Hospital #2 City of Tyumen (S Mukhacheva, N Shen); Regional Hospital #1 (M Olga, S Artem); Research Center of Neurology (D Sergeev); S.M. Kirov Military Medical Academy, Saint Petersburg (A Schegolev, M Surkov); Saint-Petersburg I.I. Dzhanelidze Research Institute of Emergency Medicine (S Shlyapnikov, A Kaskov); Saint-Petersburg State Budget Healthcare Institution “City Clinical Hospital #31” (P Lukianova-Vitolberg, Z Rogova); State Budgetary Institution of Healthcare of Arhangelsk Region "St. Luke Central City Hospital of Kotlas" (M Agibalova, A Petrichenko); State Budgetary Institution of Healthcare of Moscow "Sklifosovsky Scientific Research Institution of Emergency Care of Moscow Healthcare Department" (S Zhuravel, N Kuznetsova); Tver Regional Hospital (M Petrushin, I Starchenko); Vishnevsky Institute of Surgery (A Kleuzovich); Volga District Medical Centre under Federal Medical and Biological Agency (N Zarechnova, V Hahin); Zhadkevich Clinical Hospital (B Boskholov)

Serbia: Clinical Centre of Serbia, Center for Anesthesiology and Reanimatology (N Ladjevic); Clinical Center Nis (R Jankovic, T Maricic); Clinical Center Nis Nephrology (Z Dimitrijevic); Clinical Center of Serbia (J Velickovic); Clinical Center of Serbia, Trauma (B Jovanovic); Clinical Center of Serbia Orthopedic Surgery (M Bumbasirevic);

Clinical Center of Serbia (V Bumbasirevic); Clinical Centre of Serbia, Center for Anaesthesia and Reanimation (I Palibrk); Clinical Centre of Vojvodina (G Jovanovic, S Maricic-Prijic); Clinical Centre of Vojvodina, Trauma (J Pejakovic, B Josipovic); Emergency Center, Clinical Center of Serbia (B Stefanovic); Military Medical Academy (M Surbatovic, D Djordjevic)

Slovakia: Faculty Hospital Nitra (K Galkova, H Bihanyova); J. A. Reiman Faculty Hospital, Prešov (P Firment, L Romanová); L. Pasteur University Hospital Košice (J Firment, J Simonova); NsP Revúca no (G Slobodianiuk); University Hospital Bratislava (M Michalov, K Tarabová); University Hospital Bratislava, Ruzinov (A Gebhardtova)

Slovenia: General Hospital Jesenice (V Jurekovic, U Bricelj); General Hospital Slovenj Gradec (D Kasnik, S Kozar); Institute of Oncology Ljubljana (K Mahkovic Hergouth, K Pirtovšek Kopriva); UKC Ljubljana (T Pintar, M Podbregar); University Clinic of Respiratory and Allergic Diseases Golnik (V Tomic); University Clinical Center Ljubljana (A Stecher); University Medical Center Ljubljana, Medical ICU (R Knafelj); University Medical Centre Ljubljana, Infectious Diseases (M Jereb); University Medical Centre Ljubljana, Neurointensive Care (B Ozek)

Ukraine: Bogomolets National Medical University (I Kuchyn, K Makhynya); Dnepropetrovsk Regional Clinical Hospital Mechnikov (V Dubina); Dnipropetrovsk Regional Hospital Mechnikova (I Yovenko, E Kuzmova); Lugansk Regional Clinical Hospital (Y Nalapko); Lugansk Regional Clinical Hospital (Y Nalapko)

Central/South America

Argentina: Bazterrica (B Lattanzio, F Gutierrez); Centro de Investigaciones Clínicas Facultad de Medicina, Universidad Nacional Nordeste (L Huespe, S Lazzeri); Centro Integral de Salud Banda(CISB) (S velez, L Rodriguez); Clinica De Los Virreyes (D Sturba, A Hlavnicka); Clínica De Los Virreyes (P Szekely, C Nosti); Clinica Pueyrredon (G Fernandez, C Speziale); Eva Perón Hospital, Granadero Baigorria, Santa Fe (N Rocchetti, N Arbelais); Felipe Fossati, Balcarce (J Mateos); HIGA Dr. Alende Mar del Plata (O Elefante, M Bernadó); Hosp. Clinicas Jose De San Martin (CABA) (C Sosa); Hospial Español de La Plata (P Canavessi); Hospital Artemides Zatti (L Corzo, S Amieva); Hospital de la Madre y el Niño (P Juarez, V Olivera); Hospital Escuela J. F. de San Martín. Facultad de Medicina UNNE (S Lazzeri, L Huespe Gardel); Hospital Español de Mendoza (R Fernández); Hospital Fernadez (N Raimondi, L Budrovich); Hospital Interzonal General de Agudos San Martin de La Plata (C Balasini); Hospital Isidoro Iriarte de Quilmes (M Iadanza, L Rojas); Hospital Italiano de Buenos Aires (V Maria Sofia); Hospital Lagomaggiore (G Zakalik, G Pagella); Hospital Luis C. Lagomaggiore (A Chena, C Pellegrini); Hospital Misericordia (A Diaz, A Garcia); Hospital Municipal Pedro Ecay (L Bacci, M Traba); Hospital Privado de Comunidad (M Esperatti, M Gonzalez); Hospital Provincial del Centenario (L Cardonnet); Hospital Provincial Neuquen (E Bastias Saez); Hospital Regional Ramón Carrillo (G Roberto, F Giannoni); Hospital San Felipe de San Nicolás (A Mazzola, C Giuggia); Hospital Universitario Fundacion Favaloro (F Klein, G Tuhay); Osplad (R Villa, E Vargas); Sanatorio Allende (C Galletti, L Bielsa); Sanatorio Belgrano (R Vargas Martínez, M Gimenez); Sanatorio de la Seguridad Social Rosendo Garcia (L Talamonti, M Ramirez); Sanatorio De La Trinidad Mitre (A Santa María, M Berte); Sanatorio Güemes (V Arrosagaray, M Villegas); Sanatorio Las Lomas (A Risso-Vazquez, F Rios); Sanatorio Mater Dei (G G, G Badariotti); Sanatorio Parque (C Lovesio, C Subirá); Sanatorio San Jorge (F Bertoletti, E Milioto); Sanatorio San Jose (G Sutton); Sanatorio San Lucas (M Quinteros, M Moseinco); Santojanni hospital (J Vergara, G Carqueijeda)

Bolivia: Caja Nacional de Salud (O Gordillo Romero); Caja Petrolera de Salud (J Prieto); Hospital Del Norte Del Servicio Departamental De Salud De La Paz (J Viruez Soto, N Ali Yucra); Hospital Obrero N° 1 (C Ibañez Guzman, S Chavarria Villavicencio); Hospital Universitario Japones (M Crespo Ramírez)

Brazil: Air Force Hospital, HFAG (A Celente Soares); America Medical City (V Cravo, E Salgueiro); Anis rassi (R Filho, G Oliveira); Barra D´Or Hospital (W Homena, M Felix); BP - A Beneficência Portuguesa De São Paulo (V Veiga, S Rojas); Casa de Caridade de Carangola (S Vaz, G Vaz); Centro Hospitalar Unimed (G Westphal, M Machado); Centro Hospitalar Unimed (G Westphal, F Pfuetzenreuter); Complexo Hospital De Clínicas Da

Universidade Federal Do Paraná (K Moretto, H Carraro); Complexo Hospitalar de Niterói (M Damasceno); Complexo Hospitalar de Niterói (M Damasceno, M Bellas); Federal UNiversity of Sao Paulo (F Machado); Fundação Oswaldo Cruz (A Japiassu); Hospital AACD (L Batista Neto, R Fraga Costa); Hospital Adventista De Belém (E Sobrinho, A Veríssimo); Hospital Adventista de Manaus (P Ferreira, C Rohenkohl); Hospital Agamenon Magalhães (M Gallindo, M Paiva Jr); Hospital Aldeota (C Feijo, A Lemos); Hospital Cajuru (L Tannous, J Gasparetto); Hospital Cândido Rondon (M Huckembeck); Hospital da Luz (B Besen); Hospital da Vida de Dourados-MS (E Eberhart Neto, L Souza); Hospital Daher Lago Sul (R de Sousa Conti, J Fernandes); Hospital das Clinicas da Universidade Federal de Minas gerais (V Alencar Nobre Junior, I Borges); Hospital das Clínicas da USP (L Taniguchi, L Azevedo); Hospital das Clinicas de Ribeirão Preto (W José Lovato, J Carvalho); Hospital De Clínicas São Lucas (S Velihovetchi, E Zukeran); Hospital Distrital Evandro Ayres De Moura (L Figueiredo, M Silva); Hospital Do Coração -Hcor (V Avellar Werneck, R Vasconcelos); Hospital do Trabalhador (M Oliveira, F Reese); Hospital Dom Hélder Câmara (R GOMES, A Macedo Junior); Hospital Dr. Roberto Arnizaut Silvares – Hras (A Barbosa Lobo, D Oliveira Prates); Hospital Erasto Gaertner (L Araujo, P João); Hospital Escola Universidade Federal de Pelotas/Ebserh (M Bainy, B Orlando); Hospital Esperança (M Lima, M Paiva); Hospital Estadual Américo Brasiliense (R Noffs Gilio, E Drociunas Pacheco Cechinatti); Hospital Estadual Central (T Lopes, T Lopes); Hospital Geral Cleriston Andrade (L Couto Jr., R Nunes); hospital Geral de São Mateus (F Haag, C Lima); hospital Geral Do Grajaú (S Mataloun, M Moock); Hospital Home (A de Paiva Fagundes Júnior, R Tallarico); Hospital João XXIII (F Bruzzi de Carvalho, A Veiga); Hospital Julia Kubistchek (A Yehia, N Faria); Hospital Lifecenter (B Costa Pinto); Hospital Marcelino Champagnat (A Réa-Neto, J Motta); Hospital Metropolitano (G Sudre, E Luchi); Hospital Moinhos de Vento (N Brandão da Silva, C Teixeira); Hospital Municipal Dr Jose Soares Hungria (K Conde, N Quintino); Hospital Municipal São Jose (G Westphal, P Barbosa); Hospital Nipo Brasileiro (J Rocha); Hospital Nossa Senhora das Neves (P Gottardo, E Assis Wanderley); Hospital Nove De Julho (C Nassif Moreira, M Soares Tavares); Hospital Nove De Julho (C Nassif Moreira, A Da Silva Machado); Hospital Nove De Julho (L Costa Miranda, D Joelsons); Hospital Nove De Julho (C Nassif Moreira, L Rocha França De Araujo); Hospital Nove De Julho (F Ganem, K Deguirmendjian Rosa Campos); Hospital Nove De Julho (M D'agostino Dias, A Fernandes Filho); Hospital Novo Atibaia (R Franco, M Sousa); Hospital Primavera / Aracaju- SE (M Morais, A Veiga); Hospital Regional De Presidente Prudente (L Menegon, F Akaki); Hospital Regional Leopoldo Bevilacqua - CONSAUDE (S Scardua, A Zardo); Hospital Regional Unimed (G Ramos); Hospital SAMUR (L Melo, M Silva); Hospital SAMUR, Cardiology (R Amorim, M Silva); Hospital Santa Luzia Rede D'Or São Luiz DF (M Maia, E Moura); Hospital Santa Monica (L Tcherniacovski, A Foleto); Hospital Santa Paula (D Sielfeld, P Buainain); Hospital Sao Luiz (L Miilher, J Suh); Hospital São Paulo -Federal University of São Paulo- Unifesp (H Penna Guimaraes, G Benfatti); Hospital Unimed Litoral (R Waltrick, D Gusso); Hospital Unimed Petrópolis (J Cezar Santos, D Machado); Hospital Universitário Regional dos Campos Gerais (G Arcaro, M da Rocha); Hospital Vila da Serra (H Urbano, A Araujo); Hospital Vita Batel (A Réa-Neto, R Deucher); HPS 28 de Agosto (W De Oliveira Filho, A Medina Matos); HSM Belem Pará (L Rezegue, N Nogueira); Instituto de Neurologia de Curitiba (A Réa-Neto, J Brasil); Instituto do Coração - HC- Faculdade Medicina USP (S Lage, L Kopel); Oswaldo Cruz Hospital in Recife (T Reis, C Hanne); Real Hospital Portugues De Beneficencia (M Paiva Jr, N Guedes); Santa Casa Da Misericórdia (J Paranhos, A Meireles); Santa Casa de Curitiba (A Réa-Neto, D Pompermayer); Santa Casa De Misericordia De Marilia (H Carrasco, S El Fakouri); Santa Casa de Misericórdia de Passos (M Lopes, P das Neves); Santa Casa de Misericórdia de Pelotas (R Olivé Leite, T Neumann); Santa Casa de Misericórdia de Presidente Prudente (C da Costa Nunes Bosso, R Jorge Caetano); Santa Joana Recife Hospital (O Silva, M Gallindo); São José Do Avaí Hospital (S Macedo, M Silva Jr); São Sebastião Mártir Hospital (J Froemming, V Tavares); Secretaria Estadual de Saúde Pernambuco (M Melo, S LIma); Unimed Araçatuba Hospital (M Moreno, V Orsatti); Universidade Federal do Rio Grande do Norte (E Pereira da Silva, E Queiroz); Universidade Federal Do Rio Grande Do Sul (G Friedman, D Vieira); Vitória Apart Hospital (C Piras)

Chile: Clinica Alemana Santiago (J Montes, J Graff); Hospital del Salvador (P Vargas)

Colombia: Clinica Esensa (O Pinillos Senior, L Giraldo); Clinica Antioquia (M Gonzalez, S Gonzalez); Clinica Ces (D Yepes); Clinica de La Mujer (A Castro-Sanguino, A Barriga); Clinica De Occidente (O Pinillos Senior, J Assis); Clinica Del Prado (C Bello); Clínica Gestion Salud (C Duenas, D Borre); Clinica Iberoamerica Colsanitas Barranquilla (C Rebolledo); Clinica la Esperanza (O Villarreal Chevel, L Chevel Llamas); Clínica Los Andes (I Ortiz Solarte, A Portilla); Clinica Martha (O Lopez); Clinica Medellin (K Guerra); Clinica Medilaser (H Moncayo, D

Carrillo); Clínica Medilaser de Neiva (A Luna Flórez); Clinica Reina Sofia (L Correa-Perez, D Alba); Fundacion Clinica Shaio (C Poveda); Gestion Salud (J Rojas-Suarez); Hospital La Divina Misericordia (C López); Hospital la Maria (M Gonzalez, C Silva); Hospital Pablo Tobón Uribe (N Giraldo Ramirez, N Giraldo Ramirez); Hospital Universidad del Norte (J Borja, K Horta); La Misericordia Clinica Internacional (C Rebolledo, G Avila); Serviucis (J Torres-Millan, M Torres)

Ecuador: Carlos Andrade Marín Hospital (F Guerrero); Clinica La Merced (A Peña Padilla); Clinica La Merced (M Garcia, F Picoita); Hospital Clinica Aguilar (V Briones Morales, L Herrera); Hospital de Especialidades Eugenio Espejo (D Morocoho Tutillo); Hospital Del Instituto Ecuatoriano De Seguridad Social Iess (J Casas Rodriguez, P Cortegaza Marrero); Hospital Luis Gabriel Dávila (S Párraga, M Mejía); Hospital of Infectious Diseases José Daniel Rogriguez Maridueña (G Martinez); Hospital Oncológico Solón Espinosa Ayala (H Caballero, M Argotti); Hospital Provincial Puyo (A Saraguro); Hospital Vicente Corral Moscoso (H Aguirre-Bermeo); Solca Hospital (C Garcia, G Martinez)

French Guiana: Andrée Rosemon general Hospital (H Kallel, C Mayence)

Guatemala: Hospital General de Enfermedades - Instituto Guatemalteco de Seguridad Social (J Ranero Meneses, A Bonilla Centes); Hospital Roosevelt (Y Falla, B Orellana)

Mexico: Clinica Mexico (J Rodriguez De Molina); Fundación Clínica Médica Sur (S Namendys-Silva); Hospital Angeles de Interlomas (J Vazquez Mathieu, A Unzueta); Hospital Angeles Del Carmen (A Bassols); Hospital Ángeles Mocel (I Morales-Camporredondo, E Jaramillo); Hospital Central del Estado de Chihuahua (A Tamariz, P Villalba); Hospital Civil de Guadalajara "Fray Antonio Alcalde" (G Aguirre-Avalos); Hospital Civil Juan I Menchaca (D Rodriguez Gonzalez, V Madrigal Robles); Hospital de Especialidades "Dr. Antonio Fraga Mouret", Centro Médico Nacional La Raza, IMSS (J Baltazar-Torres); Hospital Español de México (R Martínez Zubieta); Hospital General De Mexico (P Alvarez-Maldonado); Hospital General de México Dr. Eduardo Liceaga (A Chavez, D Guzman); Hospital General Del Estado (S Perez); Hospital Gral Salvador Zubiran Anchondo Chihuahua (N Villalba); Hospital Issstecali Tijuana (L DELGADO AYALA); Hospital Juárez De México (L Gorordo-Delsol); HOSPITAL SAN JAVIER (R MIRANDA ACKERMAN, M Lira Trujillo); Hospital San Jose TEC de Monterrey (V Sanchez Nava); Hospital Star Medica Lomas Verdes (O Camacho, J Sanchez); Hospital Zambrano Hellion (V Sanchez Nava); IMSS Unidad Médica de Alta Especialidad de Mérida Yucatán (Mexican Institute of Social Security, Medical Unit of High Specialty in Mérida Yucatán). (D Blanco Manrique); Instituto Mexicano del Seguro Social (G Vazquez de Anda); Instituto Mexicano del Seguro Social (J Dávila Fernández); Instituto Mexicano del Seguro Social (S Reyes Inurrigarro); Instituto Mexicano del Seguro Social (F Galicia-Espinosa, M Rodríguez); Instituto Mexicano del Seguro Social (M Sosa Medellin, A Landaverde Lopez); Instituto Mexicano del Seguro Social (R Gómez-Guerra, A Arguello-Solís); Instituto Mexicano del Seguro Social (M Espinosa Figueroa, A Romero Limón); Instituto Mexicano Del Seguro Social (J Lopez Carrizoza, D Lopez); Instituto Mexicanos Del Seguro Social (R Campos Cerda, G Carrazco del Hoyo); Instituto Nacional de Ciencias Médicas y Nutrición ¨Salvador Zubirán¨ (E Rivero-Sigarroa, G Domínguez-Cherit); Mexican Institute of Social Security (J López Valdés)

Nicaragua: Hospital Militar, Managua (M Valdez, N Turcios)

Peru: Hospital Fuerza aérea del Peru (I Ramos); Hospital Nacional Dos de Mayo (R Quispe Sierra, R Ovalle Olmos Olmos); Hospital Regional Honorio Delgado (C Chavez Lazo); Hospital Victor Lazarte Echegaray (A Arroyo-Sanchez); Instituto Nacional de Salud del Nino - Lima Peru (M Becerra)

Trinidad and Tobago: Eric Williams Medical Sciences Complex (D Ventour)

Uruguay: ASSE / Hospital de Florida (D Paciel); Hospital Maciel (G Burghi, C Agustin)

Venezuela: Centro de Especialidades Anzoategui (L Williams); Centro Médico de Carcas (A Martinelli, J Gomez); Centro Médico Docente la Trinidad (A Martinelli, C Pacheco); Hospital Miguel Perez Carreño (I von der Osten)

North America

Canada: St. Paul's Hospital (K Walley); Alberta Health Services (G Suen); CHUM (M Chassé, P Aslanian); Hamilton Health Sciences (A Fox-Robichaud); Hôpital Santa-Cabrini Ospedale (M Charneux, I Ajmo); St Michael's Hospital, Toronto (J Marshall); The Ottawa Hospital (L McIntyre); University of Alberta (S Bagshaw, W Sligl)

United States: Baylor, Scott & White Health Medical ICU (E Jimenez, S Ghamande); Baylor, Scott & White Health Surgical and CT ICU (E Jimenez); Cleveland Clinic Foundation (A Khanna, M Walters); Duke University Medical Center (N Mehdiratta); Grant Medical Center (K Devulapally, M Woodham); HIMA San Pablo Caguas (G Rodriguez-Vega); Jackson Memorial Hospital Surgical ICU (R Silverman); Jackson Memorial Hospital Neurosurgical ICU (K O'Phelan); JPS Health Network (M Lois, S Davis); LBJ Hospital - UTHealth - McGovern Medical School (R Estrada-Y-Martin); Maine Medical Center (R Riker, D Seder); Mayo Clinic (P Bauer); Mayo Clinic (P Bauer); Medical College of Wisconsin (R Nanchal); Mount Sinai Hospital (N Dangayach, C Lay); NorthShore University (B Margolis); NorthShore University HealthSystem – Glenbrook Hospital (B Margolis); Northwestern University Feinberg School of Medicine (R Wunderink); Queen Elizabeth Hospital (Woolwich) (O Rose); Rush University Medical Center (R Kleinpell, J Greenberg); Texas Tech University Health Scineces Center at the Permian Basin (L Oud); University of California San Diego (J Beitler); University of California, San Diego (El Centro Site) (G Wardi, C Tomaszewski); University of Miami Hospital (D Kett); University of Michigan (H Prescott, R Kramer); University of Texas MD Anderson Cancer Center (I Malik); Vanderbilt University Medical Center (L Huerta, T Rice); Washington University of St. Louis/Barnes-Jewish Hospital (M Kollef, K Baker)

Oceania

Australia: Barwon Health - University Hospital Geelong (T Elderkin); Cabrini Hospital (S Simpson); Canberra Hospital (F van Haren, R Vegunta); Gold Coast University Hospital (J Winearls); Royal Brisbane and Women's Hospital (J Lipman, C Fourie); Royal North Shore Hospital (S Finfer, K Sapkota); Royal Prince Alfred Hospital (H Buhr); Sir Charles Gairdner Hospital (M Anstey)

New Zealand: Auckland City Hospital (Y Chen); Auckland City Hospital Cardiothoracic (R Parke, S McGuinness); Hawke's Bay Hospital (L Chadwick, R Freebairn); Tauranga Hospital (J Goodson, T Browne); Waitemata District Health Board (J Casement, M Carpenter); Wellington Hospital (P Young); Whangarei Hospital (D Owens, K Perry)

Western Europe

Andorra: Hospital Nostra Senyora de Meritxell (A Margarit Ribas)

Austria: Donauspital (K Pichler, S Ebenberger); Klinikum Klagenfurt am Wörthersee (R Likar, M Köstenberger); Krankenhaus der Barmherzigen Brüder (G Zasmeta); Medical University Innsbruck (M Joannidis, R Bellmann)

Belgium: AZ Damiaan Oostende (G Nackaerts); AZ Groeninge Kortrijk (S Lamote, W De Corte); AZ Sint-Augutinus (L heytens, J Raemaekers); AZ Sint-Lucas Gent (D Rijckaert, S Vanderhaeghen); AZ Turnhout (M Vanhoof, F Soetens); AZ Vesalius Tongeren (I Van Cotthem); Centre Hospitalier Mouscron (P Gadisseux, JL Mariage); CHIREC Hospitals (D De Backer, W Nabhan); CHR Citadelle (V Fraipont, G Dulière); CHU Ambroise Pare (L Haentjens); CHU Brugmann ICU 2 (D De Bels); CHU Brugmann (J Devriendt, A Cudia); CHU Charleroi (P Biston); CHU de Liège (N Layios); CHU Saint Pierre Brussels (P Dechamps); CHU Saint-Pierre (A Roman); CHU Sart Tilman Medical ICU (B Lambermont); CHU Sart Tilman Liège (P Damas, D Ledoux); CHU Tivoli La Louvière (Y Bouckaert); CHU Ucl Namur site Godinne (Godinne University Hospital) (P BULPA); Clinique Saint-Pierre (Ottignies) (N De Schryver); Clinique Univrsitaire St Luc (X Wittebole, C Collienne); Cliniques de l'Europe - St-

Michel (V Collin); Epicura Hornu (M Shahram); Erasme Hospital (F Taccone); Ghent University Hospital (J De Waele); Grand Hopital de Charleroi (D Glorieux, D Gusu); Jessaziekenhuis Hasselt (P Vranckx); Onze Lieve Vrouw Ziekenhuis (K De Decker, J Verbeke); St Dimpnaziekenhuis Geel (J Dionys); St-Jozefkliniek Bornem-Willebroek (W Pisarek); Universitair Ziekenhuis Brussel (UZ BRussel) (P Honoré, E De Waele); ZNA Jan Palfijn Merksem (A Geeurickx, R Machado)

Denmark: Aalborg University Hospital Cardiothoraci ICU (B Rasmussen, S Aagaard); Aalborg University Hospital (S Weber); Aalborg University Hospital Neuro ICU (B Rasmussen); Bispebjerg Hospital (N Erikstrup Clausen, N Reiter); Viborg Regional Hospital (C Solling); Herlev Hospital, Copenhagen (K Linnet , M Toft); Holbaek Hospital (H Eskandarani); Hospitalsenheden Horsens (L Buus); Nordsjællands Hospital (M Bestle, S Sigurdsson); Nykobing F Hospital (H Pedersen); Odense University Hospital (A Damm); Svendborg Hospital (A Kabell Nissen, H Tanghus Olsen); Regionshospitalet Herning/ Regionshospitalet Holstebro (R Laebel, C Nissen); Regionshospitalet Randers (H Bundgaard, T Grøfte); Rigshospitalet (M Steensen); Sydvestjysk Sygehus i Esbjerg (Hospital in Esbjerg) (M Boczan); Sygehus Lillebaelt (J Nielsen, H Jensen); Vejle Sygehus (M Wegger, P Berezowicz); Zealand University Hospital Koege (L Poulsen)

Finland: Helsinki University Hospital (V Harjola); Tampere University Hospital (A Kuitunen); Turku University Hospital (M Valtonen, M Järvisalo)

France: Assistance Publique Hopitaux De Marseille (M Gainnier, J Bourenne); Bethune Hospital (M Marzouk, C Vinsonneau); Bichat hospital (J timsit, C Dupuis); Centre Cardiologique du Nord, Saint-Denis (T Morichau-Beauchant); Centre Hospitalier Annecy Genevois (S Gay, D Bougon); Centre Hospitalier de Bourg-en-Bresse (R Bruyere); Centre Hospitalier de Lens (N Van Grunderbeeck, D Thevenin); Centre Hospitalier de Mulhouse (J Mootieny); Centre Hospitalier De Tourcoing (P Delannoy, L Benetazzo); Centre Hospitalier Régional d'Orléans (F Barbier); Centre Hospitalier Universitaire d'Angers (A Kouatchet); Centre Hospitalier Universitaire Nancy (M Losser); CH de Dreux (B Florent, A Garin); CHR Metz Thionville (D Barraud, R Gaci); CHRU de Reims (V Legros); CHRU Lille (M Boyer); CHU Amiens Picardie (H Dupont, Y Mahjoub); CHU Amiens Picardie (H Dupont, Y Mahjoub); CHU Amiens Picardie (H Dupont, Y Mahjoub); CHU de Clermont-ferrand (B Souweine); CHU Dijon (P Charles, A dargent); CHU Lille (S Nseir); CHU Lille (S Preau); CHU Lille, Institut Coeur-Poumon (M Moussa); CHU Lyon Sud (A LEPAPE); CHU Montpellier (P Gaudard); CHU Nimes (J Lefrant, C Roger); CHU Reims - Hopital Robert Debré (O Passouant, P Raclot); CHU Rouen (F Tamion, S Grange); CHUGA (C schwebel, N Terzi); Cochin University Hospital, Paris (J Mira, N Marin); Dieppe General Hospital (J Rigaud, A Marchalot); Edouard Herriot Hospital (P Vanhems, M Bertin-Maghit); GH ICL - Saint Philibert hospital (T Van Der Linden); Groupe Hospitalier Paris Saint Joseph (F Philippart, C Bruel); Groupe Hospitalier Sud Ile-de-France, Hôpital de Melun (S Jochmans); Hopital Antoine Beclere APHP (F Jacobs); Hôpital Bichat-Claude Bernard (P Montravers, P Tashk); Hôpital du Kremlin-Bicêtre (D Jacques, L Pierre-Etienne); Hôpital Edouard Herriot (B Floccard); Hôpital Edouard Herriot (P Vanhems, L Argaud); Hôpital Européen Georges Pompidou (B Cholley, H Carbone); Hôpital Lariboisière, Assistance Publique - Hôpitaux de Paris (B Chousterman, A Mebazaa); Hôpital Maison blanche (A Wynckel, A Debrumetz); Hopital Marie Lannelongue (F Stephan, T Kortchinsky); Hôpital Necker enfants malades (J Raphalen, L Lamhaut); Hopital Prive Claude Galien (R Chelha); Hopital Sainte Musse (A Garnero, L Ducros); Hopital Tenon (G Voiriot, M Fartoukh); Hôpitaux Civils de Colmar (M Dellenbach, H Lessire); Hôpitaux Universitaires de Strasbourg, Hôpital de Hautepierre (V Castelain); Hospices Civils de Lyon (F Dailler, T Ritzenthaler); Hospitalo Universitaire Center (J Navellou); Lille University Hospital (T Duburcq); Rangueil Hospital (P Cougot); Troyes Hospital (B Beilouny); University Hospital Center Of Limoges (B Francois, T Daix)

Germany: BG-Klinikum Duisburg (C Hermann); Elisabeth Krankenhaus (I Voigt, E Blank); GPR Klinikum Rüsselsheim (S Kloesel, Albuszies); Hospital Bergstrasse (A Kalenka, J Götz); Klinik für Anästhesiologie, Intensivmedizin- und Schmerztherapie, Universitätsklinikum des Saarlandes (A Meiser, R Lamour-Cossutta); Kliniken am Goldenen Steig (W Stadlmeyer); Klinikum Augsburg (U Jaschinski, I Kummer); Klinikum Emden (K Kogelmann, M Scheller); Klinikum Friedrichshafen (M Vogel, A Michalsen); Klinikum Konstanz (W Krüger, A Kabitz); Klinikum rechts der Isar der TUM (S Schaller); Kreiskrankenhaus Mechernich GmbH (R Hering); Marienhospital Wesel (M Freitag, V Lohmeier); Marienkrankenhaus Soest (P Lierz); Medical Center Cologne Merheim (S Sakka); Medical Center, University of Freiburg (D Staudacher); Munich University Hospital (LMU) (C Siebers, J Briegel); Munich University Hospital (LMU) (C Siebers, J Briegel); Munich University Hospital (LMU) (C

Siebers, J Briegel); St. Elisabeth Krankhaus (F Fiedler, P Fiedler); Tettnang Hospital (A Michalsen, V Wenzel); Uniklinikum Jena (M Bauer, Y Sakr); University Hospital Carl Gustav Carus at the Techical Univiversity of Dresden (M Ragaller, A Ulbricht); University Hospital Duesseldorf, Germany (D KIndgen-Milles); University Hospital Frankfurt (K Zacharowski); University Hospital Leipzig (S Petros); University Hospital Medical School Department of Anesthesiology (M Weiss); University Hospital of Leipzig (S Stehr, P Simon); University Hospital of Munich (LMU) (L Ney, J Briegel); University Hospital Tübingen (R Riessen, M Haap); University Hospital Ulm (K Traeger); University Medical Center Hamburg-Eppendorf (A Nierhaus); University Medicine Greifswald (T Schulze); University Medicine Greifswald, Department of Internal Medicine (P Abel, S Friesecke); University of Ulm (E Barth, Bracht); Vivantes - Klinikum Neukölln, Berlin (H Gerlach)

Greece: Agioi Anrgiroi Hospital (G Fildissis, E Tsigou); Ahepa University Hospital Of Thessaloniki (I Soultati, G Thoma); Aretaieion University Hospital (G Gkiokas, E Pantiora); Army Share Fund Hospital (S Aloizos); Attikon University Hospital (E Paramythiotou); General Hospital "G.Gennimatas", Thessaloniki, Greece (D Lathyris, E Antipa); General Hospital Of Arta (N Lagos); General Hospital Of Eleusis 'Thriassio' (A Kanavou); General Hospital Of Ioannina, G. Chatzikosta (D Lepida, O Ygropoulou); General Hospital Papageorgiou (K Arvaniti, M Vasileiou); General University Hospital of Patras (V Karamouzos); GH Agios Dimitrios Thessaloniki (G Vlachogianni, H Aimoniotou); Hippokration General Hospital of Thessaloniki (E Mouloudi, E Massa); Korgialenio- Benakio Red Cross Hospital Of Athens (K Mandragos, C Katsenos); Mitera Hospital Athens (S Aloizos); Panarkadian Hospital of Tripolis (N Pantelas, S Papakostopoulos); Patras General Hospital (A Stavrothanasopoulou, I Ravani); Saint Savvas Hospital (V Chantziara); Sotiria Hospital of Chest Diseases-Athens, Greece (M Kyriakopoulou); Thriassion Hospital Of Elefsina, Athens (P Alexandropoulou, I Koutsodimitropoulos); Uninersity Hospital of Ioannina (V Koulouras, V Koulouras); University Hospital Heraklion (D Marouli); University Hospital Of Alexandroupoli (I Pnevmatikos, V Theodorou); Xanthi General Hospital (A Vakalos)

Ireland: Galway Clinic (J Steiner, E Feher); Mater Misericordiae Hospital (D Marsh, L Cagova); Mercy University Hospital (A Griffith, D O'Croinin); Sligo University Hospital (O Tujjar, W Jonker); St James's Hospital (I Martin-Loeches, L Snyman); St Vincent's University Hospital, Dublin (A Nichol); Tallaght Hospital (G Fitzpatrick); University Hospital Galway (E Curran); University Hospital Kerry (N Feely, D Gunasekera); University Hospital Limerick (C Motherway)

Italy: AO San Gerardo (G Citerio, A Patruno); AOU Policlinico Vittorio Emanuele Catania (G Castiglione); AOU S. Luigi Gonzaga, Orbassano; University of Turin (P Caironi, L Odetto); AOUP (P Malacarne, S Bergamasco); Arcispedale Sant' Anna- University of Ferrara (S Spadaro); ASST Grande Ospedale Metropolitano Niguarda-Ca' Granda Milano (L Gasparini, M Gatti); ASST Grande Ospedale metropolitano Niguarda-Milano-Italy (A Chieregato); ASST Santi Paolo e Carlo - Ospedale San Paolo (D Chiumello, G Mistraletti); Azienda Ospedaliera Brotzu Cagliari (R Galbiati, P Macis); Azienda Ospedaliera 'Cardinale G. Panico' Tricase (T Pellis); Azienda Ospedaliera Universitaria Pisana (G Biancofiore); Azienda Ospedaliero Universitaria Careggi (G Villa); Azienda Ospedaliero-Universitaria di Parma (E Picetti, S Rossi); Centro Cardiologico (J campodonico, G marenzi); Centro Cardiologico Monzino IRCCS (R Ceriani, L Salvi); Città della Salute e della Scienza (L Brazzi, G Montrucchio); Città della Salute e della Scienza (L Brazzi, A Costamagna); Città della Salute e della Scienza (L Brazzi, G Montrucchio); Città della Salute e della Scienza Hospital - Turin (L BRAZZI); Fondazione Policlinico Agostino Gemelli. Universita' Cattolica del Sacro Cuore. Roma (M Antonelli, G De Pascale); IRCCS Ospedale San Raffaele Milano (G Monti, M Azzolini); IRCCS Ospedale San Raffaele Milano (G Monti, G Landoni); IRCCS Ospedale San Raffaele Srl (G Monti, G Monti); IRCCS Policlinico San Donato (M DEI POLI, E tognacci); Monaldi Hospital (D Di Fraja, A Pisano); Ospedale Policlinico San Martino (P Pelosi, I Brunetti); Ospedale Sacro Cuore - Don Calabria (I Daroui); Policlinico Universitario S.Orsola-Malpighi, Bologna (C Laici, A Siniscalchi); Policlinico Paolo Giaccone. University of Palermo (A Cortegiani); Santa Maria delle Croci Hospital, Ravenna (G Zani, M Fusari); St. Eugenio Hospital - ASL Roma 2 (M Polzoni); St. Orsola-Malpighi Hospital, Alma Mater Studiorum University, Bologna, Italy (I Di Giacinto); ULSS 3, Veneto, Mirano Hospital (I Psimadas); University Hospital of Foggia (A Cotoia); University Hospital of Modena (M Girardis); University of Pisa (F Forfori); University of Pisa (E Brogi); University of Sassari, AOU Sassari, Italy (L Pistidda)

Luxembourg: Hôpitaux Robert Schuman (M Ferring, M Koch)

Malta: Mater Dei Hospital (F Sant)

Netherlands: Antoni van Leeuwenhoek (J ten Cate, N Meijerink); Bernhoven (B Ramakers, M van der Kuil); Deventer Ziekenhuis (E Cillessen, H van den Oever); Erasmus MC (B van der Hoven, D van Duijn); Haags Medisch Centrum (T Ruys, D Hetem); HagaZiekenhuis (I Meynaar, L van de Berg); Isala (J Haringman, H Kieft); Jeroen Bosch Hospital (F Polderman); Maasstad Hospital (S Duran, S Schakel-Bok); maastricht university medical centre (H hulsewé-evers, E Pragt); Martinihospital Groningen (B Loef, A Reidinga); Maxima Medical Center (M Königs, S Kurban); Meander Medical Centre (L van Gulik, T Graafland); Medical Centre Leeuwarden (M Kuiper, M Koopmans); Radboud University Medical centre, Nijmegen, The Netherlands (P Pickkers); Rijnstate Hospital (H van Leeuwen, Y Teitink); St Anna Hospital Geldrop (B Speelberg); St Jansdal ziekenhuis (D Pretorius); St. Antonius Ziekenhuis (R Wesselink, A Meinders); Tjongerschans Hospital Heerenveen (O Beck, N Cimic); University Medical Center Groningen, University of Groningen (P Landburg, W Dieperink); University Medical Center Utrecht (O Cremer, M Varkila); Van weel Bethesda Ziekenhuis (A Dijkstra, S Duran); Ziekenhuisgroep Twente (N Al Naiemi, R te Riet); Zuyderland MC (T Dormans)

Portugal: Centro Hospitalar do Medio Tejo - Hospital de Abrantes (N Catorze); Centro Hospitalar e Universitario de Coimbra (M Simoes); Centro Hospitalar Entre Douro e Vouga (T Leonor, M Fernandes); Centro Hospitalar são Joao (L Santos, A Ferreira); Centro Hospitalar Tondela-Viseu (L Patrão, C Santos); Centro Hospitalar Vila Nova de Gaia / Espinho - EPE (J de Resende); Francisco Esteves (F Esteves); Hospital CUF Descobertas (A Correia, P Gomes); Hospital Cuf Infante Santo (P Ponce, J Mendes); Hospital da Luz Arrábida - VN Gaia (A Carneiro, M Cortez); Hospital da Luz Lisboa (J Mapril); Hospital de Egas Moniz, Centro Hospitalar de Lisboa Ocidental (E Carmo); Hospital de Santo António, Centro Hospitalar de Santo António (T Cardoso); Hospital de São Francisco Xavier (J Osório, A Pais Martins); Hospital Divino Espírito Santo de Ponta Delgada (A Alves); Hospital do Litoral Alentejano (D Pascoalinho); Hospital Professor Fernando Fonseca (S GOMES); Hospital Pulido Valente - Centro Hospitalar Lisboa Norte (F Froes); Hospital S. João (J Pereira); Hospital Sao Francisco Xavier, CHLO (P Povoa); Hospital Senhora da Oliveira- Guimarães (A Bártolo, R Milheiro); Hospital Vila Franca de Xira (A Simões, J Gonçalves-Pereira); Instituto Português de Oncologia de Lisboa (M Bouw, M Sousa); IPO Porto, Portugal (M Brinquinho); Oporto Hospital Center / Santo António Hospital (A Pinto); Santa Maria University Hospital, CHLN, Lisbon (I Moniz); SESARAM, EPE (G Silva); Unidade Local de Saúde de Castelo Branco - Hospital Amato Lusitano (J Valente); Unidade Local de Saúde do Alto Minho (E Pereira, P Moura)

Spain: CHU Ourense (P Vidal-Cortés); Clínica Diagonal (S Picos, N López); Clinica Rotger (R Jordà-Marcos); Clínica Santa Isabel (D Arteta, J Fajardo); Clinica Universidad de Navarra (P Monedero); Complejo Hospiralario de Leon (M González); Complejo Hospitalario de Navarra. (J Izura); Complejo Hospitalario Universitario de A Coruña (CHUAC) (E Alemparte Pardavila, A Díaz Lamas); Complexo Hospitalario Universitario de Santiago de Compostela (J Fernández Villanueva); Hospital Álvaro Cunqueiro, Complexo Hospitalario Universitario de Vigo, Xerencia de Xestión Integrada de Vigo. (A López Álvarez, A Román Fernández); Hospital clinic (E Zavala, R Adalia); Hospital Clinico San Carlos (M Nieto); Hospital Clinico San Carlos (F Martinez Sagasti, S Domingo Marín); Hospital Clínico Universitario de Valencia (G Aguilar); Hospital Clínico Universitario Valladolid (P Jorge-Monjas); Hospital de Mataro (J Yebenes); Hospital de Tortosa Verge de la Cinta (L claverias, J Domingo); Hospital Delfos Barcelona (S Picos Gil, J Cervello Y Campos Garcia); Hospital General De Granollers (P Garro); Hospital General de La Palma (D García Rodriguez, E Zborovsky); Hospital General San Jorge De Huesca (J Lopez Claver, P Omedas Bonafonte); Hospital General Universitario de Castellón (L Galarza, R Reig); Hospital Germans Trias i Pujol (B Catalán, S Martinez-Vega); Hospital Juan Ramon Jiménez (C Jiménez Conde); Hospital La Paz (E Maseda); Hospital Nuestra Señora de Sonsoles Avila (R Truchero, G Bello); Hospital Quironsalud MIguel Dominguez (R Gómez López); Hospital Ramon y Cajal (A Aroca Tanarro); Hospital Sant Joan de Déu Manresa. Fundació Althaia (S Cano Hernández, I Catalán Gómez); Hospital SAS of Jerez (A Estella); Hospital Son Llàtzer (A Socias Mir, A del Castillo Blanco); Hospital Universitario 12 de Octubre (J Montejo Gonzalez); Hospital Universitario 12 de Octubre de Madrid (R García Álvarez, M González Serrano); Hospital Universitario Basurto (M Tebar Soto); Hospital Universitario Central De Asturias (L Iglesias Fraile); Hospital Universitario Central De Asturias (E García-Prieto, L Forcelledo); Hospital Universitario Clinico San Carlos (M Álvarez-González, I Cis Tovar); Hospital universitario de la Ribera (S Sanchez-Morcillo); Hospital Universitario de Tarragona Joan XXIII (A Rodriguez, M Bodi); Hospital Universitario de Torrejón (M Martin Delgado, N Redondo); Hospital Universitario del Sureste (P Albert, E García Sánchez); Hospital Universitario Fundación Alcorcon (R Ruiz de Luna Gonzalez, J Pellin Ariño); Hospital Universitario Fundación Alcorcón (S García del Valle); Hospital

universitario Infanta Sofía (M González); Hospital Universitario La Princesa (J Iglesias); Hospital Universitario Virgen de la Victoria (M de la Torre-Prados); Hospital Universitario Virgen de Valme. Sevilla (A Lesmes Serrano, E Palleja); Hospital Vall d'Hebron (M de Nadal); Hospital Valle del Nalón (L Velasco); Ramón y Cajal University Hospital (A Blandino Ortiz, R De Pablo Sanchez); Rio Hortega University Hospital. Valladolid (J Rico-Feijoo); SESCAM.Hospital General Universitario de Albacete (A Prado Mira, A Prado Mira); Universitary Hospital (J Ballesteros, M Paz); Vall D'hebron University Hospital (C Maldonado Toral)

Sweden: Alingsås Lasarett (J Sivik, A Nyberg); AnOpIVA, Norra Älvsborgs Länssjukhus, NU-sjukvården (J Gustafsson, B Lindqvist); Karolinska University Hospital, Perioperative Medicine & Intensive Care, Solna (A Oldner); Norrköping (F Schiöler, A Ghazi); Lund University, Skåne University Hospital (P Ederoth, S Hyllén); Skanes universitetssjukhus Malmo, Department of Infectious Diseases (J Cronqvist, H Kulstad); Hudiksvall (J Lyrén); Centralsjukhuset, Karlstad (J Rosell, D Smole); Lund University Faculty of Medicine (L Mellhammar, A Linder); Hallands Hospital Halmstad (F Hessulf, J Undén); Hallands Sjukhus Varberg (M Meirik); Karolinska Universitetssjukhuset PMI, IVA (D Nelson); Karolinska University Hospital (B Persson, A Öwall); Karolinska University Hospital Huddinge (C Agvall-Öhman, K Kilsand); Landstinget Dalarna, Falu Lasarett (B Ahlström, M Enlund); Landstinget Västernorrland (P Eriksson, V Appleby); Länssjukhuset Ryhov (F Hammarskjold, A Granath); Linkoping University Hospital (L De Geer); Linköping University Hospital, Cardiovascular (S Walther, M Törnudd); Linköping Unviersity Hospital (L De Geer); Nykoping Hospital (H Zetterquist, Z); Östersund Hospital (U Östberg); Region Skane (M Spångfors); Region Västmanland (E Nikolic); Sahlgrenska University Hospital (K Kleiven Thiringer, B Nellgård); Sjukhuset Torsby (H Sköld); Skane University Hospital (L Mellhammar, A Linder); Södersjukhuset (M Cronhjort, W Muller); Västerbottens läns Landsting, Norrlands universitetssjukhus (C Kahlbom, C Reinikainen Diamant); Västervikssjukhus (J Berkius)

Switzerland: Centre Hospitalier Universitaire Vaudois CHUV (J Pagani, P Eckert); Hirslanden Clinic, Zurich (C Haberthür); Fribourg Hospital (Y Fleury, A Moutaouakil); Hôpital Intercantonal de la Broye (L Urbano, D Chabanel); Hôpital Neuchâtelois (M Brunner, R Zurcher); Luzerner Kantonsspital (J Scholte, A Reintam-Blaser); GHOL - Hôpital de Nyon (F Thierry, C Laurent); Spital Thurgau Muensterlingen (T Huebner); Swiss Paraplegic Centre Nottwil (P Felleiter); University Hospitals of Geneva (J Pugin, F Boroli); University of Bern (J Schefold)

United Kingdom: Addenbrooke's Hospital, Cambridge (A Conway Morris, J Coles); Aintree University NHS Foundation Trust (G Dempsey, C Jones-Criddle); Altnagelvin Hospital (S O'Kane); Aneurin Bevan University Health Board, Royal Gwent Hospital (T Szakmany); Barking Havering Redbridge University Hospitals NHS Trust (R Jain, S Banerjee); Barnsley Hospital NHS Foundation Trust (S Chau, K Inweregbu); Basingstoke and North Hampshire Hospital. (A Stokes); Belfast Health and Social Care Trust (J Silversides); Bolton Hospitals NHS Foundation Trust (C Dewitt, D Nethercott); Bradford Teaching Hospitals NHS Trust (T Lawton); Brighton and Sussex University Hospitals (C Barrera Groba); Broomfield Hospital, Chelmsford (C Spoors); Buckinghamshire Healthcare NHS trust (R West); Chelsea & Westminster Hospital (R Davies); Chesterfield Royal hospital (S Beavis); Countess of Chester Hospital NHS Foundation Trust (J Gardner, L Wilson); Croydon Health Services (A Raj, A Moghal); Cwm Taf UHB (B Gibson); Doncaster Royal Infirmary (N Singatullina, D Pryor); Dorset County Hospital (R Thomas); Dumfries and Galloway Royal Infirmary (D Wrathall, T Al-Ani); East Surrey Hospital (A Myers, P Morgan); Freeman Hospital (J Davidson); Glasgow Royal Infirmary (M Booth); Guy's Hospital (M Ostermann, A Hall); Hampshire Hospitals NHS Foundation Trust (S Wimbush); Harefield Hospital (D Hall, A Hurtado Doce); Hull Royal Infirmary (N Smith); Hywel Dda UHB (I Otahal); Imperial College Healthcare NHS Trust (D Antcliffe, R Meacher); Imperial College Healthcare NHS Trust (S Brett, P Patel); Imperial College Healthcare NHS Trust (A Gordon, M Stotz); Imperial College Healthcare NHS Trust (P Borra, D Braham); Ipswich Hospital NHS Trust (M Garfield); James Paget University Hospital (I Misane); Kent and Canterbury Hospital (R Kapoor); King's College Hospital (S Patel); Leeds General Infirmary (S Whiteley); Leicester General Hospital (L Bilek); Leicester Royal Infirmary (L Bilek); Lewisham and Greenwich NHS Trust (B Rose); London North West Healthcare NHS Trust (J Vogel); Luton and Dunstable Hospital (G brescia); Maidstone and Tunbridge Wells NHS Trust (J Wood); Medway NHS Trust (N Divekar); Mid Essex Trust (J Collins); Morriston Hospital, ABMU Health Board (C Battle, C Terblanche); National Hospital for Neurology and Neurosurgery (T Thomas, M Kalogirou); Nevill Hall Hospital (V Hamlyn); NHS Greater Glasgow and Clyde (R Docking, M Sim); North Cumbria Universities Hospital Trust (T Smith, S Jones); North Manchester General Hospital Pennine Acute Hospitals NHS Trust (C Chaintoutis, S Davis); North West Anglia NHS Foundation Trust (A Holder); Northampton General

Hospital (F Olejnik, J Wilkinson); Northern Health and Social Care Trust, Antrim Area Hospital (P Johnston); Queen Alexandra Hospital, Portsmouth (D Shearn); Queen Elizabeth Hospital Birmingham (N Parekh); Queen Elizabeth Queen Mother Hospital (R Kapoor, A Alegria); Royal Berkshire Hospital (M Thakker, C Burnett); Royal Bournemouth NHS FT (M Schuster-Bruce); Royal Cornwall Hospital, Truro, UK (M Spivey); Royal Devon & Exeter NHS Foundation Trust (C Boulanger); Royal Free London NHS Foundation Trust (D Martin, H Filipe); Royal Liverpool & Broadgreen University Hospitals (I Welters); Royal London Hospital, Barts Health (J Pennington); Royal Surrey County Hospital (J Kirk-Bayley); Royal Victoria Hospital (C Nutt); Royal Wolverhampton NHS Trust (A Meraglia, J Pooni); Sandwell and West Birmingham Hospitals NHS Trust, City Hospital (S Kannan, J Hulme); Sandwell and West Birmingham Hospitals NHS Trust, Sandwell Hospital (S Kannan, R Kumari); Scarborough Hospital (B Chandler); South Eastern Health and Social Care Trust (J Trinder); St Andrew's Centre for Burns and Plastic Surgery, Mid-Essex Hospitals NHS Trust (C Spoors); St Georges University Hospitals NHS Foundation Trust (B Philips, M Cecconi); St Georges University Hospitals NHS Foundation Trust, Neurological ICU (J Ball, C Ryan); St Georges University Hospitals NHS Foundation Trust, Cardiac ICU (J Aron, C Ryan); St Mary`s Hospital, Isle of Wight (G Debreceni); St. Thomas Hospital (A Hall, M Ostermann); St-James Univesrity Hospital, Leeds (S Whiteley); Stockport NHS Foundation Trust (E Thomas); Sunderland Royal Hospital (A Roy); The Christie NHS Foundation Trust (V Kasipandian); The Mid Yorkshire NHS Hospitals Trust (A Rose); The Rotherham NHS Foundation Trust (A Hormis); Torbay and South Devon NHS Foundation Trust (T Clark, A Revill); UCHL (D Brealey); United Hospitals Lincolnshire (A Wolverson, S Moore); University Hospital of South Manchester (T Felton); University Hospital of Wales, Cardiff (M Morgan, M Wise); University Hospital Southampton (A Dushianathan, R Cusack); University Hospitals Bristol NHS Foundation Trust (J Bewley); University Hospitals Coventry and Warwickshire NHS Trust (T Billyard); University Hospitals of Leicester NHS Trust, Glenfield Hospital (L Bilek); University Hospitals of Morecambe Bay (K Burns); University of Cambridge/Addenbrooke's Hospital (A Conway Morris); West Suffolk NHS Foundation Trust (S Humphreys); William Harvey Hospital (R Kapoor, N Richardson); WUTH NHS Trust Arrowe Park Hospital (R Jacob); York Hospital (J Carter)