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The incidence of bacterial pneumonia, antibiotic resistance and antibiotic use in hospitals in six countries during the COVID-19 pandemic

Late Breakers

24. Outbreaks and public health emergencies

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Background

Antimicrobial resistance (AMR) is a serious global threat. A link exists between increasing antibiotic use and increasing AMR. During the COVID-19 pandemic the use of antibiotics increased. We estimated the incidence of secondary respiratory infections (community acquired pneumonia (CAP); hospital-acquired pneumonia (HAP); ventilator-associated pneumonia (VAP); ventilated-HAP and other lower respiratory tract infections (LRTI)) and bloodstream infections (BSI) among patients admitted for SARS-CoV-2 infection, in selected countries.

Methods

We conducted a multicentre, international, observational, retrospective cohort study in 14 hospitals from low-, middle- and high-income countries (Sri Lanka, India, Mexico, South Africa, Spain, USA). Patients were COVID-19 positive, admitted to hospital with a bacterial culture. The first fifteen patients in each hospital between March-June 2022 were included.

Results

726 patients were included: 179 (24.66%) had a single microorganism, 128 (17.63%) two, 20 (2.75%) three, 16 (2.20%) four and 2 (0.28%) five organisms. Approximately 28% (n=204) of patients had RTI and 20% (n=145) were clinically diagnosed with CAP, 6% (n=43) with HAP and 5% (n=36) with VAP. 127 (127/726, 17.5%) bacteria were isolated; 33 (26%) were multidrug resistant bacteria (MDR) (Magiorakos et al.), including: Escherichia coli (9, 27.27%), Klebsiella species (7, 21.21%) and Staphylococcus aureus (3, 9.09%). 29 (23.97%) of patients with BSI had MDR organisms. Patients with positive samples were more likely to be prescribed antibiotics. The antibiotics prescribed most frequently (first line of treatment) for patients with confirmed infection were: ceftriaxone (17.9%), piperacillin/tazobactam (8.1%) and azithromycin (11.5%). This pattern of antibiotic was similar in patients without confirmed infection (p>0.05).

Conclusions

Confirmed infection was associated with worst outcomes compared to negative cultures. Overall incidence of confirmed secondary infection was 50.7%. 26% of bacteria were MDR, E. coli dominated. The use of "access" antibiotics decreased over time and "watch" antibiotics increased, especially those with longer hospital stays, suggesting the need for better antimicrobial stewardship programmes.

Table 1: Infection and causative organisms isolated

	Overall (%)	Spain (%)	USA (%)	Mexico (%)	South Africa (%)	Sri Lanka (%)	India (%)
Community acquired pneumonia							
	N=145	N=99	N=24	N=2	N=1	N=13	N=6
Positive	29 (20.00)	12 (12.12)	6 (25.00)	0	0	11 (84.62)	0
Negative	116 (80.00)	87 (87.88)	18 (75.00)	2 (100)	1 (100)	2 (15.38)	6 (100)
Hospital acquired pneumonia:							
	N=43	N=24	N=9	N=1	N=0	N=2	N=7
Positive	19 (44.19)	10 (41.67)	7 (77.78)	0	0	2 (100)	0
Negative	24 (55.81)	14 (58.33)	2 (22.22)	1 (100)	0		7 (100)
Ventilator associated pneumonia:							
	N=36	N=22	N=1	N=3	N=2	N=1	N=7
Positive	19 (52.78)	17 (77.27)	1 (100)	0	0	1 (100)	0
Negative	17 (47.22)	5 (22.72)	0	3 (100)	2 (100)	0	7 (100)
Respiratory tract infection:							
	N=204	N=100	N=15	N=8	N=14	N=23	N=44
Positive	51 (25.00)	26 (26.00)	9 (60.00)	0	0	16 (69.57)	0
Negative	153 (75.00)	74 (74.00)	6 (30.00)	8 (100)	14 (100)	7 (30.43)	44 (100)
Blood stream infection*							
	N=102	N=56	N=8	N=1	N=5	N=29	N=3
Positive	67 (65.69)	33 (58.93)	8 (100)	0	0	26 (89.66)	0
Negative	35 (34.31)	23 (41.07)	0	1 (100)	5 (100)	3 (10.34)	3 (100)
Catheter associated blood stream infection*							
	N=39	N=29	N=4	N=1	N=3	N=1	N=1
Positive	21 (53.85)	17 (58.62)	3 (75.00)	1 (100)	0	0	0
Negative	18 (46.15)	12 (41.38)	1 (25.00)	0	3 (100)	1 (100)	1 (100)