HOSPITAL ACQUIRED PNEUMONIA
Supporting information

This guideline has been prepared with reference to the following:

NICE. Pneumonia: diagnosis and management. 2025. London. NICE

https://www.nice.org.uk/guidance/ng250

NICE. COVID-19 rapid guideline: managing COVID-19. 2023. London. NICE.

https://www.nice.org.uk/guidance/ng191

Kalil AC, Metersky ML, Klompas M et al. Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. Clin Infect Dis. 2016;63:e61-e111

https://www.thoracic.org/statements/resources/tb-opi/hap-vap-guidelines-2016.pdf

Masterton RG, Galloway A, French G, et al. Guidelines for the management of hospital-acquired pneumonia in the UK: report of the working party on hospital-acquired pneumonia of the British Society for Antimicrobial Chemotherapy. J Antimicrob Chemother 2008;62:5-34

http://jac.oxfordjournals.org/content/62/1/5.long

Immediate treatment

Indications of severity

A 2024 systematic review compared four severity assessment tools (PSI, A-DROP, I-ROAD, and CURB-65) and found that neither had enough ability to predict mortality in healthcare-associated pneumonia patients and there were no significant differences in predictive performance among them (Noguchi, 2024). Overall the summary area under the curves were 0.70 (0.68 to 0.72), 0.70 (0.63 to 0.76), 0.68 (0.64 to 0.73), and 0.67 (0.63 to 0.71), respectively, for PSI, A-DROP, I-ROAD, and CURB-65 (p = 0.66).

Noguchi S, Katsurada M, Yatera K et al. Utility of pneumonia severity assessment tools for mortality prediction in healthcare-associated pneumonia: a systematic review and meta-analysis. Sci Rep. 2024;14:12964
https://pmc.ncbi.nlm.nih.gov/articles/PMC11153623/

Evidence Level: I

NSAIDS (including indometacin) should be avoided in patients taking ACE inhibitors?

A cross-sectional study in 301 patients (Loboz, 2005) investigated impaired renal function in those taking diuretics, ACE inhibitors and NSAIDs (the “target” drugs). Of the 301 patients, 135 were on no prior target drugs, 87 on one, 60 on two and 19 on three. There was a significant ($P < 0.01$) correlation between both creatinine and creatinine clearance with male sex, age and number of target drugs. Multivariate analysis confirmed these associations but did not support associations between renal function and heart failure or total number of diagnoses. Increasing doses of diuretics, possibly because in many cases this included two drugs, but not the other drugs, were significantly ($P < 0.001$) associated with impaired renal function. For the other three drug groups patients on doses of any drug at lower than the defined daily dose (DDD) did not have significantly different creatinine or creatinine clearance from those on doses at or above the DDD

Loboz KK, Shenfield GM. Drug combinations and impaired renal function -- the 'triple whammy'. Br J Clin Pharmacol 2005;59:239-43
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1884747/

Evidence Level: IV

Vancomycin or Gentamicin for MRSA?

Vancomycin is widely regarded as the antibiotic of choice for MRSA (Lowy, 1998). Neither vancomycin (Georges, 1997; Rello, 1994) nor gentamicin (Noone, 1994) penetrate infected lung tissue easily and higher than normal peak serum concentrations are needed for patients with pneumonia. Both drugs have the potential for nephrotoxicity (Chow, 1994), although in the case of vancomycin, preparations since 1980 have been purer and less of a problem (Chow, 1994). A prospective, cohort study (Welty, 1994) showed that therapeutic drug monitoring reduced the incidence of vancomycin-associated renal insufficiency (7% in the TDM group of 61 versus 24% in the non-TDM group of 55).

Chow AW, Azar RM. Glycopeptides and nephrotoxicity. Intensive Care Med 1994;20:S23-S29

Georges H, Leroy O, Alfandari S, et al. Pulmonary disposition of vancomycin in critically ill patients. Eur J Clin Microbiol Infect Dis 1997;16:385-8

Lowy FD. *Staphylococcus aureus* infections. New Engl J Med 1998;339:520-32

Noone P, Parsons TM, Pattison JR, et al. Experience in monitoring gentamicin therapy during treatment of serious gram-negative sepsis. BMJ 1974;1:477-81
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1633521/pdf/brmedj02179-0023.pdf

Rello J, Torres A, Ricart M, et al. Ventilator-associated pneumonia by *staphylococcus aureus:* comparison of methicillin-resistant and methicillin-sensitive episodes. Am J Respir Crit Care Med 1994;150:1545-9

Welty TE, Copa AK. Impact of vancomycin therapeutic drug monitoring on patient care. Ann Pharmacother 1994;28:1335-9

Evidence Level: IV

Subsequent management

Duration of antibiotic treatment?
A 2015 systematic review of RCTs compared the effectiveness of short versus prolonged-course antibiotics for hospital acquired pneumonia in critically ill adults. Six relevant studies (1088 patients) were found. For patients with ventilator-associated pneumonia (VAP), overall a short seven- or eight-day course of antibiotics compared with a prolonged 10- to 15-day course increased 28-day antibiotic-free days (two studies; N = 431; mean difference (MD) 4.02 days; 95% confidence interval (CI) 2.26 to 5.78) and reduced recurrence of VAP due to multi-resistant organisms (one study; N = 110; odds ratio (OR) 0.44; 95% CI 0.21 to 0.95), without adversely affecting mortality and other recurrence outcomes. However, for cases of VAP specifically due to non-fermenting Gram-negative bacilli (NF-GNB), recurrence was greater after short-course therapy (two studies, N = 176; OR 2.18; 95% CI 1.14 to 4.16), though mortality outcomes were not significantly different.

Pugh R, Grant C, Cooke RP et al. Short-course versus prolonged-course antibiotic therapy for hospital-acquired pneumonia in critically ill adults. Cochrane Database Syst Rev. 2015:CD007577
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007577.pub3/full

Evidence Level: I

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