

Treatment restrictions and empirical antibiotic treatment of community-acquired pneumonia in elderly patients

T. Mulder^{1*}, C.H. van Werkhoven², S.M. Huijts^{2,3}, M.J.M. Bonten^{2,4}, D.F. Postma^{2,5}, J.J. Oosterheert¹

¹Department of Internal Medicine and Infectious Diseases, UMC Utrecht, Utrecht, the Netherlands,

²Julius Center for Health Sciences and Primary Care, UMC Utrecht, Utrecht, the Netherlands,

³Department of Respiratory Medicine, UMC Utrecht, Utrecht, the Netherlands, ⁴Department of Medical Microbiology, UMC Utrecht, Utrecht, the Netherlands, ⁵Department of Internal Medicine, Diaconessenhuis Utrecht, Utrecht, the Netherlands, *corresponding author: tel.: +31 (0)88-7568190, email: t.mulder-2@umcutrecht.nl

Dear Editor,

Community-acquired pneumonia (CAP) is a major health problem in the elderly, causing an estimated 5100 deaths in the Netherlands annually.¹ Treatment of CAP in elderly patients poses several challenges as a consequence of pre-existing comorbidities, quality of life and end-of-life decisions.² For a significant part of this specific patient population, optimal care may involve withholding treatment extension or even discontinuation of treatment. Adjustment in treatment can vary from specific restrictions such as do-not-resuscitate orders to providing palliative care only.

Previous studies found an association between treatment restrictions and mortality, and have also shown an association with less aggressive or inadequate care.^{3,4} However, the presence of treatment restrictions is usually not reported in therapeutic clinical studies, such as studies evaluating treatment strategies for CAP. It is unknown if treatment restrictions are associated with non-related treatment choices in CAP patients as well.

We performed a prospective cohort study on hospitalised elderly CAP patients in the Netherlands. We aimed to determine whether treatment restrictions act as a confounder of the association between empirical antibiotic treatment and clinical outcomes defined as mortality on day 30 and day 90, as well as length of hospital stay.

We studied 1093 elderly CAP patients, of whom 296 patients (27.1%) had treatment restrictions within 48 hours of admission. Treatment restrictions were associated with 90-day mortality (crude HR 4.035, 95% CI 2.905-5.606; adjusted HR 2.636, 95% CI 1.912-3.634), which implicates

that treatment restrictions are a good clinical marker for comorbidity and prognosis. An association with empirical antibiotic treatment, however, was not found (crude OR 0.962, 95% CI 0.729-1.269; adjusted OR 1.002, 95% CI 0.732-1.372). For determination of a possible confounding effect, we performed multivariate analyses with and without inclusion of treatment restrictions as potential confounders. For all analyses, treatment restrictions did not confound the association between empirical antibiotic treatment and clinical outcomes

In conclusion, in hospitalised CAP patients, treatment restrictions are frequently applied. They are a sensitive proxy for severity of comorbidity, frailty and prognosis. Treatment restrictions were not associated with empirical antibiotic treatment and did not confound associations between empirical antibiotic treatment and clinical outcome of CAP. However, given the strong and independent association with clinical outcome, documentation of treatment restrictions in future studies is recommended.

REFERENCES

1. Bijkerk P., van Lier EA, van Vliet JA, Kretzschmar ME. [Effects of ageing on infectious disease]. *Ned Tijdschr Geneesk.* 2010;154:A1613.
2. Adams SD, Cotton BA, Wade CE, et al. Do not resuscitate status, not age, affects outcomes after injury: an evaluation of 15,227 consecutive trauma patients. *J Trauma Acute Care Surg.* 2013;74:1327-30.
3. Shephardson LB. Increased risk of death in patients with do-not-resuscitate orders. *Med Care.* 1999;37:727-37.
4. Scarborough JE, Pappas TN, Bennett KM, Lagoo-Deenadayalan S. Failure-to-pursue rescue: explaining excess mortality in elderly emergency general surgical patients with preexisting "do-not-resuscitate" orders. *Ann Surg.* 2012;256:453-61.