

*Measure specifications may be modified based on
recommendations issued by the National Quality Forum*

Quality of Care Measure

PNE-1: Initial Antibiotic Received Within 4 Hours of Hospital Arrival

Description: Pneumonia patients who receive their first dose of antibiotics within 4 hours after arrival at the hospital.

Type of Measure: CMS Core

Rationale: There is growing clinical evidence of an association between timely inpatient administration of antibiotics and improved outcome among pneumonia patients. One study found that Medicare pneumonia patients had improved survival if they received antibiotics within 4 hours of admission (Kahn 1990). Another study found that shortening the time-to-first-dose to 4 hours was associated with improved survival (McGarvey 1993). In 1995 over 14,000 randomly selected Medicare pneumonia hospitalizations were examined. They found that patients who received their first dose of antibiotic within 3 hours were less likely to die within 30 days than were patients whose antibiotics were delayed, although this association did not become statistically significant until 8 hours following arrival, when a 15% ($P < 0.001$) reduction was noted (Meehan 1995). More recently, a study of 13,771 Medicare pneumonia hospitalizations from 1998-99 found that 30-day mortality was 10% ($P = 0.04$) lower and length of hospital stay was shorter among patients whose first antibiotic was administered within 4 hours when compared with those whose time to first dose was longer. Among patients who had not received antibiotics before arriving at the hospital, administration within 4 hours was associated with 17% reductions in mortality during both hospitalization ($P = 0.01$) and the 30 days following admission ($P = 0.001$) (Bratzler 2001).

Based on these studies, the Infectious Diseases Society of America (2000) and the American Thoracic Society (2001) suggests 8 hours as the maximum time to first antibiotic administration. Data collected by the National Pneumonia Project indicate that among Medicare pneumonia patients age 65 or older who were hospitalized during 1998-99, the first dose was administered within 8 hours for 83.4%, within 6 hours for 74.9%, and within 4 hours for 57.7%. This represents a significant improvement from 1995, when corresponding rates were 79.4% at 8 hours, 68.8% at 6 hours, and 49.9% at 4 hours (CMS unpublished data). For 1998-99, the rates of administration within 8 hours ranged from 38% to 91% among the states and territories.

Denominator Statement: All pneumonia patients.

Included Populations: Medicare discharges with:

- A principal diagnosis of pneumonia (refer to the Appendix for ICD-9-CM codes) **OR**
- A principal diagnosis of septicemia, or respiratory failure (acute or chronic) **AND** a secondary diagnosis of pneumonia (refer to the Appendix for ICD-9-CM codes)

Excluded Populations:

- Patients who were transferred from another acute care or critical access hospital
- Patients who had no working diagnosis of pneumonia at the time of admission
- Patients who received comfort measures only
- Patients who did not receive antibiotics during the hospitalization or within 36 hours of arrival to the hospital
- Patients who had insufficient arrival or antibiotic timing data (i.e., missing date and/or time) in their medical record

Numerator Statement: Number of pneumonia patients who received their first dose of antibiotics within 4 hours after arrival at the hospital.

Other Reported Values:

Median time, Pneumonia patients whose first dose of antibiotics was administered within 2 hours, 6 hours, 8 hours, 12 hours and > 12 hours after arrival at the hospital.

Selected References:

- Kahn KL, Rogers WH, Rubenstein LV, et al. Measuring quality of care with explicit process criteria before and after implementation of the DRG-based prospective payment system. *JAMA*. 1990;264:1969-1973.
- McGarvey RN, Harper JJ. Pneumonia mortality reduction and quality improvement in a community hospital. *Qual Rev Bull*. 1993;19:124-130.
- Meehan TP, Fine MJ, Krumholz HM, et al. Quality of care, process, and outcomes in elderly patients with pneumonia. *JAMA*. 1997;278:2080-2084.
- Bratzler DW, Houck PM, Nsa W, et al. Initial processes of care and outcomes in elderly patients with pneumonia. [abstract] American College of Emergency Physicians Research Forum, October 15, 2001, Chicago, IL.
- HYPERLINK <http://www.nationalpneumonia.org>
- Bartlett JG, Dowell SF, Mandell LA, et al. Practice guidelines for the management of community-acquired pneumonia in adults. Infectious Diseases Society of America. *Clin Infect Dis*. 2000;31:347-382.
- Niederman MS, Mandell LA, Anzueto A, et al. Guidelines for the management of adults with community-acquired pneumonia. American Thoracic Society. *Am J Respir Crit Care Med*. 2001;163:1730-1754.

Appendix:

- Principal diagnosis ICD-9-CM code of 480-483.8, 485-486, **OR** 487.0 (pneumonia);
OR
- Principal diagnosis ICD-9-CM code of 038.XX (septicemia) **OR** 518.81(respiratory failure) **AND** a secondary diagnosis code of pneumonia

Note: Principal diagnosis code 518.84 (acute and chronic respiratory failure) can be added to 518.81 for collection of data by hospitals. This code occurs infrequently (0.2% of Medicare pneumonia records as a secondary diagnosis, compared with 3.0% for the 518.81 code) and can be included in the population for individual hospitals without substantially affecting rate comparability.