Release Notes:
Measure Information Form
Version 1.0

Measure Information Form

Measure Set: Pneumonia (PN)

Set Measure ID #: PN-5

Performance Measure Name: Antibiotic Timing (Mean)

Description: Mean time from arrival at the hospital to the administration of the first dose of antibiotic at the hospital.

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 (Khan 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improvement from 1995, when corresponding rates were 79.4% at 8 hours, 68.8% at 6 hours, and 49.9% at 4 hours (CMS unpublished data).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 ranges from 38% to 91% among the states and territories.

Type of Measure: Process

Improvement Noted as: A decrease in the mean value.

Continuous Variable Statement: The time, in minutes, from hospital arrival to administration of the first dose of antibiotics in the hospital for patients 18 years of age and older with pneumonia.

Included Populations: Patients discharged with:

- *ICD-9-CM Principal Diagnosis Code* of pneumonia as defined in Appendix A, Table 3.1 **OR** *ICD-9-CM Principal Diagnosis Code* of septicemia or respiratory failure (acute or chronic) as defined in Appendix A, Tables 3.2, or 3.3, AND an *ICD-9-CM Other Diagnosis Code* of pneumonia (Appendix A, Table 3.1)

Excluded Populations:

- Patients received in transfer from another acute care or critical access hospital, including another emergency department
- Patients who had no working diagnosis of pneumonia at the time of admission
- Patients receiving *Comfort Measures Only*
- Patients who do not receive antibiotics during hospitalization or within 36 hours (2160 minutes) after arrival to the hospital
- Patients who have received antibiotics within 24 hours prior to hospital arrival
- Patients less than 18 years of age

Data Elements:

- *Admission Date*
- *Admission Source*
- *Antibiotic Administration Date*
- *Antibiotic Administration Time*
- *Antibiotic Name*
- *Antibiotics Prior to Arrival*
- *Antibiotic Received*
- *Arrival Date*
- *Arrival Time*
- *Birthdate*
- *Comfort Measures Only*
- *ICD-9-CM Other Diagnosis Codes*
- *ICD-9-CM Principal Diagnosis Code*
- *Pneumonia Working Diagnosis on Admission*
- *Transfer From Another ED*

Risk Adjustment: No

Data Collection Approach: Retrospective, data sources for required data elements include administrative data and medical record documents. Some hospitals may prefer to gather data concurrently by identifying patients in the population of interest. This approach provides opportunities for improvement at the point of care/service. However, complete documentation

includes the principal and other ICD-9-CM diagnosis and procedure codes, which require retrospective data entry.

Data Accuracy:
- Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.
- Health care organizations may want to work with their hospital pharmacy to identify and list the antibiotics that are used in their organization. This list can serve as a reference for the abstractor.
- To be part of the measure population, a patient must have received an antibiotic during the hospitalization.
- The date and time for the initial antibiotic refer to the initial antibiotic administered during the hospital stay, not the antibiotic taken prior to hospital arrival.

Measure Analysis Suggestions: Health care organizations should investigate any patients whose time to antibiotic administration was greater than 2160 minutes (36 hours) for a possible data entry error or a performance improvement opportunity.

This measure seeks to identify the timing of the first antibiotic administered. It is important to note that the measure focuses on the administration of any antibiotic, not necessarily the antibiotic consistent with consensus guidelines. Therefore, data from this measure should be reviewed in conjunction with PN-6, PN-6a, and PN-6b, that address appropriate antibiotic selections. For example, an HCO could receive excellent indicator rates for antibiotic administered timing but low rates for giving the appropriate antibiotics consistent with guidelines.

Sampling: Yes, for additional information see the Sampling section

Data Reported As: Aggregate measure of central tendency

Selected References:

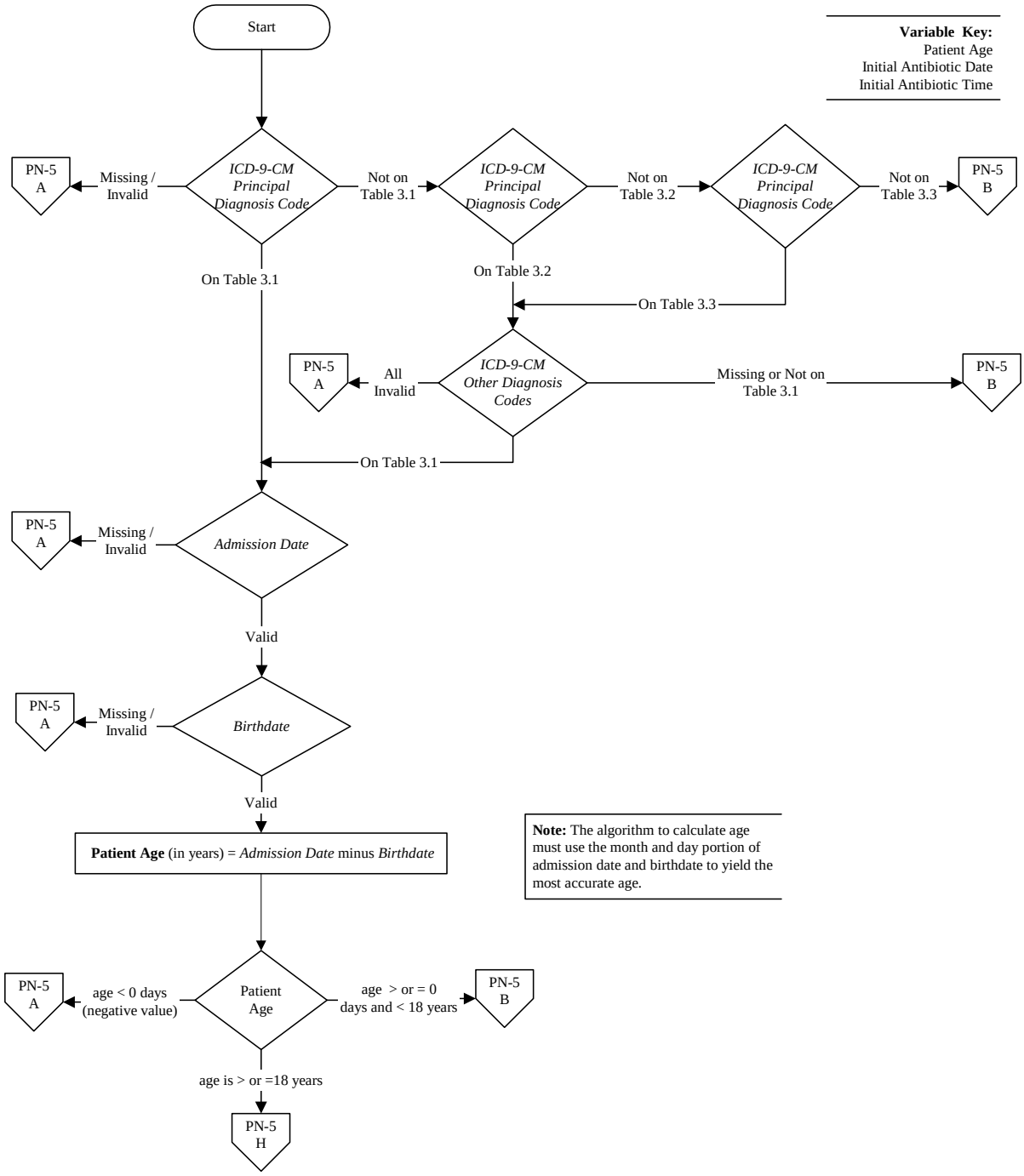
- Bartlett JG, Dowell SF, Mandell LA, et al. Practice guidelines for the management of community-acquired pneumonia in adults. Infectious Diseases Society of America. *Clin Infect Dis*. 2000;31:347-382.
- Bratzler, DW, Houck PM, Nsa W, et al. Initial processes of care and outcomes in elderly patients with pneumonia. {abstract} American College of Emergency Physicians Research Forum, October 15, 2001, Chicago, IL.
- Heffelfinger JD, Dowell SF, Jorgensen JH, Klugman KP, Mabry LR, Musher DM, Plouffle JF, Rakowsky A, Schuchat A, Whitney C and the Drug-Resistant Streptococcus pneumoniae Therapeutic Working Group, "Management of Community-Acquired Pneumonia in the Era of Pneumococcal Resistance: A Report From the Drug-Resistant Streptococcus pneumoniae Therapeutic Working Group." *Archives of Internal Medicine*, 160:1399-1408, May 22, 2000.
- Houck PM, Bratzler DW, Nsa W, et al. Timing of antibiotic administration and outcomes for Medicare patients hospitalized with community-acquired pneumonia. *Archives of Internal*

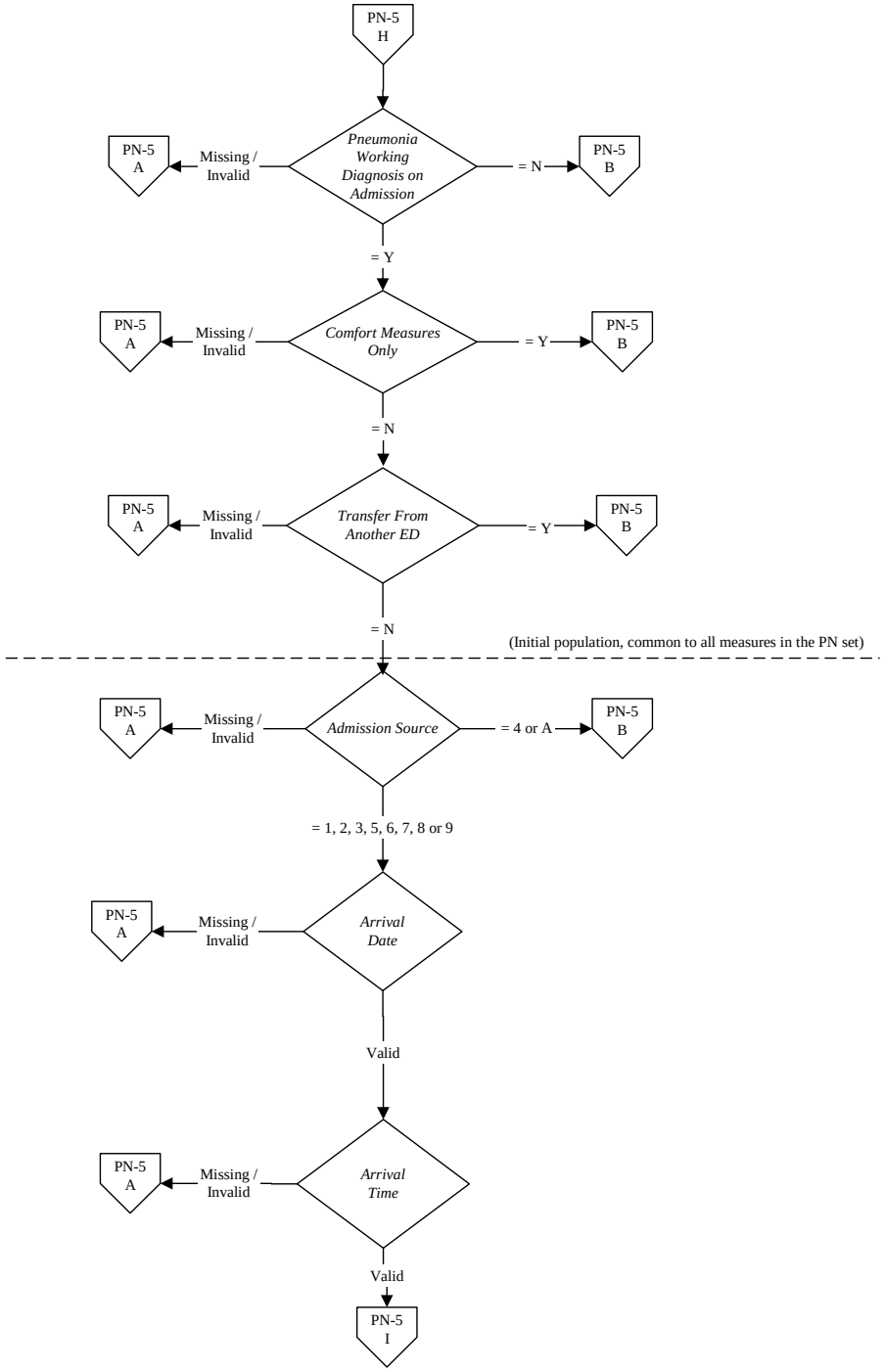
Medicine, 2004; 164: 637-644.

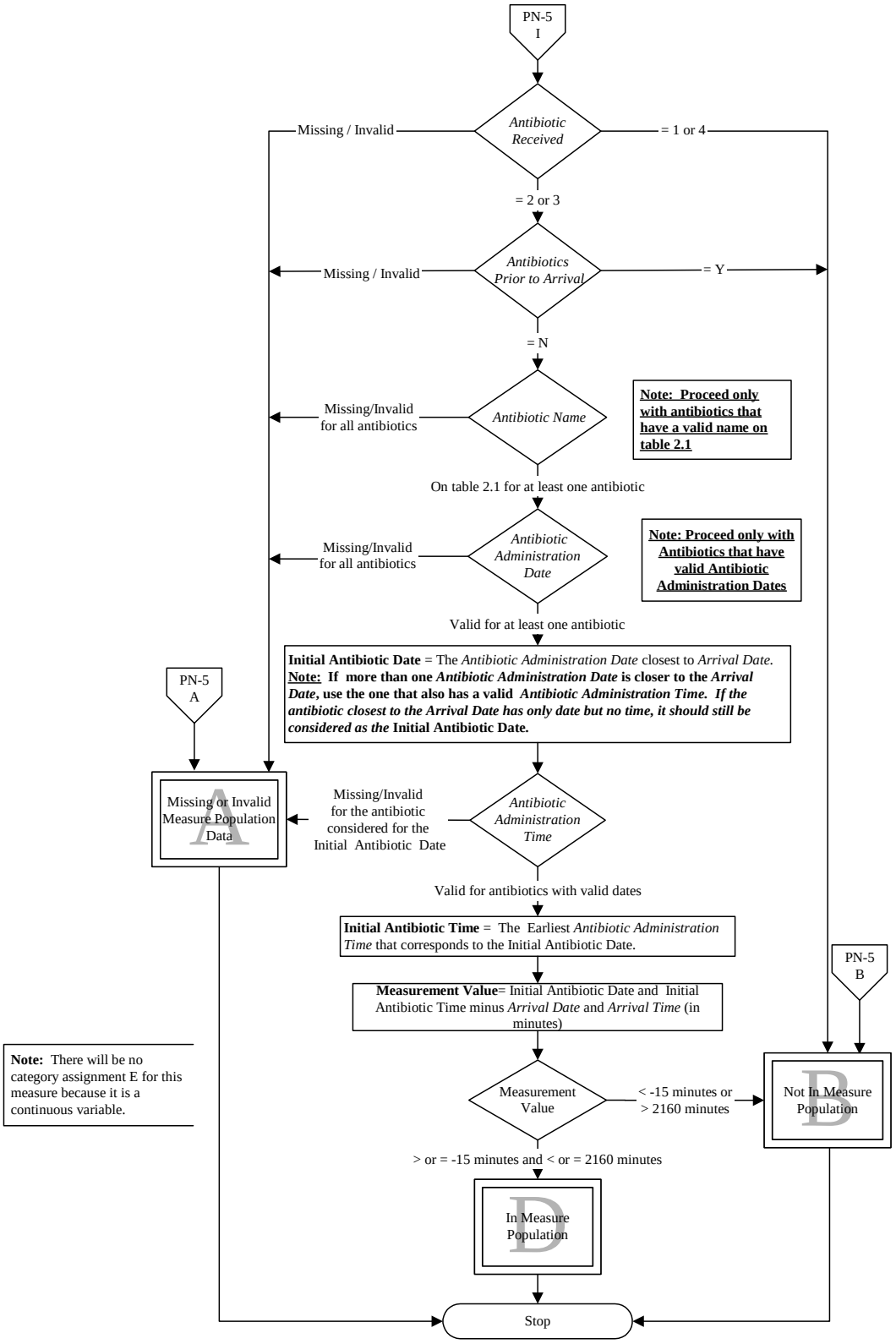
- Khan KL, Rogers WH, Rubenstein LV, et al. Measuring quality of care with explicit process criteria before and after implementation of the DRG-based prospective payment system. *JAMA*. 1990:264:1969-1973.
- Mandell LA, Bartlett JG, Dowell SF, et al. Practice guidelines for the management of community-acquired pneumonia in adults. Infectious Diseases Society of America. *Clin Infect Dis*. 2003;37:1405-1433.
- 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.
- 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.

PN-5: Antibiotic Timing (Mean)

Continous Variable Statement: The time, in minutes, from hospital arrival to administration of the first dose of antibiotics in the hospital for patients 18 years of age and older with pneumonia.




PN-5 H
Pneumonia Working Diagnosis on Admission
Missing / Invalid
PN-5 A
= N
PN-5 B
= Y
Comfort Measures Only
Missing / Invalid
PN-5 A
= Y
PN-5 B
= N
Transfer From Another ED
Missing / Invalid
PN-5 A
= Y
PN-5 B
= N
(Initial population, common to all measures in the PN set)
Admission Source
Missing / Invalid
PN-5 A
= 4 or A
PN-5 B
= 1, 2, 3, 5, 6, 7, 8 or 9
Arrival Date
Missing / Invalid
PN-5 A
Valid
Arrival Time
Missing / Invalid
PN-5 A
Valid
PN-5 I


PN-5 I
Antibiotic Received
Missing / Invalid
= 1 or 4
= 2 or 3
Antibiotics Prior to Arrival
Missing / Invalid
= Y
= N
Antibiotic Name
Missing/Invalid for all antibiotics
Note: Proceed only with antibiotics that have a valid name on table 2.1
On table 2.1 for at least one antibiotic
Antibiotic Administration Date
Missing/Invalid for all antibiotics
Note: Proceed only with Antibiotics that have valid Antibiotic Administration Dates
Valid for at least one antibiotic
Initial Antibiotic Date = The Antibiotic Administration Date closest to Arrival Date. Note: If more than one Antibiotic Administration Date is closer to the Arrival Date, use the one that also has a valid Antibiotic Administration Time. If the antibiotic closest to the Arrival Date has only date but no time, it should still be considered as the Initial Antibiotic Date.
PN-5 A
A
Missing or Invalid Measure Population Data
Missing/Invalid for the antibiotic considered for the Initial Antibiotic Date
Antibiotic Administration Time
Valid for antibiotics with valid dates
Initial Antibiotic Time = The Earliest Antibiotic Administration Time that corresponds to the Initial Antibiotic Date.
Measurement Value= Initial Antibiotic Date and Initial Antibiotic Time minus Arrival Date and Arrival Time (in minutes)
PN-5 B
Note: There will be no category assignment E for this measure because it is a continuous variable.
Measurement Value
< -15 minutes or > 2160 minutes
B
Not In Measure Population
> or = -15 minutes and < or = 2160 minutes
D
In Measure Population
Stop