International CAPO Study Data Collection Manual

"An International, Observational Study to Evaluate Current Management of Hospitalized Patients with Community-Acquired Pneumonia"

May 2017

The data on this page are to be collected by the investigator and will not be entered into the study database. Please keep this first page of the case report form for you records in a secure place. This page is the only way to link the CAPO Case ID with the patient name for data quality queries and corrections.

Principal Investigator: _____

Hospital: _____

First Name:_____ Middle Initial:____ Last Name: _____ Suffix:_____

Medical Record Number:_____

Arrival Date: ____/____/_____ (mm/dd/yyyy) Arrival Time: ____:____ (hh:mm)

Initial Data Collected by (Name): _____

Case ID: _____

If you have any questions regarding data collection or entry, please read this CAPO Data Collection Manual. If you still have questions, please send an email to: ctrsu@louisville.edu

****** All dates should be collected in Month/Day/Year format. All times should be collected in 24-hour time format (e.g. 1200 for noon, 0000 for midnight). ******

************CAPO PATIENT SCREENING FORM**************

INCLUSION CRITERIA:

NOTE: Only patients diagnosed with Community Acquired Pneumonia should be included in this study. Diagnosis of CAP requires the presence of criterion A, and B:

- ***Criterion A: New pulmonary infiltrate.***

  The purpose of this criterion is to identify a **radiologically** "new PNA" through the following findings:
  - *New pulmonary infiltrate/ opacities/ air bronchogram/ consolidation/ air space disease/ acute infectious process/ pulmonary density due to infection/ septic pulmonary emboli present on imaging (CT or chest x-ray)*.
  - *Worsening/Increased findings* (described above) *present on imaging (CT or chest x-ray)*. For the present study we consider Worsening/Increased as positive when the finding is located in a new lobe or the image used for comparison is older than a month ago.

  Qualifying images need to be taken **within 48 hours prior to or following arrival to the hospital**. CT scans of chest override chest x-ray images to meet this criterion (abdomen CT may be use to prove the finding, but never to override the chest x-ray). Example: If an infiltrate is seen on CT of chest but not chest x-ray, the new pulmonary infiltrate criterion is met. On the other hand, an infiltrate not seen on CT of chest but reported on a chest x-ray, the new pulmonary infiltrate criterion is *NOT* met.

  Note: If the subject meets all the criteria and the physician interpretation of the image is considered positive, but the radiologist report is negative, the case may be discussed with the PI who will then make the final decision.

- ***Criterion B: Signs and Symptoms of CAP***

  For this criterion to be met, at least one of the following signs and symptoms should be present:

  1. *Fever ≥ 38°C (100.4°F) or Hypothermia ≤ 35.5°C (95.9°F).* The value can either be reported by the patient or in the hospital record within the 24 hours of arrival. Subjective fever does not meet the criteria for fever. The temperature values have to be documented.
  2. *Changes in WBC* (leukocytosis >11,000 WBC/mm^3, left shift > 10% band forms/microliter, or leukopenia i.e. leukocyte count < 4,000 WBC/ mm^3). The leukocytosis or leukopenia will be determined based on the corresponding hospital's reference values.
  3. S*upporting signs and symptoms:*
     - *New/increased cough*. Reported by patient.
     - *New/increased sputum.* Reported by the patient or in the hospital record within the 24 hours of arrival.
     - *Rales, wheezes or rhonci.* Reported in the hospital record within the 24 hours of arrival.

Healthcare-Associated Pneumonia (HCAP): Should these patients be included in the study?

Yes. From the CAPO study perspective, patients with healthcare-associated pneumonia (HCAP) are considered patients with CAP who are at increased risk for multidrug-resistant organisms.

HCAP is defined as a patient admitted with CAP who also has at least one of the following criteria:

- Resided in a nursing home or long-term care facility.
- Has been hospitalized for ≥ 2 days within the prior 90 days of current hospitalization.
- Received intravenous antibiotic therapy, chemotherapy, or wound care within the prior 30 days of the current admission.
- Attended a hospital or hemodialysis clinic in the prior 30 days.

EXCLUSION CRITERIA:

***** If either exclusion criteria are marked "Yes" do not continue data collection and do not enter this case into the CAPO database. *****

- ***Criterion ONE: Transferred directly after already being hospitalized for 48 hours or more AND the information from the previous hospitalization is not available.***

Should I exclude a patient based only on the fact that it was transferred directly to our site (hospital) after already being hospitalized for 48 hours or more?

NO. If **all the information from the previous hospitalization is available**, you can enroll the subject. Day 0, for data collection purposes will start at arrival date and time of the prior hospitalization. Therefore, all the initial data would be collected from the previous admission.

The patient was admitted with a working diagnosis of CAP, but at the time of discharge an alternative diagnosis of urinary tract infection (UTI) and congestive heart failure (CHF) explained the pulmonary infiltrate, fever and leukocytosis. Should this patient be excluded from the CAPO study?

YES, **exclude this patient after discussing the case with the PI**. The goal of the CAPO study is to enroll only patients with a diagnosis of CAP. If at the time of hospital discharge an alternative diagnosis other than CAP was reached, the patient should be excluded. **However, if the patient has CAP plus another infection, the patient should not be excluded.**

- ***Criterion TWO: Hospital Acquired Pneumonia.***

Hospital Acquired Pneumonia (HAP) is defined as pneumonia that occurs 48 hours or more after admission, which was not incubating at the time of admission.

***** Principal Investigator opinion overrides any inclusion/exclusion criteria*****

DATA COLLECTION

Case ID (assigned by database) is the ID provided by RedCap to the case (i.e. 20123).

Prospective data collection should be selected when there is any contact with the patient while he/she is in the hospital for the episode of CAP. This implies that at least some information is captured directly from the patient (number of days of respiratory symptoms, improvement in cough, vaccination history). However, **Retrospective** data collection can be done once patient is discharged from the hospital (vital signs, laboratory results, etc.).

DEMOGRAPHICS AND HOSPITALIZATION

Age: collected in years. This is the age at the time that patient was hospitalized for the episode of CAP.

Gender: select one of two options. If patient is transgender, please select the current gender the patient identifies as.

If female, is she pregnant? Needs to be answered for every female patient irrespective of the age.

If **pregnant**, please collect the pregnancy trimester as defined below:

- *First trimester*: conception to end of week 13
- *Second trimester*: week 14 to end of week 28
- *Third trimester*: week 29 to delivery
- **Puerperal state**: defined as the first 6 weeks after completion of labor

The **Date and Time of Arrival** is the day and time which the patient **first interacted with the facility** resulting in their later hospitalization. This could be an emergency room sign-in time, nurse triage time, or any other time in the medical record for the encounter in question. **This should be earliest time in the medical record**. If the patient is seen in the Emergency Department and leaves the facility, only to return at a later date and time to be admitted, the Date and Time of Arrival is that of their return.

For this study, date of arrival to the hospital is considered "Study day 0", which ends at midnight of the arrival day. Day 0 can be as long as approximately 24 hours if arrival time is early in the day, to ≤1 hours if the arrival time is 23:30.

Direct admission to an intensive care unit (ICU) from the emergency department (ED/ER): answer YES if patient is admitted to the (ICU) directly from the ED/ER and this occurs within day 0 (from arriving to the hospital until midnight of that same day)

Transferred to an ICU after admission to hospital: answer YES if patient if any the following occur

1. Patient is admitted to the ICU on day 1 onwards.
2. Patient is admitted to regular floor from the ED/ER and then transferred to the ICU, even if it happens on day 0.

Please enter the date of transfer.

Did the patient need ventilatory support on day 0? Answer YES:
1. If patient needed pressurized ventilation (CPAP, BiPAP) or mechanical ventilation by a ventilator machine. Supplementary oxygen given by nasal cannula, mask, etc. is not considered pressurized ventilation. DO NOT ANSWER YES if the patient uses CPAP or BiPAP AT HOME for obstructive sleep apnea and did not require changes in CPAP or BiPAP regimen for treatment of CAP or resulting conditions.
2. If the patient is intubated prior to the hospital arrival by the EMS.
If answered yes, please select the type of ventilator support, either **invasive** (any form of tube) OR **non-invasive** (CPAP or BiPAP)
If the patient is placed on BiPAP and later intubated on day 0, please mark intubated.

Did the patient need vasopressors on day 0?: answer YES if vasopressors were administered to the patient on day 0 (i.e. dopamine, epinephrine, norepinephrine, phenylephrine). You will still answer Yes if the vasopressor was ordered on day 0 but administered early on day 1 (i.e. ordered at 11:30pm and administered at 12:30am).

Date of discharge from the ICU and from the Hospital: This is very important information since one of the objectives of the study is to determine the economic burden of CAP.

Date of discharge from the hospital: The subject will be considered "Discharged" in the following situations:
1. Discharged home, to nursing home or rehabilitation center directly from the Floor/ICU.
2. Died at the hospital.
3. Transferred to hospice.
4. Transferred to palliative care service, when there is discontinuation of antimicrobial treatments.
5. Transferred to a hospital that is not a study site. Because when the subject is transferred to one of the hospitals of the study, you will continue collecting the data as if the patient was never transferred. But you will make a comment in the comments section.
6. Left the hospital against medical advice (AMA).

Date of hospital discharge = Date of ICU discharge = Date of death, if the patient dies in the hospital ICU and **please mention in the comments section**.

PATIENT HISTORY

Ensure all data are entered as requested. For all "YES/NO" answers; if diagnosis was made during current hospitalization, select "YES", if unknown, select "NO". Remember to **check the discharge summary looking for chronic diseases** that were not listed before during hospitalization.

Are the number of days with respiratory symptoms before day 0 known: Number of days with **respiratory symptoms** before day of arrival. Answer **yes** if known and enter the number of days with respiratory symptoms. If patient has a history of chronic respiratory symptoms (such as cough or shortness of air) please capture here the number of days during which those symptoms worsened.

If the symptoms started on day 0, you will answer "YES" and enter in the number of days "0". On the other hand, if the subject didn't have respiratory symptoms at all, you will still answer "YES" and enter "0". These two scenarios will be differentiated using the Time To Clinical Stability table, since in the second situation you will check the Cough and SOB criterion as met on day 0.

Below you may find some scenarios and how to answer them (based on our decision):
1. Respiratory symptoms started a **few days** ago = 3 days.
2. Respiratory symptoms started **several days** ago or **a week** ago = 7 days.
3. Respiratory symptoms started **2 weeks** ago = 14 days.
4. Respiratory symptoms started **2-4 days** ago = 4 days. For this scenario you will use the maximum number of days. Same decision for when there are **different days** (2, 3, or 4) mentioned throughout the notes.

Past Social and Medical History (prior to current hospitalization)

- Neoplastic disease (active or within the last year): variable used to calculate the Pneumonia Severity Index (PSI), Defined as any abnormal proliferation of malignant cells, excluding basal or squamous-cell carcinoma of the skin that was active at the time of presentation, diagnosed within the last year, or during current hospitalization if undiagnosed at admission. This should be documented by patient directly or in patient's medical record. If the patient received any form of medical (chemotherapy or radiotherapy) or surgical management during the past year then "Neoplastic Disease" field should be considered as active.

- Congestive heart failure: a variable used to calculate the PSI. Defined as systolic or diastolic or ventricular dysfunction documented by history, physical examination, chest X-Ray, echocardiogram, multiple gated acquisition scan, or left ventriculogram. This should be documented by patient directly or in patient's medical records. **There has to be a diagnosis of CHF**. Diastolic dysfunction in itself does **NOT** mean CHF.

- Cerebrovascular disease: a variable used to calculate the PSI. Defined as a clinical diagnosis of stroke or transient ischemic attack or incidental stroke documented in chart notes, by magnetic resonance imaging (MRI), or computed tomography (CT). This should be documented by patient directly or in patient's medical record. The diagnosis has to be made right before being admitted or at admission. It will also be considered as "YES" when the patient has a residual deficit of a prior episode.

- Renal disease: a variable used to calculate the PSI. Defined as history of chronic renal disease or other acute cause of abnormal blood urea nitrogen (BUN) and creatinine (Cr) concentration documented in the medical record. This should be documented by patient directly or in patient's medical records.

- Liver disease: a variable used to calculate the PSI. Defined as a clinical or histological diagnosis of cirrhosis or another form of chronic liver disease such as chronic active hepatitis. This should be documented by patient directly or in patient's medical records.

- Chronic Renal Failure: a previous diagnosis of chronic renal failure, end stage renal disease (ESRD), or chronic kidney disease (CKD) **requiring chronic hemodialysis** as documented by patient directly or in patient's medical records. Acute resuscitation with dialysis does not count.

- Diabetes: as documented by patient directly or in patient's medical records.
    - If YES, answer if patient uses insulin for its treatment
    - If YES, answer if a recent HbA1c has been recorded during last 3 months prior to hospitalization.

- Suspicion of aspiration: as documented by patient directly or in patient's medical records, including radiology report stating aspiration pneumonia. If the patient has aspiration pneumonia then mark it as "YES".

- Cirrhosis: as documented by patient directly or in patient's medical records.

- Asplenia: as documented by patient directly or in patient's medical records. If patient has sickle cell disease or any other chronic diseases for a long period of time and can cause asplenia, please mark "YES".

- Alcoholism: as documented by patient directly or in patient's medical record.

- IV steroids on day 0: defined as current use of intravenous steroid therapy at or prior to day 0

- Cystic Fibrosis: as documented by patient directly or in patient's medical record.

- COPD: as documented by patient directly or in patient's medical record.
    - If YES, document if patient is on oral steroids due to COPD diagnosis prior to day 0
    - If YES and available, record last Forced Expiratory Volume in the first second (FEV1) within the previous year
    - If YES, record if patient uses home oxygen.

- Active intravenous drug use: as documented by patient directly or in patient's medical records.

- HIV: as documented by patient directly or in patient's medical records.
    - If YES, answer all the following if available (use most current value if more than one available):
        - Last absolute CD4 within the previous year if available (CD4 <200/mm3 is diagnostic for AIDS)
        - Last CD4 % within previous year if available
        - Last HIV viral load within previous year if available (in copies/mL)
        - Duration of HIV seropositivity in years
        - Currently on anti-retroviral therapy (HAART, any anti-HIV drug, etc.)? Please list all antiretrovirals that patient is taking
        - Current episode of CAP part of the initial presentation of HIV in patient? Answer yes if patient is hospitalized for CAP and the diagnosis of HIV is made during the current hospitalization.
        - Prior AIDS defining illness: as defined by the Centers for Disease Control and Prevention http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5710a2.htm
        - Prior history of PCP (Pneumocystis Pneumonia): as documented by patient history from chart review
        - Prior history of tuberculosis: as documented by patient history from chart review
        - Antibiotic prophylaxis for PCP: answer yes if prior to current hospitalization patient was receiving Trimethoprim/Sulfamethoxazole (Bactrim), Dapsone, Atovaquone, or aerosolized Pentamidine
        - Antibiotic prophylaxis for MAC (mycobacterium avium complex): answer yes if prior to current hospitalization patient was receiving – Azithromycin PO weekly (or daily in when GI intolerance), Clarithromycin PO twice a day, or Rifabutin PO once daily

Risk factors for healthcare-associated pneumonia (HCAP): as documented by patient directly or in patient's medical record, prior to current hospitalization.

- Nursing home or long-term care facility resident: as documented by patient history from chart review.
- Hospitalized in an acute care hospital ≥ 2 days in the prior 90 days, excluding current hospitalization
- Intravenous (IV) antibiotic therapy in the prior 30 days
- Home infusion therapy (including ABT and chemotherapy) within prior 30 days
- Attended a hospital or hemodialysis clinic
- Wound care in the prior 30 days

Risk factors for cardiovascular events: as documented by patient directly or in patient's medical records, prior to current hospitalization.

- Family history of coronary artery disease (CAD): Answer YES only if in immediate family. Heart Disease in the immediate family will also be considered CAD.
- Coronary artery disease
- Essential arterial hypotension
- Hyperlipidemia
- Prior myocardial infarction
- Prior PTCA (percutaneous transluminal coronary angioplasty)/ CABG (coronary artery bypass graft) or angioplasty
- Atrial Fibrillation

Cardiovascular medications prior to hospital admission: as documented by patient directly or in patient's medical records, **prior** to current hospitalization.

- Aspirin (generic: acetylsalicylic acid)

- Beta-Blockers: includes atenolol, carvedilol, bisoprolol, nebivolol, propranolol, acebutolol, betaxolol, nadolol, oxprenolol, etc.

- ACE (angiotensin converting enzyme) inhibitors/ ARBs (Angiotensin II receptor blockers):

    - ACE inhibitors include: benazepril, captopril, enalapril, fosinopril, lisinopril, moexipril, perindopril, quinapril, ramipril, trandolapril
    - ARBs include: azilsartan (Edarbi), candesartan (Atacand), eprosartan (Teveten), irbesartan (Avapro), telmisartan (Micardis), valsartan (Diovan), losartan (Cozaar), and olmesartan (Benicar).

- Anticoagulants: **MUST** be specified as:
    - *Warfarin*
    - *Heparin*
    - *Other: Includes Xarelto (Rivaroxaban), or any form of drug given for anticoagulation other than Warfarin or heparin.*
- Antiplatelets: Includes dipyridamole, clopidogrel, ticlopidine, prasugrel, tirofiban, eptifibatide.

- Statins: atorvastatin, rosuvastatin, pitavastatin, simvastatin, lovastatin, fluvastatin.

PHYSICAL EXAMINATION AT ADMISSION

Vital signs and lab values should be collected during the **first 24 hours since time of arrival**. If more than one value for a field exists, select **the worst value** during that period of time. If no value is available, leave the field **blank**.

- Height (centimeters). The value has to be entered as an entire number. Therefore if a value has decimals, round the value. More than or equal to 0.5 round up to the following value (i.e. for 175.5, enter 176). Less than 0.5 round down (i.e. for 175.4, enter 175)
- Weight (kilograms). The value has to be entered as an entire number. You will do the same as for Height.
- Heart rate (normal range 60-100 beats/minute)
- Respiratory rate (normal range 12-24 breath/minute)
- Systolic/ Diastolic Blood Pressure: (normal range 90-120/60-80 mmHg) **Systolic and diastolic blood pressure must be recorded from same reading.** The process to select the worse pair will be:
  1st: Select the lowest Diastolic among the Diastolic readings below 60 OR
  2nd: Select the lowest Systolic among the Systolic readings below 90 OR
  3rd: Select the lowest Diastolic among all the Diastolic readings.
- Temperature in **Celsius** (normal range 36.4-37.2 Degrees Celsius)
- Was O2 saturation recorded?
  - If YES, document O_2 saturation (normal range 93-100%). O_2 saturation and FiO_2 **must be recorded from same reading.**
  - Document FiO_2 at the time of O_2 saturation measurement as %. If room air**, FiO_2 = 21%.** If more than one O_2 saturation recordings, **document the one with the highest FiO_2.**
- Altered mental status: acute and/or worsening mental status at the time of hospitalization. This includes but is not limited to confusion, lethargy, stupor, coma, decreased consciousness. Remember that dementia and diseases like Alzheimer are not considered altered mental status due to pneumonia, unless the medical record specifies that there is an acute worsening/change in the baseline of the mental status of the patient and it's considered to be related to pneumonia.

Laboratory findings*:* Laboratory findings should be obtained from samples drawn in the first 24 hours after arrival. If there is more than one value for a field that exists in the first 24 hrs, select **the worst value** during that period of time. **The only exceptions to this rule are Hemoglobin A1c, LDL, HDL, LDH, Cholesterol, Triglycerides and Vitamin D**, where values obtained from anytime in the previous 3 months and during the present hospitalization can be used. For Hemoglobin A1c, results obtained up to 2 months after should be considered.

Normal ranges and units are listed in parentheses. Before collecting, check that the unit in which the value is reported corresponds to the unit listed in the source document, since it may vary by laboratories and countries.

- Hematocrit (33-49%)
- Hemoglobin (6-19 g/dL)
- WBC (0.9 - 20 x 10^3/µL)
- Bands (2-6 %)
- Platelet count (130-400 x 10^3/µL)

- INR [International Normalized Ratio] (1.0-5.0)
- Serum Sodium (135-147 mEq/L)
- Serum Potassium (3.5-5.0 mEq/L)
- Blood Urea Nitrogen (BUN) (8-18 mg/dL)
- Serum Creatinine: (0.6-1.2 mg/dL)
- Serum bicarbonate or CO2: (10-40 mEq/L)
- Serum Glucose: (60-140 mg/dl)
- Albumin (4-6 g/dL)
- Aspartate transaminase (AST) (0-35 units/L)
- Alanine transferase (ALT) (0-35 units/L)
- Bilirubin, Total (0.0-1.0 mg/dL)
- Serum troponin I (**first sample drawn**) (0.0-0.4 ng/mL)
- Serum troponin II (**second sample**) (0.0-0.4 ng/mL)
- Serum troponin III (**third sample**) (0.0-0.4 ng/mL)
- Serum CK-MB 1 (**first sample**) (0-3 ng/mL)
- Serum CK-MB 2 (**second sample**) (0-3 ng/mL)
- Serum CK-MB 3 (**third sample**) (0-3 ng/mL)
- Low Density Lipoprotein (LDL) (50-130 mg/dL)
- High Density Lipoprotein (HDL) (40-90 mg/dL)
- Cholesterol (< 200 mg/dL)
- Triglycerides (< 150 mg/dL)
- Lactate (0.5-1 mmol/L)
- HbA1c (mg/dL)
- Lactate Dehydrogenase (LDH) (50-150 units/L)
- Brain natriuretic peptide (BNP) (<100 pg/mL)
- C-reactive protein (CRP) (6.8-820 mg/L)
- Procalcitonin (<0.05 µg/L)
- 25-hydroxy Vitamin D (16-65 pg/mL)
- Was arterial blood gas (ABG) obtained? If more than one ABG obtained, document the one with the worse (lowest) PaO2/FiO_2 calculation. Record all of the followings:
  - pH (7.35-7.45 pH units)
  - PaCO2 (35-45 mmHg)
  - PaO2 (75-100 mmHg)
  - HCO3/bicarbonate (24-28 mEq/L)
  - FiO2 **in decimals** (0.21 – 1)

RADIOLOGICAL FINDINGS

A pulmonary infiltrate can be diagnosed with a chest X-ray or a CT scan obtained within 48 hours before or 48 hours after time of arrival. CT findings, if present, override chest X-ray findings. Example: If an infiltrate is seen on chest CT but not chest x-ray, CAPO inclusion criteria are met. If an infiltrate not seen on chest CT but reported on chest x-ray the new pulmonary infiltrate criterion is *NOT* met. The abdomen CT may be used in the absence of a chest CT only to record its findings and not to override the chest X-Ray. If physician interpretation is suggestive of PNA but imaging is negative, case should be discussed with PI.

Date and Time of Chest X-Ray and/or CT scan if done

New Pulmonary Infiltrate: answer YES or NO for each location based on where the new infiltrate in the chest x-ray or CT scan is reported. If the only description says “Retrocardiac”, left lower lobe should be checked. On the other hand, if the description mentions “Lingula”, left upper lobe should be checked.

RUL: Right Upper Lobe
RML: Right Middle Lobe
RLL: Right Lower Lobe
LUL: Left Upper Lobe
LLL: Left Lower Lobe
Diffuse Bilateral
Diffuse Unilateral

Note: Diffuse will be checked for the following findings: diffuse interstitial, alveolar, peri / para / infrahilar and left mid lung. Also when the report mentions only right, left or both lungs without specifying the region/lobe.

Cavitation

Pleural Effusion: check the box that indicates the location of the pleural effusion.
None
Right
Left
Bilateral

Multiple lesions (cavitary or not) compatible with CAP due to hematogenous spread. Here we are looking for findings related to Endocarditis.

INITIAL MICROBIOLOGICAL WORKUP FOR CAP

Was the following workup performed?: Only record microbiological workup obtained within 48 hours before or after arrival for the diagnosis of CAP.

- Gram Stain
  - If YES, record date of Gram Stain. Use the 1st one that was acceptable for culture.
  - If YES, was the specimen acceptable?
    - If NO, skip the rest and go to: **Was a Respiratory Culture performed?**
    - If YES, record the organism(s) reported in the gram stain (select all that apply):
      - **Gram-Positive**
        - Cocci unspecified
        - Cocci in pairs (i.e. *S.pneumoniae*)
        - Cocci in chains (i.e. Group A *Streptococcus)*
        - Cocci in clusters (i.e. *Staphylococcus*)
        - Bacilli/Rods (i.e. Listeria)
      - **Gram-Negative**
        - Cocci (i.e. *Neisseria, Moraxella*)
        - Cocco-bacilli (i.e. *Haemophilus*)
        - Bacilli/Rods (i.e. *Enterobacter*)
      - If there were organisms seen but they were unable to be identified (i.e. bacterial flora/ morphotypes), check **YES** for **"No predominant organism"**. This option should be chosen if there are no specific bacteria reported in the gram stain. If different types identified and specified (Gram positive and/or negative, cocci, rods, etc), then this should be recorded under the organisms listed above
      - If no microorganisms identified on specimen (i.e. Gram stain shows many WBCs) check YES for **"No organisms seen"** or if the sputum gram stain report actually states 'NO PREDOMINANT ORGANISM SEEN' OR 'NO ORGANISM SEEN' (also note that this does **NOT** mean you need to have more than one organism always to answer the questions as yes).

- Respiratory Culture (Pertains to the same specimen as Gram Stain, but you will always answer YES or NO, even if there was no Gram Stain done or the sample was not eligible for culture)
  - If YES, record site of culture:
    - Sputum
    - Tracheal aspirate. Select this option if sputum culture is reported in a **ventilated or intubated patient**
    - BAL (Bronchoalveolar Lavage)
    - If site is unknown or other, check OTHER

- Blood Culture (Check 'Yes' only if collected within 48 hours)
  - If YES, record date of Blood Culture
    - If there is more than one set use the earliest date or if one Blood Culture is positive for pathogen use that one.
    - If you see a positive culture that had been collected after 48 hours of admission it maybe a Nosocomial pathogen or it may be from visitors. (Considerer discussing the Microbiology).

How to interpret blood cultures results?

a. TIMING of Blood cultures is very important and remember that blood cultures are ordered in pairs and collected in sets of twos. A patient with CAP may have 1 of 2 blood cultures that might be positive.

b. TRANSIT BACTERIA: it takes the body 20 minutes to clear an organism from the blood.

   However, if there are two blood cultures over 20 minutes apart are positive then the source could possibly be Endocarditis. So, the Pneumonia is a result of hematogenous spread or septic emboli. This means that if you pay attention to how many blood cultures and how far apart there are, then you could tell if it is CAP or a different infection.

- Urinary Antigen to detect *Streptococcus pneumoniae*
  - If YES, record date of Urinary Antigen
- Legionella Urinary Antigen
  - If YES, record date of Urinary Antigen
- Rapid Influenza Test
  - If YES, record date of Rapid Influenza Test
- Viral PCR (Respiratory Pathogen Panel)
  - If YES, record date of Viral PCR
- Atypical Pathogens PCR
  - If YES, record date of result
- Atypical Pathogens PCR: includes **Mycoplasma, Legionella** and **Chlamydia**.

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<u>Did the patient have persistent bacteremia?</u> (Defined as at least two positive blood cultures obtained on different calendar days or on the same calendar day but separated for at least 30 minutes, during the same infectious episode).

- If yes, was the patient diagnosed with Endocarditis confirmed by an Echocardiogram? (Vegetation seen)

Was the cause of the pneumonia identified? : Indicate YES or NO. If YES, record organism(s) identified.

Do not include pathogens that are not traditionally considered to be a cause of CAP, such as Enterococci, Candida, or Coagulase negative staphylococci. For those, consider the sample contaminated. Coagulase negative staphylococci include: *Staphylococcus epidermidis (75% of all)*, *Staphylococcus saprophyticus*, *Staphylococcus hominis*, *Staphylococcus haemolyticus*, *Staphylococcus warneri*, *Staphylococcus simulans*, *Staphylococcus lugdunensis*.
In case these pathogens are isolated from immunocompromised patients or from different cultures, the case must be discussed with the Principal Investigator before entering into the CAPO database.
If *Pneumocystis jirovecii* is clinically suspected in an immunocompromised patient with a low CD4 count, positive beta D-Glucan, high serum lactate dehydrogenase (LDH) and low PO2; then Pneumocystis will be considered as a cause of pneumonia. For these specimens you will select "Other" and will record the following: Clinical diagnosis and positive Beta D-Glucan.

- **If yes, specimen type for organism 1**: source of positive result, check all that apply.
- Blood: Culture only
- Sputum/Tracheal Aspirate
- Bronchoalveolar Lavage (BAL)
- Urinary Antigen
- Nasopharyngeal (NP) Swab
- Oropharyngeal (OP) Swab
- Serology
- Other: if test not listed above. If OTHER, record type of test.

Note: The specimen for a Respiratory Viral PCR is obtained from a Nasopharyngeal (NP) Swab, unless the record specifies that was obtained from Bronchoalveolar Lavage (BAL).

Was there a second organism? : If yes, complete same as above. Remember that a second organism implies a different organism. Therefore if there is one organism isolated from different specimens (i.e. blood culture and sputum), you will still consider those as **one organism** and select all the corresponding specimens exactly like organism 1.

If the organism was *Streptococcus pneumoniae*, what is the MIC for Penicillin?

If the organism was *Methicillin-Resistant Staphylococcus aureus (MRSA)*, what is the MIC for Vancomycin?

If the organism is Streptococcus pneumoniae or MRSA, please enter the Minimum Inhibitory Concentration (MIC) for Penicillin or Vancomycin, respectively. If no value was recorded, please check "Not done".

ANTIMICROBIAL THERAPY

Did the patient receive oral antibiotics during the last 30 days? : If yes, answer the next two questions.

- **If yes, provide the name(s) of the antibiotic(s)**: The ABX name needs to be documented regardless of the cause of ABX administration (CAP or Non-CAP). Provide this information as documented by patient history from chart review
- **If yes, was the antibiotic given for the treatment of CAP?** ABX used for CAP only. Provide this information as documented by patient history from chart review.**If yes, did the patient fail outpatient oral antibiotic therapy for CAP?** Answer yes if patient did not improve while on antibiotics **for CAP** for at least 3 days before current admission. For example, the patient developed difficulty breathing, lack of improvement/worsening cough, onset of rigors, fever persisting for **more than 48 hours**, or medication intolerance after outpatient oral antimicrobial therapy was started. Patient is also considered to fail if radiologic imaging shows that the infiltrate has not resolved 6-8 weeks following treatment.

Antimicrobials received for therapy of CAP

This section should be completed with only antibiotics given for CAP. In some situations the antibiotic therapy will be used to cover CAP simultaneously with other infection (i.e. UTI), and you will collect those antibiotics anyways since they're being used for an infectious process along with CAP as well. If unsure whether antibiotics were given for treatment of CAP, **you should discuss with your Principal Investigator** before entering the data into the CAPO database. All entries in this section must be completed. Your entries should be in **chronological order** in relation to the first antibiotic's start date. Start with the date and time **the initial** antimicrobial therapy was **administered** to patient, irrespective of whether it was given in the emergency department, ICU, triage, or the wards.

Please indicate all antibiotics received for the therapy of CAP

- **Antimicrobial Name:** Choose from the drop-down menu.
- **Route:** **Route of administration**, i.e. intravenous= IV, by mouth= PO, intramuscular= IM, subcutaneous= SC, interosseous= IO, inhalation= INH
- **Start Date:** The **date of antimicrobial administration** (not the date of the order)
- **Start Time:** The **time of drug administration**. If you do not know the Start Time for an antimicrobial, **enter: 00:00.** For drugs given on discharge and not administered in the facility please put Start Date as the date of discharge and Start Time as 23:59 of the discharge day.
- **Stop Date:** The **date of the last administration of the drug**. If you do not know the Stop Date for an antimicrobial, **enter: 1/1/1900. This is not the discharge date.** For drugs given PRN or based on serum levels, record the last day that they were given. For drugs taken after discharge you should calculate the stop date based on when the patient should take the last pill.

Antibiotics with SKIPPED DATES: Check for renal dosing, check to ensure antibiotic had not been restarted for a different reason. If skipped only for a day or two but antibiotic was given for a long duration then continue as given.

METRONIDAZOLE: Be careful because when Metronidazole is given ORALLY it is usually for C. difficile colitis. However, when given IV it maybe for ASPIRATION PNEUMONIA.

What is the start and stop dates for the antibiotic if the patient got the oral antibiotic while in hospital then later was discharged home on it?
If the patient is started on an oral antibiotic during the hospital admission and subsequently discharged home on it then the start date is the date the ABX was started while the patient was still in the hospital, however the stop date would be the discharge date PLUS the number of additional days the antibiotic was prescribed for the patient to complete the full antibiotic course.

How do you document if the same antibiotic was given IV initially then changed to oral later during the hospital?
You would document these as two separate entries: One entry would be **IV** route and then on the next line you would document the **ORAL** entry both with the appropriate start and stop dates.

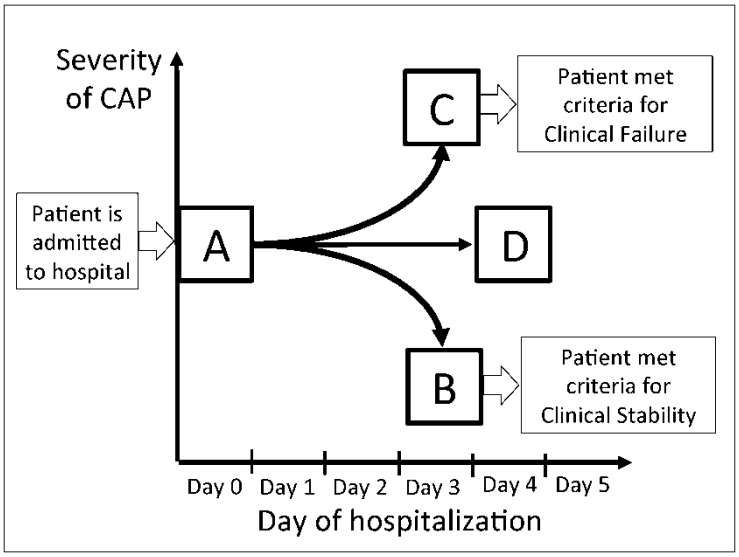
Please classify the initial antibiotic therapy based on the antibiotic received within the first 24 hours of admission: *Consider **antibiotics only** for this classification (exclude antivirals or antifungals).*

- **Beta-lactam monotherapy only**: i.e. ampicillin or ceftriaxone; this also includes Zosyn (Piperacillin/Tazobactam) and Ampicillin/Sulbactam.
- **Beta-lactam + macrolide combination only**: i.e. ampicillin and azithromycin
- **Beta-lactam + quinolone combination only**: i.e. ampicillin and levofloxacin
- **Quinolone monotherapy**: i.e. levofloxacin
- **Any other antibiotic combination**: i.e. ceftriaxone, azithromycin PLUS vancomycin

Note: Remember that you are classifying a family, not the individual antibiotic. Therefore if the patient received more than one Beta-lactam in the first 24hrs, you will still select **Beta-lactam monotherapy only**.

CLINCIAL COURSE

From the perspective of the CAPO study, the day that the patient is admitted to the hospital is considered "day 0". Everything that happens to the patient on day 0 is considered "baseline clinical status". After day 0, we begin to evaluate the clinical course of the patient. The figure to the left depicts the clinical course according to the CAPO study protocol. In this figure, **Point A** represents the patient's status at time of hospital arrival throughout day 0, which is **until midnight of the day of arrival**. **Point B** represents the patient that reached clinical stability according to the criteria defined below. **Point C** represents the patient that developed clinical failure according to the same criteria. By default, if the patient does not reach clinical stability or clinical failure, the patient is defined as "non-resolving pneumonia" **(Point D)**. The patient cannot reach clinical stability or clinical failure on day 0.



CLINICAL COURSE – CLINICAL STABILITY

Criteria for clinical stability: Indicate the different criteria the patient met on that day. The first day when all four criterions are met is the day that the patient reached **clinical stability** and became a candidate for switch therapy (switching from intravenous to oral antibiotics). **The remainder of excess days therefore should not be checked.**

- **Day 0 (day of admission)** begins at the time of hospital arrival and ends at midnight that day. The worst value on day 0 should be used as baseline. In the event that the patient is afebrile throughout the entire day 0 (8 hours or more) or sustained a normal WBC count, then those criteria are fulfilled on day 0 and the "Yes" box should be checked. Otherwise check "No". **By definition, clinical stability cannot be reached on day 0**.
- **Day 1** begins at 00:01 on the day after hospital arrival and ends at midnight of that day. On days 1 through 7, answer "Cough and shortness of breath normal or improving" and "WBC normal or improving" in comparison to the day before. Check the box if the patient is improving or is back to baseline (before current illness). Continue checking boxes until all 4 boxes are checked on the same day and patient is assumed to have achieved clinical stability.
  - **Symptoms: "Cough and shortness of breath normal or improving?"** Improvement of other symptoms besides Cough and/or SOB are not assessed at all in this section. This means that "patient feels less pain", "patient without fever", "patient denies new symptoms", etc. doesn't account.
    - If Patient never presented with Cough or SOB, and there is **NO general deterioration** affecting the patient on that day, then the box should be checked.
    - If Patient never presented with Cough or SOB, and there is general deterioration affecting the patient on that day, then the box should NOT be checked.

    Cough and shortness of breath should be measured subjectively; by the patient or per physicians' documentations in medical records. But in some cases this information is NOT available. In those cases and only in those cases we will use objective measurements as a reference. We are trying to assess the "subjective" aspect in the first place: Review of Systems overrides physical exam. We rely on Objective findings (a clear variation from day to day about saturation, auscultatory findings, RR, weaning trials, etc.) when subjective information is not available. **When using objective measurements**, and there is no clear improvement in comparison to the day before and other variables were marked as No (UNCHECKED), also mark No for Cough/SOB. But if other 3 variables are marked as YES, then CHECK all four (meaning that patient reached clinical stability on that day).

  - For intubated patients: if patient remains intubated during the first week, then PaO_2/FiO_2 (worst value) should be used daily. An improvement of >20% in the PaO_2/FiO_2 indicates that the criterion is met. Also a successful weaning trial is considered as YES (reached clinical stability) despite PaO_2/FiO_2.

- **Temperature:** "Afebrile for at least 8 hours?" Temperature under 37.8C or 100F but more than 35.6C or 96F. All 8 hours must be consecutive. When Day 0 represents less than 8 hours, then this box should be checked from day 0.
- **WBC:** "WBC Normal or Improving?" Must have WBC drop > 10% from the prior day if leukocytosis is documented. Criterion will be met if WBC is within normal range. If patient is leukopenic, improvement should be discussed with the principal investigator. For those situations where the WBC is not changing but there is another explanation (receiving steroids, myelodisplastic syndromes) this criterion should be checked as met when the other three criteria are met. However, it should also be discussed with the principal investigator.
- **Oral Intake: "**Oral intake and absorption are adequate?" Answer should be yes if patient is eating and/or receiving medication by mouth or tube.

When the patient is discharged under situation number 1 (refer to **"Date of discharge from the hospital"** section in page 5) before reaching Clinical Stability, mark all four criteria as met that day. For the other 5 situations of Discharge (refer to **"Date of discharge from the hospital"** section in page 5), if the subject didn't reach Stability, you will mark the four criteria as ">7 days".

If Day > 7 is checked, please classify the case as:

- **Evaluable:** ***One of the following scenarios occurred before the end of Day 7:***

- The subject didn't reach clinical stability**.**
- Subject died before reaching clinical stability**.**

- **Unevaluable:** ***One of the following scenarios occurred before the end of Day 7 and before reaching clinical stability:***

- Transfer to hospice.
- Transfer to palliative care service. (When the antimicrobial treatment is discontinued)
- Transfer to a hospital that is not a study site.
- Left the hospital Against Medical Advice (AMA).

CLINICAL COURSE – CLINICAL FAILURE

This section should be completed regardless of patient meeting or not criteria for clinical stability in the prior section.

Criteria for clinical failure: The following criteria should be evaluated daily until the patient is discharged from the hospital or up to day 14 if the patient is still hospitalized.

During day 0 (day of hospitalization), the worst value for pulmonary function and hemodynamic status are considered to be **baseline values**. Due to this, a patient cannot fail on day 0. This information is actually recorded in the demographics and hospitalization section.

For a patient to develop clinical failure, the pulmonary function and hemodynamic status are to be compared to the baseline values (worst values collected on day 0).

If **any** of the clinical failure criteria are checked **"yes"**, **please complete the following section of the etiology of clinical failure.**

If **ALL** of the clinical failure criteria are checked **"no", DO NOT complete the following section of the etiology of clinical failure.**

- Criterion 1. **Acute pulmonary deterioration with the need of invasive ventilation:** DO NOT ANSWER YES if the patient only required **invasive mechanical ventilation** while under anesthesia for procedures. If YES, record date of invasive ventilation as well.
- Criterion 2. **Acute pulmonary deterioration with the need of non-invasive ventilation:** Answer yes only if patient needed pressurized ventilation i.e. CPAP, BiPAP, or mechanical ventilation by a ventilator machine for respiratory support required due to CAP. DO NOT ANSWER YES if the patient uses **CPAP or BiPAP** AT HOME for obstructive sleep apnea and did not require **CPAP or BiPAP** for purposes other than sleep apnea. If YES, record date of non-invasive ventilation.
- Criterion 3. **Acute hemodynamic deterioration with the need of vasopressors:** If YES, record date of vasopressor administration.
- Criterion 4. **Death:** If YES, record patient's date of death.

Etiology of clinical failure: Complete **ONLY** if patient **meets criteria for clinical failure**. Check "yes" or "no". At least one of these etiologies **must be checked off**. The case will need to be discussed with the principal investigator to define the etiology/ies of clinical failure

- *Etiology 1: Progression of CAP* Defined as failure related to the pulmonary infection and/or the inflammatory response. In this scenario, the patient deteriorates usually during the first week of hospitalization

- *Etiology 2: CAP complicated with:*

    - Empyema
    - Endocarditis
    - Meningitis
    - Other (specify if other)

- *Etiology 3: Severe Sepsis:*
    - Acute Respiratory Distress Syndrome (ARDS)
    - Septic shock
    - Liver failure
    - Renal failure
    - Coagulopathy
    - Encephalopathy
    - Other (specify if other)
- *Etiology 4:Medical complications or deterioration of comorbidities*
    - Pulmonary embolism
    - Myocardial infarction
    - Cardiac arrhythmia
    - Gastrointestinal bleeding
    - Congestive heart failure
    - Chronic Obstructive Pulmonary Disease (COPD)
    - Diabetes
    - Renal disease
    - Other (specify if other)

- *Etiology 5: Complication due to the management of CAP*
    - Hemo/Pneumothorax (iatrogenic)
    - Allergic reaction to Antibiotics (ABT)
    - Hospital or Ventilator-Associated Pneumonia (HAP/VAP)
    - Intravenous Line Infection (Central Line-Associated Bloodstream Infection/CLABSI)
    - *Clostridium difficile* Infection
    - Healthcare-Associated Urinary Tract Infection
    - Other (specify if other)
- *Etiology 6:* defined as the lack of sufficient information to classify the etiology

CARDIOVASCULAR EVENTS: Complete the following information during hospitalization up to 30 days after enrollment.

Was the patient taking anti-thrombotic prophylaxis during hospitalization? It referrers to prophylaxis through medications only and includes low-molecular-weight heparin or low-dose unfractionated heparin or fondaparinux.

Was the patient taking systemic steroids prophylaxis during hospitalization? > 1dose of systemic glucocorticoids during hospitalization.

Development of acute myocardial infarction? If YES, please complete the following:

- Select type
    - STEMI
    - NSTEMI
    - Q Wave
    - No Q wave
- Date first episode occurred
- Date second episode occurred(if any)

Pulmonary Edema due to congestive heart failure (acute cardiogenic pulmonary edema): If YES, give date of first episode and second episode (if any).

Development of new, serious arrhythmia? Must be **first** diagnosed during **current** hospitalization for CAP. **If YES, please complete the following:**

- Select type
  - Flutter
  - Atrial fibrillation
  - Junctional supraventricular
  - Ventricular tachycardia
  - Other (specify if other)
- Date first episode occurred
- Date second episode occurred(if any)

Development of acute worsening of long-term arrhythmia?: Arrhythmia diagnosed in patient medical history **prior to** current hospitalization. **If YES, please complete the following:**

- Select type
  - Atrial fibrillation/Flutter
  - Switch of classes in Lown Classification (for premature ventricular beats)
  - Other (specify if other)
- Date first episode occurred
- Date second episode occurred(if any)

Cerebrovascular accident?: Includes ischemic stroke, TIA or intracranial hemorrhage occurring during current hospitalization. **If YES,** record date of first episode and second episode (if any).

Pulmonary embolism?: If YES, record date of first episode and second episode (if any)

CLINICAL OUTCOMES

Mortality and re-hospitalization should be evaluated on the day indicated after the diagnosis of CAP was made (clinic visit, telephone call, or medical record documentation). For example, mortality at 1 year should be evaluated at 1 year after the initial diagnosis of CAP.
After the patient is determined dead, you will complete all the remaining outcomes reflecting this and recording the date of death.

Outcome at hospital discharge or up to day 14 if patient is still hospitalized

- **Mortality:** If "Dead, of all causes", record date of death.

Outcome at 30 Days after Hospital Admission: Evaluate at Day 30 after diagnosis of CAP was made (via clinic visit, telephone call, or medical record documentation) if the information is available.

- **Mortality:** If "Dead, of all causes", record date of death. If patient cannot be contacted, select "Unknown."
- **Re-hospitalization:** If patient has been re-hospitalized in the past 30 days after diagnosis of CAP, please answer if patient re-hospitalized is due to CAP and date(s) of re-hospitalization. If patient cannot be contacted, select "Unknown."

Outcome at 6 Months after Hospital Admission: Evaluate at 6-Month mark after diagnosis of CAP was made (via clinic visit or telephone call) if the information is available.

- **Mortality:** Answer same as above.

- **Re-hospitalization:** Answer same as above.

Outcome at 1Year after Hospital Admission: Evaluate at 1 Year after diagnosis of CAP was made (via clinic visit or telephone call) if the information is available.

- **Mortality:** Answer same as above.
- **Re-hospitalization:** Answer same as above.

PREVENTION OF CAP

Was the patient given pneumococcal vaccination:

- Answer *YES* only if patient was given pneumococcal vaccine *during this hospitalization*.
- Answer NO*, BECAUSE PATIENT ALREADY RECEIVED THE VACCINE* before this admission if documented in the patient history or self-reported by the patient in the questionnaire.
- Answer NO*, BECAUSE PATIENT REFUSED* if it is documented that patient was offered the vaccine during hospitalization but refused. This option will be also selected for patients who are allergic to the vaccine.
- Answer NO*, BECAUSE PATIENT DIED* if patient was a candidate but died before vaccine was given.
- Answer NO*, NO REASON FOUND* if patient was a candidate to receive the vaccine during hospitalization and there is not documented reason why he did not receive it.

- If patient received the vaccine before hospitalization, please enter the approximate date of receipt. If unknown please enter 1900.
- **If patient received pneumococcal vaccine** (prior to current admission or during hospitalization)**,** please select which vaccine patient received POLYSACCHARIDE (PPSV-23 or Pneumovax), CONJUGATED (PCV-13 or Prevnar13) or UNKNOWN.

Is the current admission considered to be within the Flu season (it differs from one country to another)?

If Yes, Was the patient given influenza vaccination during the current hospitalization?

- Answer YES only if patient was given the influenza vaccine *during this hospitalization*.
- Answer NO, *BECAUSE* PATIENT ALREADY RECEIVED THE VACCINE before this admission if documented in the patient history or self-reported by the patient in the questionnaire.
- Answer NO, *BECAUSE* PATIENT REFUSED if documented the patient was offered the vaccine during hospitalization but refused. This option will be also selected for patients who are allergic to the vaccine.
- Answer NO, *BECAUSE* PATIENT DIED if patient was a candidate but died before vaccine was given.

- Answer NO, NO REASON FOUND if patient was a candidate to receive the vaccine during hospitalization and there is no documented reason did not receive it.
- If patient received the vaccine before hospitalization, please enter the approximate date of receipt. If unknown please enter 1900.
- **If patient received influenza vaccine** (prior to current admission or during hospitalization)**,** please select which vaccine patient received: INTRAMUSCULAR (NORMAL DOSE), INTRAMUSCULAR (HIGH DOSE), INTRANASAL, INTRADERMAL or UNKNOWN

Adult smoking history:

- Answer CURRENT SMOKER if patient has smoked any time in the past 12 months
- Answer HISTORY OF SMOKING if patient has abstained from smoking for at least the past 12 months
- Answer NON-SMOKING HISTORY if patient has never smoked.
- Answer UNKNOWN history if patient's smoking history is unknown.

If a current smoker, smoking cessation offered:

- Answer YES if progress notes or discharge notes records smoking cessation offered *regardless of whether patient refused*
- Answer NO, BECAUSE PATIENT UNABLE TO UNDERSTAND if patient did not have mental capacity at discharge to understand smoking cessation
- Answer NO, BECAUSE PATIENT DIED if patient died prior to discharge
- Answer NOT APPLICABLE, UNKNOWN HISTORY if patient's smoking history is unknown
- Answer NO, NO REASON FOUND if no reason given

END OF MANUAL