

Include in pathway (Patients must have all of these):

- **Suspected bacterial pneumonia without empyema or pneumatocele in an otherwise normal host.**
- Patients with uncomplicated pneumonia who are otherwise basically healthy
- Patients with no evidence of sepsis
- Patients who are stable on nasal canula or simple mask oxygen

Exclude from the pathway (Patients with any of these):

- Patients less than 1 month old
- Patients in whom primary source of respiratory distress is asthma
- Patients with prior history of significant respiratory condition including severe asthma, prior intubation, bronchopulmonary dysplasia
- Patients with significant co-morbid condition including congenital heart disease, significant neurologic impairment
- Patients who are immunocompromised
- Patients requiring non-rebreather mask to maintain O₂ saturations $\geq 92\%$
- Patients with toxic appearance
- Patients with suspected empyema
- Patients with suspected TB, cocci, or other exotic organism
- Patients with suspected pneumothorax
- Patients with pneumatoceles

Patients should be considered for removal from the pathway if:

(Nursing staff should contact MD if any of the following apply)

- No improvement in clinical condition in 72 hours
- Significant deterioration, especially persistently increasing oxygen requirement
- Primary diagnosis seems questionable

Criteria for Admission:

- SpO₂ < 92%
- Marked respiratory distress
- Dehydration with inability to take PO fluids
- Inability to take PO antibiotics

Criteria for Discharge:

- SpO₂ $\geq 92\%$
- No respiratory distress
- Able to take PO medications and fluids
- Safe home environment

Background Information:

- In infants and children over 3 years of age, the majority of uncomplicated pneumonia is caused by pneumococcus, mycoplasma, chlamydia, or viruses.
- Bacteremia may occur in 5 to 20% of children with pneumococcal pneumonia. However, the presence of bacteremia does not alter the suggested course of treatment for pneumonia (7 days, much of it with outpatient oral antibiotics).
- Pneumococcal beta-lactam intermediate resistance can usually be overcome with high doses of ampicillin or amoxicillin. Thus, as with otitis media, these drugs remain the recommended first line therapy.
- High dose Ampicillan will not cover H influenza (non-typeable).
- MSSA/MRSA pneumonia must be considered in patients with effusions or empyema.
- Mycoplasma pneumonia is rare in infants and toddlers. However, by 3 years of age mycoplasma and chlamydia pneumoniae become common pathogens. Thus, addition of a macrolide antibiotic is recommended in children with pneumonia 3 years of age and older.
- Mycoplasma titres are limited in their diagnostic accuracy. Thus they are not recommended as part of the routine workup for uncomplicated pneumonia.
- The incidence of bacterial co-infection with RSV pneumonia is low (less than 5%). Thus in a non-toxic appearing patient with a focal infiltrate and a positive RSV test, it is generally appropriate to stop antibiotics.
- The incidence of bacterial co-infection in patients with influenza pneumonia is somewhat higher (10-20%); therefore, a patient with a positive influenza test may still require antibiotics, depending on the clinical situation.

Goals:

- Reduce unnecessary use of broad spectrum antibiotics
- Promote appropriate use of macrolide antibiotics in older children
- Promote a seasonal screening for viral causes of pneumonia (RSV, influenza)
- Educate patients and families about the causes and significance of pneumonia

Lichenstein R, Suggs A, Campbell J 2003. "Pediatric Pneumonia" *Emergency Medicine Clinics of North America* 21(2): 437-51

Weight:

Allergies:

Time/
Date:

General

- 1) Diagnosis: Pneumonia
- 2) Estimated length of stay = 2 days
- 3) Condition: Stable
- 4) Begin saline lock PIV
- 5) TPR Pain Assessment: every 6 hrs and PRN
- 6) Blood pressure: routine
- 7) Activity: As tolerated for age
- 8) Initiate "Learning Assessment" and implement pneumonia education
- 9) On admit, assess discharge needs and make appropriate referrals (see pediatric admission database)
- 10) Isolation: Standard precautions (or microbial etiology)

Education

- 1) **BEGIN EDUCATION ON ADMISSION**
 - Reinforce education on signs of worsening respiratory distress, signs of inadequate PO intake. Review whom to contact for problems and reasons to call physician or return to ER.
 - Review Patient Education Sheet with family.
 - If patient has been requiring albuterol, do MDI teaching.

Diet & Fluids

- 1) Diet: age-appropriate and encourage fluids
- 2) I's & O's every shift
- 3) If patient has been vomiting, or has poor PO intake, begin IV fluids at maintenance*
- 4) Once PO intake is consistently 75% or more of maintenance, saline lock PIV

If initiated in ER for ER use only	
initial	date/time

* Definition of Maintenance Fluids:
 0-10 Kg 4 ml/kg/hr
 11-20 Kg 40 ml/hr + (2 ml/kg/hr for each kg > 10)
 > 20 Kg 60 ml/hr + (1 ml/kg/hr for each kg > 20)

Choice of IV fluids:
 for children ≤ 15 Kg, use D5 ¼ NS; + 20 mEq KCl/L
 for children > 15 Kg, use D5 ½ NS; + 20 mEq KCl/L

Oxygen & Monitoring

- 1) O₂ as needed to keep sats ≥ 92%
- 2) SpO₂: spot checks with vital signs and PRN for respiratory distress

If initiated in ER for ER use only	
initial	date/time

Pneumonia

Patient Label



Weight: _____

Allergies: _____

Time/
Date: _____

Diagnostic Tests

- 1) Chest x-ray if not done in ER
- 2) CBC
- 3) Blood culture, if not done in the Emergency Room

If initiated in ER for ER use only	
initial	date/time

Nursing & RCP Care

- 1) If requiring oxygen > 3 LPM or if oxygen requirement increases, **notify physician**, encourage deep breathing and directed cough every 4 hrs while awake.
 - Incentive spirometer (pinwheel or blow-bubbles if less than 5 years old)
 - Ambulation with assistance

Medications

- 1) **Antibiotics:**
 - Ampicillin 200 mg/kg/day IV divided every 6 hours (maximum 2 grams/dose)
 - Cefuroxime 150 mg/kg/day IV divided every 8 hours (maximum 1.5 grams/dose)
 - Azithromycin 10 mg/kg PO on day 1 (maximum 500 mg/dose), then 5 mg/kg/dose PO (maximum 250 mg/dose) once daily on days 2 through 5. (Give only for patients 3 years and older)
 - Clindamycin 30 mg/kg/day IV divided every 8 hours (maximum 1.8 grams/day)
- 2) Acetaminophen 15 mg/kg (max dose = 650mg) PO/PR every 4 hours PRN T> 101°F for mild pain.
(maximum 75 mg/kg/day or 4 gms/day, whichever is less)
- 3) Ibuprofen 10 mg/kg (max dose = 400 mg) PO every 6 hours PRN T> 101°F or if acetaminophen is not effective.
(nurse to contact physician for unrelieved pain)

If initiated in ER for ER use only	
initial	date/time

Follow-up

- 1) FAX discharge instructions (once signed by physician) to primary care physician.

Physician's Signature / ID number: _____

Date: ____/____/____ Time: _____

Pneumonia

page 2

Patient Label



Physician's Order Sheet

Interdisciplinary Patient/Family Learning Evaluation

Initial Patient/Family Learner Assessment

A learning evaluation is done with each initial teaching intervention for each learner. Teaching interventions should be documented in an ongoing manner with ongoing assessment and evaluation of readiness to learn, barriers to learning, and learning outcomes. Use your department or topic specific Interdisciplinary Patient/Family Education Documentation forms for ongoing patient/parent/family education documentation. Use this form for the initial assessment of a learner and keep this form with the ongoing patient/family education documentation forms.

Initial Learner Evaluation (assess one or multiple learners)			
1. _____ Date _____ (Pt./Primary care giver)	2. _____ Date _____ learner	3. _____ Date _____ learner	4. _____ Date _____ learner
Prior Knowledge of Plan of Care or care needs: <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	Prior Knowledge of Plan of Care or care needs: <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	Prior Knowledge of Plan of Care or care needs: <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	Prior Knowledge of Plan of Care or care needs: <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____
Primary Language: check <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Hmong Other _____ <input type="checkbox"/> Writes <input type="checkbox"/> Reads	Primary Language: check <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Hmong Other _____ <input type="checkbox"/> Writes <input type="checkbox"/> Reads	Primary Language: check <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Hmong Other _____ <input type="checkbox"/> Writes <input type="checkbox"/> Reads	Primary Language: check <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Hmong Other _____ <input type="checkbox"/> Writes <input type="checkbox"/> Reads
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Barriers to learning: check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	Barriers to learning: check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	Barriers to learning: check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	Barriers to learning: check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other
Learning Preferences: <input type="checkbox"/> Demonstration <input type="checkbox"/> Written handouts <input type="checkbox"/> Verbal or audio <input type="checkbox"/> Video or TV <input type="checkbox"/> Hands on <input type="checkbox"/> Other _____	Learning Preferences: <input type="checkbox"/> Demonstration <input type="checkbox"/> Written handouts <input type="checkbox"/> Verbal or audio <input type="checkbox"/> Video or TV <input type="checkbox"/> Hands on <input type="checkbox"/> Other _____	Learning Preferences: <input type="checkbox"/> Demonstration <input type="checkbox"/> Written handouts <input type="checkbox"/> Verbal or audio <input type="checkbox"/> Video or TV <input type="checkbox"/> Hands on <input type="checkbox"/> Other _____	Learning Preferences: <input type="checkbox"/> Demonstration <input type="checkbox"/> Written handouts <input type="checkbox"/> Verbal or audio <input type="checkbox"/> Video or TV <input type="checkbox"/> Hands on <input type="checkbox"/> Other _____
Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____
Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____

Patient Label

0006



pathway



Patient/Family Learner Assessment

Pneumonia

What is Pneumonia ?

It is an infection of the lungs that may be caused by different types of viruses or bacteria. Often pneumonia begins two or three days from when the cold or sore throat started. With some types of pneumonia children become sick quickly. Your doctor will let you know how serious your child's pneumonia is.

How will I know if my child has Pneumonia?

Pneumonia may be different depending on the age of the child and the cause of the pneumonia. Some signs are:

- Fever/Chills
- Vomiting/Abdominal pain

Along with signs of difficulty breathing:

- Cough
- Nasal flaring (the openings of the nose open wide with breathing)
- Retractions (sinking of the skin between the ribs)
- Breathing is faster than usual
- Loss of appetite, trouble eating or feeding
- Muscle pain in the chest
- Tired, not wanting to play



How did my child get Pneumonia?

It is not really known why some kids get pneumonia and others do not. Some myths about why kids get pneumonia are: If you wash your child's hair in the winter, if you let your child play outside in the cold without a jacket or shoes, or if your child drinks cold water or milk or other liquids. These things do not cause pneumonia. Most pneumonia cases just happen and the reason is not known for sure.

How is Pneumonia spread from person to person?

The virus or bacteria is found in the mucous from the nose of an infected person. A person with the infection who coughs or sneezes near someone else can spread the germs. Touching someone else after touching the nose or eyes of an infected person can also spread it.

How can I prevent the spread of Pneumonia?

- There are vaccines to prevent some infections caused by viruses or bacteria. Children usually get immunizations against the Haemophilus and pertussis (whooping cough). Another vaccine called pneumococcal can also help prevent certain types of pneumonia. In addition, yearly flu shots can prevent pneumonia caused by the influenza virus. Every October or November your child can get a new flu shot. However, most types of pneumonia cannot be prevented by vaccine or antibiotics. Ask your doctor if any of these options will work for your child.
- **WASH YOUR HANDS** frequently throughout the day.
- It is best to keep your child away from others who are sick. (kissing can spread respiratory germs)
- Keep your baby or child from coughing or sneezing on others
- Do not share drinks or food.
- Clean drinking and eating utensils well after use

Treatment for Pneumonia:

- Antibiotics may be ordered for certain types of pneumonia, but not all pneumonia can be treated with antibiotics.
- Taking the temperature frequently throughout the day is important to monitor the fever and see if the medicine is working. **CALL YOUR DOCTOR IF THE FEVER RETURNS OR INCREASES.** (Fever reducing medications such as Acetaminophen (Tylenol) or Ibuprofen (PediaProfen) may be ordered by your doctor).

What can I do at home?

- Keep your child calm, explain what's happening. If you need further help on how to do this, talk with your nurse.
- Use cool mist humidifiers
- Encourage your child to drink plenty of fluids and get lots of rest.
- Raise the head of the bed if possible, so your child is not lying flat. This may make it easier for him/her to breathe. **DO NOT** use pillows for infants.
- Hold infants upright for feedings and place on side after feedings.
- Give small frequent feedings.
- Burp frequently.
- **NO SMOKING:** Tobacco smoke makes coughing worse. Children who have respiratory infections are more likely to have trouble breathing if they are around tobacco smoke. Do not let anyone smoke around your child or inside of your home or car.
- Suctioning of a stuffy nose: If the child's nose is stuffed up, they cannot drink from a bottle or breastfeed very well. Most stuffy noses are blocked by dry or sticky mucous. Suction alone cannot remove dry secretions. Normal saline (salt-water) nose drops are better than any over-the-counter medicine you can buy for loosening up mucous. You can make normal saline nose drops by mixing:
 - 1/2 cup bottled water (warm)
 - 1/4 teaspoon of salt

Place three drops of the normal saline mix in each nostril by using a clean medicine dropper. (These are available at most pharmacies). After about one minute, use a soft rubber suction bulb (suction syringe) to suck out the mucous. You can repeat this several times until your child's breathing becomes quiet and easy. You should use the bulb suction before each feeding and whenever the nose is blocked. Keep any extra salt water (normal saline) in the refrigerator in a clean, covered container. Make a new batch everyday.

When should I call my child's doctor**

When your child has:

- increased coughing
- nasal flaring (the openings of the nose open wide with breathing)
- retractions (sinking of the skin between the ribs)
- breathing that becomes faster
- paleness to area around nose and mouth
- a poor appetite or ability to eat or feed has worsened
- started acting very sick
- difficulty waking up or is less active than usual
- become very irritable or anxious, increase in complaint of pain or you are unable to calm him or her
- Fever of 100.4 degrees Fahrenheit for children two months of age or younger. Do not give Acetaminophen (Tylenol) or Ibuprofen (Pediaprofen) before calling your doctor.
- A fever that returns or increases

**If you cannot reach your child's doctor, and your child has any of these symptoms take your child to the Emergency Department closest to you.

CALL 911, if your child

- **Makes a grunting noise when breathing**
 - **Turns blue or gray in color**
 - **Passes out**
 - **Stops breathing**
- Start CPR if needed.***



Discharge Sheet

For Hospital Use Only

Dictation: 1-800-411-1001 (#963)

D/S Job #: _____

Discharge sheet FAXed to PCP _____
initial/date

Follow-up appointment SCHEDULED with PCP _____
initial/date

PATIENT'S NAME: _____ DISCHARGE DATE: _____

Dx: 1) Pneumonia 2) _____ 3) _____

Hospital Course

Patient admitted with acute pneumonia. No evidence of pneumothorax, or structural anomaly.

CXR findings: _____

Chest CT findings: _____

Treated with: Ampicillin Cefuroxime Azithromycin O₂ Other _____

Blood Culture: positive negative not done

Viral studies: RSV pos
neg (circle one)

Influenza pos
neg (circle one)

Other _____ pos
neg (circle one)

Complications during hospitalization: _____

DISCHARGE CONDITION: _____ Discharge weight _____

Instruction to Patient

Activity: As tolerated

Diet: Regular diet.

Medications: See Medication Reconciliation Form

Additional instructions: Bulb suction nose with saline if congested (infants only); return immediately if child has difficulty breathing, becomes lethargic, or cannot eat.

Reference: Patient Instruction Sheet

Signed: _____ M.D. _____
Signature of Parent or Guardian

Attending Physician

Primary Care Physician

Attending Resident

City

Pneumonia

0083



pathway 8/2008

Children's
Hospital
Central California 

Patient Label

Discharge Instructions