

# Ostschweizer Notfallsymposium 2018

---

Workshop

# Atemnot beim Kind

Ivo Iglowstein - Ostschweizer Kinderspital



# Klinische Zeichen der Atemnot

---

- Tachypnoe
- Nasenflügeln
- Einziehungen (jugulär, sternal, intercostal)
- Stöhnen (exspiratorisch)
- Zyanose
- Bewusstseinsstörungen
- Hypopnoe oder Atempausen



# Normale Atemfrequenz

---

Säugling	30-60/min
Kleinkind	24-40/min
Schulkind	18-30/min
Jugendlicher	12-16/min



# Massnahmen bei Atemnot oder Hypoxie

---

- Kind beruhigen!
- Atemwege freihalten
- Sauerstoffgabe
- Maskenbeatmung
- Intubation und Beatmung



# Korrekte Beatmung

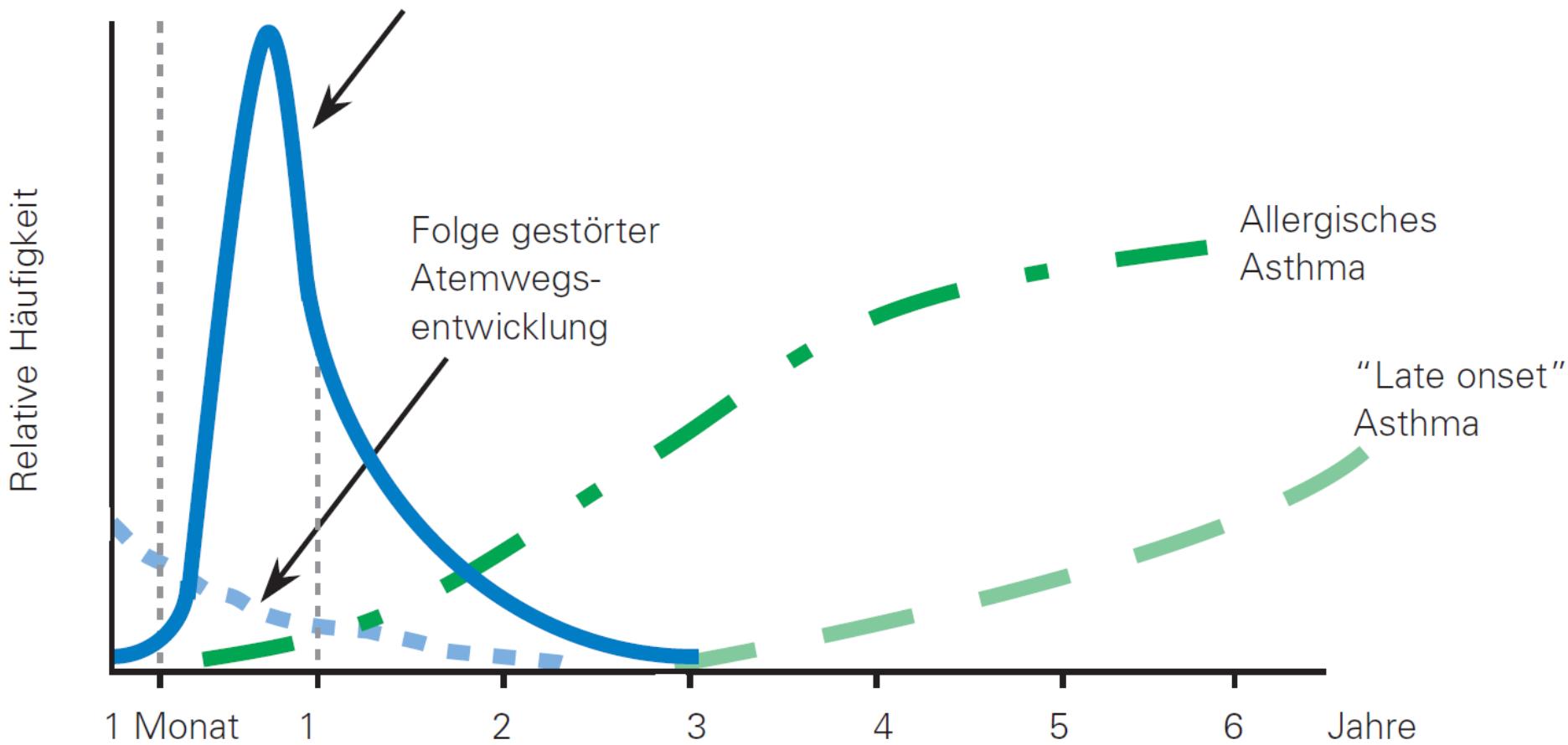
---

- Eine Thoraxhebung muss erfolgen
  - Wenn nicht, nach Obstruktion oder Fremdkörper schauen
  - Auf korrekte Technik und Maskenabdichtung achten
- Mit Frequenz von 12-20/min beatmen (bei alleiniger Beatmung!)
- Hyperventilation vermeiden



# Obstruktive Atemwegserkrankungen

Obstruktive Bronchitis / Bronchiolitis  
nach viralen Infekten («viral wheeze»)



# Obstruktive Atemwegserkrankungen

---

- Akute Bronchiolitis (oft RSV)  
(erste Episode, erstes Lebensjahr)
- Infektinduzierte obstruktive Bronchitis  
(episodisch, Kleinkind)
- „frühkindliches Asthma bronchiale“  
(rezidivierende bzw. persistierende Verläufe,  
Kindern mit atopischer Belastung)



# Akutbehandlung (Inhalation)

---

## **Salbutamol (Ventolin®)**

- via Nassvernebler (10-20 Tropfen in 2 ml NaCl 0,9%)
- mittels Dosieraerosole (DA) und Vorschaltkammer
  - Kinder <6 Jahre: 4–6 Hübe pro Dosis
  - Kinder >6 Jahre: bis 12 Hübe pro Dosis
- nach jedem einzelnen Hub wird inhaliert
- nach 20 und 40 Minuten wiederholen

Bei schwerem Asthmaanfall zusätzlich

## **Ipratropiumbromid (Atrovent®)**

- via Nassvernebler 20 Tropfen = 1 ml = 250 mg
- nach 20 und 40 Minuten wiederholen



## Akutbehandlung (Steroide)

---

**Corticosteroide** im Akutfall immer systemisch !

Dexamethason (Betnesol®) po 0.2 mg/kg  
oder

Prednisolon per os 1-2 mg/kg pro Dosis  
oder

Methylprednisolon i.v.  
bei schweren Anfällen: 1-2 mg/kg pro Dosis

i.d.R. für drei bis fünf Tage, ohne Ausschleichen



# RSV

---

- Häufigste Ursache für schwere Infektionen unterer Respi-Trakt bei Säuglingen und Kleinkindern
- Bronchiolitis Gipfel 2.- 6. LM
- RSV Pneumonien 2.- 3. LJ



# RSV - Klinik

---

- Atemnotsyndrom Zeichen
  - Apnoen !!!
  - Trinkschwäche
- 
- diffuse RG`s, Giemen
  - Rx: diffuse Infiltrate, Ueberblähungen, Atelektasen

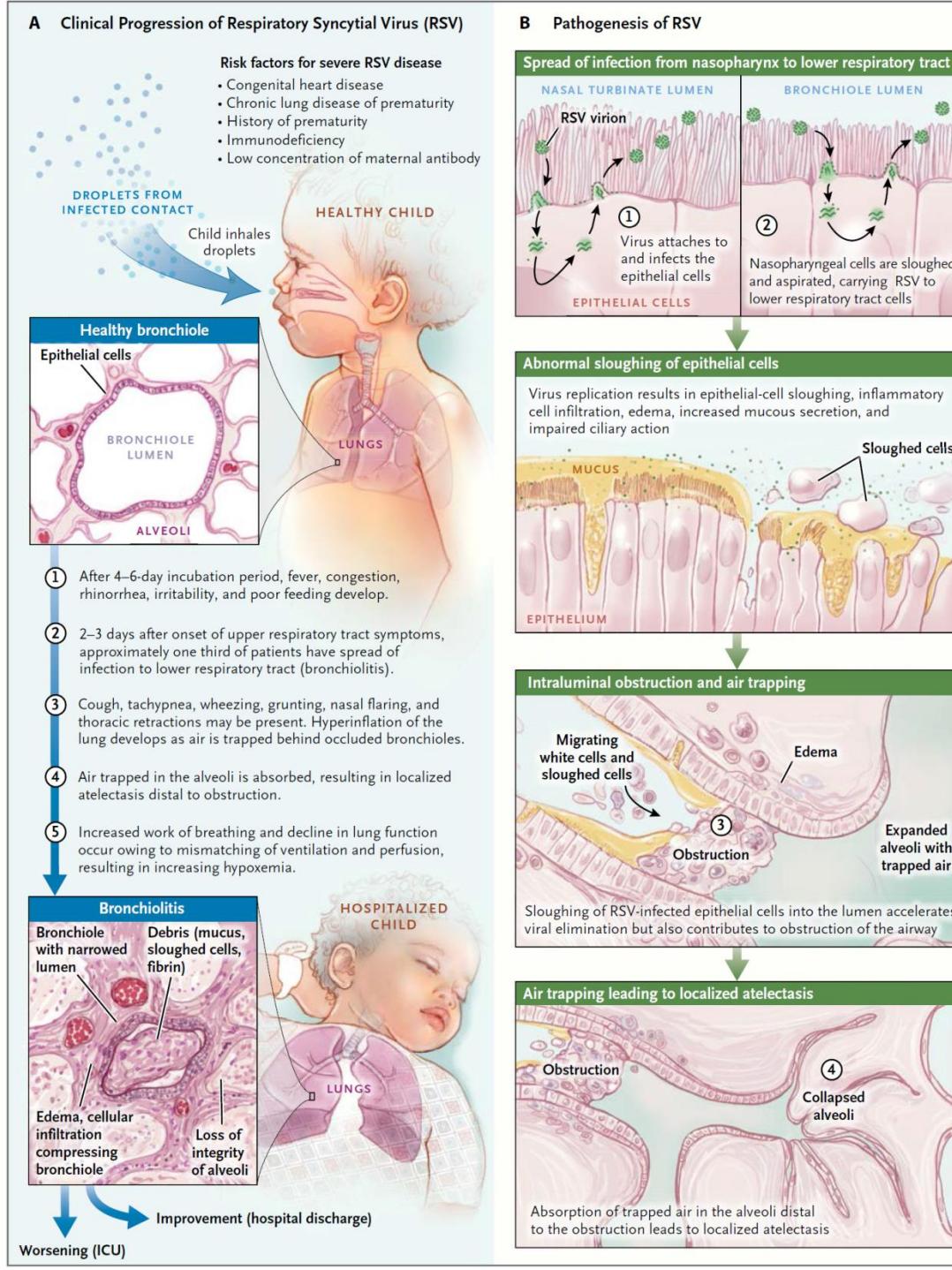


# Probleme/Komplikationen

---

- Respiratorische Erschöpfung
- Dehydratation
- Apnoen (zentrale)
- Hyponatriämien (SIADH)
- Krampfanfälle, vermindertes Bewusstsein
- Hypoglykämien





**Table 2.** American Academy of Pediatrics Guidance for Diagnosis and Management of Bronchiolitis.\*

Intervention	Recommendation	Comment
<b>Diagnostic Test</b>		
Chest radiography	Not recommended for routine use	Poor correlation with severity of disease or risk of progression; studies show increase in inappropriate use of antimicrobial therapy owing to similar radiographic appearance of atelectasis and infiltrate
Testing for viral cause	Not recommended for routine use	May influence isolation of symptomatic patients, but infection-control procedures are similar for most respiratory viruses
<b>Treatment</b>		
Bronchodilator therapy	Not recommended	Randomized trials have not shown a consistent beneficial effect on disease resolution, need for hospitalization, or length of stay
Epinephrine	Not recommended	Large, multicenter, randomized trials have not shown improvement in outcome among outpatients with bronchiolitis or hospitalized children
Glucocorticoid therapy	Not recommended	Large, multicenter, randomized trials provide clear evidence of lack of benefit
Nebulized hypertonic saline	May be considered	Nebulized 3% saline may improve symptoms of mild-to-moderate bronchiolitis if length of stay is >3 days (most hospitalizations are <72 hr)
Supplemental oxygen	Routine use not recommended if oxyhemoglobin saturation is >90% in the absence of acidosis	Transient episodes of hypoxemia are not associated with complications; such episodes occur commonly in healthy children
Pulse oximetry	Not recommended for patients who do not require supplemental oxygen or if oxygen saturation is >90%	Oxygen saturation is a poor predictor of respiratory distress; routine use correlates with prolonged stays in the emergency department and hospital
Chest physiotherapy	Not recommended	Deep suctioning is associated with a prolonged hospital stay; removal of obstructive secretions by suctioning the nasopharynx may provide temporary relief
Antimicrobial therapy	Not recommended for routine use	Risk of serious bacterial infection is low; routine screening is not warranted, especially among infants 30 to 90 days of age
Nutrition and hydration	Hospitalization for observation of hydration and nutritional status may be needed for infants with respiratory distress	Intravenous or nasogastric hydration may be used



# Sauerstoffgabe

---

bei akuter, infektiöser  
Atemwegserkrankung

- Wann genau?
- Warum überhaupt?
- Wie dosiert?



# Oxygen therapy for LRI

---

## Objectives

Objectives were to determine the indications for oxygen therapy, describe the clinical criteria for ending oxygen therapy.

## Results

We did not find any trials comparing oxygen versus no oxygen. We found no clinical signs, model or score system that accurately identifies hypoxaemic children.



# Supplemental oxygen

---

## Pneumonia

We suggest that children with **SpO<sub>2</sub> <95** percent in room air be treated with supplemental oxygen while they are in respiratory distress.

## Bronchiolitis

- O<sub>2</sub> should be provided to **maintain SpO<sub>2</sub> above 90 to 92%**
- **No data** to support the use of a specific SpO<sub>2</sub> cutoff value.  
The AAP practice guideline recommends SpO<sub>2</sub> <90 percent as the threshold to start supplemental oxygen.
- Evidence from other clinical settings suggests that chronic or intermittent hypoxemia (SpO<sub>2</sub> 90 to 94 percent) may have long-term cognitive and behavioral effects.



# Supplemental oxygen

---

## Asthma

- acute asthma → ventilation-perfusion (V/Q) mismatch
- Beta 2-agonists may worsen this mismatch
- Oxyhemoglobin saturation may decrease by  $\geq 5$  percent in the first 30 minutes after treatment .

Supplemental oxygen (humidified) should be provided to maintain **an oxygen saturation of  $\geq 92$  percent**. All nebulized medications should be delivered with oxygen.



## The Effect of Chronic or Intermittent Hypoxia on Cognition in Childhood: A Review of the Evidence

---

### CONCLUSIONS

- Some of the adverse effects were noted with oxygen saturations just below the range of normal for age.
- Because the precise minimal exposure that may result in adverse effects is currently unknown, future research in this area should provide specific information
  - on SaO<sub>2</sub> levels observed
  - on the duration of exposure to mild levels of oxygen desaturation.



## Prospective Multicenter Study of Bronchiolitis: Predicting Safe Discharges From the ED

- prospective cohort study
- 30 US emergency departments contributed data
- < 2 years of age and diagnosis of bronchiolitis
- multivariate logistic regression
  - low-risk model was developed with half of the data
  - then validated with the other half
- 1456 enrolled patients, 837 (57%) were discharged home from the emergency department



## Prospective Multicenter Study of Bronchiolitis: Predicting Safe Discharges From the ED

---

### Factors predicting safe discharge to home:

- age of > 2 months
- no/mild retractions
- initial oxygen saturation of > 94%
- respiratory rates
  - <45 / min for 0–1.9 months
  - <43 / min for 2–5.9 months
  - <40 / min for 6–23.9 months
- adequate oral intake



## Child health and living at high altitude

---

**Table 2** Incidence of hypoxaemia with acute lower respiratory infection (ALRI) at high altitude

Altitude (m)	Location	Population and mean SaO <sub>2</sub>	Definition of hypoxaemia (SaO <sub>2</sub> )	Condition	Incidence of hypoxaemia (%)	n
1600	Papua <sup>35</sup>	0–1 months 93%	<85%	Moderate ALRI	53	110
		1–60 months 96%		Severe ALRI		
1670	Nairobi <sup>37</sup>	7 days–36 months 96%	<90%	ALRI	59	256
2640	Bogota <sup>39</sup>	7 days–36 months 93%	<88%	Cough <7 days	63	201
3750	LaOroya <sup>38</sup>	2–11 months 88%	<82%	Moderate ALRI	36	175
		12–60 months 90%	2–11 months <82%	Severe ALRI	83	60

“Cognitive development during infancy and childhood at high altitude is an area of growing concern, but relatively limited research data.”

# Pertussis

---

- Diagnose durch PCR im Nasopharyngealsekret
- Krankheitsverlauf wird nur bei Therapiebeginn in ersten 3 Wochen nach Hustenbeginn beeinflusst, später nicht mehr.
- Azithromycin po für 5 Tage  
10mg/kg am ersten Tag, dann 5 mg/kg po
- Säuglinge < 6 Monate stationäre Therapie wegen zentralen Apnoen.



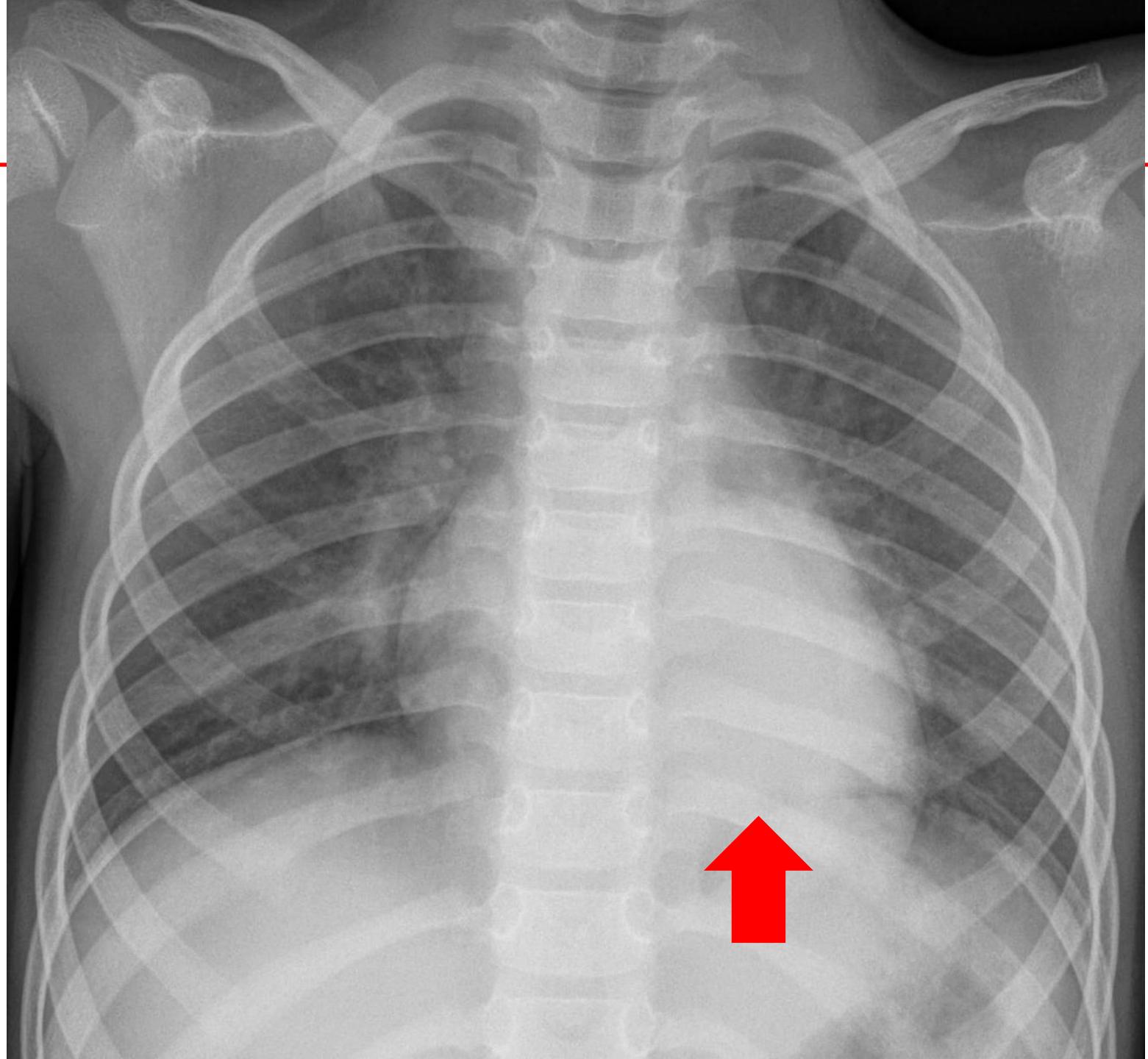
Liegend

66/1.4 mAs SOS



Ostschweizer Kinderspital





Ostschweizer Kinderspital



# Pneumonie – klinisches Bild

---

*Klinische Zeichen der Pneumonie beim Kind:*

- Persistierendes oder repetitives Fieber >38.5°C
- Tachypnoe, erschwertes Atemmuster
- Nasenflügel, Einziehungen

→ **visuelle Diagnose (Inspektion)**

aus Distanz beim ruhigen Kind auf dem Arm  
der Mutter



# Pneumonie – klinisches Bild

---

*Auskultation beim Kind mit Pneumonie:*

- seitendifferentes Atemgeräusch  
→ abgeschwächt auf der Seite des Infiltrates
- feuchte, grobblasige RGs oft auch bei infektinduzierter obstruktiver Bronchitis



# Stationäre Aufnahme bei Pneumonie

---

- Kleines Kind (unter 6 Monate)
- SaO<sub>2</sub> < 92% (<95%?)
- Deutliche Tachypnoe (>70min im 1.LJ, >50/min >1.LJ)
- Vd.a. Komplikation (Erguss)
- Septischer Eindruck
- Erbrechen, Dehydratation
- Keine Verbesserung unter p.o. AB in 48h



# Pneumonie

Wann soll man ein  
Röntgenbild machen?

## Frage

Braucht es ein Röntgenbild für die Diagnose  
einer bakteriellen Pneumonie?



# **British Thoracic Society guidelines (2011)**

---

- **Chest radiography** should **not be considered** a routine investigation in children thought to have community acquired pneumonia (CAP). [Evidence level Ib]
- Children with signs and symptoms of pneumonia who are not admitted to hospital should not have a chest x-ray. [Evidence level Ib]
- A lateral x-ray should not be performed routinely. [Evidence level III]
- **C reactive protein is not useful** in the management of uncomplicated pneumonia and should not be measured routinely. [Evidence level Ia]

## Main results

- We identified two trials.  
(eine davon vom verfassenden Cochrane-Autor!!)

## Authors' conclusions

There is **no evidence that chest radiography improves outcome in outpatients** with acute lower respiratory infection. The findings do not exclude a potential effect of radiography, but the potential benefit needs to be balanced against the hazards and expense of chest radiography.

The findings apply to outpatients only.

# **Chest radiography in children 2-59 months diagnosed with non-severe pneumonia as defined by WHO**

---

## **Setting**

Outpatient departments of six hospitals in Pakistan.

## **Participants**

2000 children with non-severe pneumonia were enrolled;  
1932 children were selected for chest radiography.

## **Interventions**

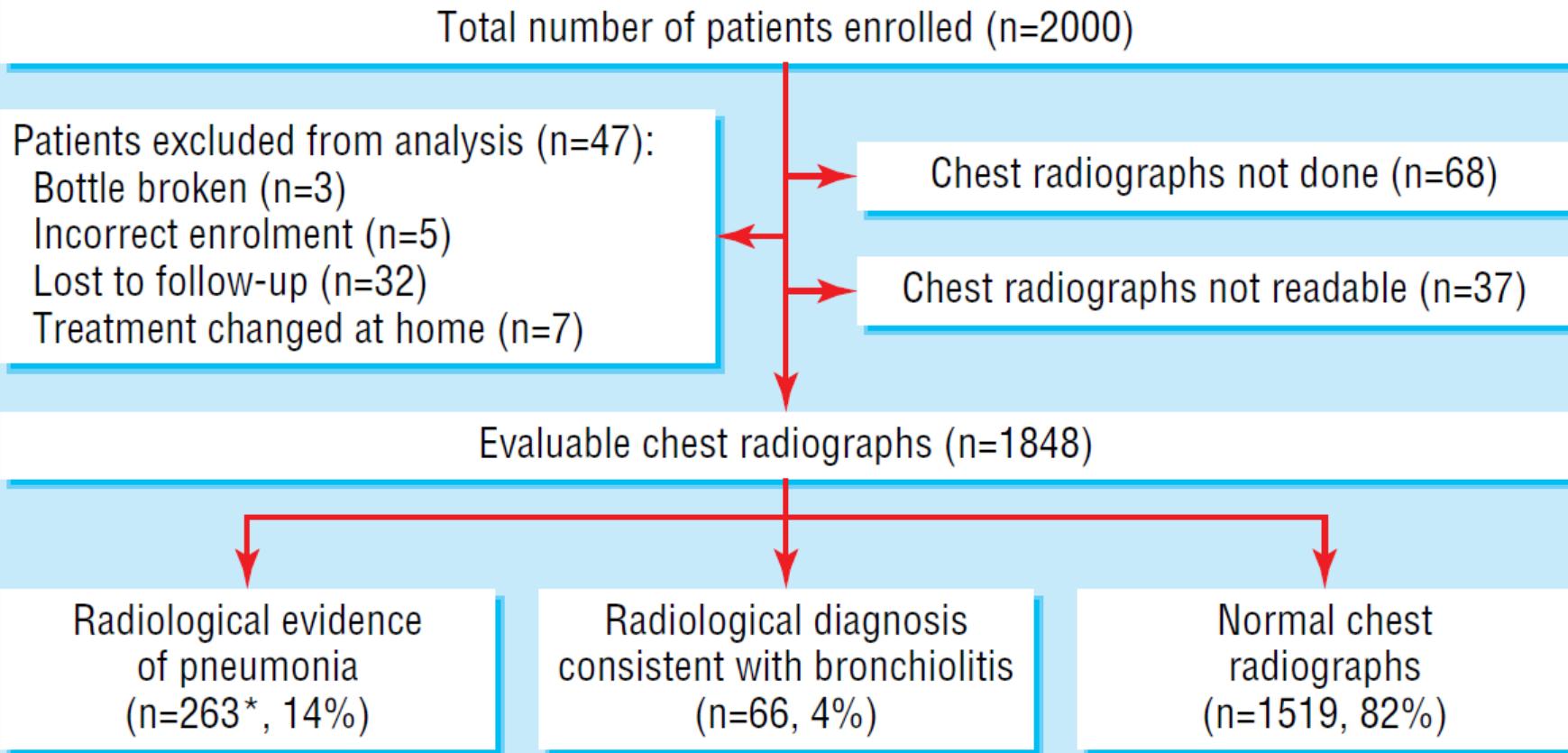
Two consultant radiologists used standardised WHO definitions to evaluate chest radiographs;  
no clinical information was made available to them.

## **Main outcome measures**

Presence or absence of pneumonia on radiographs.



## Chest radiography in children 2-59 months diagnosed with non-severe pneumonia as defined by WHO



\* Lobar pneumonia=26

Interstitial parenchymal changes=223

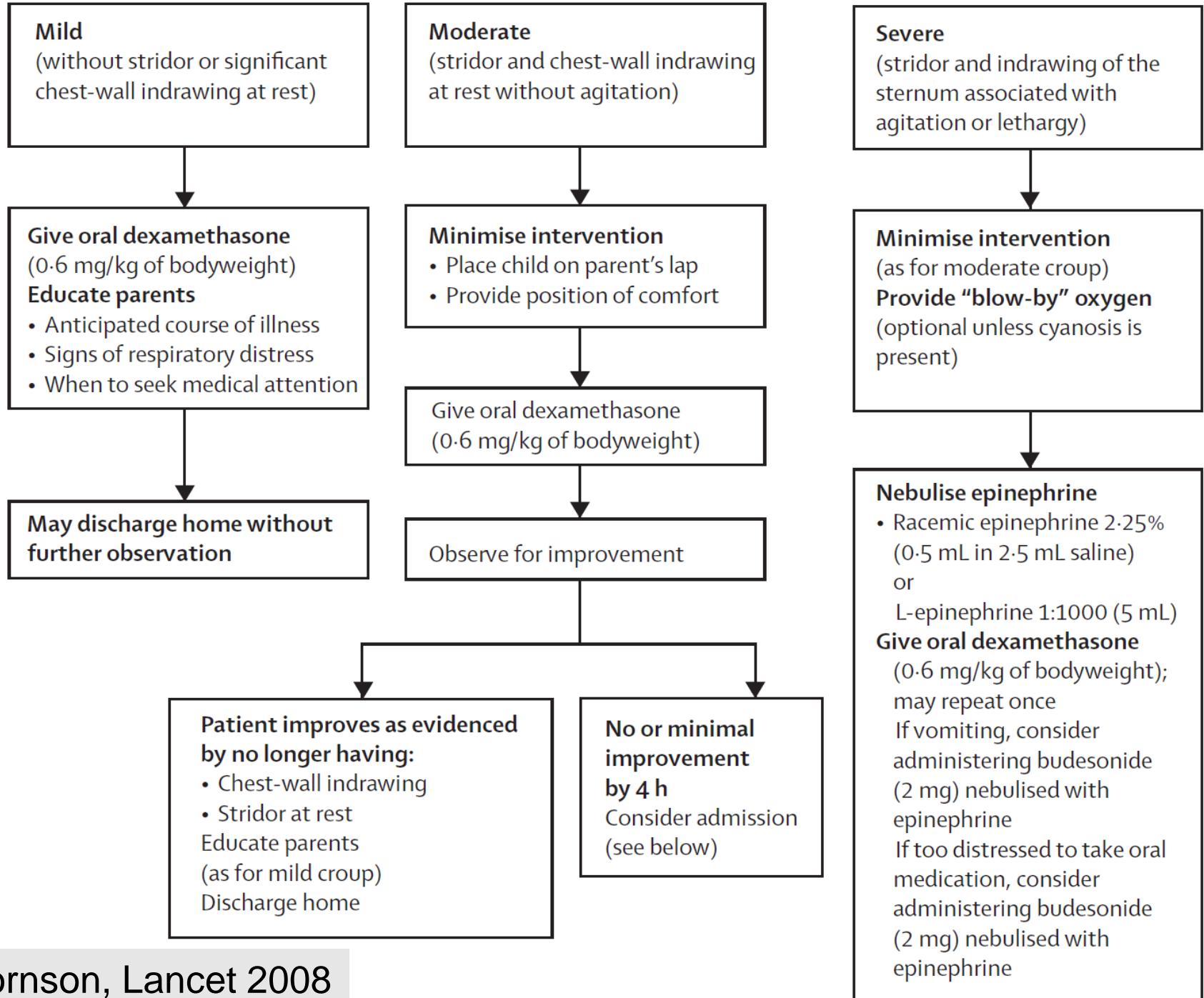
## Chest radiography in children 2-59 months diagnosed with non-severe pneumonia as defined by WHO

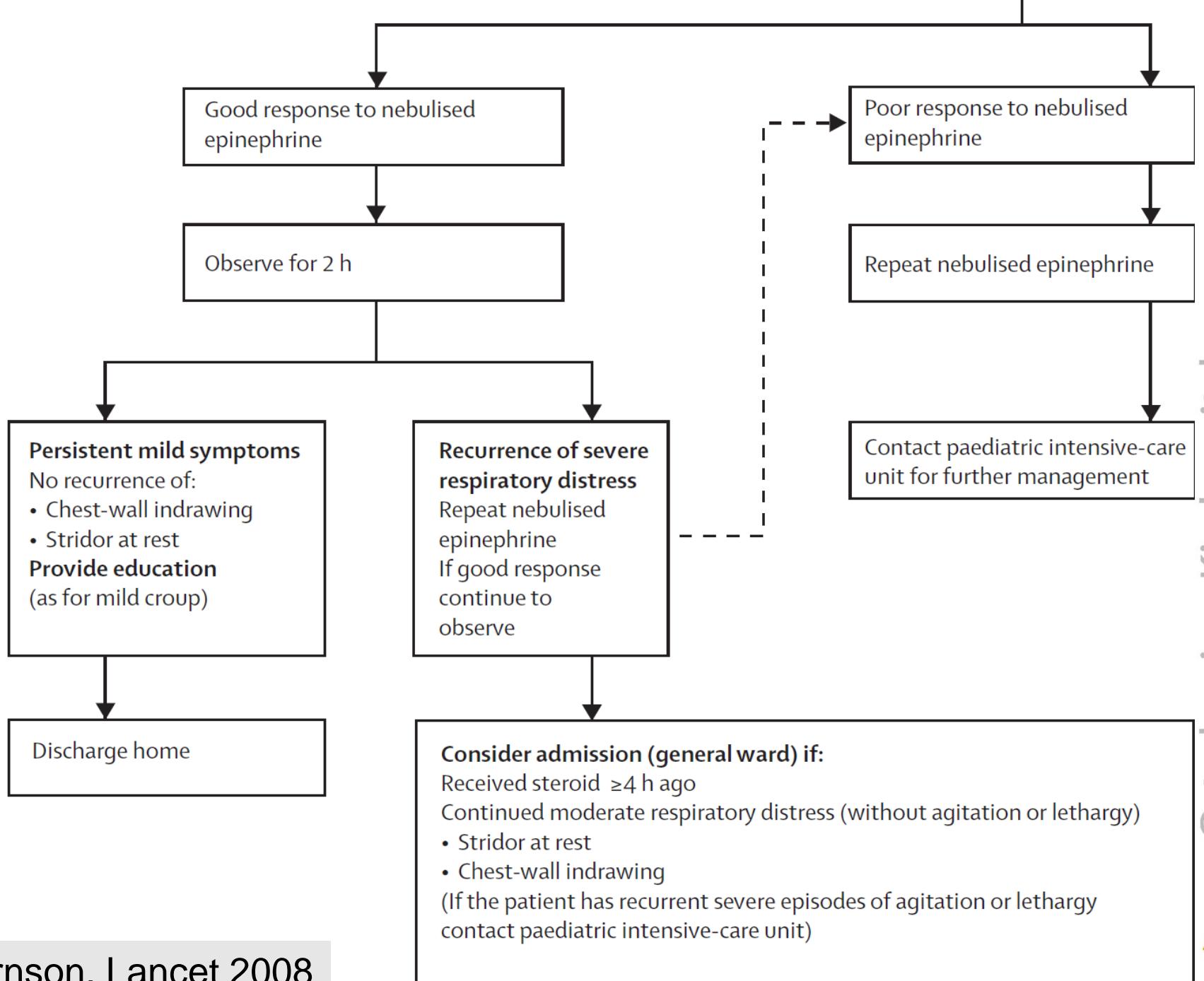
---

### Conclusion

Most children diagnosed with non-severe pneumonia on the basis of fast breathing alone had normal chest radiographs and many of them may not have had bacterial pneumonia.







# Therapie Laryngotracheitis

---

- Beruhigung von Mutter und Kind !
- Dexamethason (Betnesol®)  
0.2 (- 0.6) mg / kgKG
- Adrenalin Inhalation (2-5 Ampullen à 1 mg)
- Luftbefeuchtung ???

Bjornson, Lancet 2008  
Scolnik, JAMA 2006  
Cochrane 2011



## Main results

- 3 studies in ED setting,  
 $n=135$  patients with moderate croup
- outcome (croup score) from 20 to 60 minutes marginally favoured the treatment group with a weighted standardised mean difference of -0.14 (95% confidence interval (CI) -0.75 to 0.47).
- No other outcomes were significantly different between the groups.



## Main results

### Authors' conclusions

The croup score of children managed in an emergency setting with mild to moderate croup **probably does not improve greatly** with inhalation of humidified air.

Further research is needed in primary care settings, using a wider range of more sensitive outcome measures.

between the groups.



---

**VIELEN DANK FÜR DIE  
AUFMERKSAMKEIT !!**

