# PNEUMONIA 2002: Outpatient, Inpatient and Nosocomial

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# TREATMENT ACTION PLAN

- Antibiotic must kill bug quickly and completely
- Antibiotic must not drive resistance
- Antibiotic must not create emergence of other pathogens (C diff, MRSA, VRE)
- Shorter dose time course of therapy
- If devices are involved, remove + shorten course, 5 – 7 days total

# TREATMENT ACTION PLAN

- Strict definition  Hospital Acquired Pneumonia
- Purulent or colored phlegm
- Fever
- New chest infiltrate on CXR
- Leukocytosis
- Currently favored therapy includes Pip/tazo combination (Zosyn) because emergence and resistance are rare

# Clostridium Difficele

- Pressure by 1st 3 generation cephalosporins and clindamycin, but not cefepime (Maxipime) to emerge
- Produces A + B toxin which produce symptom
- Profuse diarrhea, severe abdominal pain + high WBC's
- Toxicity also related to gram neg sepsis from colon permeability. Here add Zosyn or Maxipime

# CLOSTRIDIUM DIFFICELE

- Treatment Oral Flagyl 250 q6 w/ or w/o oral Vancomycin 250 qid
- High lethality. Do not take this problem lightly.
- Colonoscopy may be needed to determine severity.
- Barriers, alcohol hand solutions and contact isolation helpful to prevent spread.

# CLOSTRIDIA DIFFICELE

- Group sequestration helpful.
- Limit number of personnel taking care of patient.
- Pulse therapy. Treat 5 days off 2 and repeat. Allowing spores to form which are more easily killed.

# CLOSTRIDIA DIFFICELE

- PROBIOTICS
- Prevent antibiotic associated diarrhea.
- Live organisms that improve microbial balance of the host.
- Commonest used are Lactobacilli 1 gm tid and Saccharomyces boullardii 250 qid
- Reduced diarrhea 15 – 20 %

# METHICILLIN RESISTENT STAPHYLOCOCCUS AUREUS

- MRSA or ORSA
- Surgical prophylactic treatment with cephalosporins for 4 days or more increase the risk
- Prophylactic treatment of 2 days or less is probably ok
- Biggest problems occur with 2nd and 3rd generation cephalosporins

# METHICILLIN RESISTENT STAPHYLOCOCCUS AUREUS

- Treatment (MRSA) first choice is Vancomycin
- Synercid/Linizolid combination has a greater success rate than either alone
- Reculture in 4 or 5 days. If MRSA is still present, mortality is 70%. If culture is negative, this drops to 20%
- If Methicillin sensitive (MSSA) don't rely on vancomycin alone. Vancomycin 8/17 died, Cloxacillin 0/18.

# METHICILLIN RESISTENT STAPHYLOCOCCUS AUREUS

- Nasal Bactroban twice a week prevents MRSA in at risk populations such as vent units and nursing home patients.
- Alcohol hand washes have also been shown to help.

# VANCOMYCIN RESISTANT ENTEROCOCCUS

- Increased incidence with use of beta lactam drugs (penicillins and cephalosporins) except with cefepime (Maxipime)
- Clindamycin use increases incidence
- Colon is site of colonization
- Barriers not shown to be effective
- May need to sequester patient
- If urine is infected may need to d/c foley and don't use antibiotics

# VANCOMYCIN RESISTANT ENTEROCOCCUS

- Fortaz, Vancomycin and Quinolones all increase the risk
- Synercid or Linizolid for Enterococcus facium, but not E fecalis
- Clean sites.
- Pull lines.
- Empiric therapy with Gentamycin and Ampicillin

# PSEUDOMONAS AERUGINOSA

- Emergence driven by prolonged surgical prophylaxis
- In Hospital Acquired Pneumonia incidence is 19% if no prior antibiotics , 65% if prior Rx
- Using 2 drug therapy cuts mortality in half
- Either antipseudomanal Betalactam drug w/ aminoglcoside
- Or antipseudomal Betalactam drug w/ quinolone

# PSEUDOMONAS AERUGINOSA

- Another successful therapy is cefepime/pip-tazo
- Important to consider local antibiograms
- High dose Levaquin 750 qd or 500 mg bid IV
- Produces large amount of green phlegm
- Presence of ETTube increases risk

# Risk factors for Nosocomial Pneumonia
# Patient related Factors

- Severe acute or chronic illnesses
- Coma
- Malnutrition
- Prolonged hospitalization and/or preop period
- Hypotension
- Metabolic acidosis
- Cigarette smoking

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# Risk factors for Nosocomial Pneumonia
# Patient related factors

- CNS dysfunction
- COPD
- Diabetes mellitus
- Alcoholism
- Azotemia
- Respiratory failure
- Advanced age

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# Risk factors for Nosocomial Pneumonia

## Infection Control Related Factors

- Poor infection control practices
- Not washing hands or changing gloves between patients
- Contaminated respiratory therapy devices and equipment

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# Risk factors for Nosocomial Pneumonia
# Intervention Related Factors

- Prolonged or complicated surgery, especially thoracoabdominal procedures
- Endotracheal tubes
- Nasogastric tubes
- Enteral feedings
- Antacids and histamine type 2 blockers
- Prolonged or inappropriate use of antibiotics

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# Bacteriology of Nosocomial Pneumonia
# Early Onset (2 – 5 days)

- S pneumoniae
- H influenzae
- M catarrhalis
- S aureus
- Enteric gram negative bacilli

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# Bacteriology of Nosocomial Pneumonia
# Late Onset ( >5 days)

- P aeruginosa
- Enterobacter species
- Acinetobacter species
- Klebsiella
- S marcescens
- E coli and other gram negative bacilli
- MRSA

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# Bacteriology of Nosocomial Pneumonia Indeterminate Onset

- Anaerobic bacteria
- Legionella pneumophila
- Candida

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# Effect of Initial Rx on VAP Mortality

| Study | Adequate Rx | Inadequate Rx | p value |
|---|---|---|---|
| Luna | 38% | 91% | <.001 |
| Alvarez/Luna | 16% | 25% | <.039 |
| Rello | 42% | 63% | .060 |
| Kollef | 33% | 61% | <.001 |

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# Current Therapy Nosocomial Pneumonia Monotherapy

- Piperacillin/tazobactm or ticarcillin/clavulanate
- Carbapenem (imipenem, meropenem)
- Broad spectrum cephalosporin (ceftazidime or cefepime)
- Ceftriaxone or cefotaxime if Pseudomonas unlikely
- Quinolone if penicillin allergic

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# Current Therapy Severe Nosocomial Pneumonia

- These include patients at risk for Pseudomonas
- Dual therapy indicated here
- Piperacillin/tazobactam or ticarcillin/clavulanate or ceftazidime or cefepime or imipenem or meropenem
- Plus aminoglycocide or quinolone
- If penicillin allergic, use quinolone w/ clindamycin

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# Current Therapy Nosocomial Pneumonia

- Consider adding Vancomycin if gram stain shows GPC's and MRSA is present in facility
- Consider adding aminoglycoside to pen allergic protocol to improve GNR coverage
- Risk factors which increase severity include prolonged ICU stay, steroids, antibiotic use, underlying lung disease

# Preventing VAP
# Effective Measures

Nonpharmacologic

Hand washing
Semi-recumbent position
Avoid gastric distention
Subglottic suctioning

Pharmacologic

Limit stress-ulcer prophylaxis
Chlorhexidine oral rinse

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# Preventing VAP
# Ineffective Measures

Nonpharmacologic

- Routine change of ventilator circuits or in-line suction catheters
- Dedicated disposable suction catheters
- qD change of moisture reservoirs
- Chest physiotherapy

Pharmacologic

- Aerosolized antibiotic therapy
- Selective GI decontamination

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# Summary
# Outpatient, Inpatient and Hospital Acquired Pneumonias

- Logical approach
- Local knowledge of Antibiograms
- Shorter course surgical prophylaxis
- Effective therapy of Nosocomial pneumonia reduces mortality
- Ventilator acquired pneumonia preventive measures do exist