肺部感染的治療（上）

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課程大綱

1.Incidence and characteristics

2.Classification of pulmonary infection

3.Antimicrobial Therapy – guidelines

4.Conclusion

1.Incidence and characteristics

肺炎在臺灣十大死因排名有上升之趨勢

2010年臺灣人十大死因	
◆ 所有死因	144,709人
◆ 惡性腫瘤	41,046人
◆ 心臟疾病	15,675人
◆ 腦血管疾病	10,134人
肺炎 4th	8,909人
◆ 糖尿病	8,211人
事故傷害	6,660人
慢性下呼吸道疾病	5,197人
慢性肝病及肝硬化	4,912人
◆ 高血壓性疾病	4,174人
◆ 腎炎、腎徵候群及腎性病	4,105人

十大死因	平均發生情形
1.惡性腫瘤	每12分48秒有1人死亡
2.心臟疾病	每33分32秒有1人死亡
3.腦血管疾病	每51分52秒有1人死亡
4.肺炎	每59分有1人死亡

資料來源：www.doh.gov.tw

Mortality Rates, Pneumonia, Taiwan, Department of Health

	1986		1996		2007	
Age Group	Deaths / Rate per 100,000 pop.		Deaths / Rate per 100,000 pop.		Deaths / Rate per 100,000 pop.	
Total	2,378	12.3	3,200	14.9	5,895	25.7
5 - 9	33	1.6	2	0.1	6	0.4
15 - 19	20	1.1	10	0.5	6	0.4
25 - 29	23	1.2	20	1.1	16	0.8
35 - 39	15	1.2	35	1.9	31	1.7
45 - 49	42	4.8	43	3.6	72	3.9
55 - 59	104	13.4	84	10.3	132	10.4
65 - 69	224	53.2	269	40.3	322	43.3
75 - 79	383	228.3	566	200.6	981	198.8
85+	292	825.1	738	960.0	2,093	1137.5

肺炎臨床診斷

社區肺炎 (Community-acquired pneumonia)	• 來自社區之肺炎
院內肺炎 (Hospital-acquired pneumonia)	• 住院48小時後或出院後14天內發生之肺部感染
呼吸器相關肺炎 (Ventilator-associated pneumonia)	• 使用呼吸器48小時後的肺炎
醫療照護相關肺炎 (Healthcare-associated pneumonia, HCAP)	• 考慮多重抗藥性菌感染

肺炎診斷治療步驟

臨床症狀、理學檢查及胸部X光檢查

↓

區分社區型或醫院型感染

↓

區分細菌性或非典型感染

↓

肺炎嚴重程度

↓

血液及痰液檢查培養

↓

血清學（抗原抗體）檢查

↓

經驗性抗生素治療→降階治療

↓

侵襲性檢查治療（支氣管鏡檢查或肺切片）

2.Classification of pulmonary infection

大綱

- Community-acquired Pneumonia
- Lung abscess & Empyema
- Healthcare Associated Pneumonia

CAP: Incidence and Outcomes

- 6th leading cause of death in United States
- 2-3 million cases/year
- 500,000 admissions/year
- 45,000 deaths/year
- Mortality
  - Outpatient < 1%
  - Admit (ward) 10%-14%
  - ICU 30%-40%

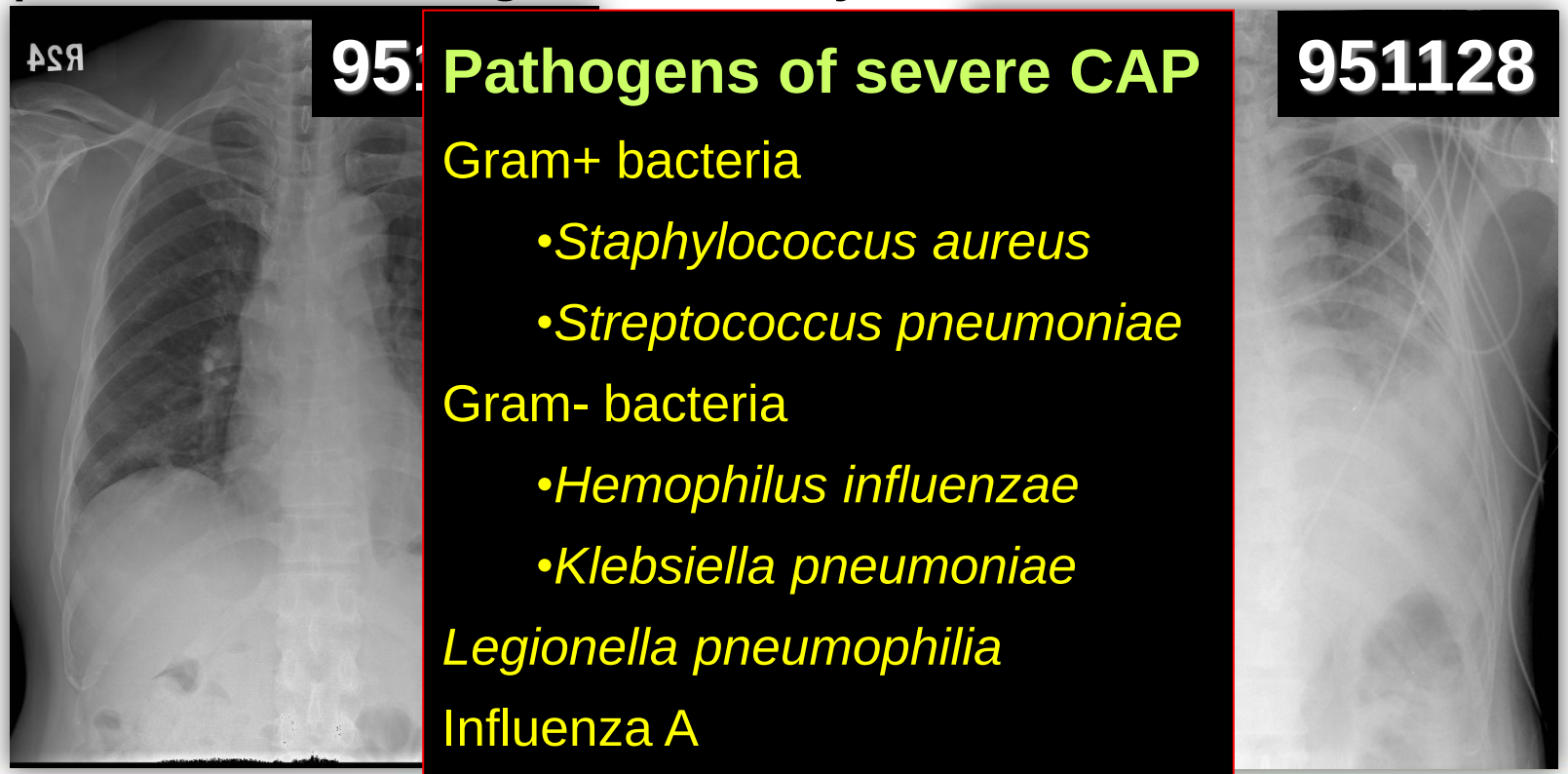
資料來源：Bartlett JG et al. *Clin Infect Dis*. 2000;31:347-382.

社區性肺炎診斷的困難點

- Fail to differentiate etiology by clinical and CXR
- Etiology not defined in up to 50% of patients
  - Up to 30% patients unable to produce sputum
  - Prior use of antimicrobials decrease yield rate
  - Only 25% sputum samples are good quality
  - Low blood culture yield rate (<30%)
- Co-pathogens infection varied (3%-40%)
- Rapidly and emerging resistance of pathogen

案例分析

- 71 y/o male, a heavy smoker, fever and productive cough for 3 days.



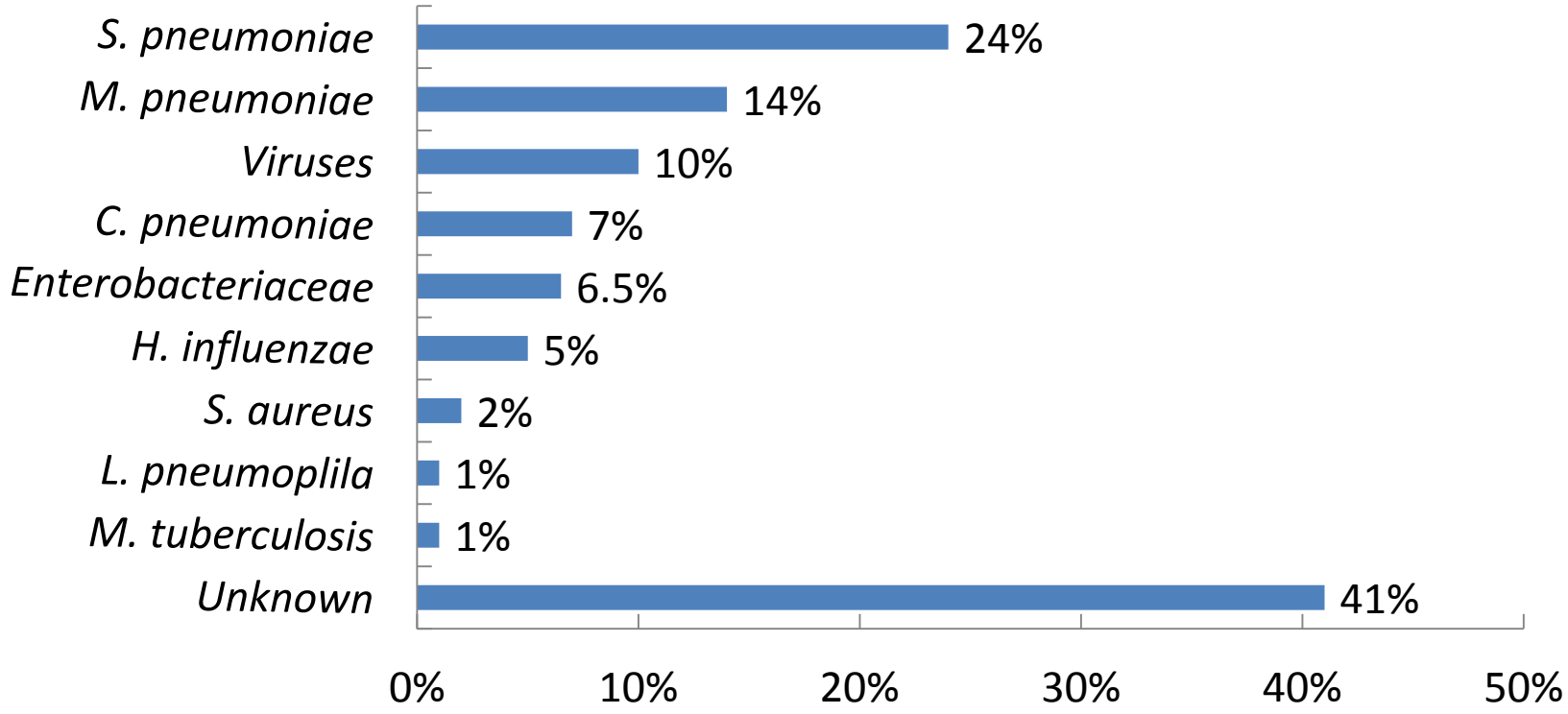
肺炎（致病菌）診斷

- 下列情況視為肺炎病因確定
  - 從不受污染檢體培養出病原，如血液、肋膜腔液、經氣管穿刺或經胸穿刺抽吸液或切片。
  - 檢出非呼吸道正常移生菌，如結核菌、退伍軍人桿菌、流感病毒、卡氏肺囊蟲等。
  - 氣管內管抽吸液、肺泡灌洗術或保護性檢體刷拭術取得下呼吸道檢體，經定量分析培養出高濃度的可能病菌。
  - 血清學檢查確定。

資料來源：國家衛生研究院、臺灣感染症醫學會、臺灣胸腔暨重症加護醫學會

Etiology (definite) of CAP in Taiwan

- 168 Hospitalized Adults, Dec. 2001 to Apr. 2002



資料來源：Lauderdale TL et al. Respir Med 2005;99:1079-86.

Empirical Therapy of CAP

- Treatment is often empiric
- Macrolide monotherapy
  - Not active against >90% *S. pneumoniae*
- Combination therapy
  - Penicillin (high dose) + macrolide
  - β-lactam/ β-lactamase inhibitor + macrolide
  - 2nd- or 3rd cephalosporin + macrolide
- Respiratory (newer) fluoroquinolones
  - Moxifloxacin or levofloxacin or gemifloxacin

資料來源：Clin Infect Dis 2000; 31: 347-82.
Am J Respir Crit Care Med 2001; 163: 1730-54..

2007 ATS/IDSA Guideline for CAP, Out-patients

Outpatient treatment

1. Previously healthy and no use of antimicrobials within the previous 3 months

   A macrolide (strong recommendation; level I evidence)

   Doxycyline (weak recommendation; level III evidence)

2. Presence of comorbidities such as chronic heart, lung, liver or renal disease; diabetes mellitus; alcoholism; malignancies; asplenia; immunosuppressing conditions or use of immunosuppressing drugs; or use of antimicrobials within the previous 3 months (in which case an alternative from a different class should be selected)

   A respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin [750 mg]) (strong recommendation; level I evidence)

   A β-lactam **plus** a macrolide (strong recommendation; level I evidence)

2007 ATS/IDSA Guideline for CAP, In-patients

Inpatients, non-ICU treatment

- A respiratory fluoroquinolone (strong recommendation; level I evidence)
- A β-lactam **plus** a macrolide (strong recommendation; level I evidence)

Inpatients, ICU treatment

- A β-lactam (cefotaxime, ceftriaxone, or ampicillin-sulbactam) **plus** either azithromycin (level II evidence) **or** a respiratory fluoroquinolone (level I evidence) (strong recommendation) (for penicillin-allergic patients, a respiratory fluoroquinolone and aztreonam are recommended)

資料來源：IDSA/ATS Guidelines for CAP in Adults • CID 2007:44 (Suppl 2) • S27

Taiwan Guideline of Pneumonia Management 臺灣肺炎診治指引

Pathogens	First line	Second line
Streptococcus pneumonia	Penicillin, amoxicillin	3^0 or 4^0 cephalosporin vancomycin New fluoroquinolones
Haemophilus influenzae	Penicillin or amoxicillin, Amp / sul, Amo / clav 2^0 cephalosporin	New macrolides, Fluoroquinolones, 3^0 cephalosporin
Legionella species	Erythromycin or new macrolides	Tetracyclines Fluoroquinolones

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

臺灣肺炎治療準則(1/2)

Guidelines on antimicrobial therapy of pneumonia in adults

A. Target Therapy

Etiology	Antibiotic of choice
Streptococcus pneumoniae	
Penicillin MIC	
≤1 μg/mL	Penicillin
	Penicillin or amoxicillin
2 μg/mL	Penicillin (12-18 MU/d)
	Ampicillin or amoxicillin
≥4 μg/mL	Third- or fourth-generation cephalosporins[a]
	Vancomycin or teicoplanin

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

臺灣肺炎治療準則(2/2)

B. Empirical Therapy	
Community-acquired pneumonia	
Age/core pathogen(s)	Antibiotic of choice
Outpatients	
Streptococcus pneumoniae *Mycoplasma pneumoniae* *Chlamydia pneumoniae* *Haemophilus influenzae*, other GNB *Staphylococcus aureus*	Penicillin or Erythromycin, new macrolides or in combination

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

Susceptibility of *S. Pneumoniae* in Taiwan

Drug	%Intermediate	%Resistance
Penicillin	24.6	38.6*
Cefuroxime	8.8	40.4
Ceftriaxone	1.8	0
Erythromycin	1.8	86
Levofloxacin	0	1.8
Moxifloxacin	1.8	0
Ciprofloxacin	-	7

*2.8% resistance if PCN R≧8 μg/ml (≧2 μg/ml before CLSI 2008)

資料來源：Song JA, et al Antimicrob Agents Chemother 2004.
Wang H, et al. Int J Antimicrob 2011.

社區肺炎(1/4)

嚴重度 / 主要致病菌	首　選	另　選
Outpatients		
S. pneumoniae *M. pneumoniae* *C. pneumoniae* *H. influenzae*, other GNB *S. aureus*	Penicillin or Erythromycin, new macrolides[c] or Combination	Ampicillin/sulbactam, amoxicillin/clavulanate, 2° cephalosporins or Erythromycin, new macrolidesc or Combination Tetracyclines Newer fluoroquinolones[b] Telithromycin

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

社區肺炎(2/4)

嚴重度 / 主要致病菌	首　選	另　選
Aspiration pneumonia (including lung abscess)		
Anaerobes	Penicillin or	Penicillin + metronidazole or
S. pneumoniae	Clindamycin	Ampicillin/sulbactam or
Other streptococci		Amoxicillin/clavulanate or
Enterobacteriaceae		2° cephalosporins (cephamycins)[g] or
		Ertapenem

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

社區肺炎(3/4)

嚴重度 / 主要致病菌	首　選	另　選
Inpatients, Mild-to-Moderate		
S. pneumoniae *H. influenzae* Other GNB *Legionella* spp. *C. pneumoniae*	Penicillin, 2[o] cephalosporins or Erythromycin, new macrolides[c] or Combination	Ampicillin/sulbactam, amoxicillin/clavulanate, ertapenem or Erythromycin, new macrolidesc or Combiantion Tetracyclines Newer fluoroquinolones[b] Telithromycin

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

社區肺炎(4/4)

嚴重度 / 主要致病菌	首　選	另　選
Inpatients, Severe, ICU stay[d]		
K. pneumoniae	3° cephalosporins[e] or	Ticarcillin/clavulanate or
S. pneuomniae	Ureidopenicillins ±	Piperacillin/tazobactam or
Legionella spp.	Aminoglycosides[f] ±	4° cephalosporins ±
Other GNB	Erythromycin or	Aminoglycosides[f] ±
P. aeruginosa	new macrolidesc	Erythromycin or new macrolides[c]
Acinetobacter spp.		Fluoroquinolones

「Severe」: ICU, ventilator use, rapid progress, multi-lobar, cavitation, septic shock

資料來源： J Microbiol Immunol Infect. 2007;40:279-283.

Legionella Pneumophila Infection in Taiwan

- CDC specimens (sputum, urine, serum) from 5097 pneumonia patients in Taiwan hospitals, 2001 to 2003.
- 237 (4.7%) diagnosis of Legionellosis
- Paired-serum antibody test was the most effective detection method, followed by urine-antigen detection and the sputum culture.
- Age: >61 yrs, 50.2%, 41-60 yrs, 26.2%, 21-40 yrs, 12.2%.
- Peak season, autumn > winter > summer > spring

資料來源：Su HP, et al. J Infect Chemother 2005;11:244-9.

Diagnostic Features Suggestive of Community-Acquired Pneumonia Caused by Atypical Pathogens (1/2)

Diagnostic feature	Mycoplasma pneumonia	Chlamydia pneumoniae *pneumonia*	*Legionella species pneumonia*
History			
Abdominal pain	–	–	+
Confusion	+/–	–	+
Diarrhea	+/–	–	+
Ear pain	+/–	–	–
Headache (mild)	+	–	–
Myalgias	+	+/–	+
Pleuritic pain	+/–	–	+
Sore throat	+	+	–
Hemoptysis	–	–	+
Pharyngitis (nonexudative)	+	+	–

資料來源：Stout JE. Yu VL. New Engl J Med 1997;337:682-7.

Diagnostic Features Suggestive of Community-Acquired Pneumonia Caused by Atypical Pathogens (2/2)

Diagnostic feature	Mycoplasma pneumonia	Chlamydia pneumoniae *pneumonia*	*Legionella species pneumonia*
Chest radiograph	Patchy infiltrate	Funnel-shaped or circumscribed infiltrate	Patchy consolidation
Laboratory test results			
Cold agglutinins	+	–	–
Hyponatremia	–	–	+
Leukocytosis	+/–	–	+
Microscopic hematuria	–	–	+
Transaminase elevation	–	–	+

資料來源：Stout JE. Yu VL. New Engl J Med 1997;337:682-7.

Legionella Urine Antigen

Test and incubation time (min)	% Sensitivity	% Specificity
Xpect		
15	81 (69/85)	100 (0/86)
60	89 (76/85)	98 (2/86)
NOW		
15	86 (74/86)	100 (0/87)
60	93 (80/86)	100 (0/87)

資料來源：Journal of Clinical Microbiology, July 2009, p. 2272-2274, Vol. 47, No. 7

Box 2 CURB-65 Severity Score[14]

Method

Score 1 point for each of following features that are present:

- Confusion (mental test score ≤8 new disorientation in person, place or time)
- Urea ›7 mmol/l
- Respiratory rate ≥30 breaths/min
- Blood pressure (systolic ‹90 mm Hg, or diastolic ≤60 mm Hg)
- Age ≥65 years

Interpretation of CURB-65 score

0-1: Probably suitable for home treatment; low risk of death

2: Consider hospital supervised treatment

≥3: Manage in hospital as severe pneumonia; high risk of death

資料來源：Menéndez R, et al. Thorax 2004;59:960-965

Length of Antibiotic Treatment

- Uncomplicated CAP
  - ATS Guideline : ≥ 5 days; BTS Guideline : ≥ 7 days
- Severe CAP, both ATS and BTS : ≥ 10 days
- Meta-analysis of RCTs (5-7 days vs. > 7 days)
  - No differences in clinical and bacteriological success, mortality, adverse effects in mild to moderate CAP
- Depend on clinical response and pathogens

資料來源：Macfarlane JT, Boldy D. Thorax 2004;59:364-6.
Mandell LA, et al. Clin Infect Dis 2007;44:S27-72.
Moussaoui RE, et al. BMJ 2006;332:1355-61.

Performance Indicator-Pneumonia (1/2)

- Blood cultures prior to antibiotic in hospitalized P’ts (B-III)
- Antibiotic initiation within 4 h after registration for hospitalized patients with CAP (B-III)
- Smoking cessation for hospitalized Pt’s with CAP (B-II)
- *Legionella* tests (culture or antigen) for 50% for ICU admission for severe pneumonia (A-III)

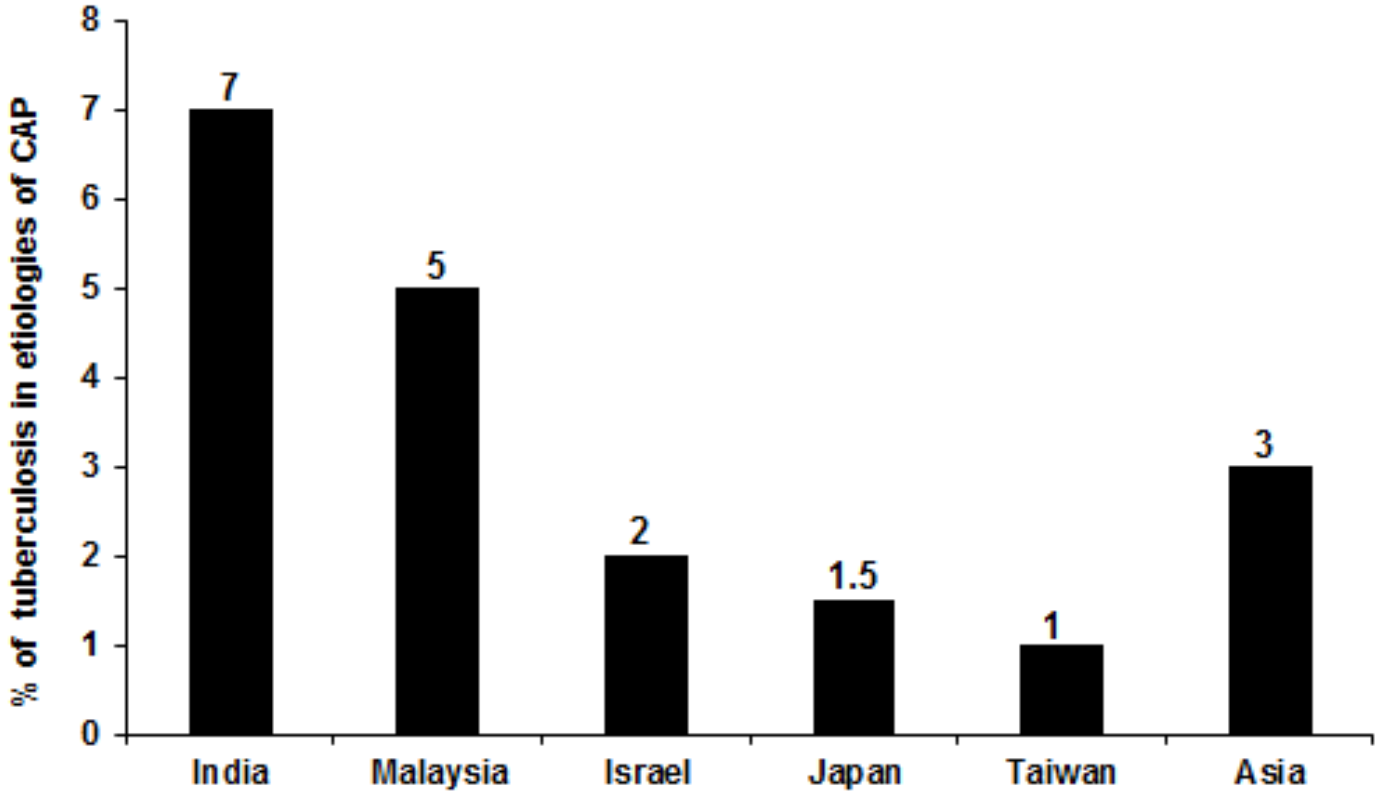
資料來源：Mandell LA. Clin Infect Dis 2003; 37:1405–33

Performance Indicator-Pneumonia (2/2)

- Oxygenation by arterial blood-gas or pulse oximetry within 8 h after admission (A-III)
- Demonstration of infiltrates by chest radiograph or other images in all patients diagnosis of CAP (A-I)

資料來源：Mandell LA. Clin Infect Dis 2003; 37:1405–33

Proportion of TB as Causative Agent of CAP in Asia



資料來源：Lauderdale et al, Respir Med 2005;99:1259
Yen et al, J Formos Med Assoc 2005;104:724
Liam et al, Respirology 2006;11:786

Pulmonary TB Presenting as CAP

Clinical feature	Adjusted OR	95% CI	P-value
Age up to 40 years	1.47	0.34–6.45	0.611
Duration of symptoms >2 weeks	25.10	4.63–136.05	<0.001
History of night sweats	5.43	1.10–26.79	0.038
History of weight loss	0.76	0.18–3.56	0.764
Upper lobe involvement	8.23	1.59–42.53	0.012
Cavitary infiltrates on CXR	19.41	2.94–128.19	0.002
Total WBC of 12×10^9/L or less	6.28	1.21–32.52	0.029
Lymphopenia	4.73	1.08–20.85	0.040

資料來源：Liam CK, et al. Respirology 2006;11:786–792.

Therapy for Hospitalized CAP

Initial empiric therapy	*S. pneumoniae*	*Legionella*
• b-lactam plus macrolide combination (A-I) • respiratory fluoroquinolone alone (A-I) • ICU admission: b-lactam + respiratory FQs (B-III).	• If PCN “S”, PCN or amoxicillin alone (B-II). • If PCN “R”, cefotaxime, ceftriaxone, or FQ (A-III).	• For hospitalized patients, azithromycin or FQs (moxifloxacin, gatifloxacin, levofloxacin) (B-II). • For non-hospitalized patients, erythromycin, • doxycycline, azithromycin, clarithromycin, or FQ (A-II).

大綱

Community-acquired Pneumonia

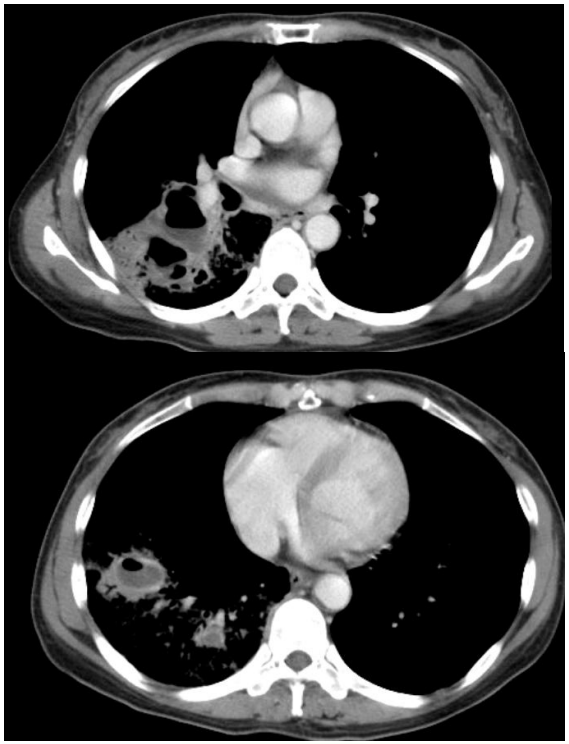
Lung abscess & Empyema

Healthcare Associated Pneumonia

案例分析

- 51 y/o female, CAP, purulent cough for 3 days
  - fever, hemoptysis, dyspnea, no underlying disease

Staphylococcus aureus



Lung Abscess & Empyema

- Aspiration : anaerobes, streptococcus
- Bacteremia : *Staphylococcus aureus, Klebsiella pneumoniae, Streptococcus*
- Local trauma, perforation of esophagus
- Obstructive lesion, bronchiectasis, cystis fibrosis: varied, may with *Pseudomonas*
- Surgery, bronchoscopic exam : *Pseudomonas*, MRSA, rapid growing Mycobaterium

Diagnosis of Empyema

- Pleural effusion tapping
  - Purulent color
  - Low effusion glucose
  - Low pH
  - Positive smear or culture
- Lung abscess aspiration or drainage

Lung Abscess & Empyema

- Needle aspiration
- Chest tube drainage
- VATS & Surgery

- Prolonged antibiotic 4-6 weeks might needed
  - Depended on pathogen, clinical response, and host condition

Recommended Antimicrobial Therapy for Pathogens

Organism	Preferred antimicrobial(s)	Alternative antimicrobial(s)
Streptococcus pneumoniae		
Penicillin nonresistant; MIC <2 μg/mL	Penicillin G, amoxicillin	Macrolide, cephalosporins (oral [cefpodoxime, cefprozil, cefuroxime, cefdinir, cefditoren] or parenteral [cefuroxime, ceftriaxone, cefotaxime]), clindamycin, doxycyline, respiratory fluoroquinolone[a]
Penicillin resistant; MIC ≥2 μg/mL	Agents chosen on the basis of susceptibility, including cefotaxime, ceftriaxone, fluoroquinolone	Vancomycin, linezolid, high-dose amoxicillin (3 g/day with penicillin MIC ≤4 μg/mL)
Haemophilus influenzae		
Non–β-lactamase producing	Amoxicillin	Fluoroquinolone, doxycycline, azithromycin, clarithromycin[b]
β-Lactamase producing	Second- or third-generation cephalosporin, amoxicillin-clavulanate	Fluoroquinolone, doxycycline, azithromycin, clarithromycin[b]

資料來源：IDSA/ATS Guidelines for CAP in Adults • CID 2007:44 (Suppl 2) • S27

大綱

Community-acquired Pneumonia

Lung abscess & Empyema

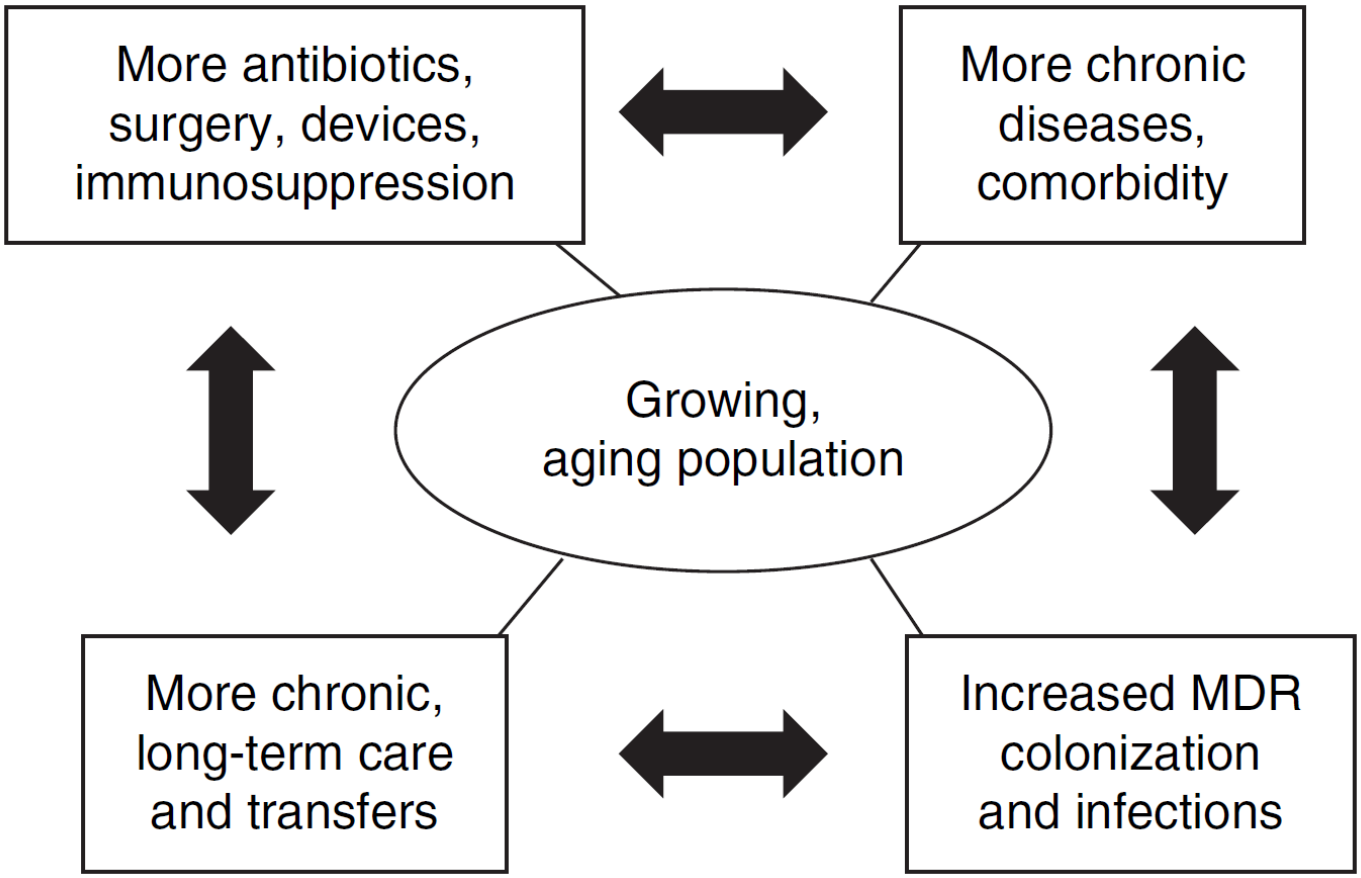
Healthcare Associated Pneumonia

Definition of Pneumonia

- Community-acquired pneumonia (CAP)
- Hospital acquired pneumonia (HAP)
  - Onset of symptoms ≥48-72 h after hospitalization
- Ventilator associated pneumonia (VAP)
  - Develop during mechanical ventilation
- Healthcare associated pneumonia (HCAP)
  - Had a history of exposure to healthcare environment
  - Potentially infected with multidrug-resistant bacteria

資料來源：ATS / IDSA. Am J Respir Crit Care Med 2005;171:388-416.

HCAP: An Emerging Pattern of Pneumonia



資料來源：Chroneou, et al. Expert Opin. Pharmacother. 2007;8:3117-31.

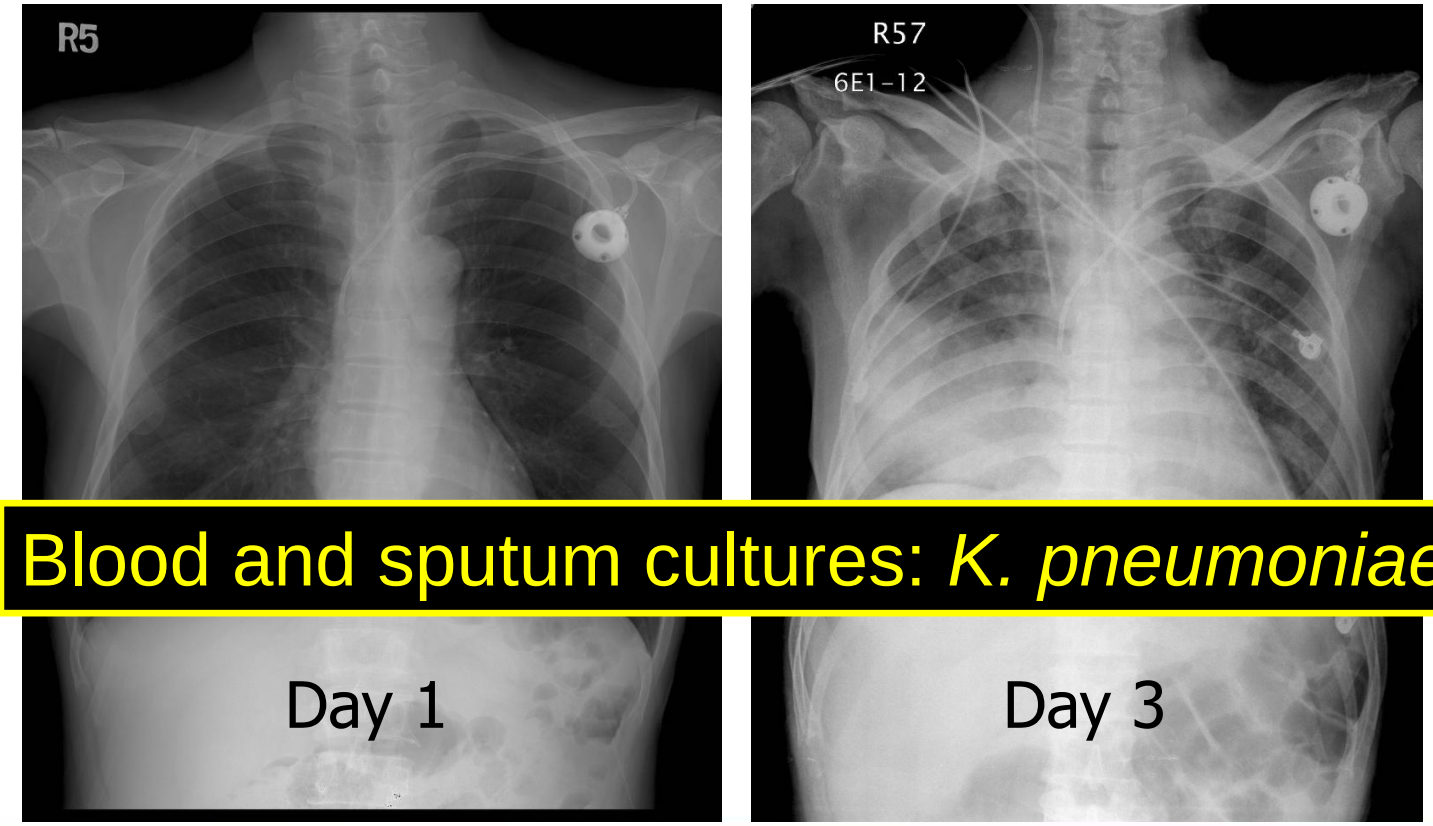
Healthcare Associated Pneumonia

- Incidence among hospitalized pneumonia
  - 17-67%
- Compared to Community acquired pneumonia
  - More elderly
  - Greater co-morbidities
    - DM, CVD, stroke, cancer, COPD,...
  - More likely to have aspiration
  - Caused by multiple drug resistant pathogens

資料來源：Carratala J, et al. Curr Opin Infect Dis 2008;21:168-173.(Review)

案例分析(1/2)

- 55 y/o male with colon cancer received chemotherapy. Fever, productive cough and dyspnea for 2 days.



Blood and sputum cultures: *K. pneumoniae*

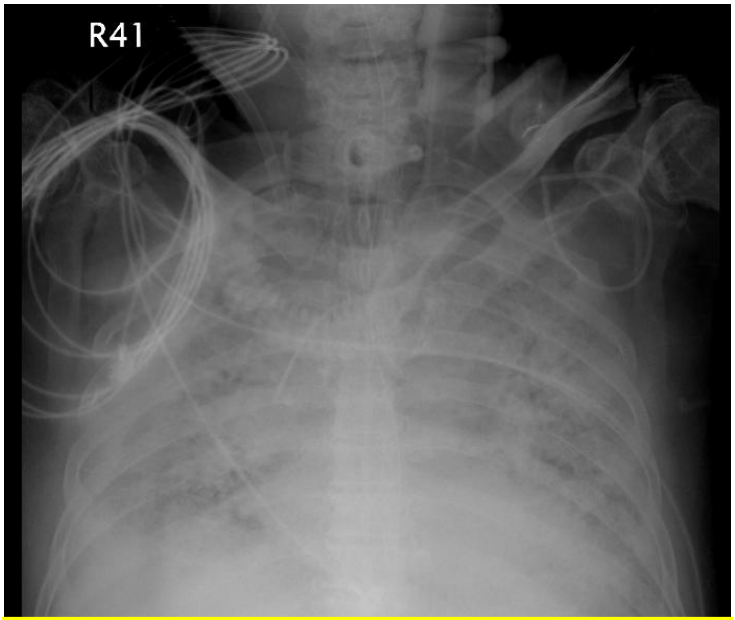
案例分析(2/2)

- 80 y/o male, a nursing home habitant with old stroke, coronary artery disease, congestive hear failure and chronic obstructive pulmonary disease. Fever and productive cough for 3 days.

Endotracheal aspirate:

1:(2+) *Acinetobacter baumannii*

Antibiotic(S,I,R)	1	2	3
GM : Gentamicin 10μg	R		
AN : Amikacin	R		
CIP : Ciprofloxacin	R		
FEP : Cefepime	R		
ATM : Aztreonam	R		
CAZ : Ceftazidime	R		
TIM : Ticar/Clavulanate	R		
MEM : Meropenem	R		
LVX : Levofloxacin	R		
SAM : Ampicillin/Sulba	R		



MDR-*Acinetobacter*

Microbiology of HCAP

- HCAP is included in spectrum of HAP
  - Need combination therapy for MDRO
  - Aerobic gram-negative bacteria, MRSA
- Caused by a wide spectrum of microbes
  - Polymicrobial etiology is common
  - Aspiration pneumonia is common
    - *S. pneumoniae; H. influenzae; M. catarrhalis*
  - Narrow-spectrum therapy

資料來源：ATS / IDSA. Am J Respir Crit Care Med 2005;171:388-416.
Chalmers JD, et al. Clin Infect Dis. 2011;53:107–13.
Ishida T, et al. Intern Med. 2012;51:2537–44.

Etiology of HCAP, Compared with CAP

Aetiology	Kollef *et al.* [12] HCAP ($n=988$)	Kollef *et al.* [12] CAP ($n=2221$)	Kollef *et al.* [12] *P*	Carratalà *et al.* [9••] HCAP ($n=126$)	Carratalà *et al.* [9••] CAP ($n=601$)	Carratalà *et al.* [9••] *P*	Micek *et al.* [13••] HCAP ($n=431$)	Micek *et al.* [13••] CAP ($n=208$)	Micek *et al.* [13••] *P*
Streptococcus pneumoniae	5.5	16.6	<0.01	27.8	33.9	NS	10.4	40.9	<0.001
Staphylococcus aureus	46.7	25.5	<0.01	2.4	0	0.005	44.5	25.5	–
MRSA	26.5	8.9	<0.01	0.8	0	–	30.6	12.0	<0.001
Other Gram positive	14.8	20.5	<0.01	–	–	–	–	–	–
Haemophilus influenzae	5.8	16.6	<0.01	11.9	6.0	0.02	4.2	17.3	<0.001
Legionella	–	–	–	2.4	8.8	0.01	0.2	3.4	0.017
Aspiration pneumonia	–	–	–	20.6	3.0	<0.001	–	–	–
Gram-negative bacilli	–	–	–	4.0	1.0	0.03			
Pseudomonas aeruginosa	25.3	17.1	<0.01	1.6	0.5	–	25.5	4.8	<0.001
Escherichia coli	5.2	4.8	NS	2.4	0.3	–	4.2	5.8	NS
Klebsiella pneumoniae	7.6	9.5	NS	0	0.2	–	6.5	3.4	NS
Other Gram negative	9.5	4.1	<0.01	–	–	–	19	4.3	<0.001
Atypical agents	–	–	–	1.6	3.7	NS	–	–	–
Other organisms	–	–	–	3.2	1.7	NS	–	–	–
No pathogen identified	–	–	–	32.5	43.9	0.02	–	–	–

資料來源：Kollef MH. Chest 2005; 128:3854-62.
Carrratala J. Arch Intern Med 2007;167:1393-9.
Micek ST, et al. Antimicrob Agents Chemother 2007; 51:3568–3573.

Etiology of HCAP are Heterogeneous

- Nursing Home - Acquired Pneumonia

Etiology	*Percentage of isolates*
Gram-negative bacilli	Up to 55
Streptococcus pneumoniae	Up to 48
Staphylococcus aureus	Up to 33
Haemophilus influenzae	Up to 22
Viruses	Up to 10
Pseudomonas aeruginosa	Up to 7
Legionella pneumophila	Up to 6
Mycoplasma pneumoniae	Up to 1

資料來源：Mills K, et al. Am Fam Physician. 2009;79(11):976-982.

Prospective Comparison of NHCAP with CAP

- Higher initial treatment failure (14.6 vs. 7%, P=0.047)
- Higher 30-d mortality (10.9 vs. 3.5 %, P = 0.022)
- Longer hospital stay (m, 12 vs. 8 days, P<0.001)
- Aspiration in 63.5% of NHCAP
  - Strep pneumoniae is common (33.9%)
  - Low rate of atypical pathogen (1.7%)
- Similar MDR-bacteria (11.0 vs. 4.5 %, P = 0.135)
- Higher recurrence (9.9 vs. 3.5%, P=0.04)

→ **Narrow-spectrum monotherapy for NHCAP !**

資料來源：Fukuyama H, et al. J Infect Chemother 2013

Antibiotic Treatment for HCAP

- Cover possible etiology empirically
- Microbiological exam, early intervention if poor response to initial therapy
- Known the susceptibility (MIC) of pathogen if difficult-to-treat pathogen
- Appropriate PK/PD
- Antimicrobial combination if MDR-pathogen
- De-escalating to monotherapy and short course as possible

Personal opinions

Combination or Monotherapy for HCAP(1/2)

ATS/IDSA Guideline - combination for HCAP

- After 2-3 days the possibility of monotherapy may be considered based on clinical response and culture data.
- “if *P.aeruginosa*, resistant *Acinetobactor* or MRSA have not been isolated and the patient is improving, it might be reasonable to change to monotherapy….”

資料來源：ATS/IDSA Guidelines. Am J Respir Crit Care Med 2005;171:388–416

Combination or Monotherapy for HCAP(2/2)

- Overtreatment without any evidence for improve outcome
- Narrow spectrum monotherapy success in most cases

資料來源： Ewig S, et al. Cur Opin Infect Dis 2012;25;166-175

課程結束