



UMC Utrecht

The appropriateness of community-acquired pneumonia guideline recommendations for treatment of healthcare-associated pneumonia in countries with low antibiotic resistance

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Conflicts of interest

- No conflicts of interest



Introduction

2005

- Healthcare associated pneumonia (HCAP) introduced¹

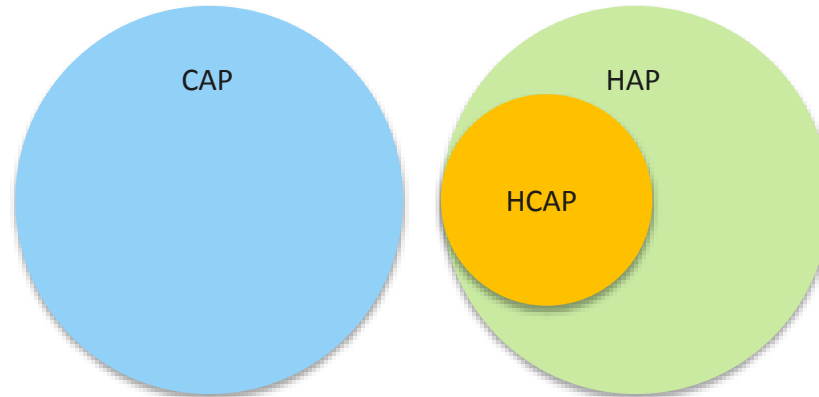
HCAP definition	
Residence of	- Nursing home
	- Long-term care facility
Within last 90 days	- Hospitalization ≥ 2 days
Within last 30 days	- i.v. antibiotic therapy
	- Woundcare
	- Chemotherapy
	- Attended hospital/hemodialysis clinic

¹ IDSA, Am J Respir Crit Care Med 2005



Introduction

- In spectrum of hospital-acquired pneumonia (HAP)



Introduction

2016

- HCAP \neq resistant pathogens¹
- HCAP removed from HAP guideline²

¹ Chalmers et al, CID 2014

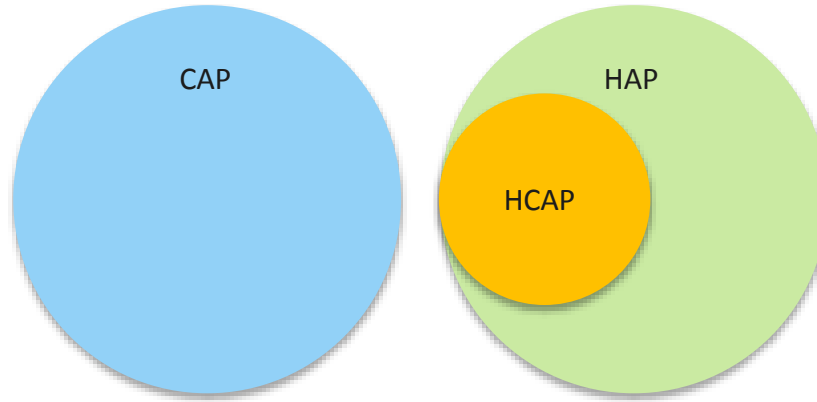
² Kalil et al, CID 2016



Introduction

2016

- HCAP \neq resistant pathogens¹
- HCAP removed from HAP guideline²
- Suggestion: implement in CAP guideline²



¹ Chalmers et al, CID 2014

² Kalil et al, CID 2016



Introduction

2016

- HCAP \neq resistant pathogens¹
 - Resistant pathogens:
 - MRSA
 - Gram-negative Enterobacteriaceae
 - *Pseudomonas aeruginosa*
 - However:
 - Resistance to empiric treatment more relevant
 - Low resistant countries: narrow-spectrum beta-lactam (amoxicillin or penicillin)

¹ Chalmers et al, CID 2014

² Kalil et al, CID 2016



Introduction

Research objective:

Investigate whether HCAP criteria predict pneumonia caused by amoxicillin resistant pathogens in moderate-severe CAP patients

¹ Chalmers et al, CID 2014

² Kalil et al, CID 2016



Method

- Data from the CAP-START trial¹
 - Multicentre cluster randomized trial
 - Patients hospitalized for moderate-severe CAP
 - 7 hospitals in the Netherlands
 - February 2011 – August 2013

¹ Postma et al. NEJM. 2015



Methods – data collection

- HCAP criteria
- Microbiology results
 - Sputum cultures
 - Blood cultures
 - Susceptibility patterns
 - Pneumococcal urine antigen tests
 - Legionella urine antigen tests

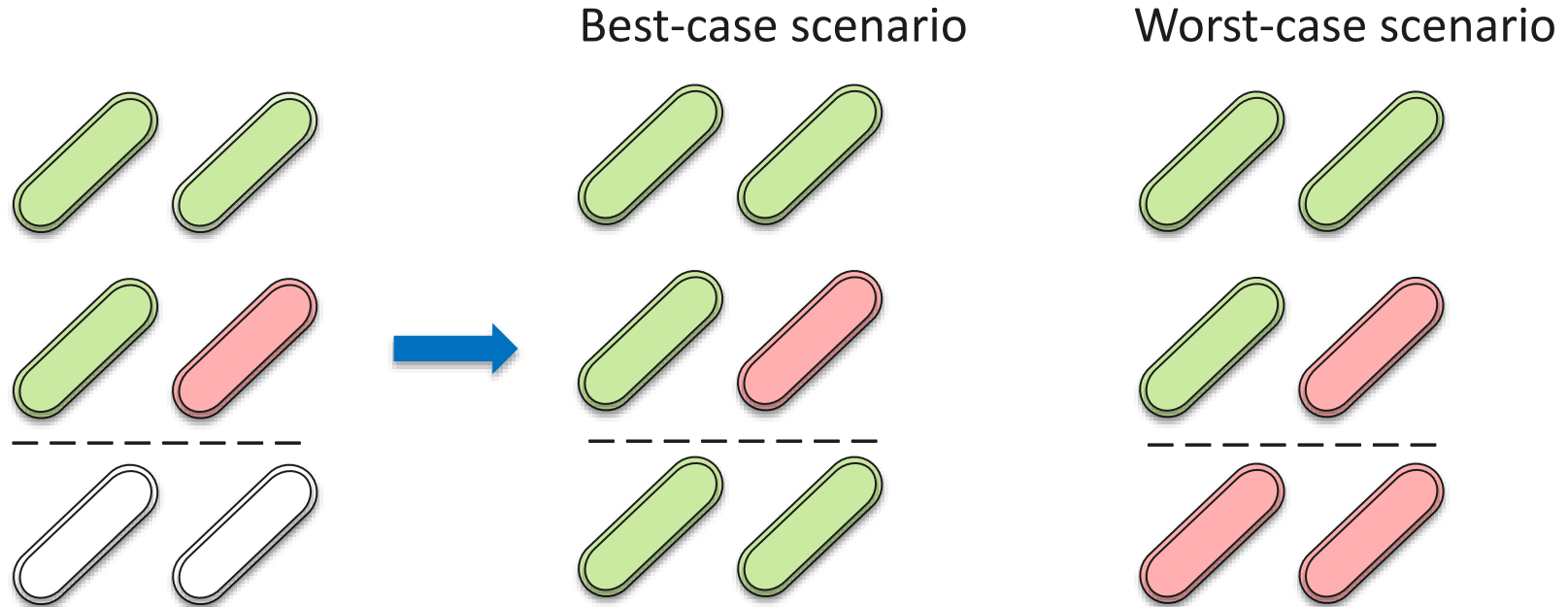


Methods – data analysis

- In case of missing susceptibility:
 - Intrinsically resistant → resistant
 - Pathogen with resistance to amoxicillin $>95\%$ → resistant
 - Pathogen with resistance to amoxicillin $<5\%$ → susceptible



Methods – sensitivity analysis



Results – baseline characteristics

	CAP	HCAP	p-value
Patients (n)	77% (1756)	23% (527)	
Age (y, median, range)	70 (18-99)	72 (19-100)	<0,01¹
Male	57%	61%	0,07 ²
Smoking	21%	19%	0,12 ²
Immunocompromised	18%	40%	<0,01²
PSI-score (mean)	132	137	0,08 ³

1. Mann-Whitney U test
2. Pearson Chi-Square test
3. Independent T-test



Results – microbiology

	CAP	HCAP	p-value
Sputum culture	46%	44%	0,50 ¹
Blood culture	76%	76%	0,99 ¹
Pneumococcal urine antigen test	79%	77%	0,29 ¹
Legionella urine antigen test	77%	72%	0,03¹

1. Pearson Chi-Square test

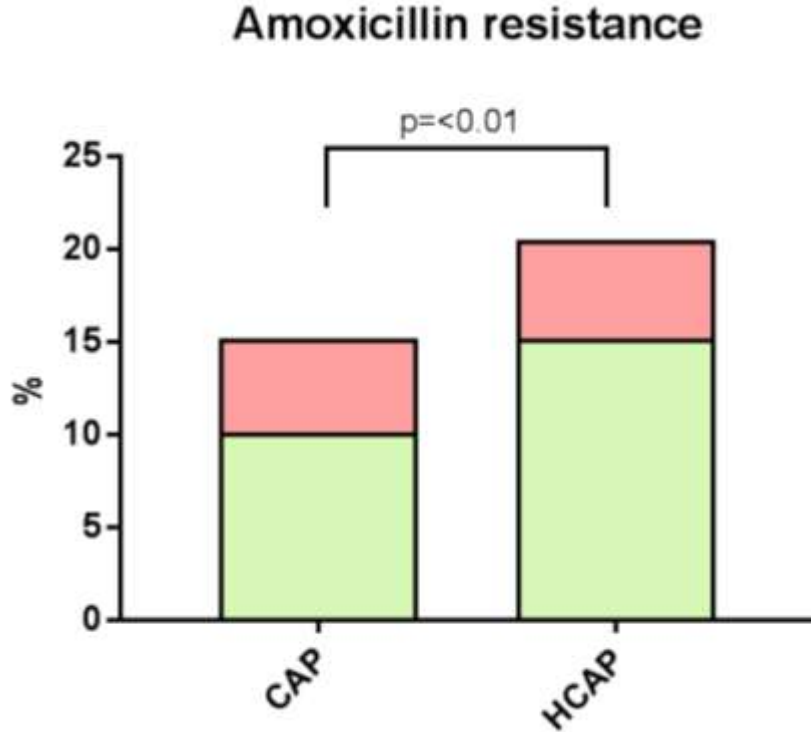


Results - pathogens

	CAP	HCAP
<i>Streptococcus pneumoniae</i>	15,4%	12,1%
<i>Haemophilus influenzae</i>	7,5%	6,5%
<i>Staphylococcus aureus</i>	2,4%	4,6%
<i>Escherichia coli</i>	2,1%	6,1%
<i>Pseudomonas species</i>	1,8%	4,4%
<i>Moraxella catarrhalis</i>	1,5%	1,5%
<i>Klebsiella species</i>	1,3%	1,9%
<i>Legionella pneumophila</i>	1,0%	0,2%
No bacterial pathogen	66,6%	65,5%



Results



	Amoxicillin resistance		
	CAP	HCAP	p-value
Best-case scenario	10,1%	15,0%	<0,01¹
Worst-case scenario	15,2%	20,3%	<0,01¹

1. Pearson Chi-Square test



Discussion

- Majority no bacterial pathogen → uncultured resistance?
- Consequences of resistance for empirical treatment unknown
- Other factors better predictors?
 - Previous cultures with resistant bacteria
 - Co-morbidities
 - Chronic obstructive pulmonary disease
 - Immunosuppression



Conclusion

- Amoxicillin resistance 5% higher in HCAP patients
- HCAP more frequently caused by:
 - *Staphylococcus aureus*
 - *Pseudomonas* species
 - *Escherichia coli*
- Absolute risks are low
- Focus on identifying better predictors for resistance



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Method

