

## Background

- Despite published guidelines which include indications for pathogen-directed therapy, the overall trend has been towards empiricism, which clashes with emerging notions of antibiotic stewardship.
- Once empiric, broad-spectrum antibiotics have been started, it is difficult to determine how to de-escalate; in many cases, physicians are likely to continue a full course of treatment.

## Objective

- Determine patterns of antibiotic use for CAP patients in regard to clinical and conventional microbiological findings.
- Evaluate the effect of systematic application of PCR for respiratory viruses on antimicrobial use.

## Methods

**Study Design:** Prospective, observational study of all patients admitted to the M. E. DeBakey Veterans Affairs Medical Center with a diagnosis of community acquired pneumonia (CAP) from July 5, 2011 to June 30, 2012. In addition to careful clinical evaluation, intense diagnostic study of every patient was planned.

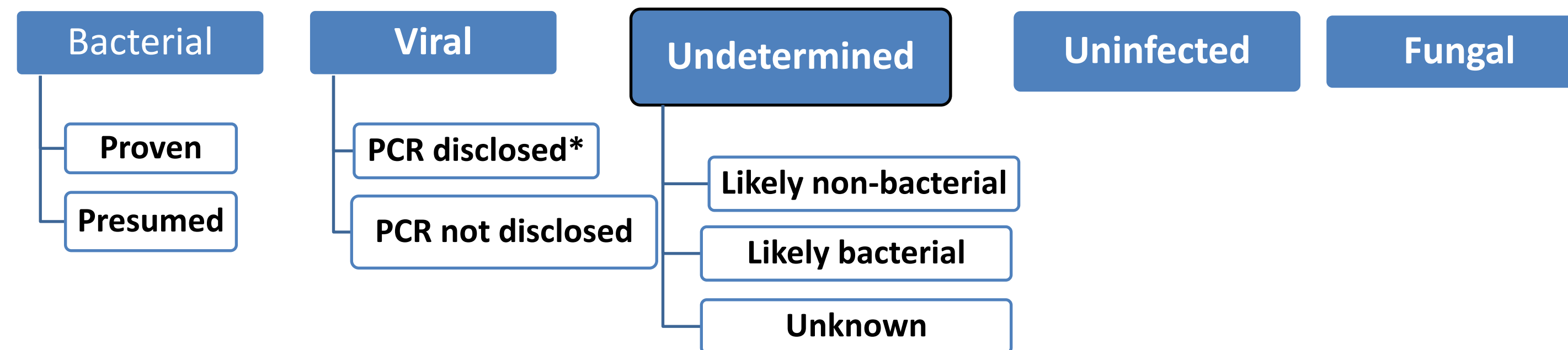
**Patients:** A total of 259 patients were included (about 5% refused to participate). Laboratory studies included: Blood cultures (97.7%); sputum gram stain and culture (83.3%); Urine pneumococcal and Legionella antigen (93.1%); PCR for 15 respiratory viruses (97.7%), serum procalcitonin level (100%).

- Results of viral PCR assays were not reported in the medical record
- Some PCPs were informed of PCR results in a non-systematic fashion

### Outcomes:

- Total # of antibiotics given
- Total duration of antibiotics
- Total sum of all antibiotics given in antibiotic-days (e.g. 1 antibiotic for 10 days and another for 7 days = 17 antibiotic-days)

## Diagnostic Categories



## Results

Table I. Antibiotic use by diagnostic category\*

Diagnostic category	N	# of Antibiotics	Total Duration of Antibiotics**	Antibiotic-Days
<b>Bacterial</b>				
Proven	28	3 (2,4)	12 (9,16)	18 (11.5,25)
Presumptive	32	3 (2,4)	13 (10,15)	16.5 (14,24)
<b>Total</b>	<b>60</b>	<b>3 (2,4)</b>	<b>13 (10,15)</b>	<b>16.5 (13,24)</b>
<b>Viral</b>				
PCR disclosed	11	2 (1,3)	7 (6,10)	9 (6,15)
PCR not disclosed	19	3 (2,3)	12 (7,15)	13 (10,20)
<b>Total</b>	<b>30</b>	<b>3 (1,3)</b>	<b>9 (6,13)</b>	<b>12.5 (8,17)</b>
<b>Undetermined</b>				
Likely non-bacterial	18	2.5 (1,4)	11 (9,14)	14 (10,20)
Likely bacterial	69	3 (2,4)	11 (8,14)	15 (11,23)
Unknown	32	2.5 (1,4)	8.5 (7,12)	12 (10,17.5)
<b>Total</b>	<b>119</b>	<b>3 (2,4)</b>	<b>10 (8,14)</b>	<b>15 (10,21)</b>
<b>Uninfected</b>	<b>44</b>	<b>3(2,3)</b>	<b>8(5,10.5)</b>	<b>12.5(7.5,18)</b>
<b>Fungal</b>	<b>6</b>	<b>3.5 (3,4)</b>	<b>21 (21,23)</b>	<b>32 (30,34)</b>

\*Results presented as medians with 25<sup>th</sup> and 75<sup>th</sup> percentiles in parentheses.

\*\* Duration presented as number of days

Table II. Comparison of antibiotic use in various diagnostic groups

	N <sub>1</sub>	Group 2	N <sub>2</sub>	Number of antibiotics (95% CI)	P-value	Antibiotic duration (95% CI)	P-value	Antibiotic-days (95% CI)	P-value
<b>Group 1</b>									
Bacterial proven	28	Bacterial presumptive	32	(0,1)	>0.9	(-3,2)	>0.9	(-4,5)	>0.9
<b>Viral (PCR disclosed)</b>	<b>11</b>	<b>All bacterial</b>	<b>60</b>	<b>(-2,0)</b>	<b>0.85</b>	<b>(-7,-2)</b>	<b>0.05</b>	<b>(-13,-3)</b>	<b>0.08</b>
Viral (PCR not disclosed)	19	All bacterial	60	(-1,0)	>0.9	(-5,1)	>0.9	(-8,0)	>0.9
Viral (PCR disclosed)	11	Viral (PCR not disclosed)	19	(-2,0)	>0.9	(-6,2)	>0.9	(-9,2)	>0.9
Likely non-bacterial	18	Likely bacterial	69	(-1,0)	>0.9	(-2,3)	>0.9	(-6,4)	>0.9
Undetermined	119	All bacterial	60	(-1,0)	>0.9	(-3,0)	0.28	(-5,0)	>0.9
<b>Not infected</b>	<b>44</b>	<b>All bacterial</b>	<b>60</b>	<b>(-1,0)</b>	<b>&gt;0.9</b>	<b>(-6,-3)</b>	<b>&lt;0.0001</b>	<b>(-8,-2)</b>	<b>0.05</b>

• P-values compare groups using the Wilcoxon rank sum test with Holm's step-down Bonferroni correction for multiple comparisons.

## Discussion

- Majority of patients hospitalized with a diagnosis of CAP received a similar duration and intensity of antibiotics treatment, even if presentation did not appear consistent with a bacterial etiology.
- The only 2 groups of patients who had reduced antibiotic exposure were those who were thought to be uninfected (CHF, lung cancer, pulmonary fibrosis) and those in whom a respiratory virus was identified by PCR and whose physicians were notified early of that result.

## Conclusion

- Our study supports the potential usefulness of newer microbiological techniques such as PCR for respiratory viruses.
- Future studies will need to apply an economic analysis to determine whether routine use of viral PCR is justified in patients admitted for treatment of CAP.
- Reminders or automatic discontinuation of antibiotics rather than educational efforts emphasizing guidelines may be needed to limit excessive antibiotic usage.