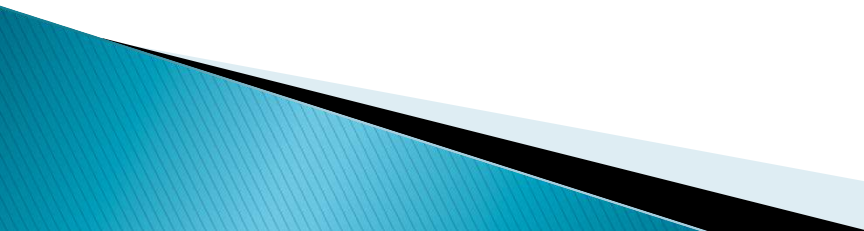# Pneumonia in the ICU: methodological keys, microbiological studies, antibiotic treatment and outcomes
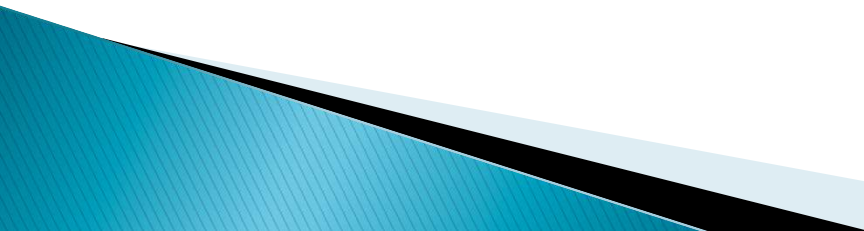
Dr Gabriel Levy Hara
Infectious Disease Unit
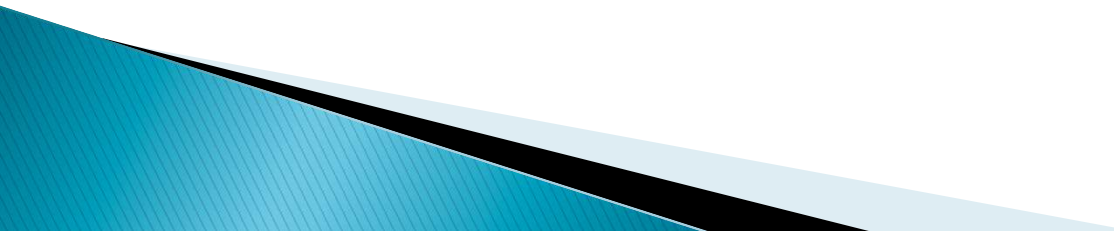Hospital Carlos G Durand
Buenos Aires, Argentina
Chair, International Society of Chemotherapy, Antimicrobial Stewardship Working Group

Methodology: general points

- Prospective collected data from February– August 2011
- 25 episodes of pneumonia in patients on mechanical ventilation.
- 23 specimens obtained through tracheal aspiration
- 3 obtained through bronchoscopic BAL.
- The majority of pneumonia episodes during the study period have positive bacteriological results
- All data presented – 25 episodes– had clinical and/or radiological criteria for pneumonia.

- Positive results from respiratory specimens without clinical/radiological suspicion of pneumonia were not analyzed (near 20%).
- Cut off point for positive tracheal aspirate: $>10^6$ CFU/mL
- Characteristics of the sample ($>$ 25 WC, $<$10 epithelial cells) and gram stain was also considered.
- 2 episodes were CAP, and 24 VAP

- Clinical criteria used to define VAP are two or more of the following:
- radiographic infiltrate that is new or progressive
- new onset of fever
- increasing secretions and/or its purulent aspect
- leukocytosis
- decline in oxygenation

- Also, septic syndrome with one of the mentioned criteria and without another evident focus, was considered as a probable VAP.

Methodology: how we work...

- From early ´90s Infectious Disease team perform three medical rounds in Hospital´s ten- bed ICU, jointly with ICU´s medical staff and residents.
- General algorithms (when to culture, what to culture, empirical ATB treatments, interpretation of microbiological results, de-escalation and other issues) have been -and are currently- largely discussed.
- Among this, a tracheal aspirate is performed every time a VAP is suspected. *As years passed by, most physicians strongly adheres to this*!

- *Moreover…about 20% of respiratory samples should not have been obtained due to lack of other – clinical or radiological– criteria…!*
- Microbiology Division enters results to the lab database manually (except for blood cultures, which goes from the computer interface to the Omega system of the lab)
- During the seven days of the week, ICU´s residents goes to the Microbiology Division, revise all the results and copy them to a specific table in a fold.
- Computer terminals are not widely available yet…

- Results are near always available during the joint rounds. Every patient with infection or under ATB treatment is discussed, and the significance of microbiological results interpreted.
- Those respiratory material without clinical correlation – irrespective of yielding $>10^4$ CFU/ml– are not considered – for therapeutic means.
- Pharmacy data regarding ATM consumption is available but not linked with the rest of variables under discussion.
- Empirical ATM recommendations is permanently discussed, depending upon changes in ICU´s flora.

Main results

- CAP= 2; VAP= 23.
- Age: 25−100 y (mean: 60.2); Male: 15, Female: 11
- Co-morbid diseases: 23/26 (cardiovascular 6; neurological 5; oncological 4; AIDS 3; COPD 2; diabetes 2; obese 1, other immunodeficiency 1)
- Mean days of intubation prior to VAP: 13.9 (0−47)
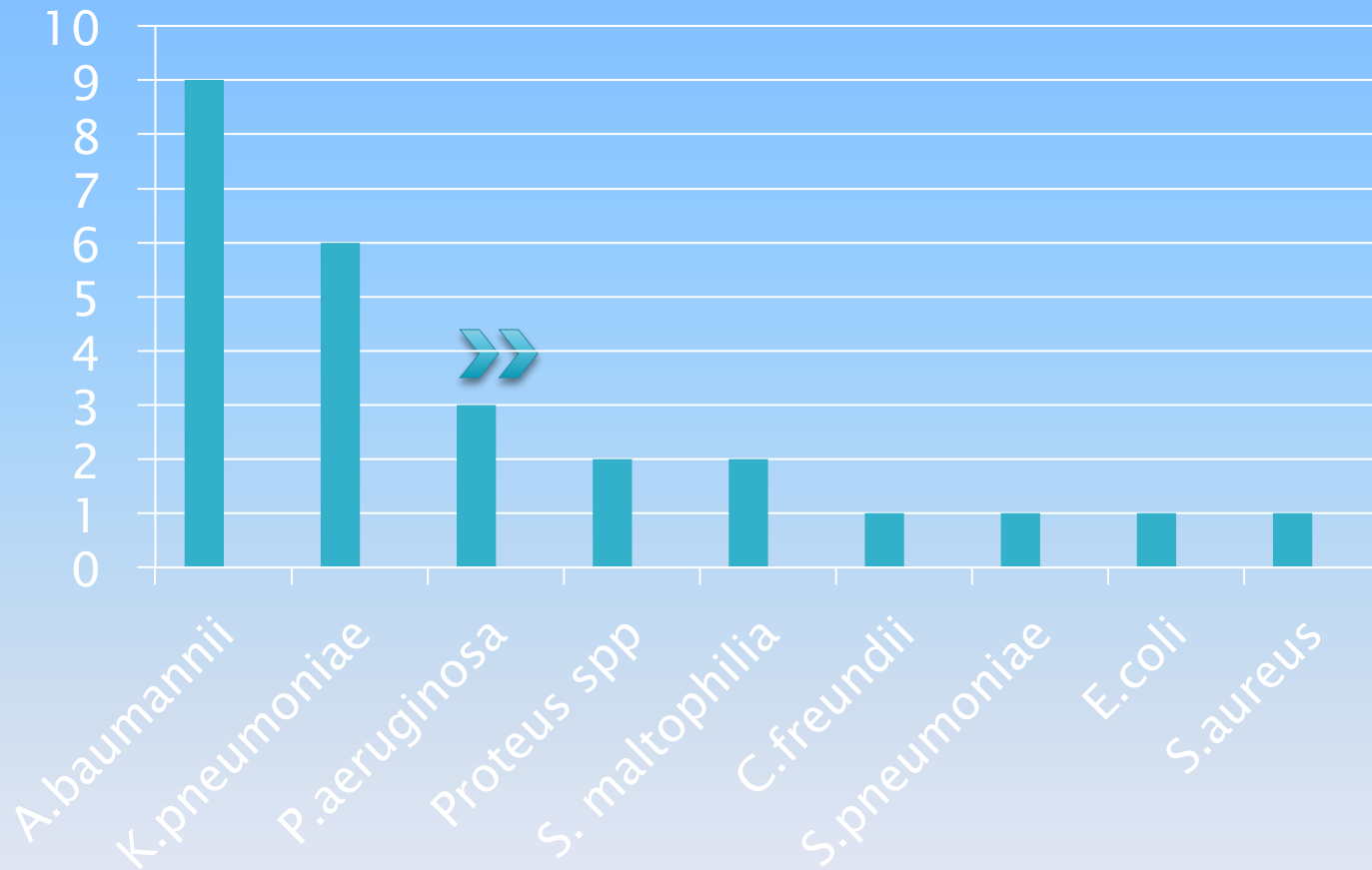
Previous ATB treatments

Previous ATB:
- None: 7 pts
- Yes: 16 pts.

ANTIBIOTIC	Nº
Vancomycin	9
Imipenem	8
Piper/tazo	8
Ampi/sulb	8
Ciprofloxacin	8
Amikacin	6
Colistin	5
Clindamycin	3
Rifampin	3
Ceftriaxone	2
Cotrimoxazole	2
Ampicillin	2
Tygecicline	1
Ertapenem	1
Metronidazole	1
Gentamicin	1

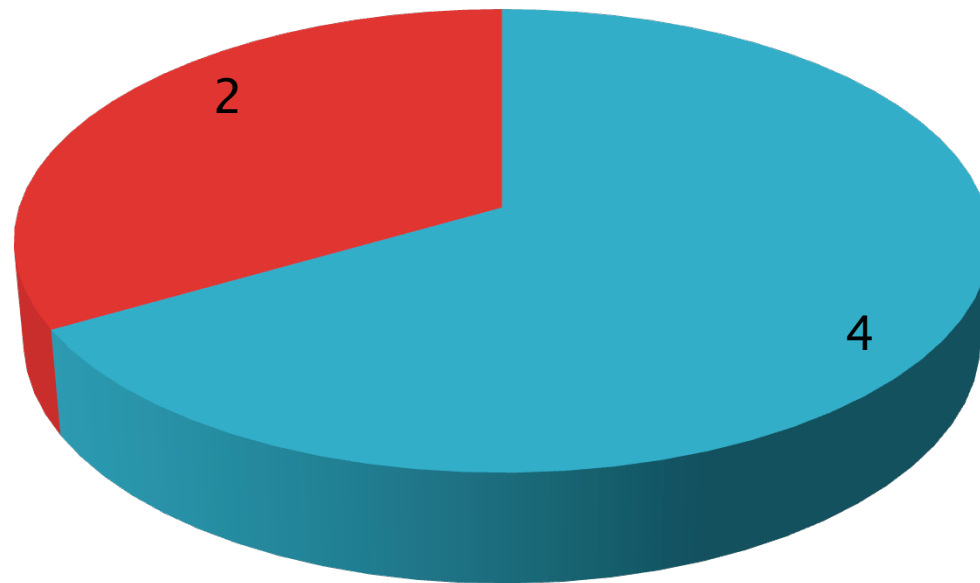| Nº of previous ATB received	N=
0	7
1	0
2	4
3	4
4	2
5	3
6	1
7	0
8	2
9	1

Etiology

CAP: *K.pneumoniae* (1), *S.pneumoniae* (1)
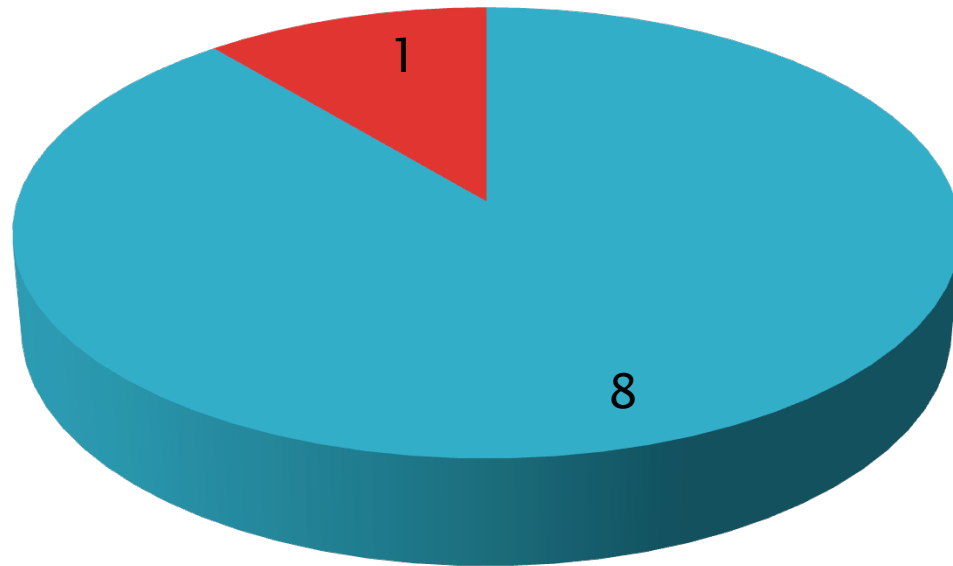VAP: One episode with mix infection (*K.pneumoniae* KPC + *A.baumannī*)

Susceptibility pattern
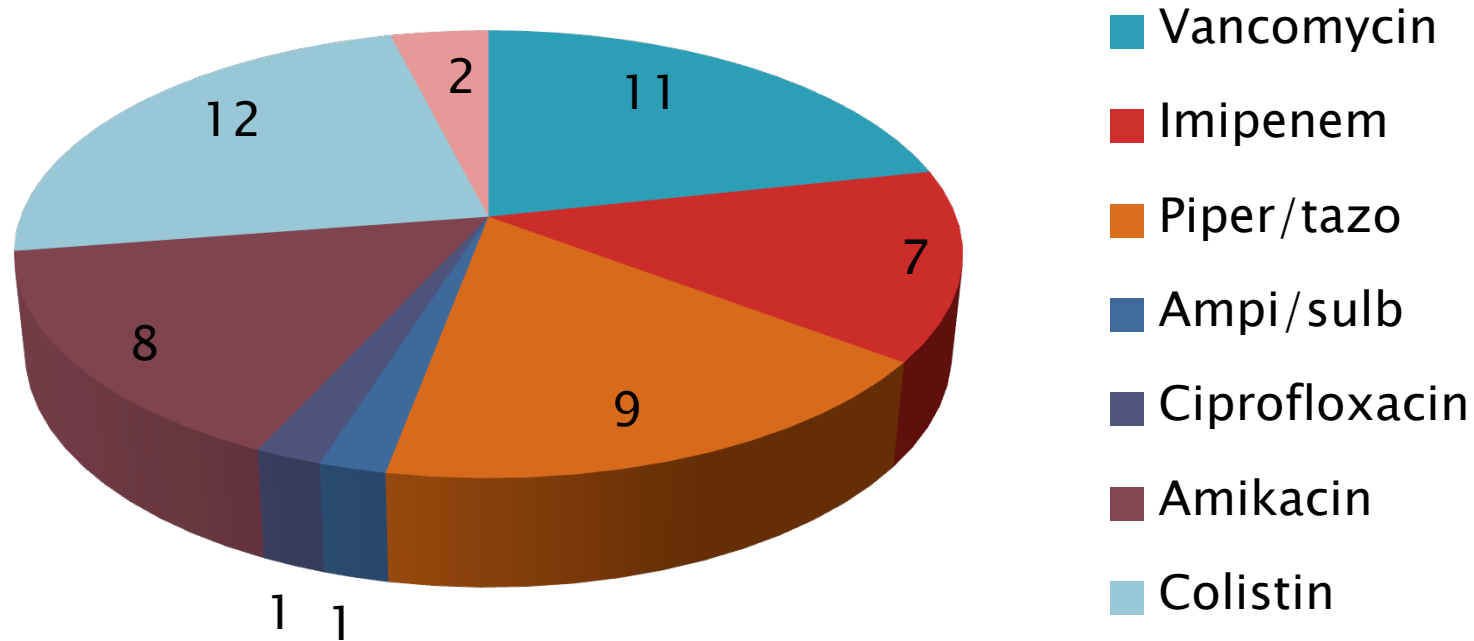## *K.pneumoniae*

Legend:
- CIP, 3rd Ceph, carbap, AG
- KPC: S COL, AMK

Susceptibility pattern
A.baumannii

Legend:
- COL, AMK, (±TYG)
- MINO, PIP/T, COL

Antibiotics for pneumonia: initial empiric treatment

Legend:
- Vancomycin
- Imipenem
- Piper/tazo
- Ampi/sulb
- Ciprofloxacin
- Amikacin
- Colistin

ADEQUATE: 17
INADEQUATE: 8

1st ATB mean duration: 6.66 d (1–21)

Antibiotics for pneumonia: subsequent regimen

Legend:
- Ciprofloxacin
- Imipenem
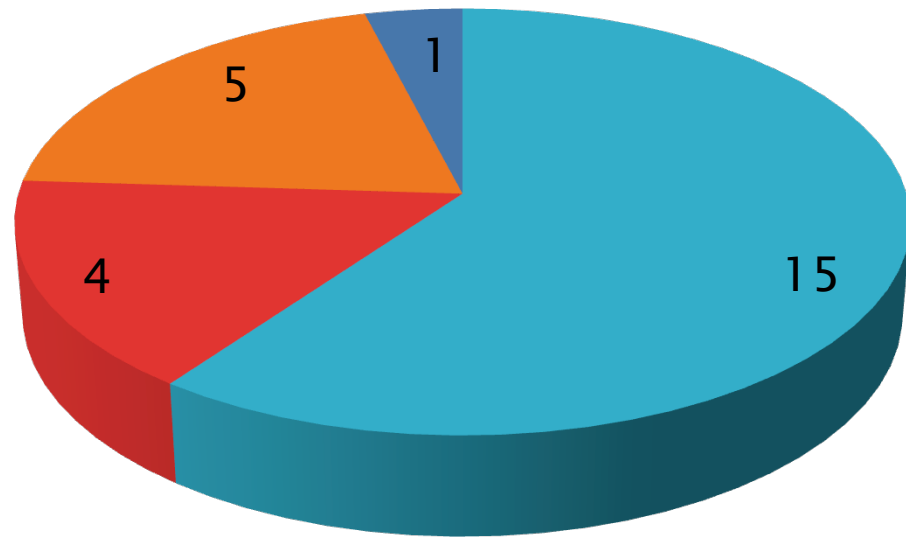- Piper/tazo
- Tygecicline
- Colistin
- Ampicillin
- Clindamycin
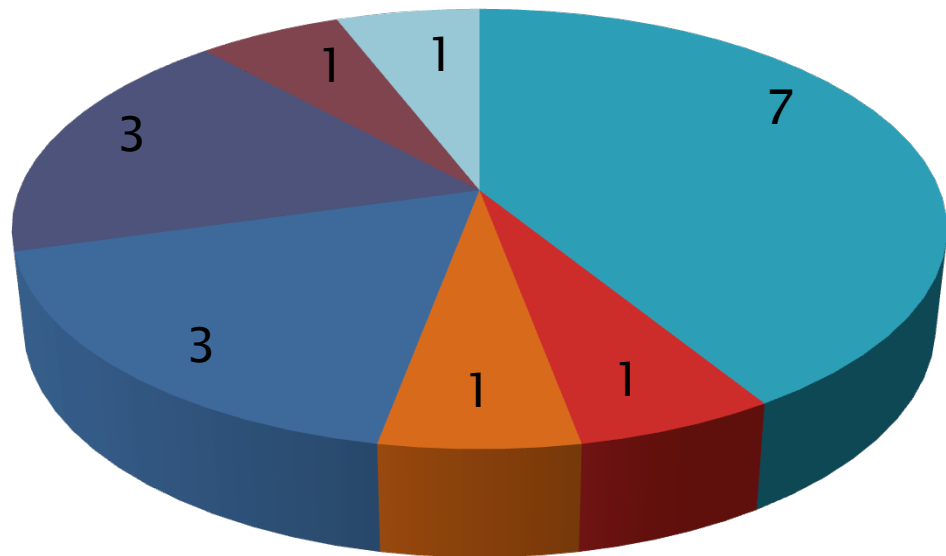
Indications:
- Adequation (initial wrong ATB): 8
- De-escalation: 6
- Other reasons: 3

2nd. ATB mean duration: 10.46 d (3- 40)

Outcomes

Legend:
- Cured — 15
- Died due pneumonia — 4
- Died other infection/s — 5
- Died non- infection reason — 1

- *Thank you very much for your attention...*

- *...and let us discuss all these important issues...!!!*