



Antibiotic Resistance and Pathogens Identified from Patients with Severe Acute Respiratory Infection (SARI) at Tangerang District Hospital, Indonesia

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Abstract

Indonesia has a high burden of morbidity and mortality from lower respiratory tract infections. Despite this burden, only a few studies have been conducted in Indonesia to determine the etiologies & the extent of antibiotic resistance.

We conducted a 1 year prospective study of children and adults admitted to Tangerang Hospital with SARI as defined by the WHO in 2012. Data collection included demographic, signs& symptoms, chest x-ray, and haematology tests. Bacterial pathogens were detected in adults by sputum or in children by blood cultures. Sensitivity of bacterial isolates to antibiotics was determined by Kirby Bauer method. Influenza virus was detected by RT-PCR on nasal& throat swabs.

The Results: In children ages 1 – 14 years, organisms were identified in 26% of 85 cases:14 bacterial, 6 influenza, and 2 mixed influenza and bacterial infections. The fatality rate in children was 11.8%, all were 1-5 years in age ranges. Pathogens isolated from 8 fatal cases were Influenza A/H1N1 pdm (4), influenza B (1), influenza A/H5N1 (1), *H. influenza* (1), *S. pneumonia* (1). In adults ages 18 – 71 years, organisms were identified in 65% of 65 cases: 38 bacterial, 3 influenza, and 1 mixed infections. The fatality rate was 15.4%, with pathogens identified in 8 cases: influenza H5N1 (2), *P. aeruginosa* (3), *S. pneumonia* (1), *S. haemoliticus* (1) *A. baumannii* (1), and mixed infection of *S. haemoliticus*, and influenza H3N2 (1). Antibiotic resistance was identified in 68% of 22 cases. More than half of cases initially received antibiotics for bacterial infections that were later shown to be resistant. Mortality among cases with antibiotic resistance was significantly higher than those with antibiotic sensitivity (36.4% vs 3.2%). Bacterial isolates from pediatric cases had predominantly resistance to Cefixime, Ofloxacin, and Erythromycin, while from the adults mostly had resistance to Cefixime, Ceftriaxone, and Cefotaxime.

This study shows the etiologies of hospitalized SARI patients and the high level of antibiotic resistance, contributing to high mortality. This study emphasizes the importance of bacterial culture & drug susceptibility test to improve the clinical management.

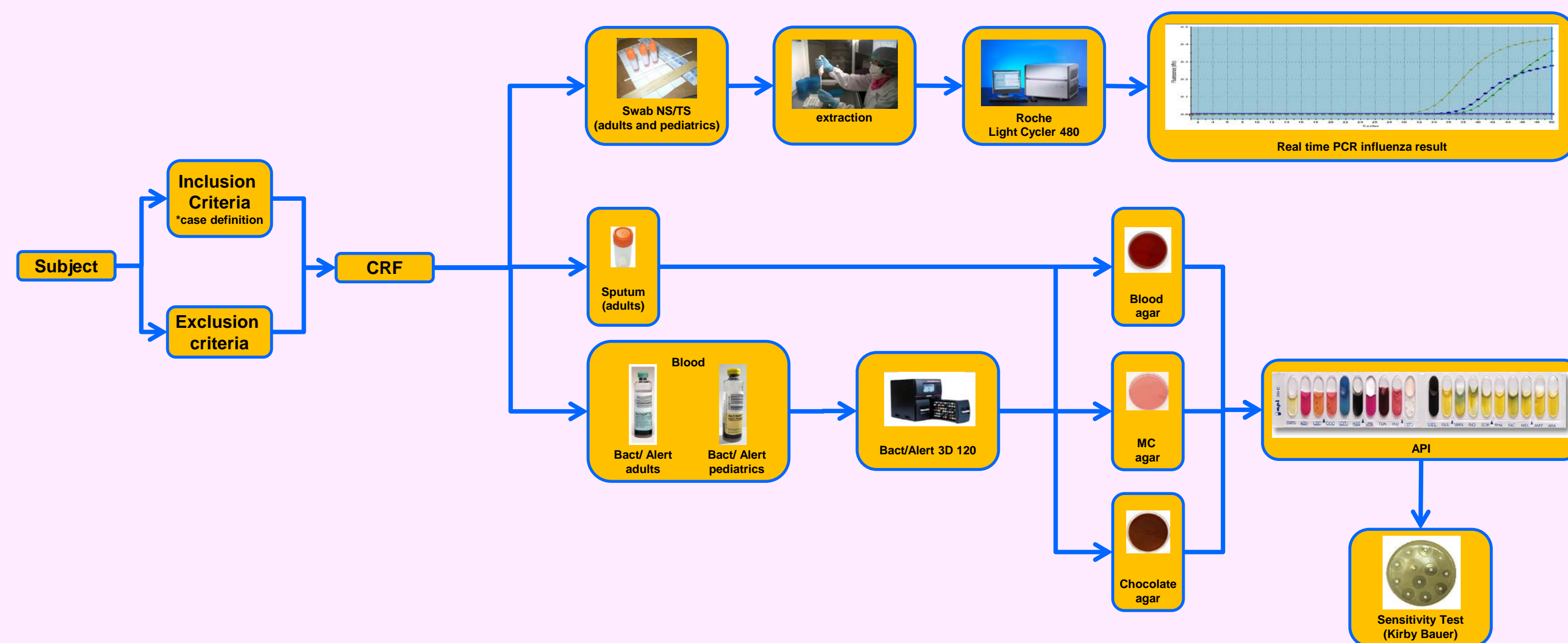
Background

Indonesia continues to struggle with a high infectious disease burden and higher mortality rates. Respiratory infections and tuberculosis account for up to a third of deaths in children and more than half in adults. However, meaningful data on etiologies, risk factors, clinical management practices including antibiotic susceptibility is often lacking, affecting the ability of hospital and health care system planners and policy makers to implement evidence-based policies that could eventually reduce the morbidity and mortality rates.

Objective

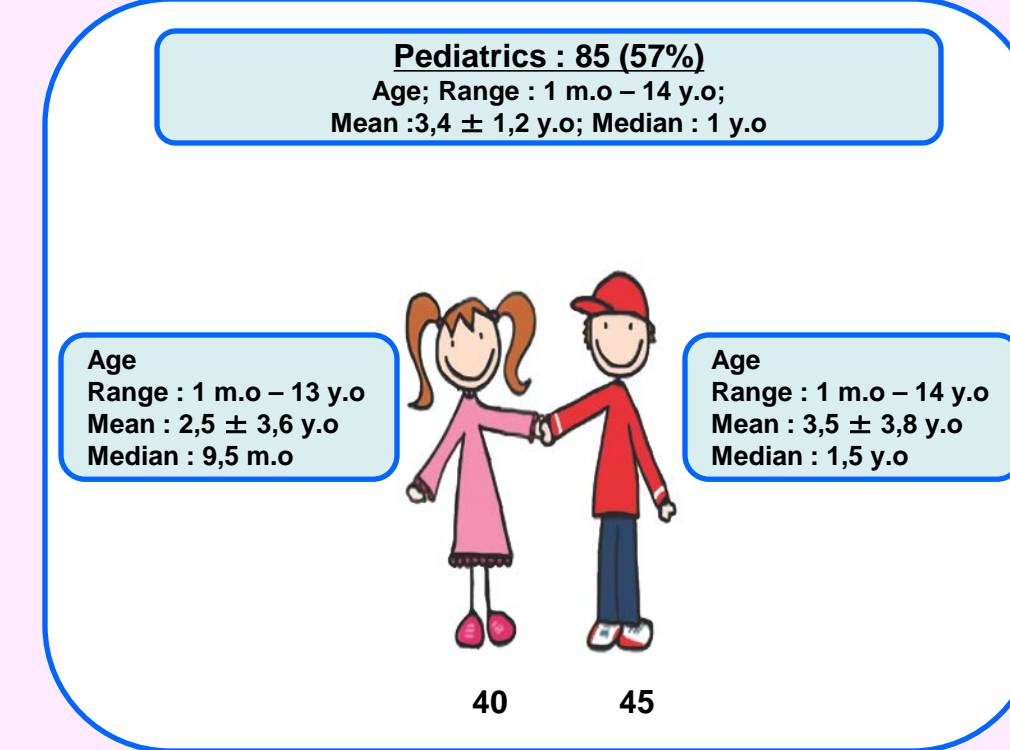
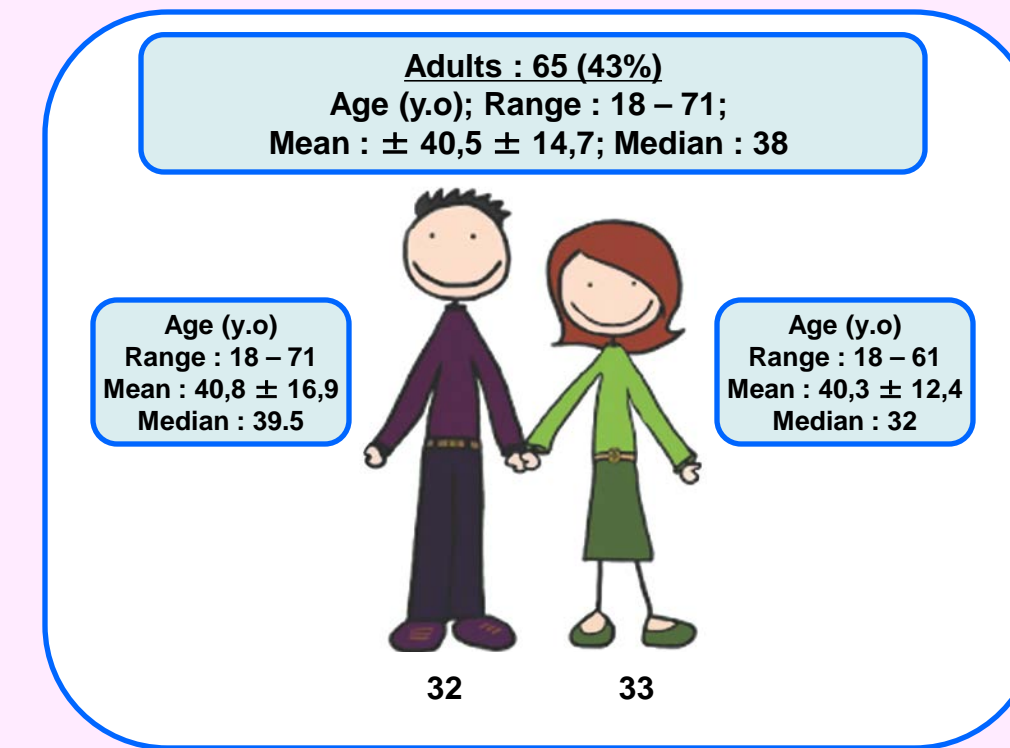
- To describe morbidity, mortality and pattern of community acquired acute respiratory infections
- To determine the extent of antibiotic resistances of the main respiratory pathogens
- To determine the extent of emerging and reemerging bacterial and viral infections and their risk factors through additional epidemiological investigations in the community
- To assess the current hospital case management for SARI and to hence develop training program and coaching process designed to improve the quality of care

Material and Methods

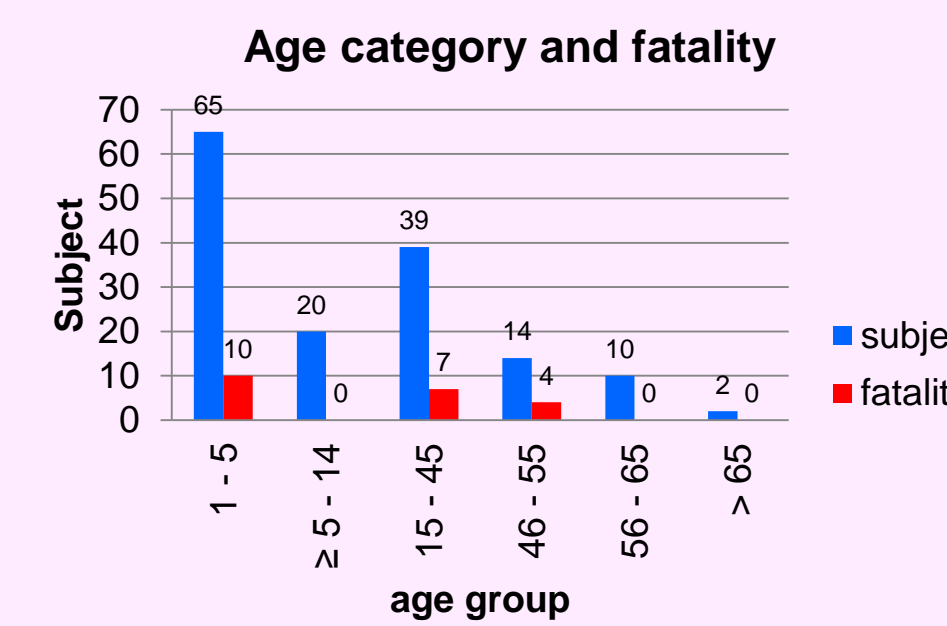
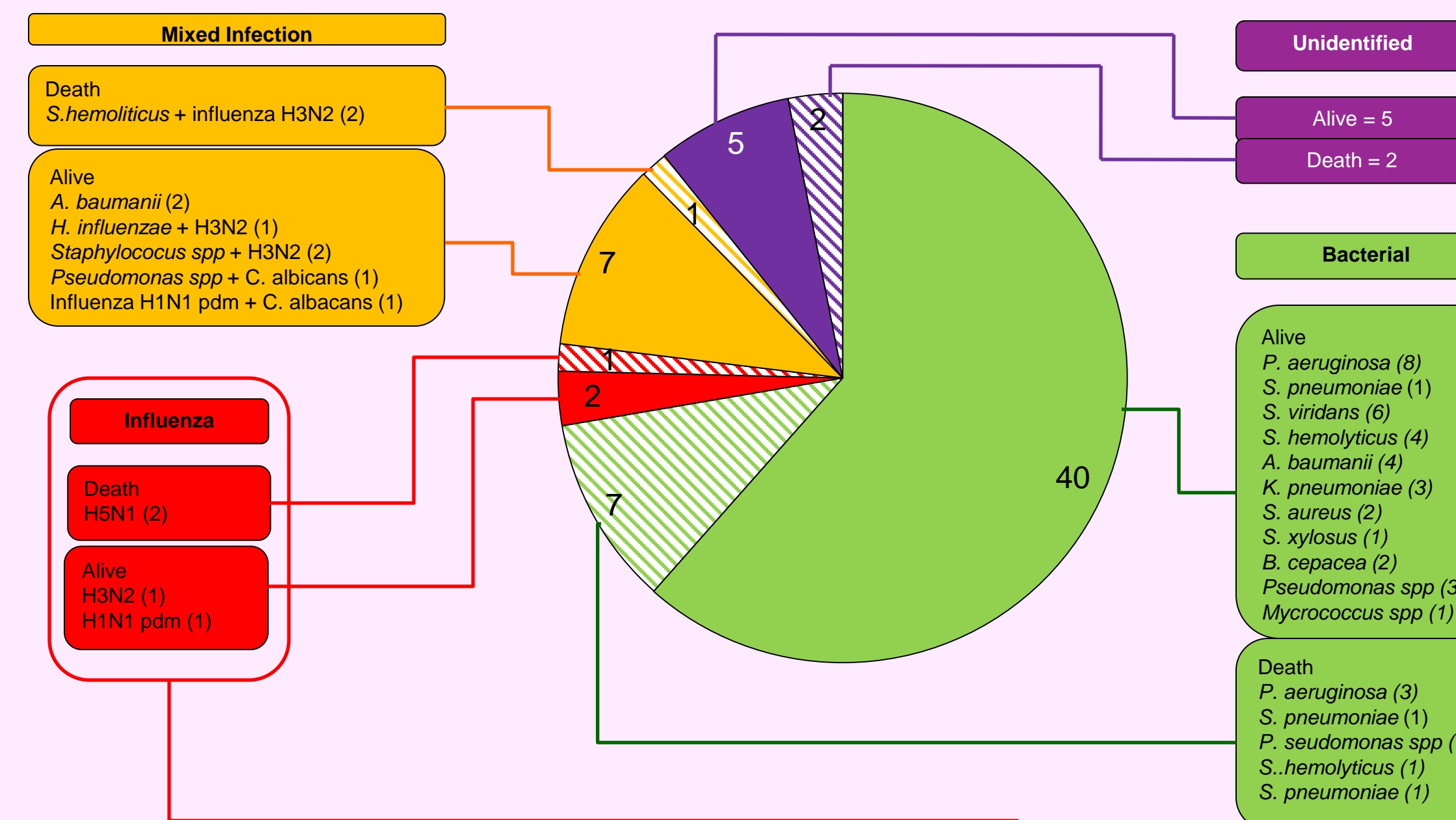


Results

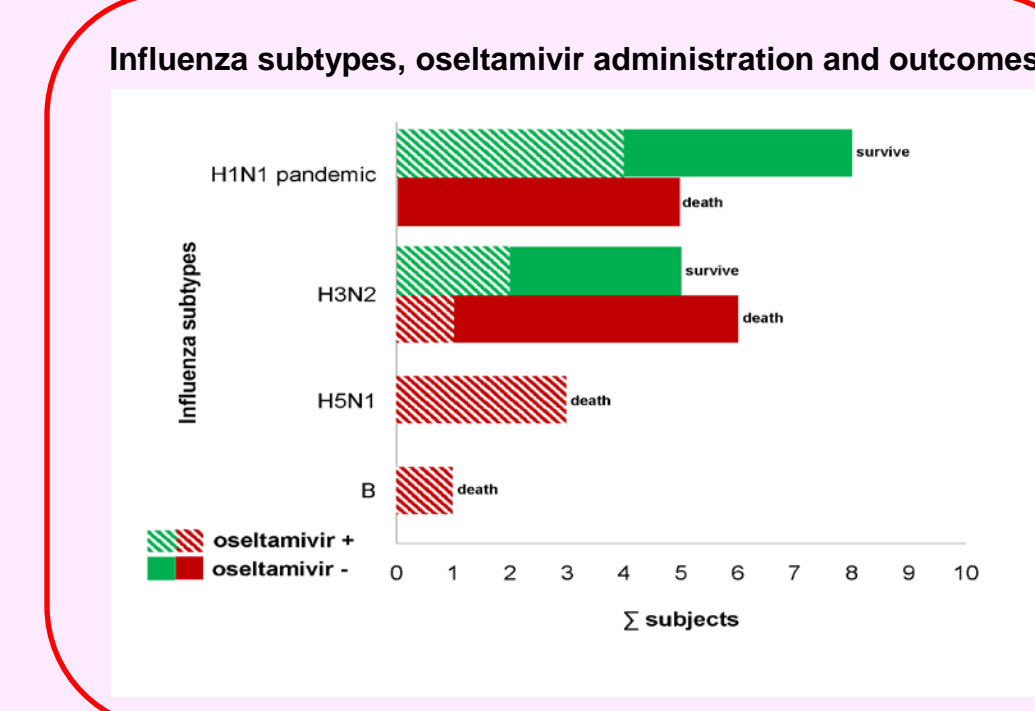
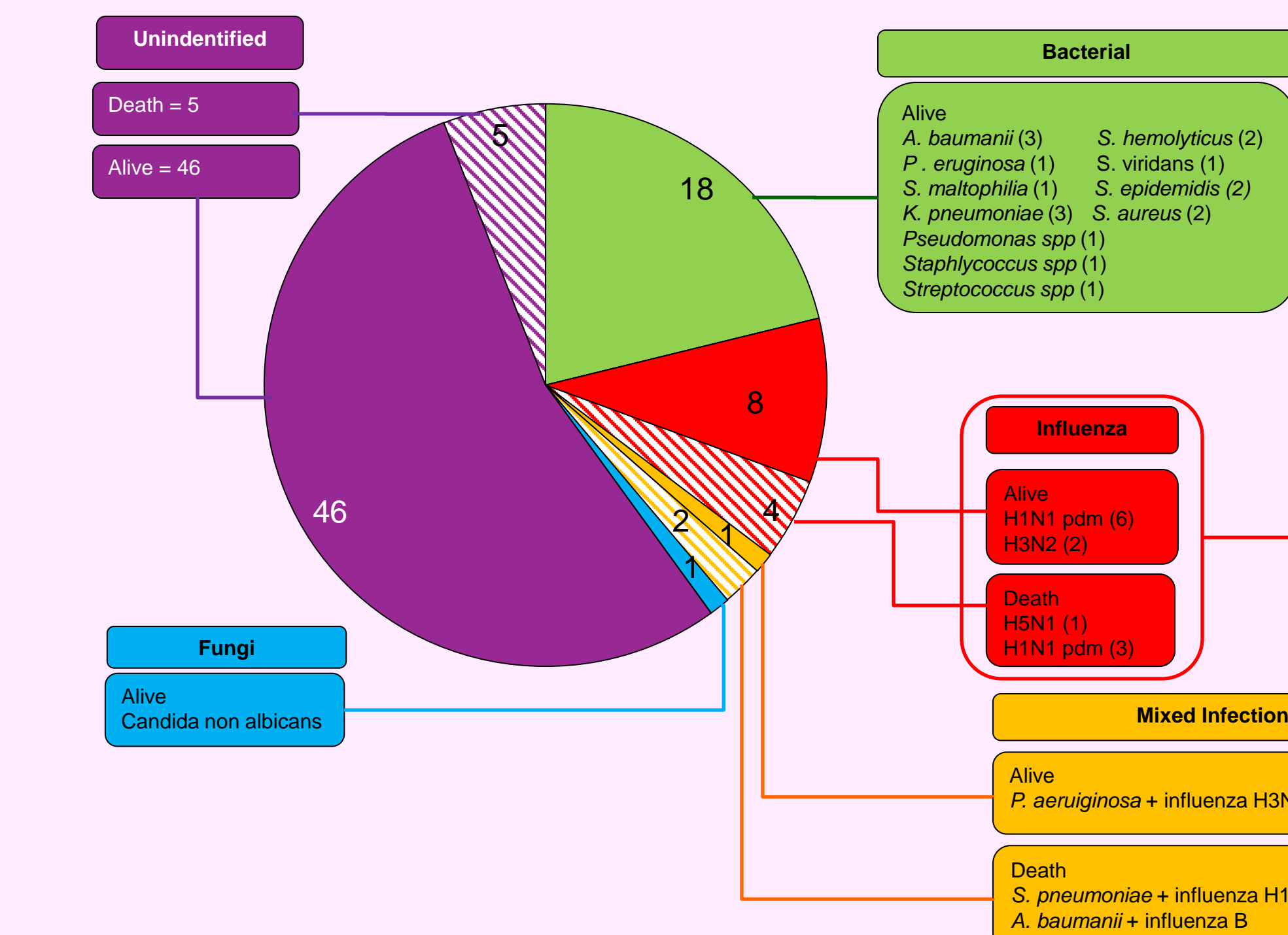
Demography



Pathogens in adults and outcomes



Pathogens in pediatrics and outcomes

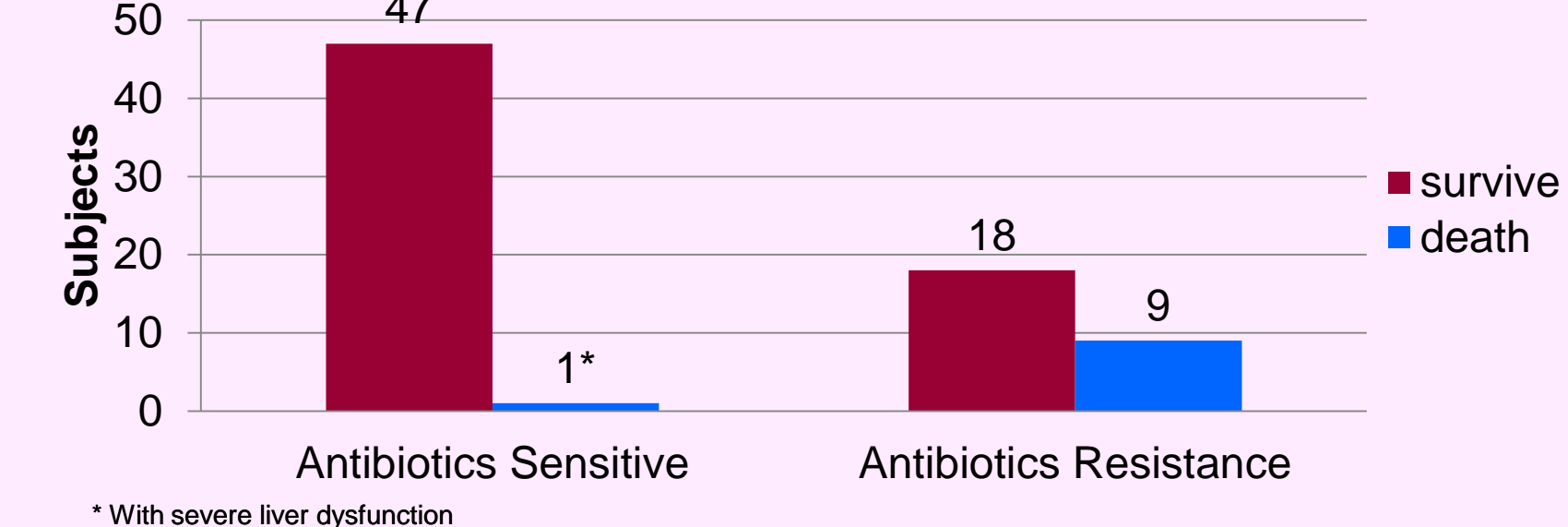


Bacterial identified and the sensitivity to antibiotics

No	Culture Result	N	Adult																											
			Aminoglycoside		Beta Lactamase			Carbapenem		Quinolon			Cephalosporin					Macrolide		Other										
			Gentamycin		Amoxicillin + Clavulamic acid	Ampicillin Sulbactam	Meropenem	Ciprofloxacin	Levofloxacin	Ofloxacin	Cefpirom	Ceftriaxone	Cefotaxime	Ceftazidime	Cefixime	Erythromycin	Trimetropim Sulfametoxazol													
1	<i>Pseudomonas aeruginosa</i>	9	9	55.6	9	0	5	60.0	9	66.7	9	44.4	6	50.0	0	0	8	37.5	9	11.1	9	11.1	6	33.3	0	0	5	20.0	8	25.0
2	<i>Staphylococcus haemolyticus</i>	6	6	33.3	6	50.0	6	50.0	6	50.0	6	0	6	0	4	25.0	5	40.0	5	20.0	5	20.0	5	20.0	1	0	2	0	6	33.3
3	<i>Streptococcus pneumoniae</i>	5	5	20.0	5	0	4	0	5	100.0	4	0	5	0	2	0	5	0	5	0	5	0	5	0	2	0	3	0	5	0
4	<i>Pseudomonas spp</i>	4	4	75.0	4	25.0	4	75.0	4	75.0	4	25.0	4	75.0	0	0	4	0	4	0	4	0	4	25.0	0	0	4	25.0	4	75.0
5	<i>Klebsiella pneumoniae</i>	3	3	66.7	3	100.0	3	66.7	3	66.7	2	100.0	3	100.0	0	0	3	66.7	3	33.3	3	66.7	3	66.7	1	0	3	33.3	3	66.7
6	<i>Acinetobacter baumannii</i>	3	3	33.3	3	33.3	3	66.7	3	66.7	3	33.3	3	33.3	1	0	3	33.3	3	0	3	0	3	33.3	0	0	3	33.3	3	66.7
7	<i>Streptococcus viridans</i>	3	3	33.3	3	66.7	2	100.0	3	100.0	2	0	3	33.3	1	100.0	3	0	2	0	3	0	3	0	1	0	2	0	3	0
8	<i>Bulkholderia cepacea</i>	2	2	50.0	2	0	2	0	2	50.0	2	0	2	50.0	0	0	2	0	2	0	2	0	2	50.0	0	0	2	0	2	100.0
9	<i>Staphylococcus spp</i>	2	2	50.0	2	100.0	1	100.0	2	50.0	2	50.0	1	100.0	1	100.0	2	50.0	2	50.0	0	0	0	0	0	0	0	0	1	100.0
10	<i>Micrococcus spp</i>	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	1	0
11	<i>Staphylococcus xylosum</i>	1	1	0	1	0	1	100.0	1	100.0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	1	100.0
Total / Mean % S		39	37.9	39	34.1	32	56.2	39	65.9	36	23.0	35	40.2	11	32.1	37	20.7	37	10.4	38	13.4	33	22.8	5.0	0	24	14.0	37	51.5	

No	Bacterial	N	Children																											
			Aminoglycoside		Beta Lactamase			Carbapenem		Quinolon			Cephalosporin					Macrolide		Other										
			Gentamycin		Amoxillin + Clavulamic acid	Ampicillin Sulbactam	Meropenem	Ciprofloxacin	Levofloxacin	Ofloxacin	Cefpirom	Ceftriaxone	Cefotaxime	Ceftazidime	Cefixime	Erythromycin	Trimetropim Sulfametoxazol													
1	<i>Acinetobacter baumannii</i>	3	3	66.66	3	66.66	3	66.66	3	66.66	2	0	3	66.66	1	0	3	66.66	3	66.66	3	66.66	3	66.66	1	0	3	66.66	3	66.66
2	<i>Klebsiella pneumoniae</i>	3	3	33.33	3	66.66	3	33.33	3	66.66	1	100	3	66.66	0	ND	3	33.33	3	33.33	3	33.33	3	33.33	1	0	3	0	3	33.33
3	<i>Streptococcus pneumoniae</i>	2	2	50	2	50	2	50	2	100	1	100	2	50	0	ND	2	50	2	50	2	50	2	50	0	ND	2	0	2	50
4	<i>Staphylococcus aureus</i>	2	2	100	2	100	2	100	2	100	0	ND	2	100	1	100	2	100	2	100	2	100	2	100	0	0	2	0	2	100
5	<i>Staphylococcus haemolyticus</i>	2	2	0	2	0	2	0	2	0	0	ND	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	50
6	<i>Pseudomonas aeruginosa</i>	1	1	100	1	0	1	0	1	100	0	ND	1	100	0	ND	1	100	1	100	1	100	1	100	1	0	1	0	1	100
7	<i>Staphylococcus spp</i>	1	1	100	1	100	1	100	1	100	1	100	1	100	0	ND	1	100	1	100	1	100	1	100	0	ND	1	100	1	100
8	<i>Stenotrophomonas maltophilia</i>	1	1	100	1	100	1	100	1	100	0	ND	1	100	0	ND	1	100	1	100	1	100	1	100	1	100	1	100	1	0
9	<i>Staphylococcus epidermidis</i>	1	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
Total / Mean % S		15	36.66	15	32.22	15	29.99	15	42.22	5	60	15	38.88	4	25	15	36.66	15	36.66	15	23.33	15	23.33	8	12.5	11	18.18	15	26.66	

Antibiotics Susceptibility and Outcomes



Acknowledgement

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Conclusions

- The most common bacterial pathogens in adults were *Pseudomonas aeruginosa*, *Staphylococcus haemolyticus*, and *Streptococcus pneumoniae* and in pediatrics were *Acinetobacter baumannii*, *Klebsiella pneumonia* and *Streptococcus pneumonia*
- Fatalities were not significantly different in adult and children. All were associated with antibiotic resistance and the presence of underlying diseases.
- Influenza contributes 18,7% of SARI cases, including 3 H5N1 fatal cases. The administration of oseltamivir in seasonal influenza is associated with survival.
- For clinical use, the most sensitive antibiotics in adults were Carbapenem (65%), Trimetropim-sulfametozazol (51%) and Beta-lactamase (45%) while the most sensitive antibiotics in the pediatric group were Carbapenem (42%), Aminoglycoside (36%) and Quinolon (31%)