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The first nationwide surveillance of bacterial respiratory pathogens conducted by the Japanese Society of Chemotherapy (JSC)

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Introduction

JSC conducted the first nationwide surveillance of bacterial respiratory pathogens in 2006.

Materials & Methods

1) Surveillance period : January - April, 2006.

2) Cooperative institutes : 34 Hospitals throughout Japan.

3) Strains tested : Isolates obtained from sputum, specimens by trans-tracheal aspiration (TTA) and/ or brochoscopy (confirmed by qualitative culture, by Gram-staining etc.) of well-defined adult respiratory tract infection (RTI) patients [community-acquired pneumonia (CAP), hospital-acquired pneumonia (HAP), acute exacerbations of chronic respiratory diseases (AECRD), and others].

4) Antibacterial agents tested : 42 Agents as listed in Table. 1.

5) Susceptibility test : Conducted at the central laboratory (The Kitasato Institute, Anti-infection Drugs Research Center) according to CLSI standards for broth microdilution methods.

6) Determination of β-lactamase : Nitrocefin method and Cica-Beta Test [Kanto Chemicals, Tokyo ; for detection of extended-spectrum β-lactamase (ESBL) and metallo-β-lactamase (MBL)].

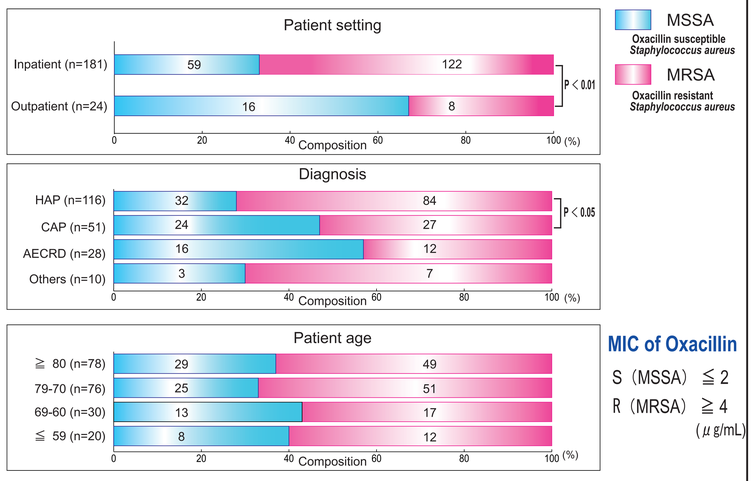
	Staphylococcus aureus	*Streptococcus pneumoniae*	*Streptococcus pyogenes*	*Moraxella catarrhalis*	*Haemophilus influenzae*	*Klebsiella pneumoniae*	*Pseudomonas aeruginosa*	Total
Numbers collected	210	210	9	93	173	80	149	924
Numbers tested	205	200	9	91	165	74	143	887

Results

Susceptibilities(Table.1) and current trends of resistant (Fig.1-3) in the three major bacterial respiratory pathogens.

Fig. 1 Proportions of MRSA under stratifications

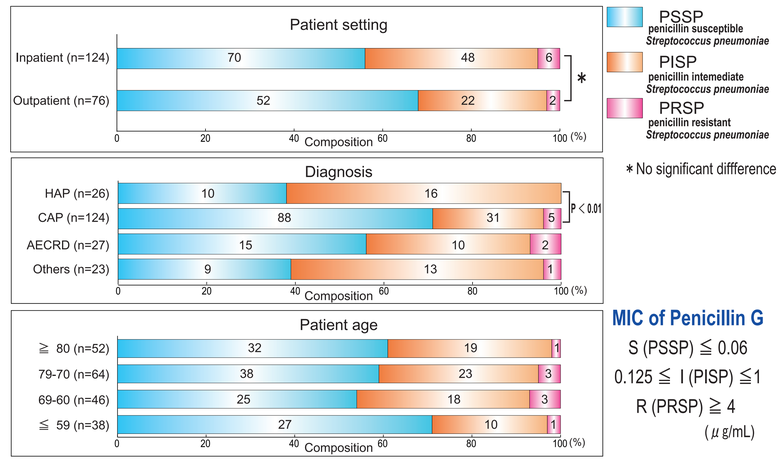
***Staphylococcus aureus* (n=205)**



* MRSA was dominant (67.4%) in *S.aureus* isolated from inpatients whereas less frequent (33.3%) in those from outpatients.
* Higher frequency (72.4%) of MRSA was noted in HAP patients than CAP (52.9%) or AECRD (42.9%) patients.
* No difference in isolation frequency of MRSA was found under stratification by patient age (56.7- 67.1% ; Av 63.2%).

Fig. 2 Proportions of PISP and PRSP under stratifications

***Streptococcus pneumoniae* (n=200)**

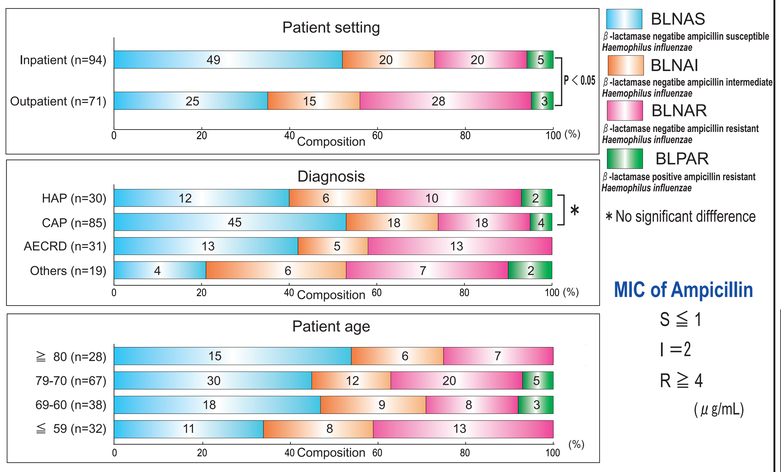


* No significant diffference

* PISP in inpatients (38.7%) tended to be more frequent than in outpatients (28.9%).
* PRSP in adult inpatients (4.8%) and adult outpatients (2.6%) was significantly less frequent than those reported in pediatric patients (26.9% ; Sunakawa K, 2005).
* PISP was significantly higher in HAP (61.5%) patients than in CAP (25.0%) patients.
* PISP tended to be more frequent in patients older than 60 years (37.0%) than in those younger than 60 years (26.3%) though the difference was not statistically significant.

Fig. 3 Proportions of BLNAI, BLNAR and BLPAR under stratifications

***Haemophilus influenzae* (n=165)**



* No significant diffference

* BLNAR was more frequent in outpatients (39.4%) than in inpatients (21.3%) [cf. 34.8% in pediatric outpatients; reported by Sunakawa K, 2005].
* BLNAR tended to be more frequent in AECRD (41.9%) than HAP (33.3%) and CAP (21.2%) though isolation of *H.influenzae* was highest in CAP.
* BLNAR tended to be more frequent in patients younger than 60 years (40.6%) than in those older than 60 years (26.3%) though the difference was not statistically significant.

Table.1 Susceptibility of 3 major respiratory pathogens to antibacterial agents (μg/mL)

Antibacterial agent	*Staphylococcus aureus* (n=205)			*Streptococcus pneumoniae* (n=200)			*Haemophilus influenzae* (n=165)		
	MIC range	MIC_{50}	MIC_{90}	MIC range	MIC_{50}	MIC_{90}	MIC range	MIC_{50}	MIC_{90}
Penicillin G	≦0.06 – 128	16	64	≦0.06 – 2	≦0.06	1	≦0.06 – ≧256	4	8
Ampicillin	0.125 – 128	16	64	≦0.06 – 8	0.125	2	0.125 – ≧256	2	8
Ampicillin / Sulbactam	0.125 – 64	16	32	≦0.06 – 8	0.125	2	0.125 – 16	2	4
Amoxicillin / Clavulanate	0.125 – ≧128	16	32	≦0.06 – 4	≦0.06	1	0.25 – 16	2	8
Piperacillin	0.5 – ≧256	64	≧256	≦0.06 – 4	≦0.06	2	≦0.06 – ≧256	≦0.06	0.25
Piperacillin / Tazobactam	0.5 – ≧256	64	≧256	≦0.06 – 8	≦0.06	2	≦0.06 – 128	≦0.06	0.125
Cefaclor	0.5 – ≧256	128	≧256	≦0.06 – 128	1	32	0.125 – ≧256	8	64
Cefdinir	0.125 – ≧128	≧128	≧128	≦0.06 – 8	0.25	4	≦0.06 – 16	2	8
Cefcapene	0.5 – ≧256	≧256	≧256	≦0.06 – 2	0.25	0.5	≦0.06 – 4	0.5	2
Cefditoren	0.25 – ≧128	64	≧128	≦0.06 – 1	0.125	0.25	≦0.06 – 1	≦0.06	0.25
Cefazolin	0.25 – ≧256	128	≧256	≦0.06 – 4	0.25	2	0.25 – ≧256	8	128
Cefotiam	0.5 – ≧256	64	≧256	≦0.06 – 8	0.25	2	0.125 – 64	8	64
Ceftazidime	2 – ≧128	≧128	≧128	≦0.06 – 16	2	8	≦0.06 – 8	0.25	0.5
Ceftriaxone	1 – ≧256	≧256	≧256	≦0.06 – 2	0.25	1	≦0.06 – 1	0.125	0.5
Cefepime	2 – ≧256	64	≧256	≦0.06 – 1	0.5	1	≦0.06 – 32	1	2
Cefozopran	0.5 – 128	16	32	≦0.06 – 2	0.25	1	≦0.06 – 64	4	16
Cefmetazole	1 – 128	16	64	≦0.06 – 8	0.5	4	0.125 – 32	4	8
Aztreonam							≦0.06 – 16	0.5	2
Imipenem	≦0.06 – ≧128	8	64	≦0.06 – 0.5	≦0.06	0.125	≦0.06 – 32	0.5	4
Panipenem	≦0.06 – 64	8	32	≦0.06 – 0.125	≦0.06	≦0.06	≦0.06 – 16	0.5	2
Meropenem	≦0.06 – 64	8	32	≦0.06 – 1	≦0.06	0.25	≦0.06 – 2	0.125	0.5
Biapenem	≦0.06 – 128	8	32	≦0.06 – 1	≦0.06	0.25	≦0.06 – 32	2	8
Doripenem	≦0.06 – ≧32	4	16	≦0.06 – 1	≦0.06	0.25	≦0.06 – 4	0.25	1
Gentamicin	0.125 – ≧256	0.5	128	0.5 – 32	8	8	0.125 – 4	1	1
Amikacin	1 – ≧256	8	32	0.5 – 128	64	128	0.25 – 8	4	8
Arbekacin	0.25 – 8	0.5	1	0.25 – 64	16	32	0.25 – 8	2	4
Ciprofloxacin	≦0.06 – ≧256	16	≧256	≦0.06 – 32	1	2	≦0.06 – 8	≦0.06	≦0.06
Levofloxacin	≦0.06 – ≧256	8	≧256	≦0.06 – 8	1	2	≦0.06 – 4	≦0.06	≦0.06
Tosufloxacin	≦0.06 – ≧32	8	≧32	≦0.06 – 8	0.125	0.25	≦0.06 – ≧32	≦0.06	≦0.06
Gatifloxacin	≦0.06 – ≧256	2	64	≦0.06 – 4	0.25	0.5	≦0.06 – 2	≦0.06	≦0.06
Pazufloxacin	0.125 – ≧256	4	≧256	0.5 – 32	2	2	≦0.06 – 4	≦0.06	≦0.06
Minocycline	≦0.06 – 32	0.25	16	≦0.06 – 16	2	8	≦0.06 – 2	0.25	0.5
Erythromycin	0.25 – ≧256	≧256	≧256	≦0.06 – ≧256	2	≧256	0.5 – 16	4	4
Clarithromycin	0.125 – ≧128	≧128	≧128	≦0.06 – ≧128	2	≧128	0.25 – 32	8	8
Azithromycin	0.25 – ≧128	≧128	≧128	≦0.06 – ≧128	4	≧128	≦0.06 – 2	0.5	1
Telithromycin	≦0.06 – ≧64	≧64	≧64	≦0.06 – 1	≦0.06	0.25	≦0.06 – 8	1	2
Clindamycin	0.125 – ≧256	≧256	≧256	≦0.06 – ≧256	0.125	≧256	≦0.06 – 64	8	16
Vancomycin	0.5 – 2	1	1						
Teicoplanin	0.25 – 8	1	1						
Linezolid	1 – 4	2	4						
Oxacillin	≦0.06 – ≧256	64	≧256						
Cefoxitin	2 – ≧256	≧256	≧256						

Conclusion and Discussion

* Unique profiles of resistant respiratory pathogens (MRSA, PISP and BLNAR) were seen in well-diagnosed adult RTI patients.
* MRSA and PISP were more frequent in inpatients and in HAP patients whereas BLNAR tended to be more frequent in outpatients and in AECRD patients. BLNAR was also characteristic to be more frequent in younger patients (≦59 years old).
* Quinolone-resistant *S.pneumoniae* appeared less frequent (4 out of 200 strains) irrespective of penicillin-resistance.
* Only 1 out of 143 *P.aeruginosa* strains was found to be multi-drug-resistant variant producing MBL. Only 2 out of 74 *K.pneumoniae* strains were found to be ESBL-producing variants.
*JSC will conduct yearly surveillance in adult RTI and, in the near future, adult UTI and pediatric infections.