The isolation rates of oxacillin-susceptible *mecA*-positive *Staphylococcus aureus* at Nagasaki University Hospital in Japan

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INTRODUCTION

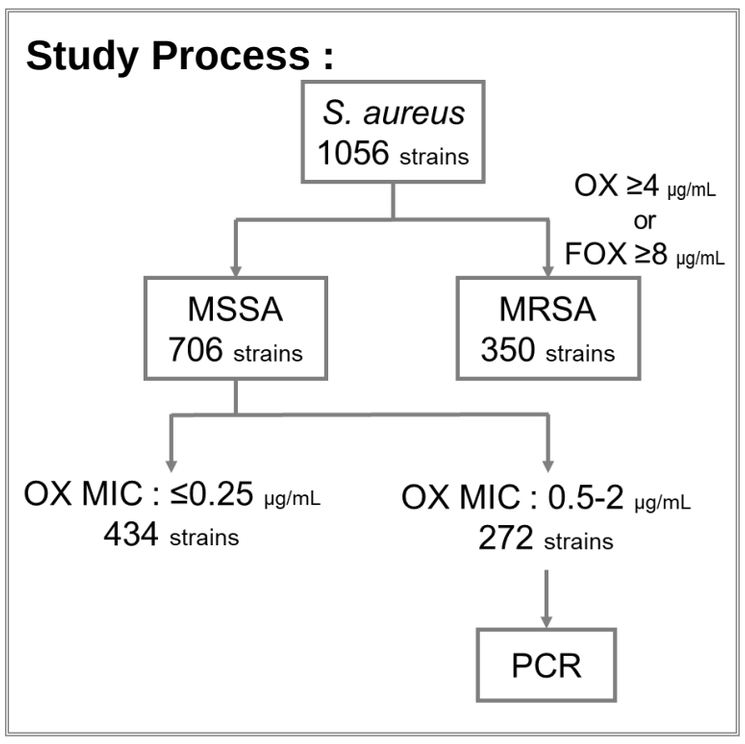
Methicillin-resistant *S. aureus* (MRSA) has been defined by antimicrobial susceptibility testing. Recently, PCR amplification of *mecA* or *mecC* genes has also been used for MRSA detection, although it is not yet the standard method.
Oxacillin-susceptible *mecA*-positive *S. aureus* (OS-MRSA) can be easily misidentified as MSSA by antimicrobial susceptibility testing[1].
OS-MRSA has been reported in many countries, but few reports indicate isolation rates [1,2,3].
Therefore, we investigated the isolation rates of OS-MRSA at our hospital.

MATERIALS AND METHODS

We included 1056 *S. aureus* strains isolated at Nagasaki University Hospital from 2023 to 2024.

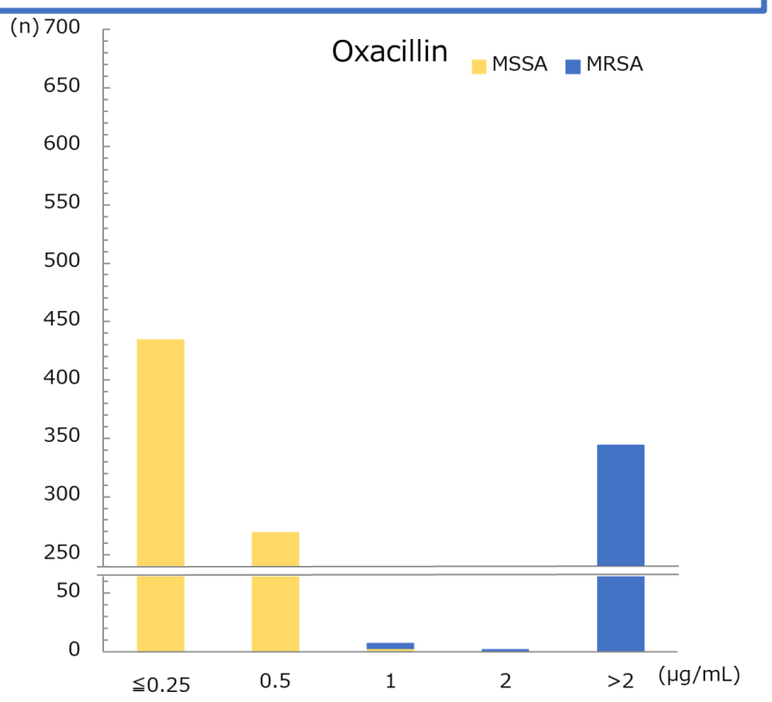
Determination of MIC :
Antimicrobial susceptibility testing for all isolates were determined using the BD Phoenix. The strains with oxacillin (OX) MIC of ≥4 μg/mL or cefoxitin (FOX) MIC of ≥8 μg/mL were defined as MRSA according to CLSI M100[4], and their MIC distributions were analyzed.

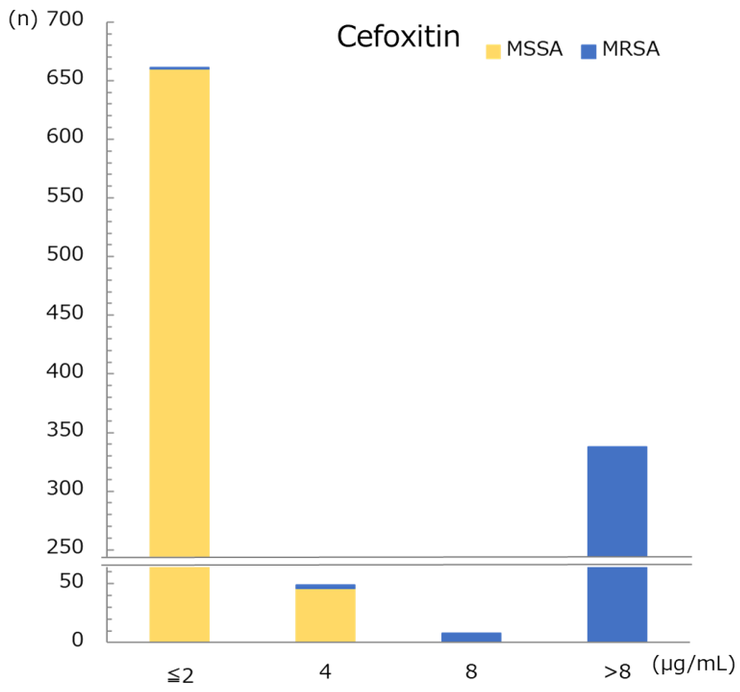
Detection of *mecA* and *mecC* gene:
PCR was performed to detect the presence of *mecA* and *mecC* genes[5], particularly in MSSA strains with oxacillin MICs ranging from 0.5 to 2 μg/mL[1].



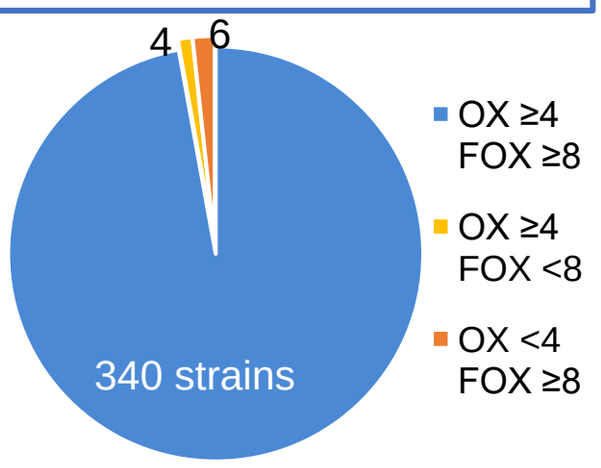
RESULTS

The distribution of MICs





Distribution of MRSA



Properties of OS-MRSA

Strain	Source origin	*mec gene*		MIC(μg/mL)	
		mecA	*mecC*	OX	FOX
MS91	blood	+	-	0.5	4
MS136	nasal	+	-	0.5	4
MS147	nasal	+	-	0.5	≤2
MS190	sputum	+	-	0.5	4

The distribution of MICs :
- The rate of MRSA was 33.1% (350/1056) and that of MSSA was 66.9% (706/1056).
- The MIC distribution for oxacillin was as follows: ≤0.25 μg/mL in 41.1% (434/1056), 0.5 μg/mL in 25.5% (269/1056), 1 μg/mL in 0.7% (7/1056), 2 μg/mL in 0.2% (2/1056), and >2 μg/mL in 32.6% (344/1056).
- The MIC distribution for cefoxitin was as follows: ≤2 μg/mL in 62.6% (661/1056), 4 μg/mL in 4.6% (49/1056), 8 μg/mL in 0.8% (8/1056), and >8 μg/mL in 32.0% (338/1056).

Distribution of MRSA :
- Among MRSA, 6/350 (1.71%) were susceptible to oxacillin.

Properties of OS-MRSA :
- The *mecA* gene was detected in 1.5% (4/272) of MSSA strains with oxacillin MICs ranging from 0.5 to 2 μg/mL.

DISCUSSION

- Six MRSA strains were susceptible to oxacillin, and discordant susceptibility results between oxacillin and cefoxitin in MRSA was consistent with previously reported [6].
- The isolation rate of OS-MRSA at our hospital was 1.5%, consistent with previously reported results (1.2～1.8%) [1,2,3].
- In one case, OS-MRSA was isolated from a blood culture, suggesting a possible bloodstream infection. Since the antibiotics used for MSSA and MRSA differ, accurate identification of OS-MRSA is critically important.
- In this study, the oxacillin MIC for OS-MRSA was 0.5 μg/mL, representing the lowest MIC within the range of the examined strains (oxacillin MICs: 0.5–2 μg/mL).Therefore, it was suggested that even strains with lower oxacillin MICs (<0.5 μg/mL) might be identified as OS-MRSA.

CONCLUSION

The findings of this study revealed the frequency of OS-MRSA.
However, the *mecA* gene detection was performed only for MSSA strains with oxacillin MICs between 0.5 and 2 μg/mL.
Therefore, comprehensive surveillance including all MSSA strains is necessary to accurately assess the prevalence of OS-MRSA.

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