Table 1. Strategies for Reporting Methicillin (Oxacillin) Results When Using Molecular and Phenotypic AST Methods for *S. aureus*

Indication	Target(s)	Method	Specimen Type	Result		Suggestions for Resolution	Consider reporting as:	Footnotes*
				Genotype or Predicted Phenotype	Observed Colony Phenotype (if tested)			
Detection of methicillin resistance in *S. aureus*	PBP2a	Latex agglutination, immunochromatography	Colony	PBP2a positive	cefoxitin R	N/A	Methicillin R	1
				PBP2a negative	cefoxitin S	N/A	Methicillin S	1
				PBP2a positive	cefoxitin S	Confirm isolate identification, repeat latex agglutination and AST and consider *mecA* colony NAAT if available.	If discrepancy is not resolved by suggested testing, report as methicillin R	1-2
				PBP2a negative	cefoxitin R	Confirm isolate identification, repeat latex agglutination and AST and consider *mecA* colony NAAT if available.	If discrepancy is not resolved by suggested testing, report as methicillin R	1
	mecA	NAAT, microarray hybridization, ISH	Colony, blood culture broth, surveillance specimen	*mecA* detected	cefoxitin R	N/A	If tested, report phenotypic result as found (methicillin R) and consider reporting molecular result as per institutional protocol	3-6
				mecA not detected	cefoxitin S	N/A	If tested, report phenotypic result as found (methicillin S) and consider reporting molecular result as per institutional protocol	3-6
				mecA detected	cefoxitin S	Confirm isolate identification, repeat AST and repeat or perform *mecA* colony NAAT if available. If mixed specimen, test isolates individually.	If discrepancy is not resolved by suggested testing, report as methicillin R	2-5, 8-9
				mecA not detected	cefoxitin R	Confirm isolate identification, repeat AST and repeat or perform *mecA* colony NAAT if available. If mixed specimen, test isolates individually.	If discrepancy is not resolved by suggested testing, report as methicillin R	3, 7
	SCC*mec-orfX* junctional regions ONLY	NAAT	Blood culture broth, surveillance specimen	SCC*mec* detected	cefoxitin R	N/A	If tested, report phenotypic result as found (methicillin R) and consider reporting molecular result as per institutional protocol	*3-6*
				SCC*mec* not detected	cefoxitin S	N/A	If tested, report phenotypic result as found (methicillin S) and consider reporting molecular result as per institutional protocol	3-6
				SCC*mec* detected	cefoxitin S	Confirm isolate identification, repeat AST and consider *mecA* colony NAAT if available. If mixed culture, test isolates individually	If discrepancy is not resolved by suggested testing, report as methicillin R	2, 10
				SCC*mec not* detected	cefoxitin R	Confirm isolate identification, repeat AST and consider *mecA* colony NAAT if available. If mixed culture, test isolates individually	If discrepancy is not resolved by suggested testing, report as methicillin R	7, 12
	SCC*mec-orfX* junctional regions AND *mecA* and/or other targets	NAAT	Blood culture broth, surveillance specimen	SCC*mec* AND *mecA* or other target detected	cefoxitin R	N/A	If tested, report phenotypic result as found (methicillin R) and consider reporting molecular result as per institutional protocol	3-6
				SCC*mec* AND *mecA* or other target *not* detected	cefoxitin S	N/A	If tested, report phenotypic result as found (methicillin S) and consider reporting molecular result as per institutional protocol	3-6
				SCC*mec* AND *mecA* or other target detected	cefoxitin S	Confirm isolate identification, repeat AST and consider *mecA* colony NAAT if available. If mixed culture, test isolates individually.	If discrepancy is not resolved by suggested testing, report as methicillin R	2
				SCC*mec* AND *mecA* or other target *not* detected	cefoxitin R	Confirm isolate identification, repeat AST and consider *mecA* colony NAAT if available. If mixed culture, test isolates individually.	If discrepancy is not resolved by suggested testing, report as methicillin R	3, 11

*In addition the specific possibilities listed, genotype/phenotype discrepancies could arise as a consequence of suboptimal sampling, mixed cultures, emergence of new genotypes, or mutations and/or wild-type reversions of resistance targets

1. False positive and false negative PBP2a latex bead agglutination results have been observed (J Clin Microbiol. 2005 Sep;43(9):4541-4).
2. Rare *mecA* positive *S. aureus* isolates will test susceptible to cefoxitin (Curr Microbiol. 2007 Dec;55(6):473-9; J Clin Microbiol. 2005 Aug;43(8):3818-23)
3. *mecC* or *mecA* variant gene mediated methicillin resistance may not be detected by *mecA* PCR (Antimicrob Agents Chemother. 2011 Aug;55(8):3765-73; Lancet Infect Dis. 2011 Aug;11(8):595-603).
4. The presence of *mecA* positive CoNS and MSSA may result in falsely positive MRSA molecular results (J Clin Microbiol. 2008 Oct;46(10):3285-90; Antimicrob Agents Chemother. 2008 Dec;52(12):4407-19).
5. Strains harboring unstable SCC*mec* insertions may lose *mecA* during culture (J Clin Microbiol. 2010 Oct;48(10):3525-31).
6. Compared to culture, the sensitivity of molecular methods may be higher while the specificity may be lower.
7. Occasional false negative *mecA* results have been reported for direct blood culture molecular assays (J Clin Microbiol. 2013 Dec;51(12):3988-92).
8. For ISH assays with a cefoxitin induction step, false positive *mecA* results should be rare (J Clin Microbiol. 2014 Nov;52(11):3928-32).
9. In polymicrobial cultures, the presence of *mecA* cannot be attributed to a specific isolate.
10. Strains harboring a SCC*mec* remnant lacking the *mecA* gene (*mecA* dropout) or mutant *mecA* allele may test positive in assays that only target SCC*mec-orfX* junctional regions. Laboratories using molecular tests that only detect SCC*mec-orfX* junctional region targets may consider adding a disclaimer to the report stating the proportion of false positives related to *mecA* dropouts observed in isolates from the patient population served.. (J Clin Microbiol. 2011 Apr;49(4):1240-4).
11. Multiple SCC*mec* types exist; depending on the design of the assay, some SCC*mec* variants may not be detected (Clin Microbiol Infect. 2007 Mar;13(3):222-35).