

Colonization and Environmental Transmission of *Staphylococcus aureus* from the Nasal Cavities of Nurses

RES-183

M. Enomoto, M. Morita, S. Ono, I. Kanesaka, A. Kanayama Katsuse, I. Kobayashi
Toho University Faculty of Nursing Department of Infection and Prevention, Tokyo, JAPAN

Background and Objective

- ◆ Long-term nasal colonization of *Staphylococcus aureus* in healthcare workers can potentially lead to transmission within healthcare settings through hand contact.
- ◆ The objective of this study was to longitudinally monitor and characterize *S. aureus* detected in the nasal cavities, hands, and surrounding environment of nurses.

Methods

- ◆ From May 2024 to April 2025, the nasal cavities, hands and frequently used devices such as medical phones of 58 nurses working in the general wards of a university hospital were sampled monthly.
- ◆ The samples were cultured and identified as *S. aureus*. After isolation, MICs were determined and recoded. MRSA isolates were identified based on susceptibility testing and confirmed by SCCmec typing and detection of PVL genes.

Results

Table1. Nasal cavity cultures yielding *S. aureus*

Nasal cavity cultures for <i>S. aureus</i>	Number of nurses (%)
Always culture positive (continuous)	10(17.2)
Intermittently culture positive (intermittent)	25(43.1)
Always culture negative (undetected)	23(39.7)

Table2. Cases with continuous detection of *S. aureus* from nasal cavity, hand and environment

ID	Months											
	0	1	2	3	4	5	6	7	8	9	10	11
3	●	●	● ^H	●	●	● ^H	●	● ^H	-	●	●	
6	●	● ^E	● ^H	● ^E	●	●	●	●	●	●	●	
21	●	-	● ^E	●	●	●	●	●	●			
27	●	-	●	●	●	-	●	-	-	-		
30	●	●	●	● ^H	●	●	●	●	●	● ^{HE}		
38	● ^H	●	● ^{HE}	●	●	-	●	-	●	●		
40	●	●	-	●	●	●	●	●	●	●		
47	●	●	● ^E	●	●							
57	●	-	-	●	-	●	-					
70	● ^H	●	●	●	●	-	-					

●: MRSA ●: MSSA ○: Culture negative - : No sample collection
H: Hands MRSA H: Hands MSSA E: Environment MRSA E: Environment MSSA

Table4. Characteristics of MRSA in cases with MRSA was continuously detected from nasal cavity

ID	Months	MIC (μg/ml)											SCCmec	PVL
		MPIPC	CFX	CEZ	IPM	CAM	MINO	GM	CLDM	LVFX	VCM	LZD	type	gene
21	0	4	16	2	≤0.06	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
	2	4	16	2	≤0.06	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
	3	4	16	2	0.12	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
	4	8	16	2	0.12	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
	5	4	16	2	0.12	>128	≤0.06	0.12	≤0.06	0.5	0.5	2	IV	-
	6	4	16	2	0.12	>128	≤0.06	0.12	≤0.06	0.5	0.5	2	IV	-
	7	4	16	1	≤0.06	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
	8	4	16	2	0.12	>128	≤0.06	0.12	≤0.06	0.12	0.5	2	IV	-
57	0	8	32	8	0.12	>128	8	4	0.12	4	0.5	2	IV	-
	3	8	32	8	0.12	>128	8	2	0.12	4	0.5	2	IV	-
	5	16	32	16	0.12	>128	8	2	0.12	8	0.5	2	IV	-
70	0	8	16	2	0.25	0.12	≤0.06	16	≤0.06	0.12	1	4	IV	-
	1	8	16	4	0.25	0.12	≤0.06	16	≤0.06	0.12	1	4	IV	-
	2	16	32	4	0.25	0.12	≤0.06	16	≤0.06	0.12	1	4	IV	-
	3	8	16	4	0.25	0.25	0.12	16	≤0.06	0.12	1	4	IV	-
	4	8	4	0.5	0.25	0.12	≤0.06	16	≤0.06	0.12	1	4	IV	-
■ : Resistant ■ :Intermediate														
CEZ, IPM: CLSI M100-S22(2012) Other: M100-Ed31(2021)														

Table6-a. Detection of *S. aureus* from the nasal cavity and hands of ID3

ID	<i>S. aureus</i> isolation site	Months											
		0	1	2	3	4	5	6	7	8	9	10	11
3 (Continuous)	Nasal	●	●	●	●	●	●	●	●	-	●	●	
	Hand	○	○	●	○	○	●	○	●	-	○	○	
	Environment (Mobile phone)	○	○	○	○	○	○	○	○	○	○	○	

●: MRSA ●: MSSA ○: Culture negative - : No sample collection

Table6-b. Antibacterial susceptibility patterns of *S. aureus* from nasal and hand of ID3

ID	Months	<i>S. aureus</i> isolation site	MIC(μg/ml)										SCCmec	
			MIP	IPC	CFX	CEZ	IPM	CAM	MINO	GM	CLDM	LVFX	VCM	LZD
3 (Continuous)	2	Nasal	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	-
		Hand	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	-
	5	Nasal	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	-
		Hand	8	32	0.5	0.5	0.12	0.12	0.25	≤0.06	16	1	4	NT*
	7	Nasal	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	-
		Hand	≤0.06	8	0.5	≤0.06	>128	≤0.06	64	0.25	8	0.5	2	NT *

■ : Resistant

* : Non- typeable

CEZ, IPM: CLSI M100-S22(2012), Other: M100-Ed31(2021)

Table3. Cases with intermittent detection of *S. aureus* from nasal cavity

ID	Months											
	0	1	2	3	4	5	6	7	8	9	10	11
2	○	●	○	○	○	○	○	○	○	○	○	○
7	●	●	○	●	●	○	●	●	●	●	●	
12	○	○	○	●	●	○	○	○	●	●		
14	●	●	○	●	○	●	●	-	●	○		
15	○	○	○	○	○	○	●	○	○	●		
16	○	○	○	○	○	○	○	○	●	○		
17	●	○	●	●	○	○	○	○	○	○		
23	○	●	○	○	○	○	○	○	○	●		
24	●	●	-	●	○	○	○	-	○			
25	○	○	●	○	●	○	●	●	●	●		
29	○	-	○	-	-	●	●	●	●	●		
33	○	●	●	○	○	○	○	○	○	●		
34	○	○	○	○	○	○	○	○	○	○		
35	●	○	●	○	○	○	○	○	○	○		
37	●	●	●	○	●	●	●	●	●	●		
42	●	●	-	-	○	-	○	-	-	○		
43	○	○	-	●	●	●	-	●	-			
44	○	○	○	○	○	●	○	●	○	-		
46	○	-	○	○	-	●	-	○	-			
49	●	●	○	●	●	●	●					
52	●	●	○	-	○	-	○					
53	○	○	-	-	-	-	-					
55	○	○	-	●	-	○	●					
64	●	●	○	○	○	○	○	○				
100	○	●	●	-	●	●	●	●				

●: MRSA ●: MSSA ○: Culture negative - : No sample collection

Table5. Antibacterial susceptibility patterns of MSSA in cases where MSSA was continuously detected from nasal cavity

ID	Months	MIC(μg/ml)											
		MPIPC	CFX	CEZ	IPM	CAM	MINO	GM	CLDM	LVFX	VCM	LZD	
3	0	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	1	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	2	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	3	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	4	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	5	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	6	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	7	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	9	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
	10	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	
6	0	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	
	1	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	
	2	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	3	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	4	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	5	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	6	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	7	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	
	8	0.5	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	
	9	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	
	10	0.5	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	

■: Resistant
CEZ, IPM: CLSI M100-S22(2012), Other: M100-Ed31(2021)

Table7-a. Detection of *S. aureus* from nasal cavity and hand of ID6

ID	<i>S. aureus</i> isolation site	Months											
		0	1	2	3	4	5	6	7	8	9	10	11
6 (Continuous)	Nasal	●	●	●	●	●	●	●	●	●	●	●	
	Hand	○	○	●	○	○	○	○	○	○	○	○	
	Environment (Mobile phone)	○	●	○	●	○	○	○	○	○	○	○	

●: MRSA ●: MSSA ○: Culture negative

Table7-b. Antibacterial susceptibility patterns of *S. aureus* from nasal and hand of ID 6

ID	Months	<i>S. aureus</i> isolation site	MIC(μg/ml)											SCCmec
			MIP	IPC	CFX	CEZ	IPM	CAM	MINO	GM	CLDM	LVFX	VCM	LZD
6 (Continuous)	1	Nasal	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	1	4	-
		Environment	0.25	4	0.5	≤0.06	0.25	0.12	0.12	≤0.06	0.25	1	4	-
	2	Nasal	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	-
		Hand	32	32	4	0.5	4	<0.06	0.12	≤0.06	16	0.5	2	IV
	3	Nasal	0.25	4	1	≤0.06	0.25	0.12	0.25	≤0.06	0.25	2	4	-
		Environment	0.25	4	0.5	≤0.06	0.25	0.12	0.25	≤0.06	4	1	4	-
■ : Resistant			CEZ, IPM: CLSI M100-S22(2012), Other: M100-Ed31(2021)											