



Surveillance of the Antimicrobial-Resistant Bacteria in Nagasaki, Japan, 2014 to 2023

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Background

Monitoring antimicrobial resistance (AMR) bacteria is essential for effective regional diagnostic and antimicrobial stewardship. This study analyzed the prevalence and trends of AMR bacteria in hospitals in Nagasaki, Japan.

Method

We collected and analyzed data on AMR bacteria from 17 hospitals in Nagasaki, Japan, between 2014 and 2023. The study focused on the following AMR bacteria: methicillin-resistant *S. aureus* (MRSA), vancomycin-resistant Enterococci (VRE), extended-spectrum β -lactamase (ESBL) producing bacteria, multidrug-resistant *P. aeruginosa* (MDRP), carbapenem-resistant Enterobacteriaceae (CRE), and carbapenemase-producing Enterobacteriaceae (CPE). As shown in the table on the right, the criteria for AMR identification are presented.

Antimicrobial-resistant

Bacterial Strains

MIC(μ g/mL) Criteria

MRSA

S. aureus

MIPIC ≥ 4 or CFX ≥ 8

VRE

E. faecalis, *E. faecium*

VCM ≥ 32

PRSP

S. pneumoniae

PCG ≥ 0.125

ESBL

E. coli, *K. pneumoniae*,
K. oxytoca, *P. mirabilis*

According to CLSI M100-S20

MDRP

P. aeruginosa

IPM or MEPM ≥ 16 and
AMK ≥ 32 and
LVFX ≥ 8 or CPFX ≥ 4

CRE

Enterobacterales

MEPM ≥ 2 or
IPM ≥ 2 and CMZ ≥ 64

CPE

Enterobacterales

Positive by carbapenemase
gene detection or phenotypic
testing

Results

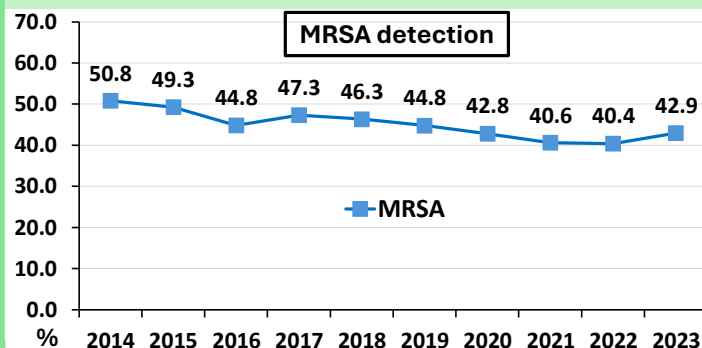


Figure 1. Trends in MRSA detection rates in Nagasaki.

MRSA detection rate (%) = Number of MRSA isolates / (Number of MRSA isolates + Number of MSSA isolates).

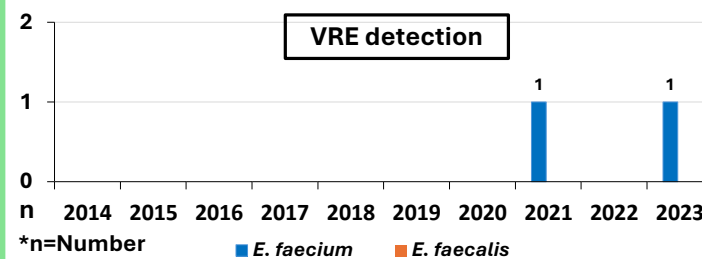


Figure 2. Number of VRE isolates.

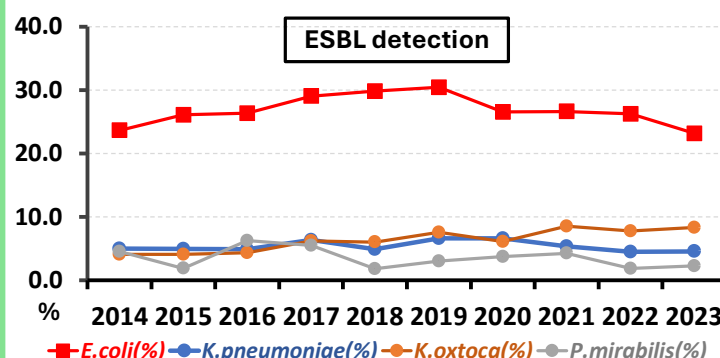


Figure 3. Trends in ESBL detection rates in Nagasaki.

Detection rate (%) = Number of ESBL-producing isolates / Total number of isolates of the corresponding species.

References

- Japan Nosocomial Infections Surveillance (JANIS), Clinical Laboratory Division. (2023). Annual Open Report 2023 (All Facilities). Tokyo: Ministry of Health, Labour and Welfare. Retrieved September 18
- Ng, R. W. Y., et al. (2025). Global prevalence of human intestinal carriage of ESBL-producing *Escherichia coli*: A systematic review and meta-analysis. *Journal of Antimicrobial Chemotherapy*, 80(4), 1021–1030.
- National Institute for Infectious Diseases, Japan. Table 3. *Infectious Agents Surveillance Report (IASR)*. 2025 Feb;46:23-24.

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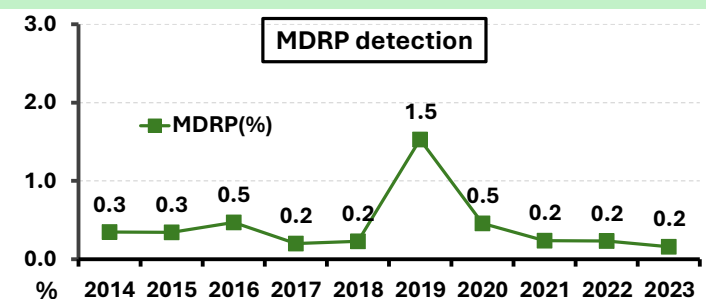


Figure 4. Trends in MDRP detection rates in Nagasaki.

Detection rate (%) = Number of MDRP isolates / Total number of *Pseudomonas aeruginosa* isolates.

Table 2. Proportion of CRE and CPE isolates by bacterial species.

Bacteria	CRE (n)	CPE (n)	Proportion of CPE among CRE (%)
<i>Enterobacter</i> spp.	665	42	6.3
<i>E. coli</i>	36	5	13.9
<i>K. pneumoniae</i>	38	6	15.8
<i>Proteus</i> spp.	4	0	0.0
<i>Citrobacter</i> spp.	48	8	16.7
Others	324	4	1.2
Total	1115	65	5.8

Note: *Klebsiella aerogenes* was included in *Enterobacter* spp. *n=Number

Discussion

- The downward trend in MRSA proportion likely reflects the cumulative effects of hospital infection control programs.
- Compared with Japan Nosocomial Infections Surveillance (JANIS) (JANIS) data reporting approximately 1,000 VRE cases annually in Japan (2023)¹, the prevalence observed in this study was relatively low.
- The proportion of ESBL-producing *E. coli* in Nagasaki rose from 23.7% in 2014 to 30.5% in 2019, then declined to 23.2% in 2023. The peak prevalence in Nagasaki was slightly higher than the global pooled prevalence of 25–28%, which continues to increase in many regions².
- MDRP represented only a small fraction of isolates. In Japan,
- According to the National Institute of Health and Crisis Management (JIHS) in Japan, the national detection rate of *Enterobacter* spp. among CRE was 69.4% in 2023³, which was not substantially different from the proportion observed in Nagasaki during the period from 2014 to 2023, where 665 out of 1,115 isolates (59.6%) were identified as CRE.

Conclusion

We identified the trends in the isolation of antimicrobial-resistant bacteria in Nagasaki, Japan over the past decade (2014–2023). Ongoing surveillance of regional drug-resistant bacteria remains imperative.