

Outbreak Investigation of Vancomycin-Resistant *Enterococcus faecium* in a City Hospital — Shizuoka, Japan, 2022



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Background:

- Vancomycin-resistant Enterococci (VRE) are an antimicrobial-resistant (AMR) pathogen on the WHO global priority pathogens list for research and are one of the target AMR pathogens for control and prevention.
- The frequency of vancomycin resistance in Enterococci has remained low in Japan (Fig. 1), with few examples of coordinated responses to its outbreaks.
- A city hospital in Shizuoka, Japan, experienced a VRE outbreak in 2022, and we conducted a joint investigation with the hospital's infection control team (ICT), a local public health center, a local public health institute, and local and national experts.
- This report describes how we are controlling the VRE outbreak in the city hospital through the coordinated response among multiple stakeholders.

Methods:

- Study design: cross-sectional study.
- Case definition: a patient testing positive for vancomycin-resistant *E. faecium* (VREfm, *E. faecium* with a minimum inhibitory concentration [MIC] of vancomycin ≥ 16 $\mu\text{g}/\text{mL}$) by samples obtained during hospitalization between 1 October 2020 and 17 October 2022. Cases in which VREfm was detected 3 days or more after admission were defined as nosocomial infection.
- Information sources: bacterial culture, screening criteria, patient chart, interview with healthcare workers, inspection in the affected wards via investigation with multiple stakeholders, and pulsed-field gel electrophoresis (PFGE).

Results:

- There were 160 cases in total (Fig. 2) from 8 of 9 wards (13 of 24 departments), with 116 cases (73%) occurring in 2 wards (6 East and 6 West) (Fig. 2, Table 1).
- Transmission possibly due to suboptimal hand hygiene during diaper changes was suggested with a high proportion of cases among patients with low activities of daily living (76%).
- All VREfm isolates tested were within 6 band differences by PFGE.
- The hospital then launched monthly screening cultures for all hospitalized patients, strengthened standard precautions including hand hygiene, strengthened contact precautions, avoided re-use or sharing of patient care materials, and enhanced information sharing among staff and neighboring hospitals.
- Joint investigation encouraged active communication between the hospital, the local public health center, the local public health laboratory, and local and national experts, and control measures were implemented under their consultation.

Conclusion:

- This large-scale, long-standing nosocomial outbreak of VREfm responded to by multiple stakeholders including the hospital ICT, local public health center and local experts, and national experts can be a model for controlling the spread of AMR pathogens (Fig. 3).

Fig. 3. Scheme of the coordinated response during the VRE outbreak in a city hospital, Shizuoka, Japan

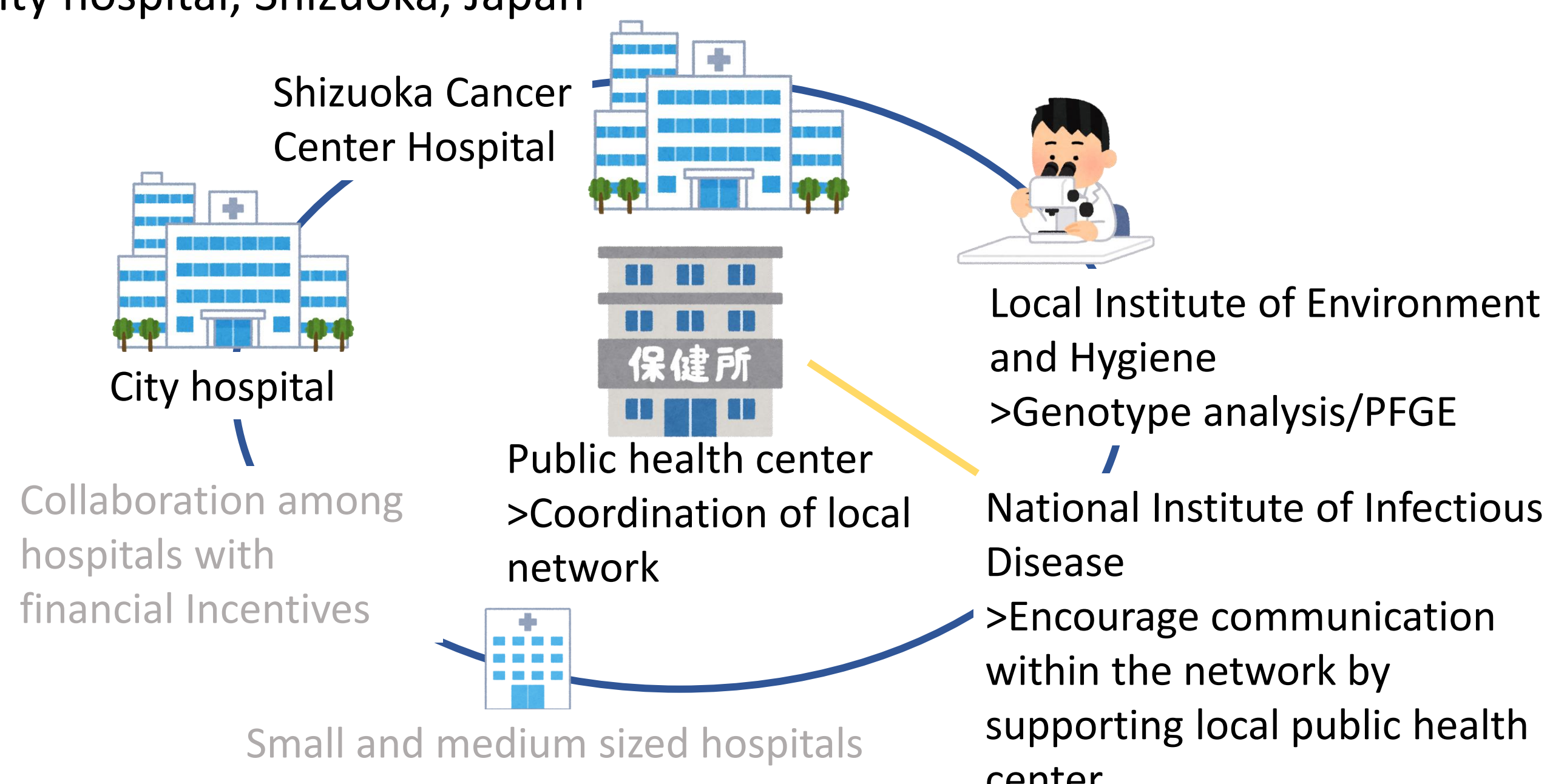


Fig. 1. Number of reported VRE infection cases*¹ in Japan, 2021 (n=124)*²

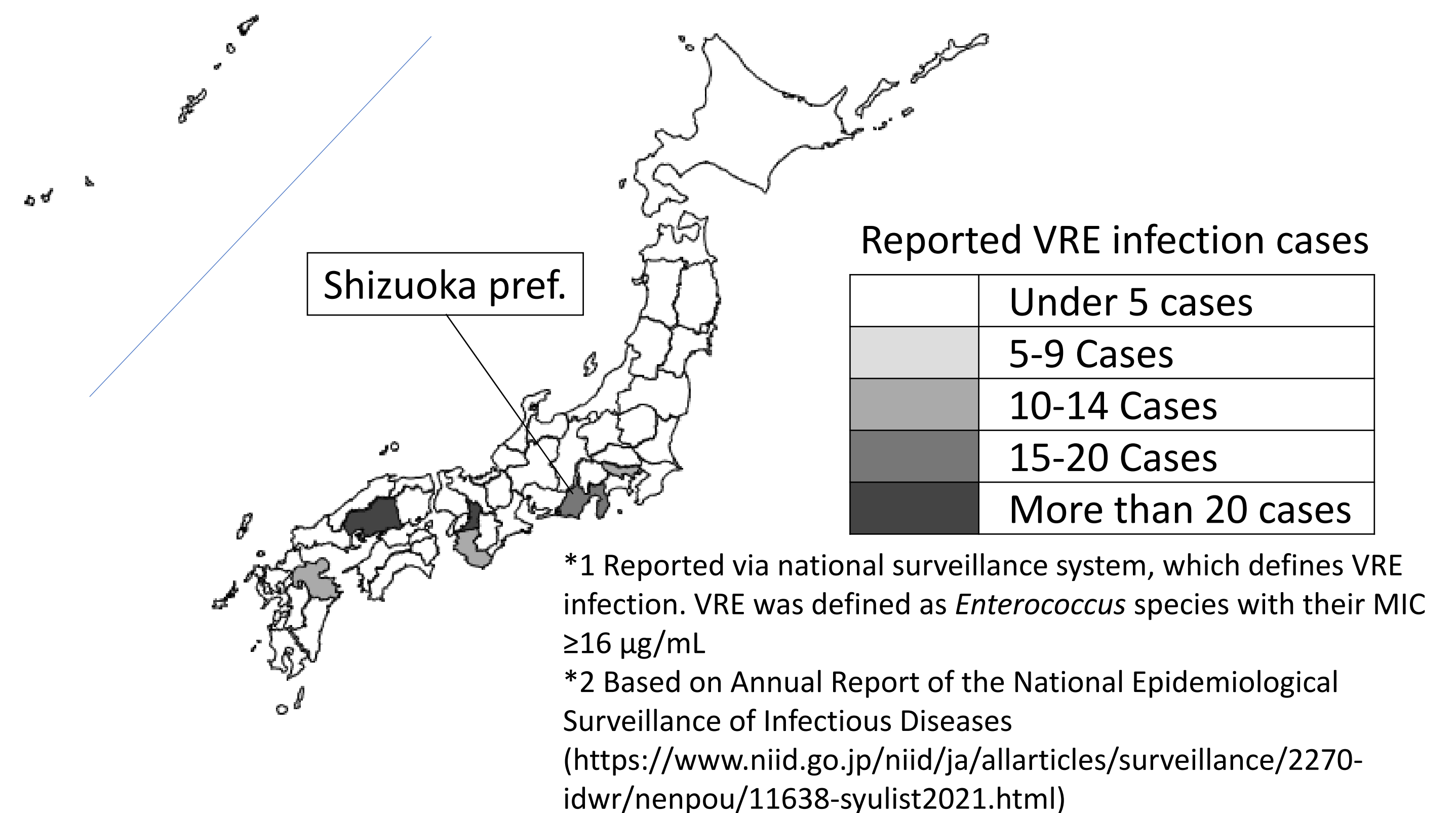


Fig. 2. Epidemic curve of the VRE outbreak in a city hospital, Shizuoka, Japan, 1 Oct 2020 – 17 Oct 2022, n=160

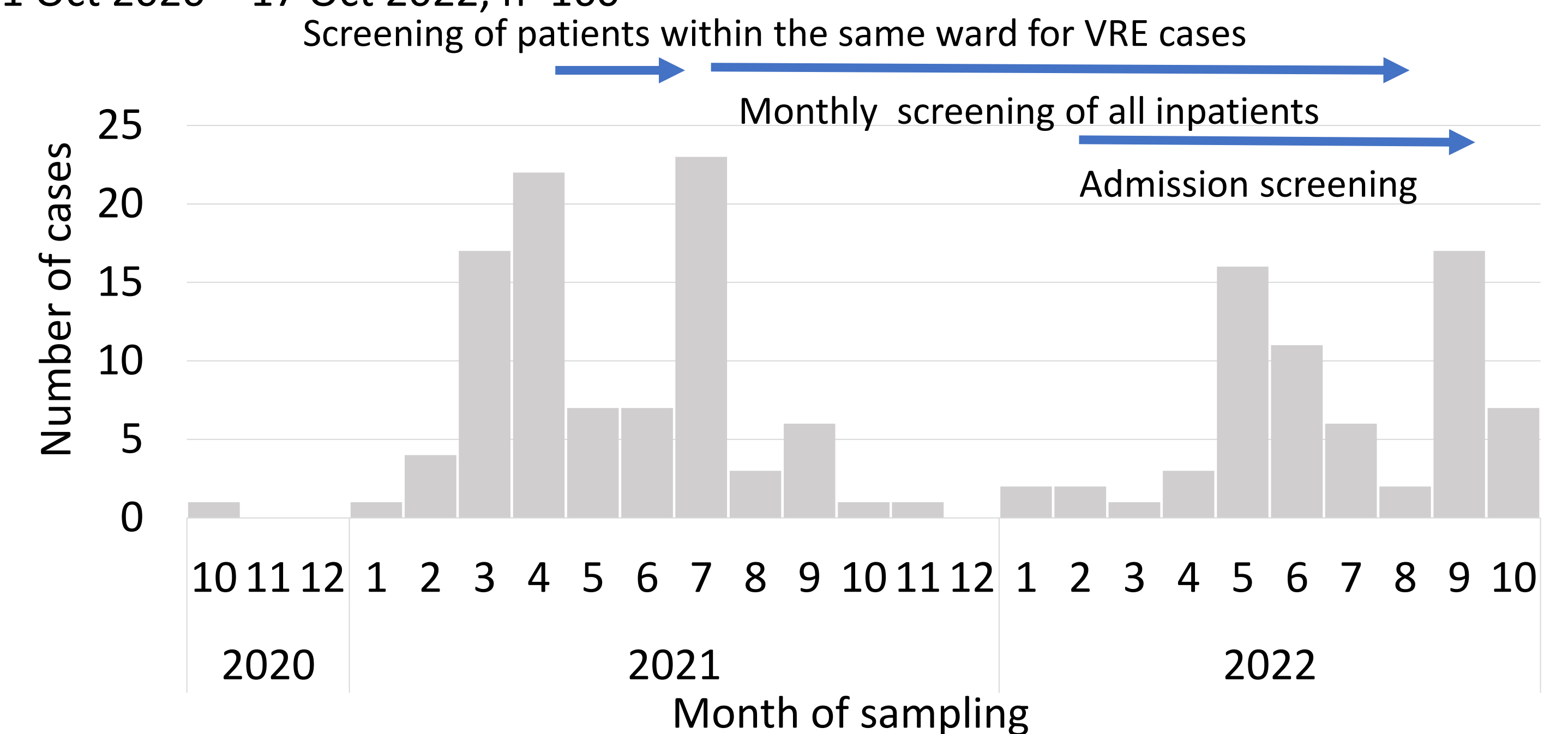


Table 1. Basic characteristics of the cases in the VRE outbreak in a city hospital, Shizuoka, Japan, 1 Oct 2020 – 17 Oct 2022, n=160

	n	%		n	%
Male sex	109	68%	Specimen		
Median age, yo (range)	79 (32-103)		Stool	154	96%
ADL			Ascites	1	1%
Independent	36	23%	Urine	2	1%
Dependent (toilet assistance, etc.)	122	76%	Bile	1	1%
Other* ¹	2	1%	Pus/abdominal abscess	2	1%
VRE infection* ²	5	3%	Intervention and care* ⁴		
Death* ³	30	19%	Endoscopy	41	25%
Nosocomial transfection	146	91%	Enteral feeding	2	1%
Ward on sampling day			Central venous catheter	11	7%
6 East	72	45%	Antimicrobial use	133	83%
6 West	44	28%	Median days between admission and VRE detection (range)	10 (0-108)	
5 East	1	1%	Patient moves to different ward(s)* ⁵		
5 West	8	5%	0	108	68%
4 West	5	3%	1	34	22%
3 East	3	2%	2	8	5%
3 West	26	16%	3 or more	8	5%
ICU	1	1%			

*¹ Need for assistance with stoma care.

*² Small bowel perforation, septic shock, cholangiocarcinoma, cholecystitis, urinary tract infection.

*³ No deaths were clearly thought to be due to VRE.

*⁴ Between admission and VRE detection.

*⁵ Excluding 2 cases with unknown history.

Acknowledgement:

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