Managing Infection Prevention and Control for Multidrug-resistant Organism patients in Ebeye Hospital, Marshall Islands

Frances-Snoddy, L[1], Nasa J[2], Choban J[3], Durand M[2]

No disclosures or conflicts of interest

[1] Infection Prevention & Control Nurse, Ministry of Health & Human Services, Ebeye, Marshall Islands
[2] Chief of Staff, Ministry of Health & Human Services, Ebeye, Marshall Islands
[2] Regional Epidemiology Unit, Pacific Island Health Officers Association (PIHOA).
[3] Infection Prevention & Control Committee Chairperson, Ministry of Health & Human Services, Ebeye, Marshall Islands

Hobart: A community vision for our island capital. Pillar 2.1

Acknowledgment of Country

I wish to acknowledge the Tasmanian Aboriginal people as the traditional owners of the Land and pay my respects to Elders past and present, for they hold the memories, knowledge, and culture, as well as the hopes, of Aboriginal Tasmania.

How did it all start?

The COVID-19 Pandemic: Inception of the IPC Program within the Ministry

Technical Assistance: Pacific Community (SPC) assisted in the review/update of National IPC Guidelines 2022.

CDC/ELC COVID-19 Grant: Lab, IPC & HAI/AR Program

Baseline: WHO Minimum Requirements Core Components /IPCAT

The joint PIHOA-CDC Regional Epidemiology Unit (REU) is leading the implementation of the SHIP program in the USAPIs, which include: American Samoa, the Commonwealth of the Northern Marianas (CNMI), the Federated States of Micronesia (FSM), Guam, the Republic of the Marshall Islands (RMI), and the Republic of Palau (Palau) - Operational Research Paper.

Background

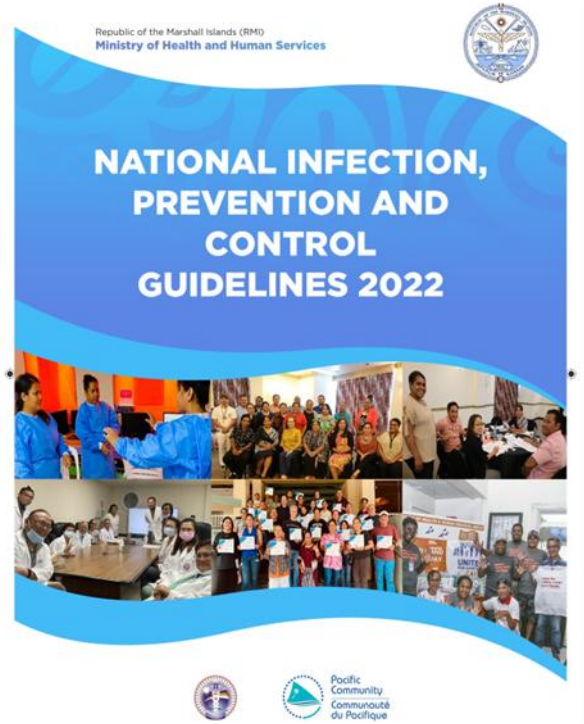
- Multidrug-resistant organisms (MDROs) are bacteria resistant to one or more classes of antimicrobial agents.

- **Ebeye Hospital, Marshall Islands**

- Sixty-bed district and acute care facility serving a population of 9,789
- Clinical and Community Health Center (CHC) - unique setting
- Healthcare workers - 124
- Services: ER, Intensive Care Unit, OBs & GYN, Surgery, Internal Medicine, Pediatrics, NICU, and other diagnostic areas (Lab & Radiology)
- Tertiary Referral - Hawaii, Philippines, and Taiwan.

Background

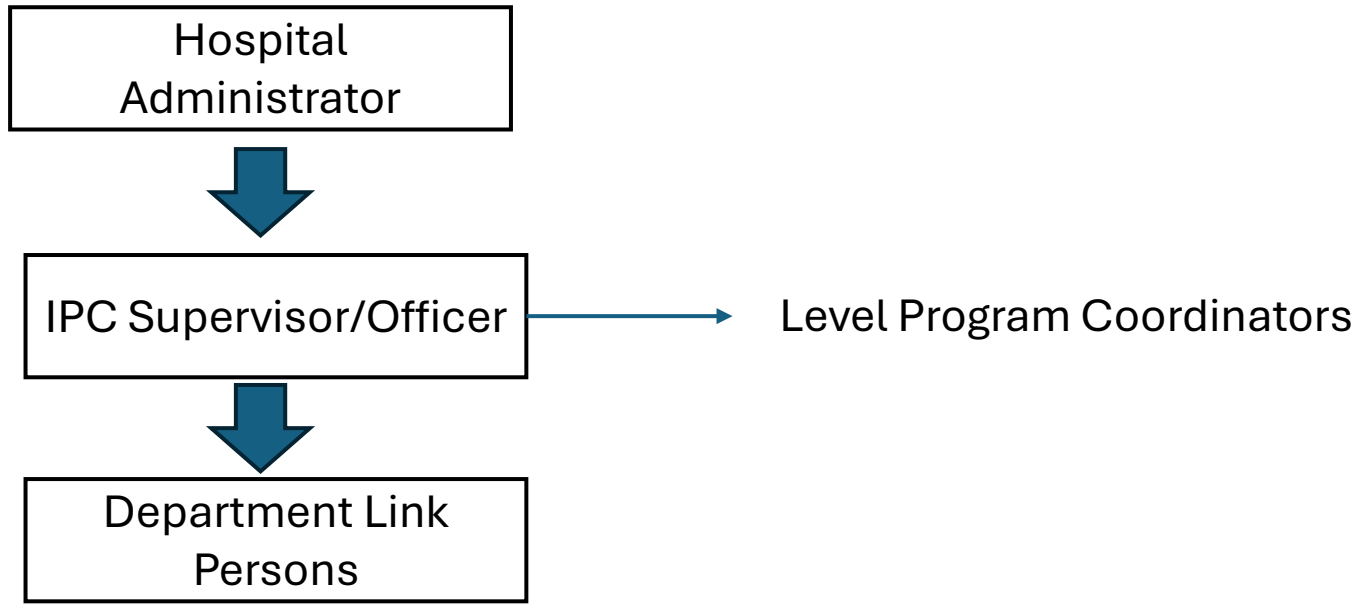
WHO Minimum Requirements Core Components: CC1 & CC6	• Infection Prevention and Control (IPC) interventions can significantly reduce healthcare-associated infection rates by 35%-70%, regardless of a country's income level.
Infection Prevention and Control: Transmission-based Precautions	• However, only 15% of all countries worldwide meet the minimum IPC requirements.
Multidrug-resistant organisms Surveillance (WHO & CDC)	• Timely reporting for actions, RMI reportable Conditions, & gaps
National RMI Antimicrobial Guidelines 2018	• Antibiotic Stewardship - current practice.



Introduction

Aim:
Examine laboratory-confirmed MDRO cases among inpatients since the program's inception.

Ebeye Hospital IPC Program Structure



Methodology

- **Study Design:** Descriptive cohort of inpatients.

- **Study Population:** Pediatric, Medical, Surgical, Maternity, and Intensive Care Unit and NICU that had laboratory-confirmed cultures for any MDROs listed under the RMI Reportable Conditions, Class 2 (report within 48 hours) from October 25th, 2022, to December 31st, 2023

Table: Reporting Requirements for Health Care Providers

Class 1 (Report Immediately or within 24 hours)	Class 2 (Report within 48 hours)	
A80 Acute Flaccid Paralysis / polio	B20 HIV/AIDS	A02 Salmonellosis
A22 Anthrax	A06.9 Amebiasis	A03 Shigellosis
A87 Aseptic meningitis: viral	A23 Brucellosis	B95.6 Staphlococc
A00 Cholera	A04.5 Campylobacteriosis	A53 Syphilis
A91 Dengue	A57 Chancroid	A35 Tetanus
A36.9 Diphtheria	B01 Chickenpox (Varicella)	B95.0 Toxic Shock
J10 Influenza A/B virus infection – type specified	A56 Chlamydia Trachomatis	B75 Trichinellosis
T61.0 Ciguatera Poisoning	B38 Coccidiomycosis	A15 Tuberculosis,
T61.1 Scombroid Poisoning	B30.1 Conjunctivitis (Viral)	A05.3 Vibriosis (n
B05 Measles	A07.2 Cryptosporidiosis	
G00 Meningococcal Disease, bacterial	A04 Escherichia coli (suspected O157: H7)	
B26 Mumps	A07.1 Giardiasis	VREs – Enterococ
A37 Pertussis (Whooping Cough)	A54.9 Gonococcal Infection	Candida auris
A20 Plague	B74 Filariasis	Carbapenemen-resis
A78 Rabies	A30.9 Hansen's Disease (Leprosy)	ESBLs – Klebsiella
B06 Rubella (including congenital)	A04.3 Hemolytic Uremic Syndrome, (post E. coli diarrhea)	Any other MDRO f Pseudomonas, espec
B03 Smallpox	B15.9 Hepatitis A	
A75.3 Scrub Typhus	B16 Hepatitis B	
A01.0 Typhoid Fever	B17.1 Hepatitis C	
A95 Yellow Fever	A48.1 Legionellosis	
A21 Tularemia	A27 Leptospirosis	
A92.8 Zika	A69.2 Lyme Disease	
A92.0 Chikungunya	A32 Listeriosis	
A98.4 Ebola	B50 Malaria	
U04.9 SARS	**G 81.0 AFM – (Acute Flaccid Myelitis)**	
U07.1 SARS-CoV-2 (COVID-19)	MERS-CoV (no code)	
J12.1 RSV pneumonia (Resp Syncytial virus)	**MIS-C Multisystem inflammatory syndrome in Children**	
Monkeypox		

M: Majuro, E: Ebeye ME: Majuro and Ebeye: Laboratory Department can confirm. The be confirmed by the Physician and off-island diagnostics tests. Surveillance Officer is responsible in following up laboratory test results locally and off-island.

Methodology

- **Data:** All were obtained from the Healthcare-Associated Infections/Antimicrobial Resistance (HAI/AR) database (Excel spreadsheet)
    - Microbiology report
    - Surveillance Form
    - Medical Record

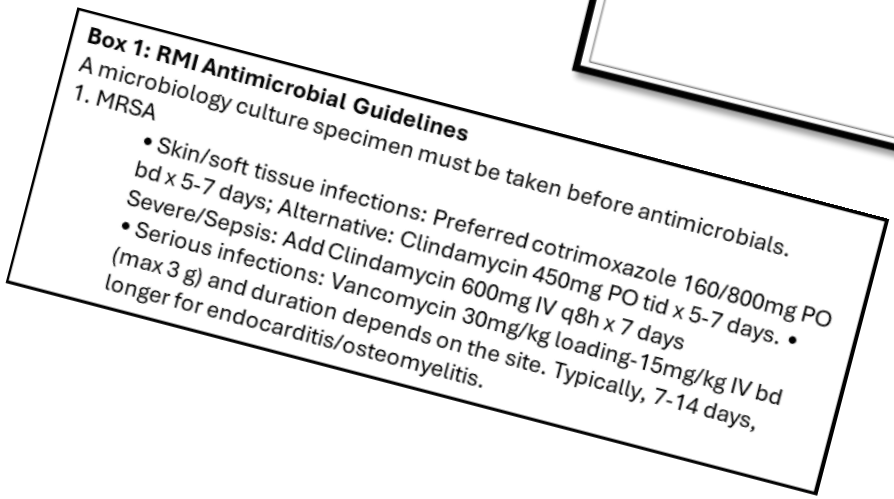

MULTI RESISTANT ORGANISM SURVEILLANCE FORM

PERSONAL DETAILS

NAME:
HN:
AGE/SEX:
DOA:
ADDRESS:
DOD:
NATIONALITY:
MRO STATUS ON ADMISSION:
WARD:

SURVEILLANCE DATA

DATE OF SPECIMEN COLLECTION:
DATE OF REPORTING:
ORGANISM/SENSITIVITY:
INDICATION FOR SPECIMEN COLLECTION:
LOCATION OF PATIENT ON DATE OF COLLECTION:
NO. OF SPECIMEN TAKEN:
DATE OF SURGERY:
COLONISED/INFECTION:
IDC/IV CANNULA/VENTILATED/CHEST DRAIN/CUT DOWN
OPERATION:
WOUND CLASSIFICATION:
SURGEON:
ANTIBIOTICS ADMINISTERED:
INFECTION CONTROL PLAN:
MANAGEMENT OF MRO WARDS:
CLASSIFICATION: HCAI/CAI


Box 1: RMI Antimicrobial Guidelines

A microbiology culture specimen must be taken before antimicrobials.

1. MRSA
    - Skin/soft tissue infections: Preferred cotrimoxazole 160/800mg PO bd x 5-7 days; Alternative: Clindamycin 450mg PO tid x 5-7 days.
    - Severe/Sepsis: Add Clindamycin 600mg IV q8h x 7 days
    - Serious infections: Vancomycin 30mg/kg loading-15mg/kg IV bd (max 3 g) and duration depends on the site. Typically, 7-14 days, longer for endocarditis/osteomyelitis.

Methodology

Each case was evaluated and classified as follows:

1. Whether it met standards for initiating IPC measures (i.e., initiated within 1 day of the culture result release date).

- Isolate the patient if isolation rooms are available or cohort

- Signage - Standard and Transmission-based Precautions

- Isolation Cart - Contains PPEs, hand hygiene supplies, waste segregation supplies, cleaning supplies,

Box 2: RMI Antimicrobial Guidelines 2018
NOTE: Carbapenem-resistant non-fermenters (e.g., CRAB and CRPA) are not explicitly covered in the RMI 2018 Guidelines.

Methodology

Each case was evaluated and classified as follows:

- Whether an adjustment to the antibiotic regimen was needed, based on the RMI Antimicrobial Guidelines 2018.
- For cases requiring adjustment, whether the correct antibiotic type, dose, and duration were applied promptly (within one day of the culture result release date)

For cases that did not meet IPC or antibiotic selection standards, the reasons for non-compliance were documented.

Results

Table 1: Characteristics of Multidrug-Resistant Organism Cases in Ebeye Hospital, October 25, 2022, to December 31, 2023 (n=58)

	MRSA	CRAB	ESBL	PAE	KPN	Total (%)
MDRO Isolates	19	4	6	13	16	58 (100%)
Age Group in No.						
≤ 14	4	0	0	0	0	4 (7%)
14 - 44	9	0	0	4	3	16 (27%)
45 - 64	2	3	5	7	12	29 (50%)
≥ 65	4	1	1	2	1	9 (16%)
Gender						
Female	7	1	4	8	5	25 (40%)
Male	12	3	2	5	11	33 (60%)
Wards						
• Maternity	1	0	0	0	0	1 (2%)
• Medical	3	1	1	2	3	10 (17%)
• Surgical	10	2	4	6	10	32 (55%)
• Pediatric	4	0	0	0	0	4 (7%)
• Intensive Care Unit (ICU)	1	1	1	5	3	11 (19%)

MRSA = Methicillin Resistant Staphylococcus Aureus; CRAB = Carbapenem-Resistant Acinetobacter Baumannii; ESBL = Extended-Spectrum Beta-Lactamase; PAE = Pseudomonas aeruginosa; KPN = Klebsiella Pneumonia

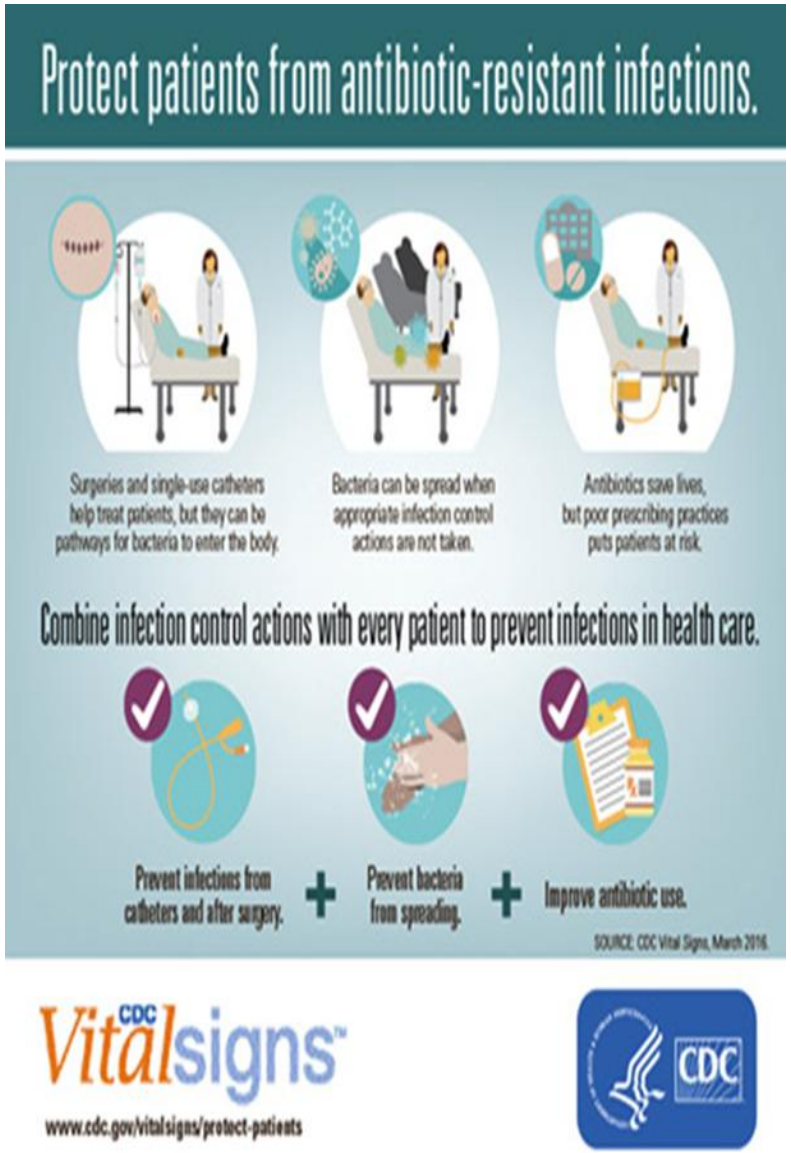
Results

Table 2: Compliance with IPC Standard Measures and Antibiotic Usage Guidelines and Reasons for Non-Compliance Among MDRO Cases in Ebeye Hospital, October 25, 2022, to September 20, 2023 (n=58)

IPC Standard Measures	Meets Standards	35 (60%)
	Does not meet standards	23 (40%)
	Reasons for Failure: ● No isolation rooms were available. ● Does not meet IPC initiation criterion	 10 (44%) * 13 (56%) *
Antibiotic Usage Guidelines	Meet Standards	8 (14%)
	Does not meet standards	50 (86%)
	Reasons for Failure: ● Unavailability of antimicrobials/shortage ● Patients discharged before the results ● Antibiotic duration: ○ Too long ○ Too short ● Frequent changes in antibiotics	 7 (14%) * 6 (12%) * 19 (38%) * 16 (32%) * 2 (4%) *

*#% Percentages are calculated based on 23 cases that did not meet IPC Standard Measures and 50 cases that did not meet Antibiotic Usage Guidelines.

Discussion



- The findings highlight critical areas for improvement, including the need to strengthen monitoring and feedback systems, enforce consistent adherence to guidelines, train all healthcare workers on IPC protocols to improve competencies, and allocate resources for essential supplies such as hand hygiene at all points of care.

- "Overcoming the obstacles of implementing infection prevention and control guidelines", concluded that multidisciplinary approaches are essential for success and that the mere existence of guidelines is insufficient for effective IPC (Birgand G, et al).

Discussion

- The prolonged use of antibiotics.
- Lack of leadership support

Limitations & Weaknesses

- Small cohort - (*n* = 58) which limits generalizability.
- The database was limited to culture result release times, IPC control measure initiation, and antibiotic adjustment times and details.
- Lack of audits - assess staff competency and give constructive feedback.
- Paper-based medical records (longer-staying patients - overflow)
- Laboratory - doesn't have the capacity to isolate Clostridioides difficile, Candida auris, and VRE
- Microbiologist - expat resigned (no surveillance)

Ways forward

- Future studies will be conducted to assess the progress of IPC implementation
- Country SOPs, bundles, standardize surveillance documents
- Leadership commitment

Conclusion

- The study identified shortcomings in both the initiation of IPC measures and adherence to antibiotic usage guidelines based on culture results.
- These findings point to actionable interventions that could improve infection control and antibiotic management, ultimately improving patient outcomes.

References

1. Birgand G, Johansson A, Szilagyi E, Lucet JC . Overcoming the obstacles of implementing infection prevention and control guidelines. Clinical Microbiology and Infection. 2015;21(12):1067-1071. doi:https://doi.org/10.1016/j.cmi.2015.09.005
2. Centers for Disease Control and Prevention. Background | MDRO Management | Guidelines Library | Infection Control | CDC. www.cdc.gov. Published March 27, 2019. https://www.cdc.gov/infectioncontrol/guidelines/mdro/background.html
3. Republic of the Marshall Islands Antimicrobial Guidelines 2018, Ministry of Health and Human Services, Unpublished.
4. Republic of the Marshall Islands National Infection Prevention and Control Guidelines 2022, Ministry of Health and Human Services.
5. WHO. Global report on infection prevention and control. www.who.int. Published May 23, 2022. https://www.who.int/publications/i/item/9789240051164
6. World Health Organization. Guidelines on core components of infection prevention and control programs at the national and acute health care facility level. www.who.int. Published 2016. https://www.who.int/publications/i/item/9789241549929

Acknowledgments:

- ✓ Ebeye IPC Committee
- ✓ Mrs. Wati Vulava - Microbiologist
- ✓ PIHOA support