

FIGHTING ANTIMICROBIAL RESISTANCE THROUGH INFECTION PREVENTION AND CONTROL



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Disclosure

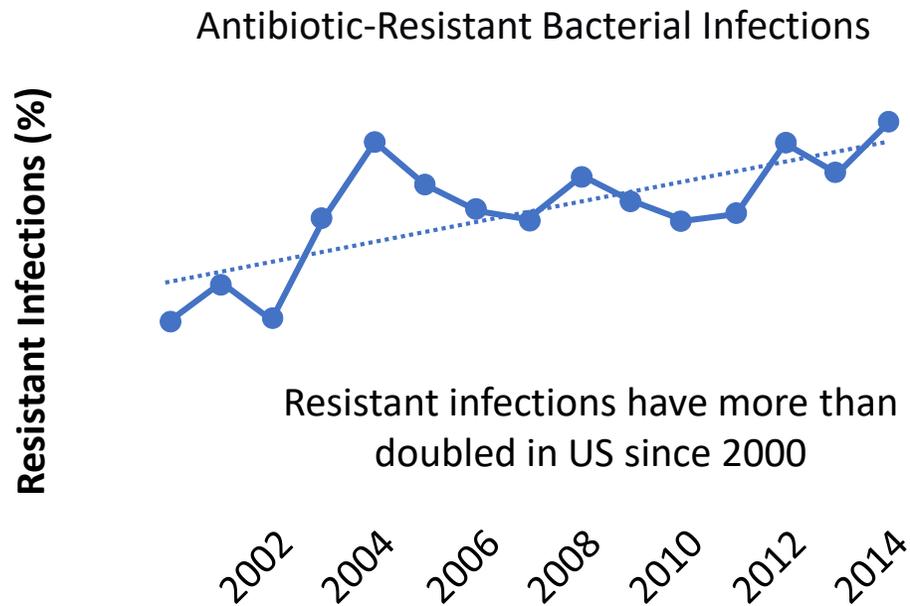
No Disclosures

OBJECTIVES

1. Review the current status of Antimicrobial Resistance (AMR) and Infection Prevention and Control (IPC) globally
2. Discuss the role of IPC in the Global action plan in reducing AMR.
3. Review the IPC evidence based strategies for reducing AMR (Hand Hygiene, Standard and Additional Precautions in reducing MDRO's, bundles, multimodal strategies)
4. Recall a regional example on the Impact of IPC on AMR :- Barbados

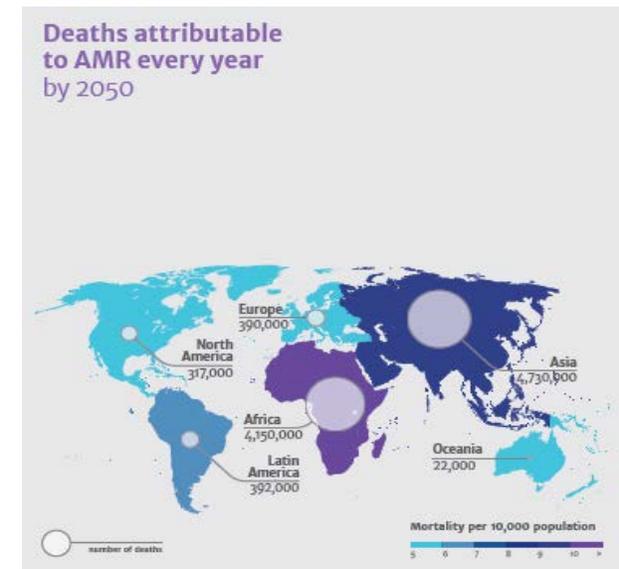
Antibiotic-Resistant Bacterial Infections Increasing in the US and Globally

- Analysis of data from US Medical Expenditure Panel Survey^[1]



Added cost of treating a resistant vs sensitive infection: \$1383 (\$2.2 billion annually)

- By 2050, global estimates of the impact of antimicrobial resistance include^[2]:
 - 10 million deaths per yr, including > 300,000 deaths per yr. in North America
 - Overall global GDP loss of \$60 to \$100 trillion USD, with 300 million premature deaths



1. Thorpe KE, et al. Health Aff (Millwood). 2018;37:662-669.

2. Review on Antimicrobial Resistance. Tackling a Crisis for the Health and Wealth of Nations. 2014.

We are using a lot of antibiotics

“The development of new antibiotics without having mechanisms to ensure their appropriate use is much like supplying your alcoholic patients with a finer brandy.”

drug consumption

between 2000 and 2010



Van Boeckel TP et al. *Lancet Infect Dis.* 2014;14:742-50.

Global Action Plan on AMR

AMR: a Tripartite priority



- Major global public health threat
- Theme of the WHD 2011
- Global Action Plan on AMR
 - FAO and OIE contributions
 - Endorsed by WHA May 2015
- WHO, OIE and FAO Resolutions 2015
- FAO Action Plan on AMR (2015, 2016)
 - Presented to Governing Bodies



Final Report

DRUG-RESISTANT INFECTIONS

A Threat to Our Economic Future

March 2017



Food and Agriculture
Organization of the
United Nations



World Health
Organization

Global Action Plan: Priority areas

Members States to develop National Plans on Antimicrobial Resistance by May 2017

1. Improve awareness and understanding of AMR

Risk communication

Education

2. Strengthen knowledge through surveillance and research

National AMR surveillance

Laboratory capacities

Research and development

3. Reduce the incidence of infection

IPC in health care

Community level prevention

Animal health: prevention and control

4. Optimize the use of antimicrobial medicines

Access to qualified antimicrobial medicines, regulation, AMS

Use in veterinary and agriculture

5. Ensure sustainable investment in countering AMR

Measuring the burden of AMR

Assessing investment needs

Establishing procedures for participation

Critical Care Focus

5 Antibiotic Resistance and Infection Control



Edited by
William F. Gilroy

Infection prevention and control

Objective 3:

Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures

IPC

- Effective hand hygiene
- Cleaning/sterilization procedures
- Reduce healthcare associated infection

Prevention at community level

- Vaccination
- Hand hygiene
- Environmental sanitation

Animal health:

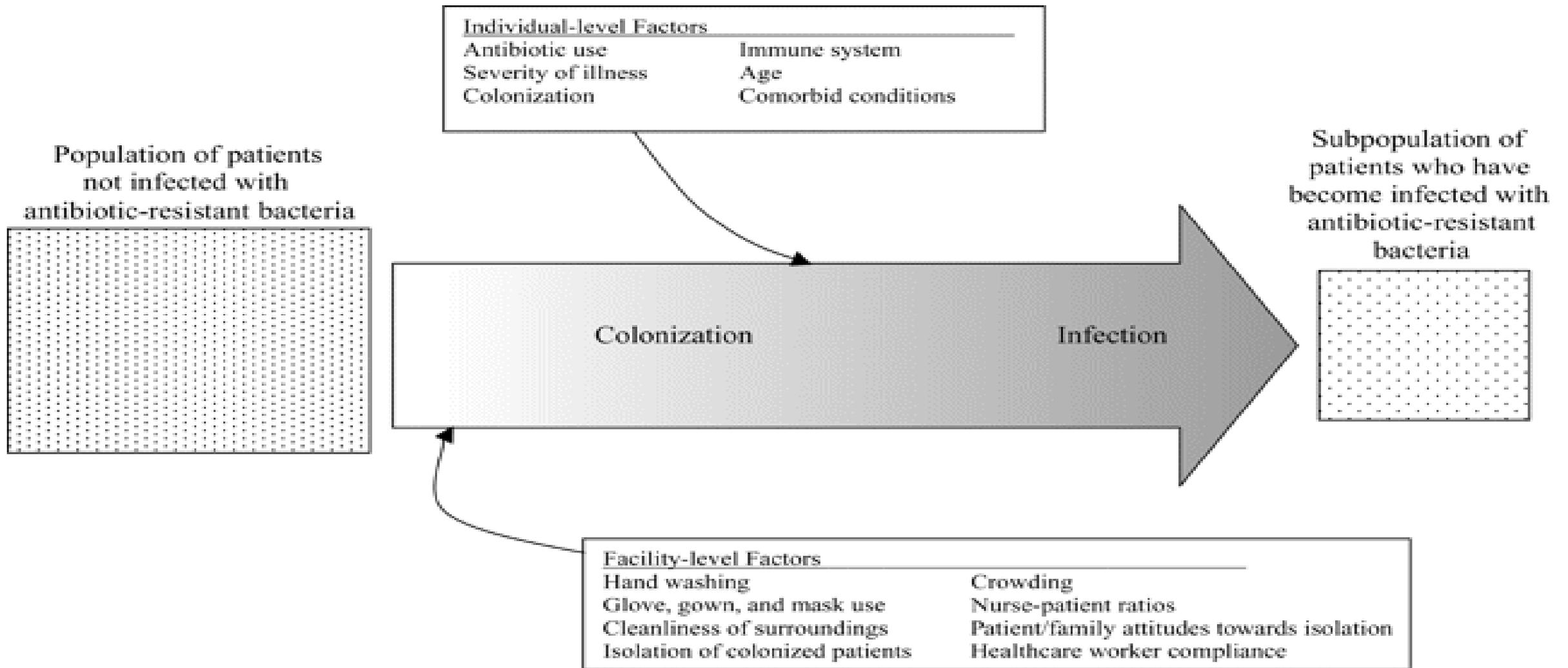
- Vaccination
- Biosecurity and hygiene
- Sustainable animal production

Ultimate Requirement In AMR Prevention is IPC



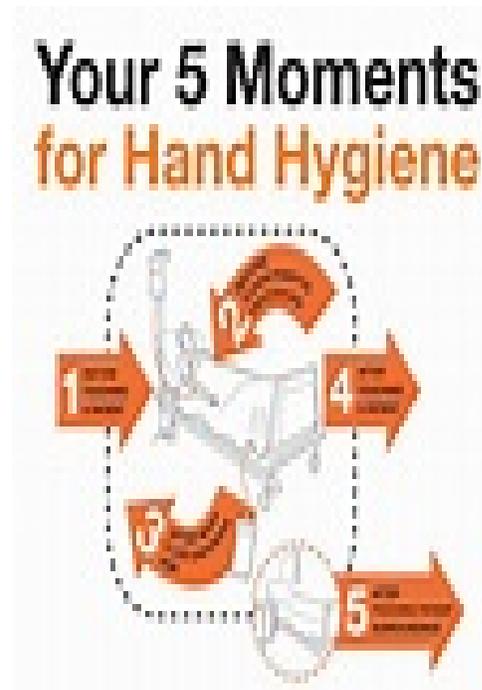
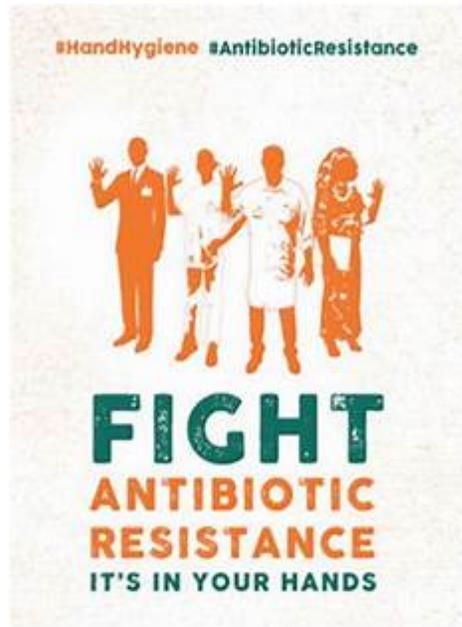
“LOW HANGING FRUIT”

Figure 1 Factors that influence the acquisition of a nosocomial antibiotic-resistant bacterial infection



Hand hygiene remains the cornerstone of decreasing the transmission of MDROs

- Alcohol-based hand rubs are a cheap, effective and convenient means of performing hand hygiene.



Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme. Lancet. 2000 Oct 14;356(9238):1307-12.

Year Country	Setting	Effect on hand hygiene compliance and/or consumption of alcohol-based handrubs (ABHR)	Impact on MDROs'	Reference
2013 Spain	Hospital-wide	Significant HH compliance increase from 57% to 85%	Significant reduction of MRSA infections/colonization/10 000 pt-days*	Mestre G et al (25)
2011 Australia	Nationwide (521 hospitals)	In sites not previously exposed to the campaign, increase of HH compliance went from 43.6% to 67.8%	Significant reduction of overall MRSA BSI (from 0,49 to 0,3497 per 10,000 patients-days) but not of hospital-onset MRSA BSI	Grayson ML et al (10)
2010 Canada	3 tertiary care hospitals	Significant difference of HH compliance between the intervention group (48.2 %) and the control group (42.6%)	No reduction in MRSA colonization. Intervention group: 48.2%; control group: 42.6%; intervention group: 0.73 cases per 1,000 patient-days, mean in control group, 0.66 cases per 1,000 patient-days (statistically insignificant)	Mertz D et al (8)
2010 USA	2 acute hospitals	Significant increase of HH compliance from 65% to 82%	51% decrease in hospital-acquired MRSA cases during the 12-month*	Carboneau C et al
2009 USA	Hospital-wide 7 acute care facilities	Significant increase of HH compliance from 49% to 98% with sustained rates greater than 90%	Significant reduction of MRSA rates from 0.52 to 0.24 episodes/1000 patient days	Lederer JW et al
2000 Switzerland	Hospital-wide	Significant increase in HH compliance from 48% to 66%. Increased consumption of ABHR from 3.5 to 15.4 L/1000 patient-days	Significant reduction in the annual overall prevalence of HAI (42%) and MRSA* cross- transmission rates (87%). Continuous increase in ABHR use, stable HAI rates and cost savings, in a follow-up study	Pittet D et al (9)

MDR Gram-Negative Bacterial Infections Associated With Increased Mortality

CDC Mortality Estimates, 2013^[1]

Infection	Estimated Annual Deaths, n
CRE	610
ESBL-producing <i>Enterobacteriaceae</i>	1700
MDR <i>Acinetobacter</i>	500
MDR <i>P aeruginosa</i>	440

- Analysis of 9 studies assessing mortality with carbapenem-resistant vs susceptible *Enterobacteriaceae* infection found **increased risk of death with CRE** (N = 985; RR: 2.05; 95% CI: 1.56-2.69)^[2]
- Studies frequently report mortality rates of 30% or greater in patients with CRE^[2-4]

How to Prevent Multi-Drug Resistant CRE with IPC

CRE – Carbapenem-Resistant Enterobacteriaceae



Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii* and *Pseudomonas aeruginosa* in health care facilities

Hand Hygiene

Contact precautions if infected/colonized with CRE

Minimize use of devices (ventilator, central line)

Antimicrobial Stewardship

Environmental cleaning

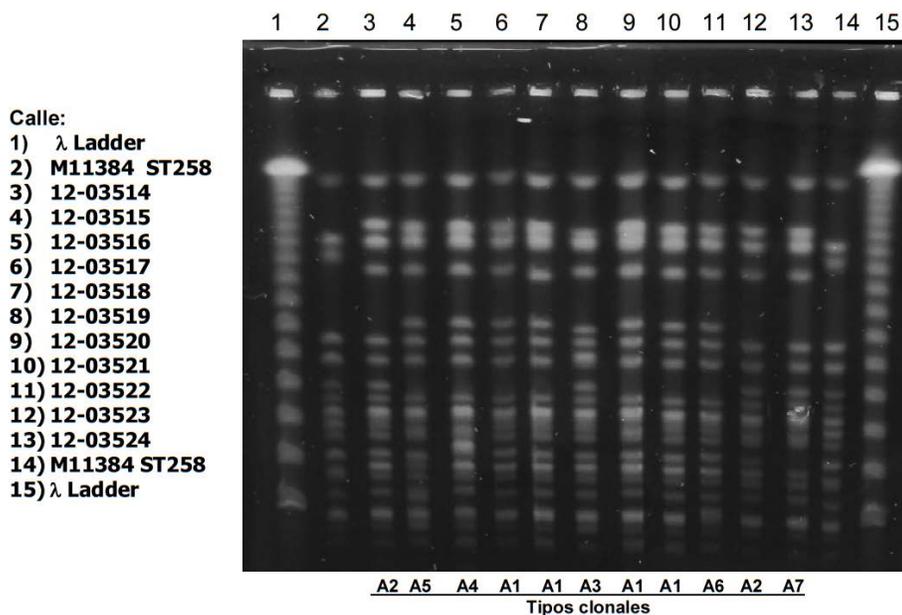
Care bundles have been shown to reduce the incidence of common healthcare-associated infections including:-

1. Catheter-associated Urinary Tract Infection,
 2. Ventilator-associated Pneumonia,
 3. Central Line-associated Bloodstream Infection
 4. Surgical Site Infection
- These bundles are relatively inexpensive, and can play an important role in reducing antibiotic use and improving clinical outcomes.

Regional Example on Impact of IPC ON AMR:- Barbados

XbaI PFGE

K. Pneumoniae productora de carbapenemasa KPC CAREC-2013



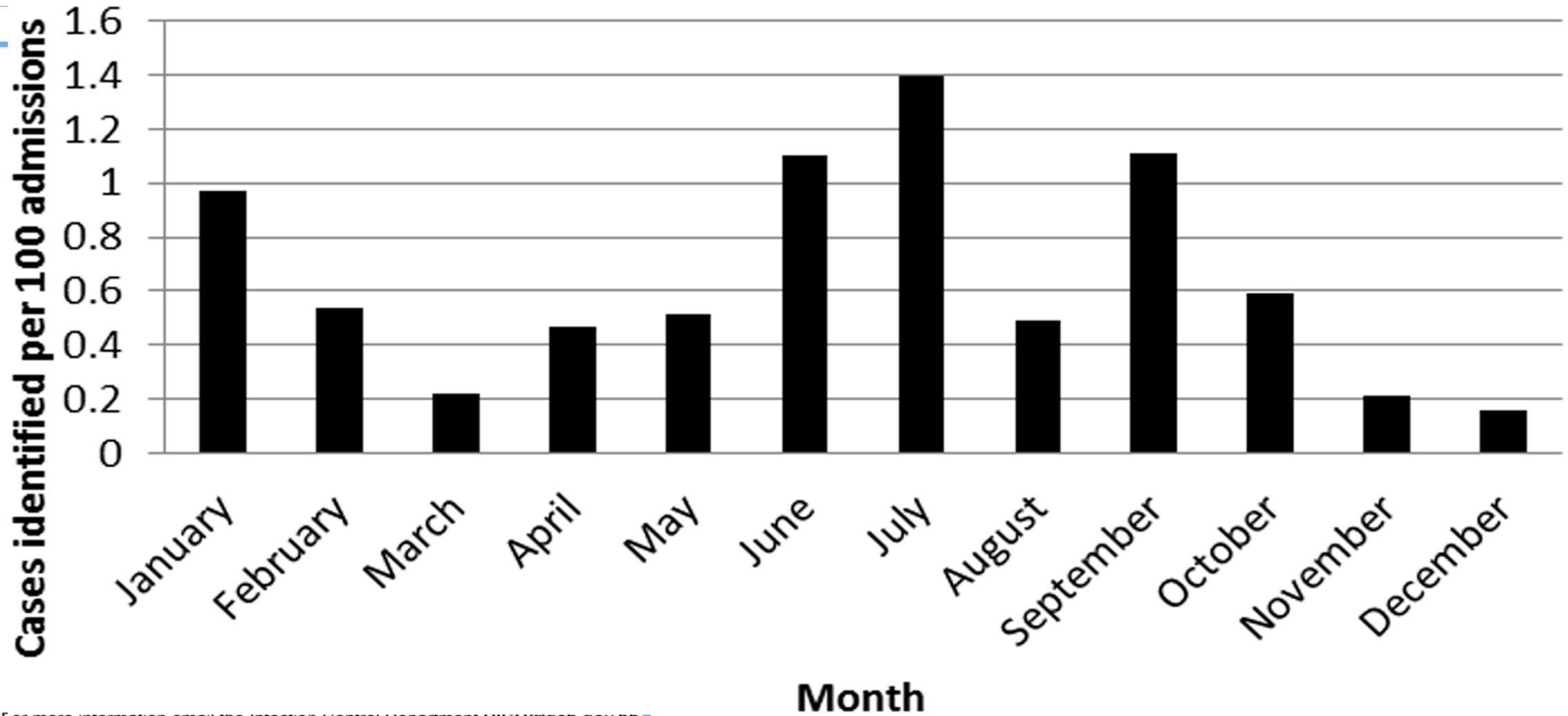
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Characteristics		Case (n = 53), n (%)	Non-Cases (n = 246), n (%)	p
Gender	Female	30 (56.6%)	153 (62.2%)	0.45
Age (years)	Mean (Min, Median, Max)	64.7 (26,65,95)	48.7 (0,49,102)	<0.0001 ^a
Length of Stay	Mean (Min, Median, Max)	42.5 (1,15,746)	27.0 (1,8,410)	0.0042 ^a
	>10 days	36 (67.8%)	113 (46.1%)	0.0040 ^a
Invasive Devices	Mean Number of Devices (Min, Median, Max)	1.02 (0,1,5)	0.51 (0,0,5)	<0.0001 ^a
	Any Device	35 (66.0%)	78 (31.7%)	<0.0001 ^a
	Urinary cath	29 (54.7%)	60 (24.4%)	<0.0001 ^a
	Mechanical Ventilation	2 (3.8%)	12 (4.9%)	1.00
	Nasogastric Tube	11 (20.8%)	29 (11.8%)	0.082
Invasive Vascular Line	7 (13.2%)	18 (7.3%)	0.17	
Antimicrobials	On Antimicrobials	48 (90.6%)	113 (45.9%)	<0.0001 ^a
	Mean Number of Antimicrobials (Min, Median, Max)	2.1 (0,2,6)	0.9 (0,0,6)	<0.0001 ^a
Location	In Intensive Care Unit	5 (9.4%)	1 (0.4%)	0.00077 ^a

Min, Minimum; Max, Maximum; Urinary Catheter; Nasogastric Tube, Intensive Care Unit

^ap ≤ 0.05 considered significant

Incidence of CRKP



For more information email the Infection Control Department HICU@qen.gov.bb

THE BUTTERFLY EFFECT



- AMR Coupled With Stewardship Programs , When Implemented Alongside IPC Measures Are More Effective Than Implementation Of ASP Alone¹

CO-IMPLEMENTATION (IPC & ASP) WITH HAND HYGEINE INTERVENTIONS	ANTIBIOTIC STEWARDSHIP ALONE
66% REDUCTION IN ANTIMICROBIAL RESISTANCE	17% REDUCTION IN ANTIMICROBIAL RESISTANCE

Baur, D. et al. Effect of antibiotic stewardship on the incidence of infection and colonization with antibiotic-resistant bacteria and *Clostridium difficile* infection: a systematic review and meta-analysis. Lancet Infect Dis 2017; 17: 990- 1001

THANK YOU

