

# Surveillance for Multidrug-Resistant Gram-negative Bacilli (MDRGNB): Use of Selective Screening Agar Increases the Rate of Detection while Decreasing Cost of Screening

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## Background

- Surveillance for MDRGNB colonization is not established as best practice in infection prevention. PA state law requires screening for MDR organisms (MDRO) including MDRGNB
- Lack of standardized methods for MDRGNB colonization detection complicates decision making

## Objectives

- Compare MDRGNB detection in surveillance cultures using a selective screening agar containing vancomycin, amphotericin B, ceftazidime (2µg/mL), and clindamycin (Thermo Scientific™ Remel™ VACC Agar) versus traditional MacConkey (MAC) screening agar
- Compare cost of MDRGNB surveillance using VACC versus MAC agar method
- Describe epidemiology of MDRGNB in study cohort

## Methods

Study performed in the clinical microbiology laboratory of a tertiary care children's hospital during two 2-month periods in 2015 (mid-Dec to mid-Feb; mid-Oct to mid-Dec)

Routine MDRGNB surveillance practices at SCHC include:

- Hospital policy for screening high-risk patients:**
  - Screening at admission:
    - By location: NICU, CCU
    - For special patient populations: Cystic fibrosis, sickle cell disease, chronic tracheostomy/ventilator dependence, oncologic disease, solid organ transplant, and any patient with ≥3 admissions in 12 months; patients from long-term care facilities or attendees of medical day care
  - Recurrent inpatient screening: Monthly MDRO screening of patients hospitalized for ≥30 days, as well as all NICU patients on a q 30-day unit schedule
- Body sites included in screen: Nares, skin & rectal swabs

Multi-drug resistance defined as GNB with:

- Extended spectrum β-lactamase (ESBL) production
- High-level resistance to cephalosporins & cephamycins (HLCR), likely to represent AmpC-β-lactamase production
- Carbapenem resistance

## Methods continued

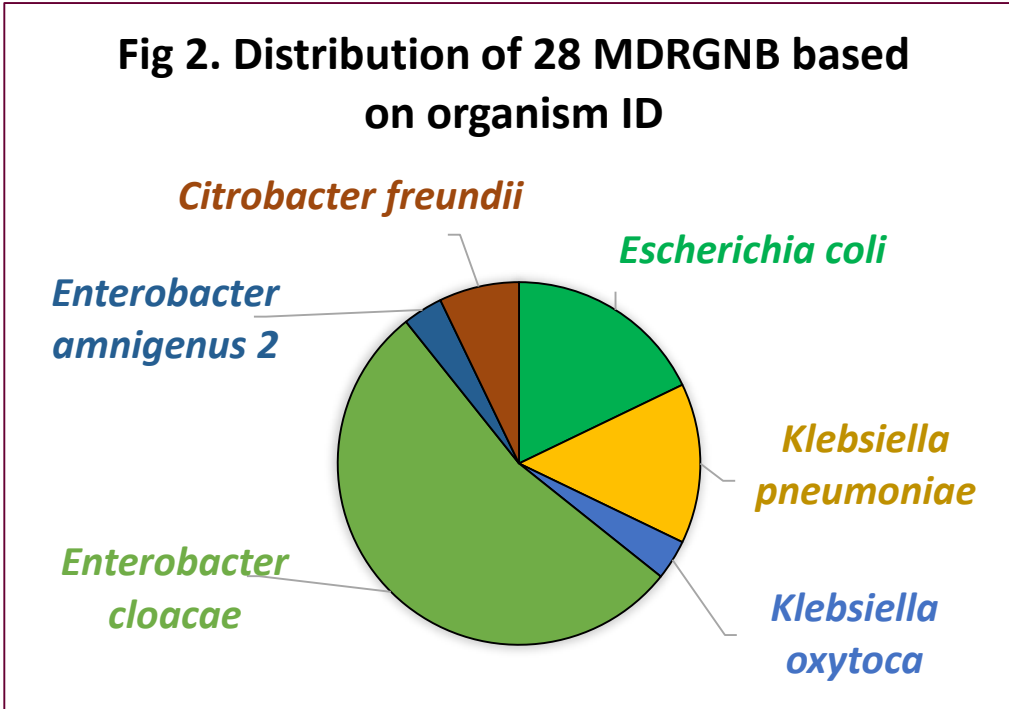
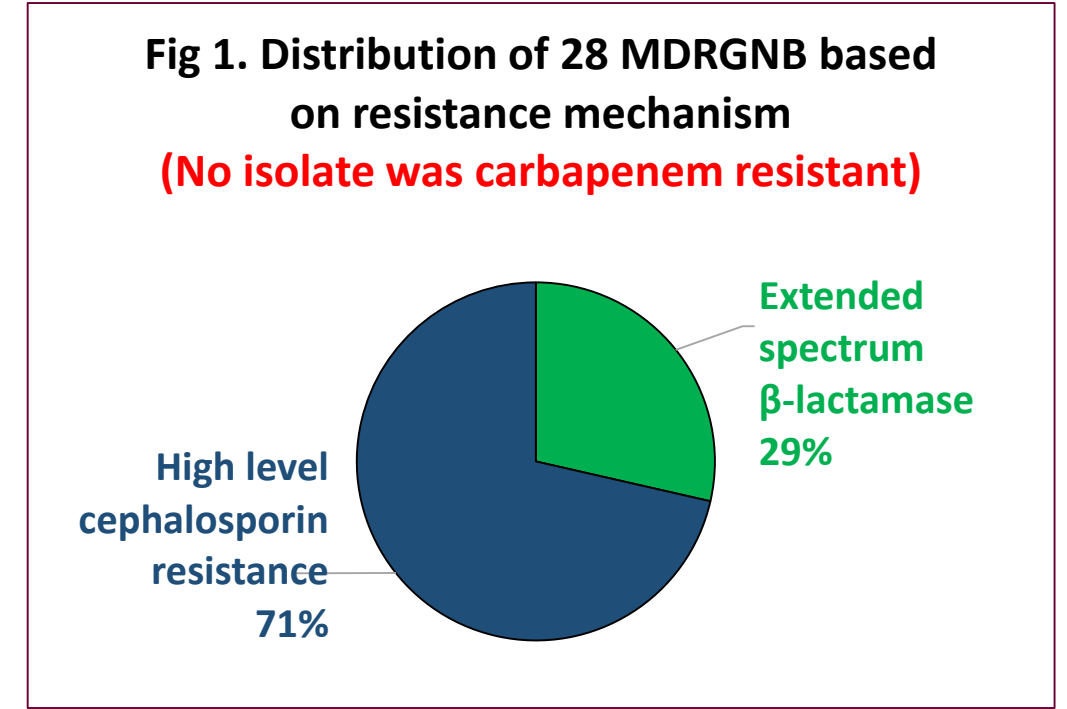
- All swabs received in the laboratory during the study period were screened for MDRGNB by both methods (parallel inoculation on MAC and VACC agars)

Clinical laboratory evaluation and definitions for MDRGNB screening

Anti-microbial	ESBL producer	AmpC β-lactamase producer	Carbapenem resistance
Piperacillin-tazobactam	R/S	R	R
Cefazolin	R	R	R
Cefoxitin	S	R	R
Ceftriaxone	R	R	R
Cefepime	R/S	S	R
Meropenem	S	S	R
Enzyme detection	YES (VITEK®2)	NO	YES (Xpert® Carba-R)

## Results

- 180 swabs from 60 pts were screened for MDRGNB by both methods
- 28 MDRGNB were detected in 20 pts; majority had HLCR (Fig 1)
- E. cloacae* (54%) was the predominant MDRGNB (Fig 2)



- Among all GNB isolates identified, 18% (28/159) were MDRGNB
- MDRGNB colonization was identified in 33% (20/60) of all patients screened

## Results continued

Selective agar method was less costly overall, despite higher per plate cost for VACC agar (Table 2)

- The selective nature of VACC agar reduced the number of isolates requiring further ID & AST, allowing for cost savings of \$2.53 per patient per screen

VACC agar detected more resistant organisms than MAC agar

- All 14 MDRGNB detected with MAC agar were also detected by VACC
- VACC identified 14 more MDRGNB (in 11 additional patients)

Use of VACC agar decreased utilization of lab resources

- VACC: 1.5 isolates tested to identify 1 MDRGNB
- MAC: 8.2 isolates tested to identify 1 MDRGNB

Table 2. Cost of Screening Methods

Type of Agar for Screen	Traditional (MAC)	Selective (VACC)
Cost of screening agar, per plate	\$0.21	\$1.80
Number of swabs screened	180	180
<b>TOTAL STUDY COST FOR AGAR</b>	<b>\$37.80</b>	<b>\$324.00</b>
Cost of MDRGNB confirmation, per isolate	\$6.00	\$6.00
Number of isolates on screening agar	116	43
<b>TOTAL STUDY COST FOR MDRGNB CONFIRMATION*</b>	<b>\$696.00</b>	<b>\$258.00</b>
<b>TOTAL COST FOR EACH SCREENING METHOD</b>	<b>\$733.88</b>	<b>\$582.00</b>
Number of GNB isolates with MDR detected	N=14	N=28

\* Confirmation using VITEK®2 ID & AST

## Conclusions

- One third of screened patients were colonized with MDRGNB
- Use of selective screening agar for MDRGNB detection improved hospital MDRO surveillance efforts
  - The rate of MDRGNB detection was increased 2 fold
  - The cost of screening was decreased by 21%