

Molecular Detection of Multi-Drug Resistant Organism (MDRO)

Colonization in a High Risk Patient Population

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BACKGROUND

- Multi-Drug Resistant Organisms (MDROs) present substantial clinical and financial burden to patients and hospitals.
- Links between MDRO colonization and risk of subsequent infection in high risk patient populations are not fully characterized.
- Rapid molecular identification of MDRO could optimize detection, outbreak investigation, and implementation of measures to interrupt transmission.

RESULTS

- Forty-eight patients were enrolled, from whom 42 perianal and 32 nasal swabs were obtained.
- Using standard culture-based screening methodology, 14/42 (33%) perianal and 0/32 (0%) nasal swabs screened positive for possible MDRO.
- OpGen's Acuitas MDRO Gene Test and subsequent standard culture and antibiotic susceptibility testing confirmed 4 of these 14 as actual MDRO (4/42;10%) [3 VRE (VanA) and 1 ESBL (CTX-M)].
- Three to six month follow-up revealed no MDRO invasive infections in the study cohort.
- Non-MDRO invasive infections were identified in 10/48 (21%) subjects due to *Bacillus*, *Klebsiella*, *Micrococcus*, *Pseudomonas*, rapid-growing *Mycobacteria*, *Staphylococcus aureus*, and *Streptococcus viridans* group.
 - Eight of 10 infected subjects were not previously colonized with any pathogen
 - 1 was colonized with different pathogens
 - 1 was both colonized and infected with *Pseudomonas*, but with differing antibiotic susceptibilities.

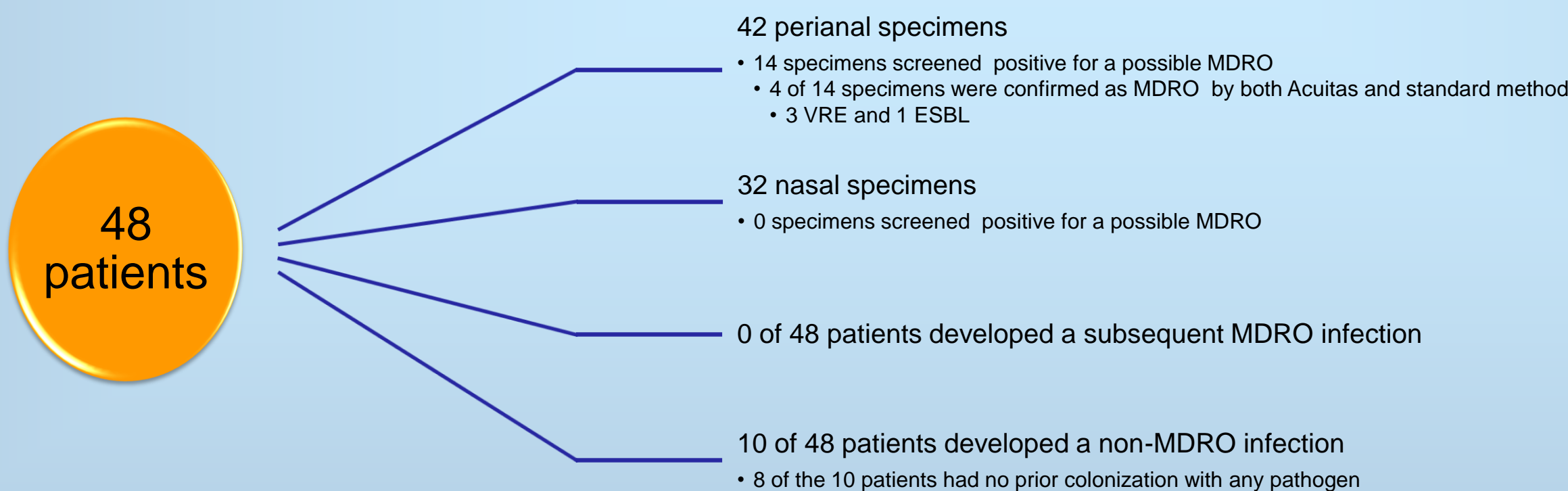
Culture and Acuitas MDRO Gene Test Results

Swab ID #	VRE Culture Screen	ESBL Culture Screen	CRE Culture Screen	MRSA Culture Screen	MRSA PCR	Isolate Identification	Swab Type	AST Phenotype	Acuitas Gene Test Result for Swab	Acuitas Gene Test Result for Culture Isolate
01-001	Neg	Neg	Neg	Neg	Neg				Negative	
01-002	Neg	Neg	Neg	Neg	Neg				Negative	
01-003	NA	NA	NA	Neg	Neg				NA	
01-004	Neg	Neg	Neg	Neg	Neg				Negative	
01-005	NA	NA	NA	Neg	Neg				NA	
01-006#1	Neg	Neg	Pos	Neg	Neg	<i>Klebsiella pneumoniae</i> <i>Enterobacter cloacae</i>	Perianal	S-GNB S-GNB	Negative	
01-007	Neg	Neg	Neg	Neg	Neg				Negative	
01-008	Neg	Neg	Neg	Neg	Neg				Negative	
01-009	Neg	Pos	Neg	Neg	Neg	<i>Pseudomonas aeruginosa</i>	Perianal	S-GNB	Negative	
01-010	Neg	Neg	Neg	Neg	Neg				Negative	
01-011	NA	NA	NA	Neg	Neg				Not Tested	
01-012	Neg	Neg	Neg	Neg	Neg				Negative	
01-014	Neg	Neg	Neg	Neg	Neg				Negative	
01-016	NA	NA	NA	Neg	Neg				NA	
01-018	Neg	Neg	Neg	Neg	Neg				Negative	
01-019	NA	NA	NA	Neg	Neg				NA	
01-020#1	Neg	Pos	Neg	Neg	Neg	<i>Morganella morganii</i> * <i>Enterobacter cloacae</i>	Perianal	CephR-GNB S-GNB	Negative	
01-008	Neg	Neg	Neg	Neg	Neg				Negative	
01-020	Neg	Neg	Neg	Neg	Neg				Negative	
01-002	Neg	Neg	Neg	Neg	Neg				Negative	
01-008(10/23)	Neg	Pos	Neg	Neg	Neg	<i>Morganella morganii</i>	Perianal	CephR-GNB	Negative	
01-021	Neg	Neg	Neg	Neg	Neg				Negative	
01-022	Neg	Neg	Neg	Neg	Neg				Negative	
01-008(10/30)	Neg	Pos	Pos	Neg	Neg	<i>Enterobacter cloacae</i> <i>Enterobacter cloacae</i>	Perianal	CephR-GNB CephR-GNB	Negative	
01-020	Neg	Neg	Neg	Neg	Neg				Negative	
01-023	Neg	Pos	Neg	Neg	Neg	<i>Citrobacter freundii</i>	Perianal	CephR-GNB	Negative	
01-006(10/30)	Neg	Pos	Neg	Neg	Neg	<i>Escherichia coli</i>	Perianal	CephR-GNB	Negative	
01-020	Neg	Neg	Neg	Neg	Neg				Negative	
01-024	Neg	Neg	Neg	Neg	Neg				Negative	
01-008(11/6)a	Neg	Pos	Pos	Neg	Neg	<i>Enterobacter cloacae</i> <i>Morganella morganii</i>	Perianal	CephR-GNB CephR-GNB	Negative	
01-026	Neg	Neg	Neg	Neg	Neg				Negative	
01-025	Pos	Neg	Neg	Neg	Neg	<i>Enterococcus faecalis</i>	Perianal	VSE	Negative	
01-027	Neg	Neg	Neg	Neg	Neg				Negative	
01-029	Neg	Neg	Neg	Neg	Neg				Negative	
03-001a	Pos	Pos	Neg	NA	NA	<i>Enterococcus faecium</i> <i>Enterococcus faecium</i>	Perianal	VRE VRE	Not Tested	VanA+ VanA+
03-002	Pos	Neg	Neg	NA	NA	<i>Enterococcus faecalis</i>	Perianal	VSE	Not Tested	NA
03-003a	Pos	Pos	Pos	NA	NA	<i>Pseudomonas aeruginosa</i> <i>Pseudomonas aeruginosa</i> <i>Enterococcus faecalis</i>	Perianal	S-GNB S-GNB VSE	Not Tested	Negative Negative Negative
03-004	Pos	Neg	Neg	NA	NA	<i>Staphylococcus epidermidis</i>	Perianal	MRSE	Not Tested	Negative
03-005	Neg	Neg	Pos	NA	NA	<i>Staphylococcus epidermidis</i>	Perianal	S-GNB	Not Tested	Negative
03-006	Neg	Neg	Neg	NA	NA				Not Tested	
03-007	Neg	Neg	Neg	NA	NA				Not Tested	
03-008	Pos	Neg	Neg	NA	NA	<i>Staphylococcus epidermidis</i>	Perianal	MRSE	Not Tested	Negative
03-009	Neg	Neg	Neg	NA	NA				Not Tested	
03-010	Neg	Neg	Neg	NA	NA				Not Tested	
03-011a	Pos	Pos	Neg	NA	NA	<i>Enterococcus faecium</i>	Perianal	VRE	Not Tested	VanA+
03-011b	Pos	Pos	Neg	NA	NA	<i>Enterococcus faecium</i>	Perianal	VRE	Not Tested	VanA+
03-012	Neg	Neg	Neg	NA	NA				Not Tested	
03-013	Neg	Neg	Neg	NA	NA				Not Tested	
03-014a	Pos	Pos	Neg	NA	NA	<i>Enterococcus faecium</i> <i>Enterococcus faecium</i>	Perianal	VRE VRE	Not Tested	VanA+ VanA+
03-015	Neg	Neg	Neg	NA	NA				Not Tested	
03-016	Neg	Neg	Neg	NA	NA				Not Tested	
03-017	Neg	Neg	Neg	NA	NA				Not Tested	
03-018	Neg	Neg	Neg	NA	NA				Not Tested	
03-019	Neg	Neg	Neg	NA	NA				Not Tested	
03-020	Pos	Pos	Neg	NA	NA	<i>Hafnia alvei</i> <i>Enterococcus faecalis</i>	Perianal	S-GNB VSE	Not Tested	Negative Negative
03-021	Neg	Pos	Neg	NA	NA	<i>Escherichia coli</i>	Perianal	ESBL	Not Tested	CTX-M+
03-022	Neg	Neg	Neg	NA	NA				Not Tested	
01-030	NA	NA	NA	Neg	Neg				Not Tested	
01-031	Neg	Neg	Neg	Neg	Neg				Negative	
01-032	Neg	Pos	Neg	Neg	Neg	<i>Escherichia coli</i>	Perianal	CephR-GNB	Negative	

*Morganella may have elevated MIC's to Imipenem for reasons other than carbapenemase production. These are not considered CREs. www.posteression.com

METHODS

- Prospective surveillance for nasal and perianal MDRO colonization was instituted over a 3 month period in patients admitted to the Children's National Medical Center oncology and stem-cell transplant wards.
- MDRO was defined as either Methicillin Resistant *Staphylococcus aureus* (MRSA), Vancomycin-Resistant *Enterococcus* (VRE), Extended-Spectrum Beta-lactamase producing gram negative bacilli (ESBL), or Carbapenem-resistant Enterobacteriaceae (CRE).
- Enrolled subjects were subsequently monitored for 3-6 months for presence of invasive infection and any correlation with colonization.
- Nasal and perianal E-swabs were simultaneously analyzed using standard culture-based screening methods, as well as OpGen's Acuitas™ MDRO Gene Test.



CONCLUSIONS

- OpGen's Acuitas MDRO Gene Test and standard culture accurately identified and excluded MDRO colonization in patients from the oncology and stem-cell transplant wards.
- Colonization with non-MDRO or MDRO pathogens did not predict likelihood or etiology of subsequent invasive infection.
- The utility of screening high-risk patient populations for MDRO colonization requires further characterization