



Cost-Effectiveness of Screening-Based Strategies to Prevent MRSA Transmission and Infection



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Background

- Healthcare-associated infections caused by MRSA are associated with higher morbidity and mortality.
- Identifying MRSA colonized patients for isolation or decolonization using active surveillance cultures (ASC) may be an effective strategy to prevent transmission and infection.
- Turn-around time and cost of test may affect cost-effectiveness – PCR is quicker than culture, but more costly.

Objectives

- To evaluate the projected health benefits, costs and cost-effectiveness of ASC-based screening strategies to prevent MRSA colonization and infection.

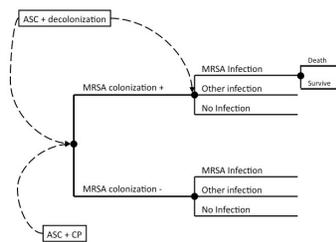
Methods

Design: Markov microsimulation model for a hypothetical cohort of 100,000 adult patients admitted to ICUs in U.S hospitals

- Box 1 – Strategies tested**
- Standard precautions
 - ASC using chromogenic culture with contact precautions (CP) if MRSA +
 - ASC using PCR with CP if MRSA +
 - ASC using chromogenic culture plus selective decolonization if MRSA +
 - ASC using PCR plus selective decolonization if MRSA +

Methods

Model structure:



Turn-around times:

- Tested turn-around times of 2 and 3 days for chromogenic culture
- Tested turn-around time of 1 day for PCR

Key assumptions:

- 12% patients colonized on admission
- 0%-1.5% acquire MRSA colonization/ ICU day (depending on colonization prevalence)
- 0.6% develop MRSA infection per colonization day
- Efficacy of CP 94% (transmission)
- Efficacy of decolonization 60% (transmission), 50% (infection)
- Sensitivity and specificity:
 - Culture at 24h: 78% and 99%
 - Culture at 48h: 88% and 95%
 - PCR: 93% and 97%
- Cost of culture \$23, cost of PCR \$47 (includes test materials and labor)
- Cost of decolonization \$23 per day x 5 days (includes mupirocin, CHG, and labor)
- Cost of CP \$75 per day (includes gowns, gloves, labor)

Results

Table 1 - Cases of MRSA colonization and infection prevented under different ASC strategies

	% Colonization prevented	% Infection prevented	Disease costs	Strategy costs
Standard precautions	-	-	\$72.5 million	\$0
Chromogenic culture with CP				
2 days	23%	22%	\$57.1 million	\$4.8 million
3 days	23%	22%	\$57.0 million	\$4.0 million
PCR with CP				
1 day	22%	21%	\$58.1 million	\$5.7 million
Chromogenic culture with decolonization				
2 days	43%	46%	\$41.0 million	\$5.2 million
3 days	43%	45%	\$41.5 million	\$4.1 million
PCR with decolonization				
1 day	48%	53%	\$35.4 million	\$6.1 million

- Represents one run of our microsimulation model; results may differ somewhat due to stochasticity for subsequent runs

- Based on our key assumptions, about 18,100 new cases of colonization and 4,800 MRSA infections occurred under standard precautions

- ASC-PCR with a 1-day turn-around time + decolonization prevented the highest number of cases of MRSA colonization and infection

- All ASC-based strategies – with or without decolonization – were more effective and cost-saving compared to standard precautions

Table 2 – Incremental cost-effectiveness ratios of ASC strategies to prevent MRSA colonization and infection

	Incremental cost per colonization prevented	Incremental cost per infection prevented
PCR with decolonization, 1 day	--	--
Chromogenic culture with decolonization, 3 days	Dominated	Dominated
Chromogenic culture with decolonization, 2 days	Dominated	Dominated
Chromogenic culture with CP, 3 days	Dominated	Dominated
Chromogenic culture with CP, 2 days	Dominated	Dominated
PCR with CP, 1 day	Dominated	Dominated
Standard Precautions	Dominated	Dominated

Conclusions

- Under our current base case assumptions, PCR with decolonization and a 1-day turn-around resulted in the greatest number of cases of MRSA colonization and infection averted
- Compared to standard precautions alone, strategies that employ the use of ASC-based strategies appear to be cost-effective
- When comparing strategies to each other, all were dominated compared to PCR with decolonization and 1-day turn-around
- Our model provides useful guidance for decision makers who are choosing between multiple available screening-based strategies to prevent MRSA transmission.

Limitations and Future Directions

- Have not taken patient quality of life into account, so cannot generate true cost-effectiveness ratios
- Awaiting pending expert panel to further refine estimates and validate the model
- Will conduct sensitivity analyses on cost of PCR and chromogenic culture, turn-around time, and efficacy of CP and decolonization
- Will also need to conduct probabilistic sensitivity analyses to determine the robustness of results

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