



Neonatologists' Perceptions Regarding Antimicrobial Stewardship and the CDC *12-Steps to Prevent Antimicrobial Resistance in Hospitalized Children*

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Objectives

- To assess knowledge, attitude, and practice (KAP) regarding antimicrobial utilization, resistance, and the Centers for Disease Control and Prevention's (CDC) *12-Step Campaign for Hospitalized Children*
- To assess barriers to adherence to 12-Step Campaign recommendations
- To assess satisfaction with the didactic lecture and preferences for alternative means of receiving education



12 Steps to Prevent Antimicrobial Resistance Among Hospitalized Children

- | | |
|---|------------------------------|
| 12 Practice hand hygiene | Prevent Transmission |
| 11 Practice infection control | |
| 10 Stop treatment | Use Antimicrobials Wisely |
| 9 Know when to say "no" | |
| 8 Treat infection, not colonization | |
| 7 Use local data | |
| 6 Practice antimicrobial control | Diagnose & Treat Effectively |
| 5 Access the experts | |
| 4 Target the pathogen | Prevent Infections |
| 3 Use appropriate methods for diagnosis | |
| 2 Get the catheters out | |
| 1 Vaccinate | |



Hypothesis

1. Lack of awareness of 12-step campaign
2. Familiarity with core concepts
3. Agreement with core concepts
4. Significant attitudinal barriers to implementing interventions
5. Low adherence to recommendations, particularly antimicrobial use



Potential Barriers to Adherence to Guidelines

Knowledge	<i>Lack of awareness</i> – no knowledge of CDC 12 Steps <i>Lack of familiarity</i> – unfamiliar with 12 Steps in general or with specific component(s)
Attitude	<i>Lack of agreement</i> – disagreement with CDC 12 steps or with specific component(s) <i>Lack of self efficacy</i> - perceived lack of confidence or lack of preparation by neonatologist to perform specific guideline(s) <i>Lack of outcome expectancy</i> – lack of belief by neonatologist that guideline(s) will lead to an important patient outcome
Practice	<i>Frequency (Adherence)</i> - how often guideline(s) performed <i>External factors</i> - lack of the following factors that could impact performance of guideline(s): time, support staff, administrative support, and/or financial reimbursement.

Cabana MD, et al. Why Don't Physicians Follow Clinical Practice Guidelines? A Framework for improvement. JAMA 1999; 282: 1458-1465



Methods

- **Setting and Participants**

- Neonatology fellows and faculty attending a conference *“Infection and Immunity in the Preterm Infant”* at the 70th Annual Perinatal Development Symposium on June 1, 2007

- **Interventions**


- Pre-lecture Survey
- Didactic Lecture
- Post-lecture Survey
- Survey with 3- or 5-point Likert or multiple choice responses
- Results dichotomized
- IRB approved



Survey Format

- Pre-Lecture Survey
 - Anonymous, self-administered KAP survey of antimicrobial usage, stewardship, and CDC *12-Step* Program.
- Post-Lecture Survey
 - Receptiveness to educational material
 - Belief in most/least important *12-Step* strategies
 - Belief in *12-Step* strategies with the least/most barriers to implementation
 - Preferred method of education

Characteristics of Respondents and NICUS



Characteristics		n(%)
Position	Fellow- 2 and 3 rd year	21 (84%)
Level of NICU	III	31 (97)
Patient Population	Non-cardiac surgery	30 (94)
	Cardiac surgery	27 (84)
	Transferred from other institutions	31 (97)
	Discharged to a step-down NICU in your institution	17 (53)
Number of beds	≤50	14 (43)
	>50	18 (57)
Resources	Pre-approval for restricted antibiotics	18 (56)
	Infectious Diseases consult	29 (91)
	Clinical Pharmacist consult	22 (69)
	Antimicrobial Stewardship Program	7 (22)



RESULTS



Knowledge

H1: Lack of Awareness

- Awareness of 12 Step Campaign
 - 59% not aware of the campaign
 - 25% somewhat aware
 - 16% very aware

- 28% received educational materials
 - (including 4 unaware of 12 Steps)



Knowledge

H2: Familiarity with 12 Step core concepts

- *Preventing Transmission*
 - Hand hygiene should be performed before and after patient contact.
- 97% familiar with guideline
- *Use Antimicrobials Wisely*
 - Oxacillin is superior to vancomycin for treatment of MSSA.
- 50% familiar with guidelines
- American Clinical Laboratory Association's guidelines on proper aseptic technique for blood draws.
- 44% familiar with guidelines



Attitude

H3: Agreement with 12 Step core concepts

- *Use Antimicrobials Wisely*
 - Limiting 3rd generation cephalosporin can decrease antimicrobial resistance in the NICU.
- 91% agree

- *Preventing Transmission*
 - Contact precautions can decrease antimicrobial resistance in the NICU.
- 50% agree

- *Interestingly...*
 - Development of new agents can decrease antimicrobial resistance in the NICU.
- 25% agree



Attitude

H4: Lack of Self-Efficacy (Confidence)

- *Prevent Transmission*
 - Can adhere to appropriate contact precautions when caring for patients in the NICU.
- 81% confident
- *Use Antimicrobials Wisely*
 - Able to use local epidemiology and resistance patterns to guide choices of empiric antibiotic therapy.
- 34% confident
- When interpreting a positive culture, able to distinguish infection from colonization or contamination.
- 19% Confident



Attitude

H4: Lack of Outcome Expectancy

- *Diagnose and Treat Infections Effectively*
 - Obtaining two blood cultures, with at least one peripheral culture, will improve patient outcomes.
- 53% believe will have effect

- *Use Antimicrobials Wisely*
 - Limiting post-op prophylaxis to 48 hours.
- 50% believe will have effect
 - Stopping vancomycin if cultures are negative (and no evidence of sepsis) will improve patient outcomes.
- 13% believe will have effect



Practice

H5: Low rates of Adherence

12 Step Strategy	Practice	% Adherence
Prevent Infection	Remove CVC when tolerating enteral feeds	56%
Diagnose and Treat Infection Effectively	Obtain 2 blood cultures	38%
Use Antimicrobials Wisely	Avoid vancomycin for MSSA	25%
	Not using carbapenem empiric therapy for sepsis	41%



Practice

Influences on Antimicrobial Prescribing

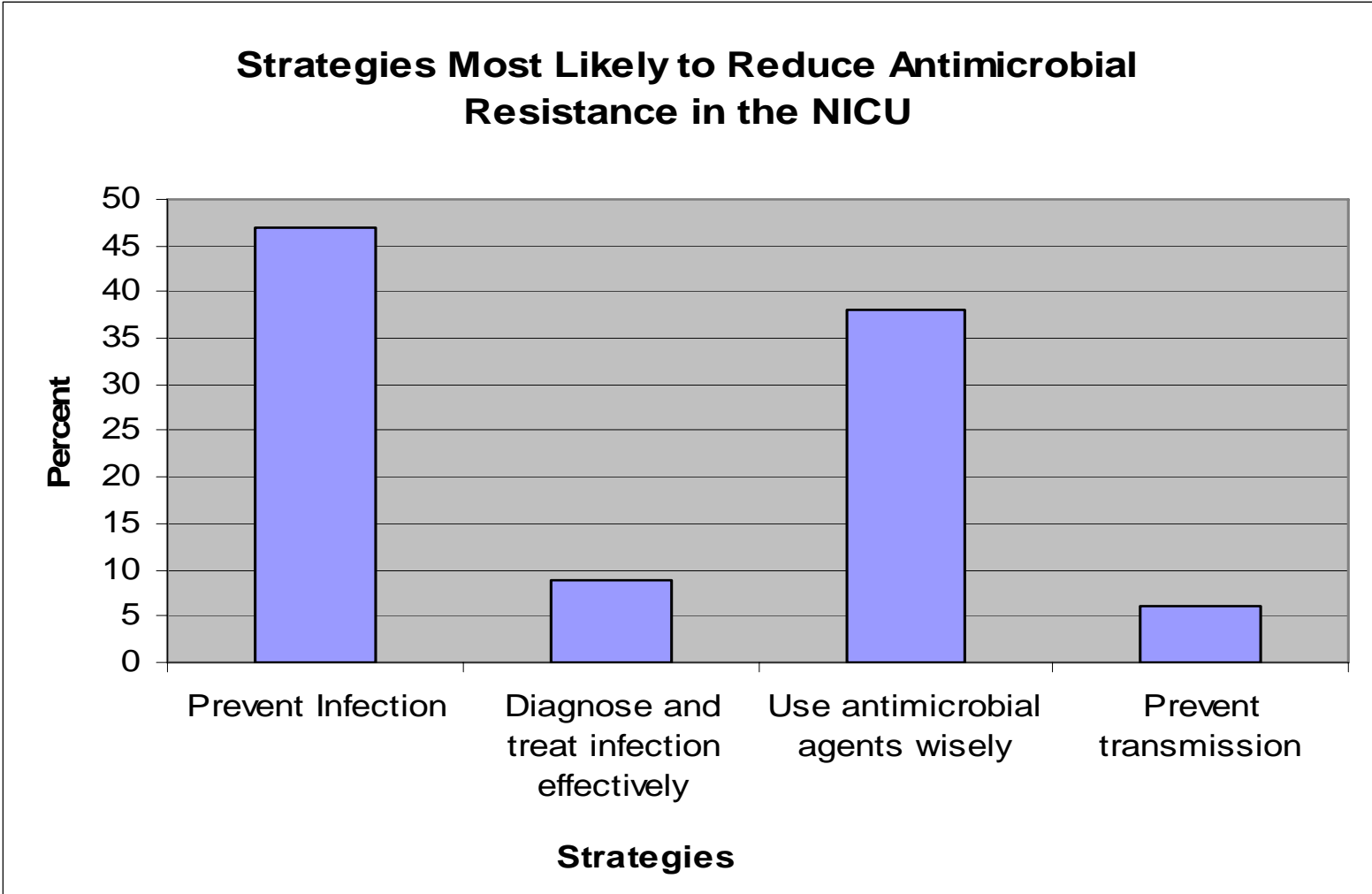
Source	% Influential
Consultation with ID colleagues	94
Key colleagues	94
Personal Experience	91
Peer-reviewed literature	91
Institutional Guidelines	88
Consultation with Clinical Pharmacist	66



Comparison of Pre- vs. Post-Survey Attitudes

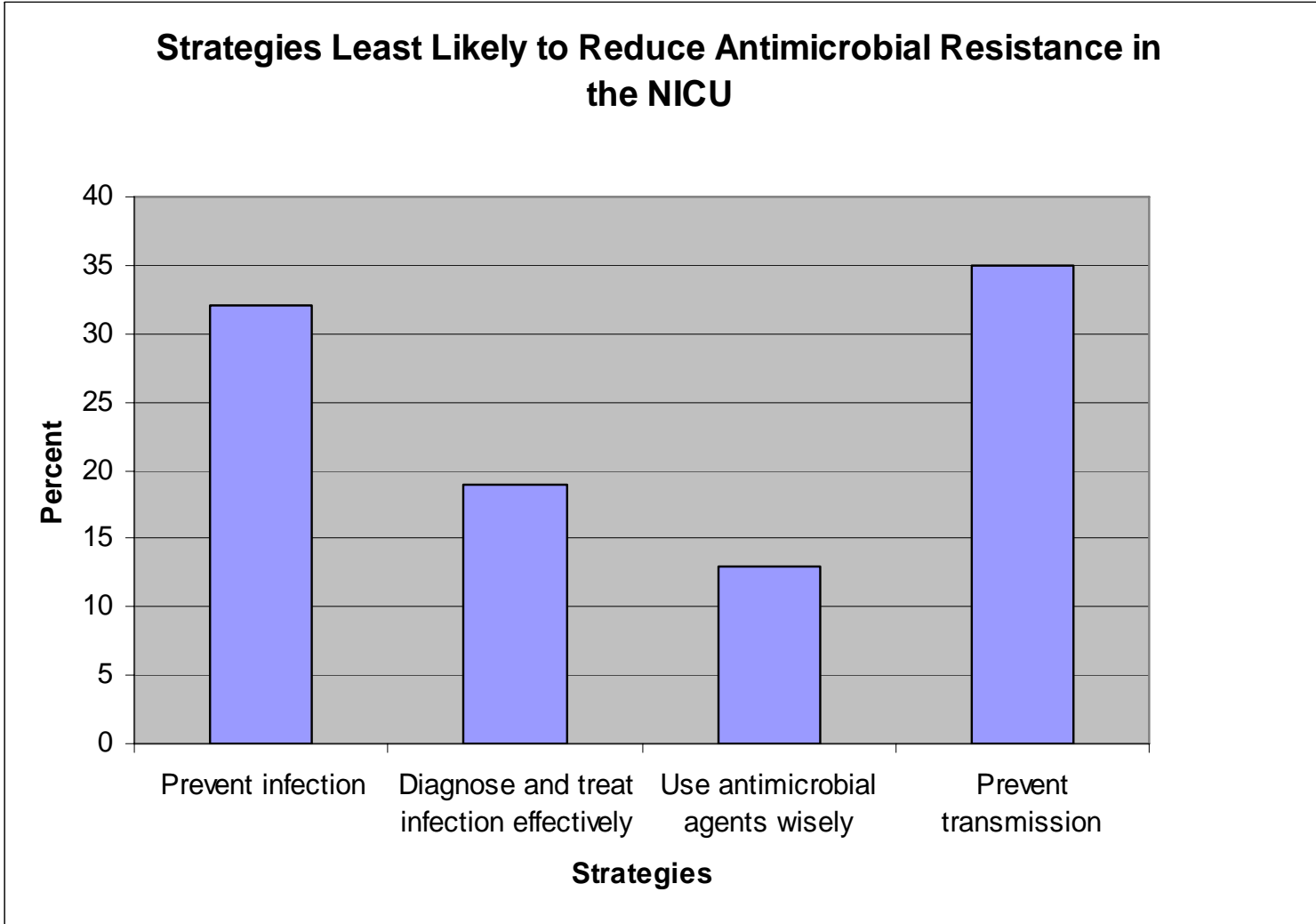
Antimicrobial resistance is a problem in NICUs...	Pre-Survey	Post-Survey
in the US	84%	100%
in my institution	62%	88%

- Post-survey effect of didactic lecture:
Likelihood of changing antibiotic
prescribing practices 75%



Individual Steps Most Likely to Reduce AR:

- o Treat infection, not contamination or colonization
- o Get the devices out
- o Practice hand hygiene



Individual Steps Least Likely to Reduce AR:

- oVaccinate hospitalized infants and staff
- oUse appropriate methods of diagnosis
- oStop treatment



Barriers to Implementation

- Greatest Barriers to implementation
 - Treat infection, not contamination or colonization
 - Get the devices out
 - Know when to say “no”
 - Stop treatment

- Least Barriers to implementation
 - Practice hand hygiene
 - Access the experts
 - Get the devices out
 - Practice infection control



Preferred Means of Education on Improved Antibiotic Prescribing

Source	* n %
Printed Materials	9 (29%)
Didactic Lectures	20 (63%)
Small Group Lectures	15 (47%)
Prescriber feedback from peers	8 (26%)
ID consultation	10 (32%)
Computer-based provider order	27 (7%)

*first or second choice



Discussion

- Resistance is perceived as a national problem rather than a local problem.
- Low rates of self-reported adherence to desired practices *with exception of infection control*.
- Complex attitudinal barriers exist
 - Agree with limiting 3rd generation cephalosporins, BUT...
 - Lack of belief that 12 Steps will improve patient outcomes
 - Lack of confidence can implement 12 Steps
- Generally prefer education from expert.



Possible Interventions

- *Use Antimicrobials Wisely*
 - Improved antimicrobial use is the intervention that physicians can most control.
 - Regarded as important but with significant barriers to implementation.
 - Likely would need educational intervention besides direct education
 - Initially would involve addressing “low hanging fruit.”
 - Speculate that improving antibiotic use in situations there is the least threat to autonomy may be just as important familiarity or consensus.



Possible Interventions

- **Prevent Transmission**

- Claims of high adherence, self efficacy, and low barriers to implementation.
- Known to have poor adherence despite self-report.
- Reinforce already accepted behaviors.

- **Diagnose and Treat Infections Effectively**

- Low agreement, self-efficacy, outcome expectancy, and adherence.



Limitations

- Lack of generalizability
- Socially desirable answers
- Sham questions may have been too similar to existing recommendations