

# Safe Use of Vancomycin in The Children's Hospital of Alabama: The SUV Program

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## Current State of the Problem

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- In November 2007, Child Health Corporation of America (CHCA) demonstrated:
  - The Children's Hospital of Birmingham, Alabama (TCH) had statistically higher utilization of vancomycin compared to the CHCA average when 38 hospitals' utilization were compared.
  - Thus, there was/is a concern about its overutilization.
- Vancomycin is the most frequently reported medication associated with adverse drug reactions (ADRs) in our hospital.

## Current State of the Problem

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- The Centers for Disease Control (CDC) has recommended the avoidance of the routine use of vancomycin to slow the emergence of antimicrobial resistance among hospitalized children which they have now declared a **public health crisis**.

## Current State of the Problem

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- Currently, in our hospital, there are no:
  - formulary restrictions for vancomycin's use;
  - standardized guidelines/indications for its use
  - standardized policies regarding its preparation, dosing, and administration;
  - ongoing monitoring of its use
  - analysis of any potential associations of vancomycin's use with ADRs, increased morbidity/mortality, healthcare costs, and the emergence of multidrug resistant organisms.

## Current State of the Problem National Patient Safety Goals

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- Evaluation and monitoring of multi-drug resistant organisms is a 2009 Joint Commission National Patient Safety Goal.
- This project interfaces with the premise and goals of this safety goal and provides an important component in addressing the issues.

## Aligning Our Mission

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- To reduce the morbidity, mortality and cost associated with vancomycin utilization through:
  - evaluating its current utilization
  - aligning our utilization with national and evidence-based recommendations
  - standardizing our utilization
  - educating health care providers about its utilization
  - provide on-going monitoring to protect and improve the health of children at The Children's Hospital, Alabama.

## Safety Project Goal

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- To improve the safe utilization of vancomycin in The Children's Hospital of Alabama



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## Safety Project Objectives

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- To evaluate the current utilization of vancomycin in our hospital
- To develop and implement standardized:
  - indications for vancomycin's use
  - processes for preparation and administration
  - guidelines for therapeutic drug monitoring
- To monitor several process and outcome measures associated with vancomycin utilization

# Scanning the Environment

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## Threats

- Physician pushback for monitoring antibiotic utilization
- Higher priorities for program improvements voiced by hospital administration
- Lack of "buy-in" from all disciplines involved
- Vancomycin is not a "high-cost" medication

## Opportunities

- Improve the safety of vancomycin utilization in children
- Decrease hospital costs associated with overutilization/inappropriate use of vancomycin
- Improve public health (CDC has declared this issue "a public health crisis")

## Weaknesses

- Safety culture not embraced by all stakeholders
- Physicians do not want to adhere to guidelines ("practice how they want")
- Lack of financial resources to sustain the safety project

## Strengths

- Core of committed leaders
- National comparative data demonstrate our hospital overutilizes vancomycin, eg "we have a problem"
- Potential for public health impact

# Stakeholders

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- Patients
- Physicians
  - Hematology/Oncology
  - Infectious Diseases
  - PICU/NICU
  - Surgery
  - General Pediatricians
  - Pediatric Residents
- Nurses
- Pharmacy
- Performance Improvement/Patient Safety
- Infection Control
- Laboratory medicine

## Project Outline

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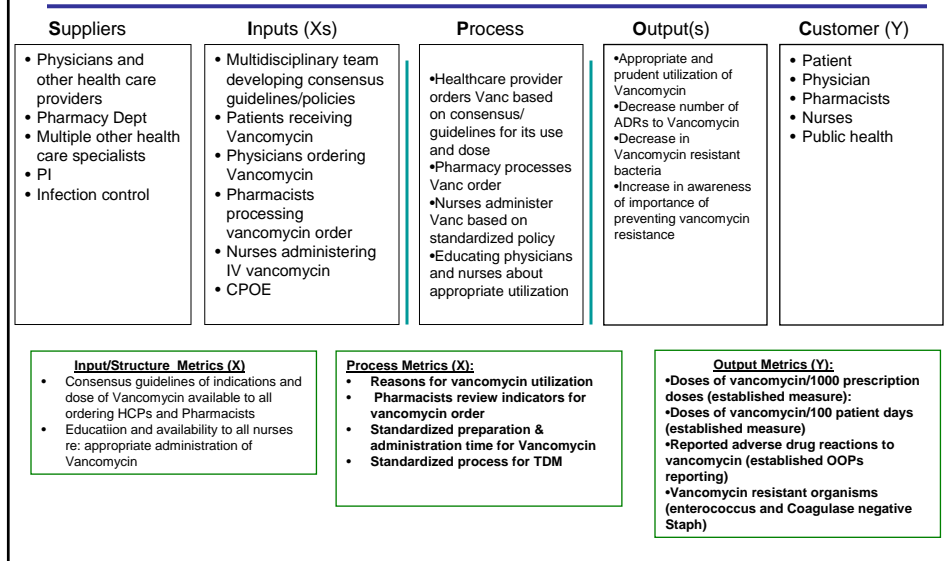
- Phase One:
  - Drug Utilization Evaluation of Vancomycin
- Phase Two:
  - Develop standardized indications, preparation, administration, and Therapeutic Drug Monitoring (TDM) for vancomycin
  - Pilot on one geographic hospital unit/defined population
  - Monitor vancomycin utilization with numerous process and outcome measures

## Phase 1 Retrospective Drug Utilization Evaluation (N=87)

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- Prescribing Service
  - Top users: PICU, Hematology/Oncology, NICU
- Indications: Top 3
  - Empiric initiation of treatment/48-hour “rule-out”
  - Neonatal sepsis
  - Neutropenia/fever
  - Comparison to national guidelines
- Dose: Appropriate
- Therapeutic Drug Monitoring
  - 40% pts received TDM despite empiric therapy/48-hour rule out


## SIPOC Safe Use of Vancomycin – Phase 2



## Phase 2 SUV

- Nursing Focus Group Convened (1/09)
  - What are the issues/problems with Vancomycin preparation/administration/monitoring?
    - Variation in preparation/dilution
    - Problems with Therapeutic Drug Monitoring
- Completion to date:
  - Meetings with all subspecialty stakeholders
  - Standardized evidence/consensus-based clinical indications for vancomycin use
  - Standardized guidelines for vancomycin preparation (dilution), doses, administration times
  - Standardized evidence-based process/indications for therapeutic drug monitoring
- Vancomycin Treatment Protocol completed

# Vancomycin Treatment Protocol

 <p>CHILDREN'S HOSPITAL SYSTEM 1600 7<sup>th</sup> Avenue South Birmingham, AL 35233</p>	<b>TREATMENT AND MEDICATION ORDERS</b>		«AdmitDate»      «PatientNumber» «PatientNumberBarcode» «PatientName» MR#: «MedicalRecordNumber»    LOC: «Location» «Room» «Bed» «AttendingDoctorName»      DOB: «BirthDate»
	<b>STANDARD ADMINISTRATION TIMES</b> Daily 8a      Q8H 8a-4p midnight BID 8a-8p      Q6H 8a-2p-8p-2a TID 8a-2p-8p      Q4H 8a-noon-4p-8p-midnight-4a QID 8am-noon-4p-8p Nightly 9p Q12H 8a-8p		
Weight: _____ Kg    Allergies: _____			The following abbreviations <b>CANNOT</b> be used with this form: u IU q.d. q.o.d. MS MSO4 MgSO4 Trailing Zero (X.0 mg)    Leading decimal point (.X mg)    (always use a leading zero)
DOCTOR: USE THE METRIC SYSTEM TO WRITE ALL MEDICATION ORDERS MUST INCLUDE DATE, TIME, SIGNATURE AND HFFP # _____			MEDS COMMENTS
DATE	TIME	WRITE LEGIBLY USE BALL POINT PEN- PRESS FIRMLY BEGIN WRITING IN BOX BELOW LAST ORDER.	
<b>INTRAVENOUS VANCOMYCIN TREATMENT PROTOCOL (High Alert Medication)</b>			
1) <b>Indication:</b> _____ (See Information Sheet Pages 1 and 2 for Recommended Guidelines for Use)			
2) <b>Document Renal Function:</b> Serum Creatinine (SCr): _____ <input type="checkbox"/> If no SCr, order basic metabolic panel (BMP) (Note: In children with impaired renal function, dosing/frequency adjustments may be indicated. See #8)			
3) <b>Initial IV Vancomycin Dose:</b> See Information Sheet page 4 for Suggested Dosages Initial dose _____ mg/kg/dose = _____ mg IV <input type="checkbox"/> every 6 hours <input type="checkbox"/> every 8 hours <input type="checkbox"/> every 12 hours <input type="checkbox"/> every 18 hours <input type="checkbox"/> every 24 hours			
4) <b>Preparation:</b> Vancomycin (50 mg/mL) should be diluted to a maximum concentration of 5 mg/mL in Normal Saline EXCEPT neonatal doses which will be pre-mixed.			

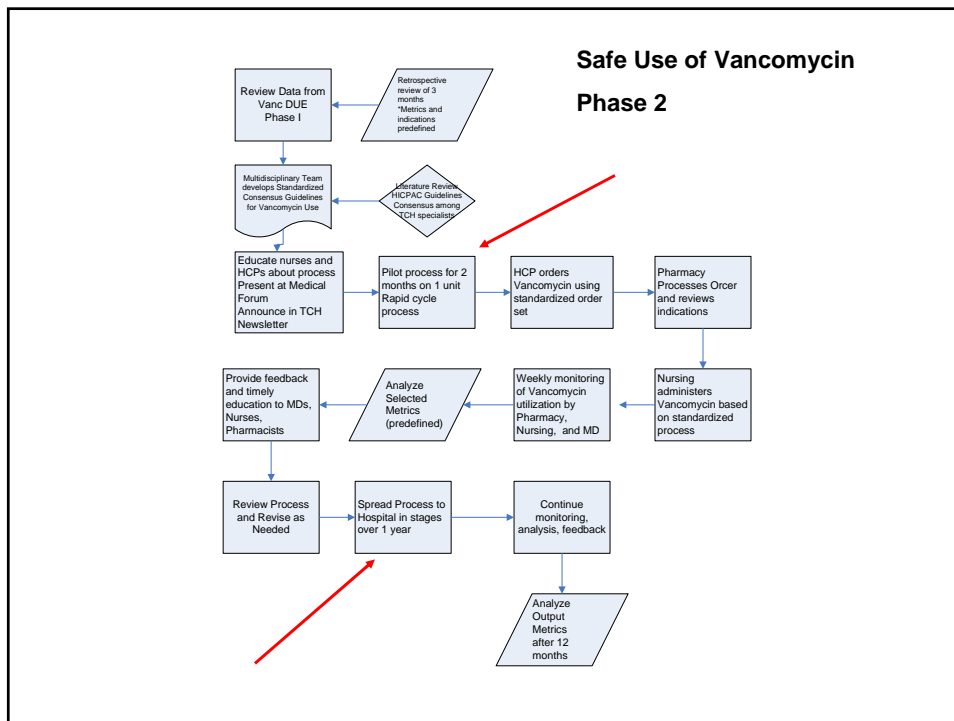
## Output Metrics – Phase 2

- **Adherence rates with standardized guidelines for:**
  - **Indications for antibiotic use,**
  - **Preparation and administration,**
  - **Therapeutic drug monitoring**
- **Adverse drug events: medication errors and adverse drug reactions**
- **Length of hospital stay (extended use of vancomycin)**
- Overall hospital costs
- Microbiologic and clinical response rates
- Hospital readmission rates related to infectious diagnoses
- Mortality rates
- Antimicrobial resistance rates
- Frequency of antibiotic readministration within 7 days
- Infection rates
- Antibiotic expenditures and use rates measured in terms of defined daily dose
- Associations between antimicrobial use and resistance or infection rates
- Costs directly attributable to the infectious process

# Potential Output Metrics

## Phase 2 – Cost Metric Analyses

- Cost Metrics/Analysis
  - Antibiotic expenditures and use rates measured in terms of defined daily dose
  - Overall hospital costs
  - Prolonged hospital costs due to resistance organisms requiring Vancomycin (ie MRSA) or due to vancomycin-resistant organisms
  - Costs directly attributable to the infectious process
  - Costs attributable to Adverse Drug Events (ADEs)
  - Costs associated with unnecessary laboratory/therapeutic monitoring
  - Costs associated with nursing time
  - Projected Public Health Costs



## The SUV Program Further Directions/Projects

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- Serve as a model for evaluating other pharmaceuticals
  - TCH Pharmaceutical Stewardship Program
  - Financial Support from the hospital
- “Ready-to-Infuse Medications” Project
- Align with our academic mission
  - Health Economics and Policy research

## Acknowledgements

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  - Crayton Fargason MD MBA
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  - Nurses, pharmacists, and physicians at TCH



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