

“Analyzing Antimicrobial Usage Pattern and MDRO Trends in Intensive Care Units”

Synopsis submitted to



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SYNOPSIS

TITLE: The Impact of Antimicrobial Stewardship Programs on the Development and Spread of Multidrug-Resistant Organisms (MDROs) in Intensive Care Units.

1. INTRODUCTION:

1. Background of the Topic:

ICUs as Hotspots: ICUs are high-risk environments for MDRO infections due to:

- * Critically ill patients with weakened immune systems.
- * Frequent use of invasive procedures (ventilators, catheters).
- * High and often prolonged exposure to broad-spectrum antibiotics.

2. Importance:

Patient Safety: Reducing MDRO infections is crucial for improving patient outcomes and preventing avoidable deaths.

Resource Management: MDRO infections increase healthcare costs due to prolonged hospital stays and the use of expensive antibiotics.

Preventing Future resistance: The research will help to find methods to prevent the creation of new antibiotic resistant organisms.

4. Purpose of the Study:

- * To determine the prevalence of MDROs in the ICU after the implementation of an ASP.
- * To assess the impact of the ASP on antibiotic utilization patterns.
- * To evaluate the association between the ASP and the incidence of MDRO infections.
- * To identify risk factors associated with MDRO acquisition.
- * To evaluate the economic impact of the ASP.
- * To analyze the effectiveness of specific ASP interventions.

2. RESEARCH QUESTION:

I. Program Effectiveness and Impact:

Primary Question:

Does the implementation of an ASP lead to a statistically significant decrease in the length of stay for ICU patients with MDRO infections?

What is the cost-effectiveness of an ASP in reducing MDRO-related healthcare costs in the ICU?

How does the ASP influence the adherence to evidence-based antibiotic prescribing guidelines in the ICU?

What is the impact of specific ASP interventions (e.g., prospective audit and feedback, pre-authorization) on MDRO rates?

How does the implementation of an ASP affect the mortality rates associated with MDRO infections in the ICU?

II. Patient-Specific Factors:

How does the severity of illness of ICU patients affect the impact of the ASP on MDRO rates?

What is the impact of the ASP on specific patient populations within the ICU (e.g., immune-compromised patients, patients with prolonged mechanical ventilation)?

How does the presence of invasive medical devices affect the impact of the ASP on MDRO infections?

3. OBJECTIVES:

Primary Objectives:

To evaluate the effectiveness of the Antimicrobial Stewardship Program (ASP) in reducing the incidence of MDROs in the ICU.

To assess the impact of the ASP on antimicrobial consumption patterns in the ICU.

To determine the association between the ASP and the prevalence of specific MDROs (e.g., MRSA, VRE, Carbapenem-resistant Enterobacteriaceae) in the ICU.

Secondary Objectives:

To investigate the changes in antimicrobial susceptibility patterns of common ICU pathogens following the implementation of the ASP.

To analyze the impact of the ASP on patient outcomes, including length of stay, mortality rates, and healthcare-associated infections (HAIs) in the ICU.

To evaluate the adherence of ICU staff to the ASP guidelines and recommendations.

4. HYPOTHESIS:

1. Prospective Cohort Study Hypotheses:

A cohort study would follow two groups: an ICU with an ASP and an ICU without an ASP (or before and after ASP implementation).

H1 (Alternative Hypothesis): Patients admitted to the ICU with an established ASP will have a significantly lower incidence of MDRO acquisition and a lower rate of MDRO spread compared to patients admitted to the ICU without an ASP.

H0 (Null Hypothesis): There is no significant difference in the incidence of MDRO acquisition and the rate of MDRO spread between patients admitted to the ICU with an ASP and those admitted to the ICU without an ASP.

5. MATERIALS AND METHODS:

Setting:

- A single or multiple ICUs within a hospital or healthcare system.
- The setting should be clearly defined, including the type of ICU (e.g., medical, surgical, mixed), the number of beds, and the patient population served.

Study Population:

- All patients admitted to the ICU during the study period two months.

Sample Size:

- The sample size will be calculated based on the expected incidence of MDROs, the desired statistical power, and the level of significance.

- Retrospective data from the ICU can be used to estimate the baseline MDRO incidence.

Sampling Technique:

- **Consecutive sampling:** All eligible patients admitted to the ICU during the study period are included.

6. DATA ANALYSIS PLAN:

1. Study Design:

- Considering a prospective observational study, or a quasi-experimental design (e.g., pre- and post-intervention analysis).
- A pre and post-intervention study would be optimal to assess the impact of an implemented ASP.

2. Data Collection:

- **Demographic Data:** Age, sex, length of ICU stay, comorbidities, severity of illness (majorly considering urinary tract infections and surgical prophylaxis)
- **Antibiotic Usage Data:**
 - Types of antibiotics used.
 - Dosage and duration of antibiotic therapy.
 - Route of administration.
 - Documented indications for antibiotic use.
 - Compliance with ASP guidelines.
- **Microbiological Data:**
 - Identification of MDROs
 - Antibiotic susceptibility patterns.
 - Frequency of MDRO isolation (before and after ASP implementation).
 - Infection rates

6. ETHICAL CONSIDERATIONS:

1. CEO's Approval:

Obtaining CEO's approval before initiating data collection.

1. Patient Confidentiality:

- Ensuring patient confidentiality by de-identifying data and using unique identifiers.
- Storing data securely and restrict access to authorized personnel.

2. Informed Consent (if applicable):

- If prospective data collection is involved, obtaining informed consent from patients or their legal representatives.

3. Data Usage agreement:

- If using data from a hospital database, ensuring that you have the proper data usage agreements in place.

8. IMPLICATIONS OF RESEARCH:

1. Clinical Practice:

- Providing evidence-based recommendations for optimizing antibiotic use in the ICU.
- 2. **Public Health:**
 - Contributing to the global effort to combat antibiotic resistance.
- 3. **Hospital Policy:**
 - Supporting the implementation and maintenance of effective ASPs in hospitals.
- 4. **Future Research:**
 - Identifying areas for further research, such as the long-term impact of antibiotic stewardship.
- 5. **Cost-Effectiveness:**
 - Providing evidence about the cost savings related to a properly implemented ASP.
- 6. **Education:**
 - The research will contribute to the education of medical professionals regarding the importance of antibiotic stewardship.

9. REFERENCES:

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