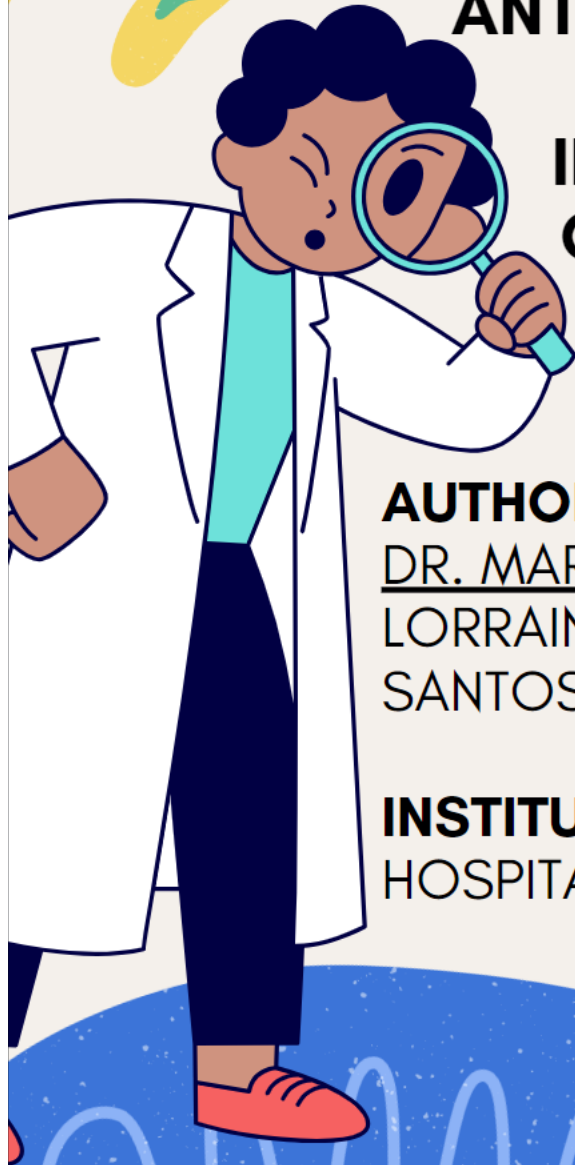


CLINICODEMOGRAPHIC PROFILE AND ANTIBIOGRAM OF NEWBORNS WITH BLOOD ISOLATES ADMITTED AT NEONATAL INTENSIVE CARE UNIT OF A TERTIARY GOVERNMENT HOSPITAL IN BATAAN

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BACKGROUND

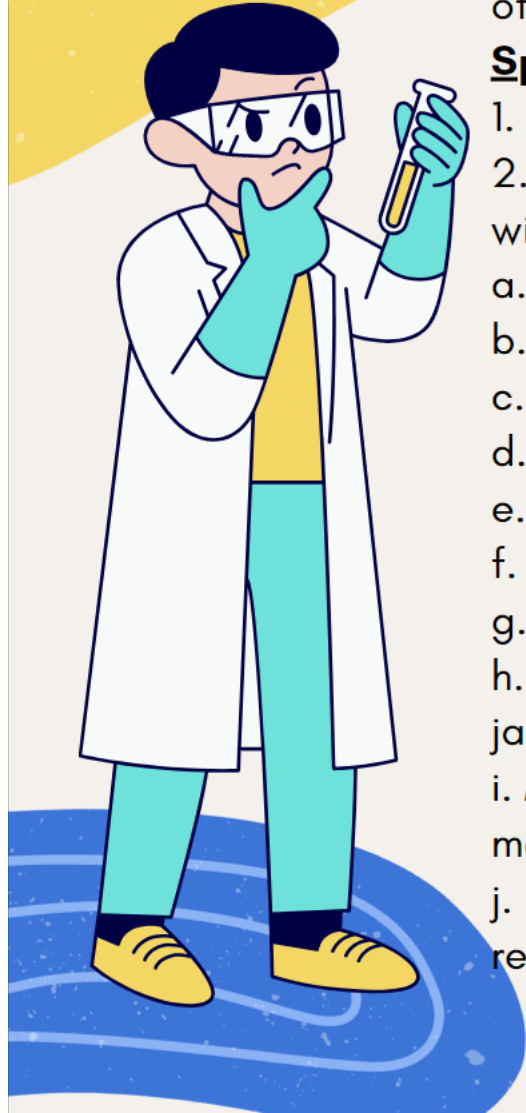
Sepsis still is one of the leading causes of morbidity and mortality among newborns. The overall incidence of neonatal sepsis ranges from 1 to 5 cases per 1000 live births. A definitive diagnosis is difficult in this age group because sepsis manifestations are nonspecific. Therefore, all infants with suspected sepsis should be immediately evaluated and antimicrobial therapy was initiated. Moreover, antimicrobial resistance is an urgent public health threat, and antibiograms are critical tools for identifying and combating the spread of drug-resistant organisms. Antibiograms are therefore an essential component of patient care and management.

OBJECTIVES

General Objectives: To determine the clinicodemographic profile and antibiogram of newborns with bacteremia in a Neonatal Intensive Care Unit of a tertiary government hospital from January 2020 to December 2022

Specific Objectives:

1. To determine the incidence of neonatal bacteremia in 2020 to 2022
2. To determine the demographic and clinical characteristics of newborns with bacteremia, as to:
 - a. Gender (Male, female)
 - b. Place of Delivery (Inborn or Outborn)
 - c. Manner of delivery (Normal spontaneous delivery, Cesarean Section)
 - d. Birthweight (LBW, VLBW, ELBW)
 - e. Pediatric aging (preterm, term, post term)
 - f. Appropriateness for gestational age (SGA, AGA, LGA)
 - g. Outcome (Discharged, Mortality, THOC, HAMA)
 - h. Signs and symptoms (Difficulty of breathing, fever, cardiac arrhythmia, jaundice, GI bleeding, poor suck, and activity)
 - i. Maternal risk factors -initial isolates (infection : UTI, Hepatitis, syphilis, maternal fever, Premature rupture of membrane)
 - j. Introduction of umbilical vein catheter and endotracheal intubation - repeat isolates



METHODOLOGY

Research Design

Retrospective
Cohort Descriptive
Design

Materials and Method

Sample Size:

The study included all newborns with positive baseline and/or repeat blood cultures.

Duration of the study

The study was conducted for 3 years (January 2020 to December 2022).

Sample Method:

Purposive sampling method was used.

Study Population

All newborns admitted in Bataan General Hospital and Medical Center between January 1, 2020 to December 31, 2022 at neonatal intensive care unit both inborn and outborn with positive baseline and/or repeat blood culture results are included in the study. Neonatal intensive care unit patients mostly were oxygen requiring, febrile, small for gestational age, and with signs and symptoms of sepsis

Results

Clinicodemographic profile of the 252 neonates with positive blood cultures

GENDER	Frequency (n=252)	Percentage
Male	138	55%
Female	114	45%

Table 1. Gender Distribution of Newborns with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022

PLACE OF DELIVERY	Frequency (n=252)	Percentage
Inborn	144	57%
Outborn	108	43%

Table 2. Distribution of Newborns with bacteremia admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2023 as to place of delivery

Total of 1,397 newborns were admitted, of these 252 neonates had positive baseline and/or repeat blood cultures (18%).

MANNER OF DELIVERY	FREQUENCY (n=252)	Percentage
Normal spontaneous delivery	140	56%
Cesarean Section	112	44%

Table 3. Distribution of Newborns as to manner of delivery with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022

PEDIATRIC AGING	Frequency (n=252)	Percentage
Term	135	54%
Preterm	117	46%

Table 4. Distribution of Newborns as to pediatric aging with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022



APPROPRIATENESS FOR GESTATIONAL AGE	Frequency (n=252)	Percentage
SGA	61	24%
AGA	171	68%
LGA	20	8%

Table 5. Distribution of Newborns as to appropriateness for gestational age with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022

BIRTHWEIGHT	Frequency (n=252)	Percentage
Normal	110	44%
LBW	104	41%
VLBW	35	14%
ELBW	3	1%

Table 6. Distribution of Newborns as to birthweight with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

SIGNS AND SYMPTOMS	Frequency	Percentage
Difficulty of breathing	183	73%
Jaundice	169	67%
Poor activity	120	47%
Poor suck	111	44%
Cardiac arrhythmia (Tachycardia and/or bradycardia)	108	43%
Gastrointestinal bleeding	95	38%
Fever	82	33%

Table 7. Distribution based on presenting signs and symptoms of Newborns with bacteremia at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022

MATERNAL RISK FACTORS (initial isolates)	Frequency	Percentage
Urinary tract infection	25	19%
Premature rupture of membrane (>18 hours)	18	14%
Syphilis	4	1.5%
Maternal fever	4	1.5%
Hepatitis	1	0.8%

Table 8. Distribution according to Maternal Risk Factors of Newborns with bacteremia from initial isolates at Bataan General Hospital and Medical Center from January 2020 to December 2022

INTRODUCTION OF UMBILICAL VEIN CATHETER AND ENDOTRACHEAL INTUBATION (repeat isolates)	Frequency	Percentage
Umbilical vein catheter	76	64%
Endotracheal intubation	103	86%

Table 9. Distribution as to introduction of umbilical vein catheter and endotracheal intubation with bacteremia from repeat isolates Bataan General Hospital and Medical Center from January 2020 to December 2023

OUTCOME	Frequency (n=252)	Percentage
Discharged	159	63%
Mortality	74	29%
HAMA	17	7%
THOC	2	1%

Table 10. Distribution as to outcome of newborns with bacteremia Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2023

Bacteremia is usually seen in males, term, appropriate for gestational age, born via Normal spontaneous delivery with normal birth weight neonates. Most common manifestations of bacteremia are difficulty of breathing, jaundice, poor activity and suck respectively, while Urinary tract infection is the most common maternal risk factor from the initial isolates. Lastly, introduction of endotracheal intubation was more common cause of hospital acquired infection comparing to umbilical vein catheter.

ISOLATE	BASELINE	REPEAT	TOTAL NUMBER OF GROWTHS
<i>Staphylococcus haemolyticus</i>	37	54	91
<i>Staphylococcus epidermidis</i>	27	31	58
Coagulase-negative staphylococci	22	17	39
<i>Staphylococcus hominis</i>	8	3	11
<i>Enterococcus faecalis</i>	4	3	7
<i>Staphylococcus Aureus</i>	3	1	4
<i>Staphylococcus capitis</i>	3	1	4
<i>Staphylococcus lugdunensis</i>	0	3	3
<i>Streptococcus agalactiae</i>	3	0	3
<i>Staphylococcus intermedius</i>	3	0	3
<i>Staphylococcus saprophyticus</i>	1	1	2
<i>Staphylococcus cohnii</i>	1	1	2
<i>Staphylococcus caprae</i>	0	1	1
<i>Streptococcus acidominus</i>	1	0	1
<i>Streptococcus thoraltensis</i>	0	1	1
<i>Staphylococcus vitulinus</i>	0	1	1
<i>Staphylococcus simulans</i>	1	0	1
<i>Staphylococcus schleiferi</i>	0	1	1
<i>Streptococcus hyointestinalis</i>	1	0	1

TABLE 11: Baseline and/or repeat gram positive bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

ISOLATE	BASELINE	REPEAT	TOTAL NUMBER OF GROWTHS
<i>Klebsiella pneumoniae</i>	4	72	76
<i>Burkholderia cepactan</i>	0	9	9
<i>Pseudomonas aeruginosa</i>	5	3	8
<i>Escherichia coli</i>	6	1	7
<i>Enterobacter cloacae</i>	2	5	7
<i>Serratia marcesens</i>	1	3	4
<i>Acinetobacter baumannii</i>	0	3	3
<i>Enterobacter aerogenes</i>	3	0	3
<i>Klebsiella ozaenae</i>	0	3	3
<i>Aeromonas veronii Biovar sobria</i>	0	1	1
<i>Citrobacter koseri</i>	0	1	1
<i>Kluyvera ascorbate</i>	0	1	1
<i>Ralstonia pickettii</i>	1	0	1
<i>Acinetobacter haemolyticus</i>	1	0	1
<i>Enterobacter sakazakii</i>	1	0	1
<i>Stenotrophomonas maltophilia</i>	0	1	1
<i>Escherichia sakazakii</i>	1	0	1

TABLE 12: Baseline and/or repeat gram negative bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

ISOLATE	BASELINE	REPEAT	TOTAL NUMBER OF GROWTHS
<i>Candida Tropicalis fungi</i>	0	3	3

TABLE 13: Repeat fungal bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

Tables 11 to 13 showed the bacterial and fungal isolates for the initial and/or repeat positive blood cultures. Majority of the samples had *S. haemolyticus* (25%) followed by *K. pneumoniae* (21%), *S. epidermidis* (16%), CONS (11%), *S. hominis* (3%). It also interprets that the most common isolate on initial blood culture are *Staphylococcus haemolyticus*, *Staphylococcus epidermidis*, CONS and *Staphylococcus hominis* respectively. While the most common repeat or hospital blood culture are *Klebsiella pneumoniae*, *Staphylococcus haemolyticus*, and *Staphylococcus epidermidis* respectively.

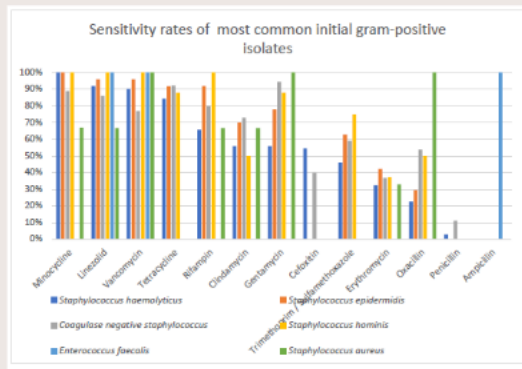


FIGURE 1: Sensitivity rate of most common baseline gram-positive bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

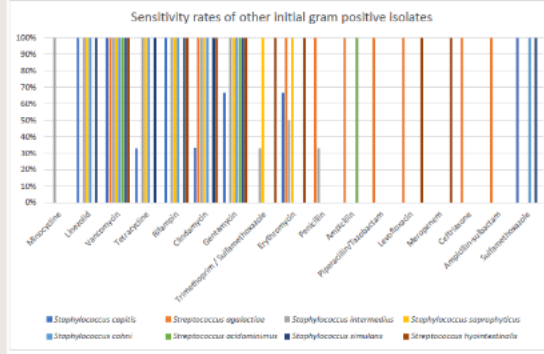


FIGURE 2: Sensitivity rate of other baseline gram-positive bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

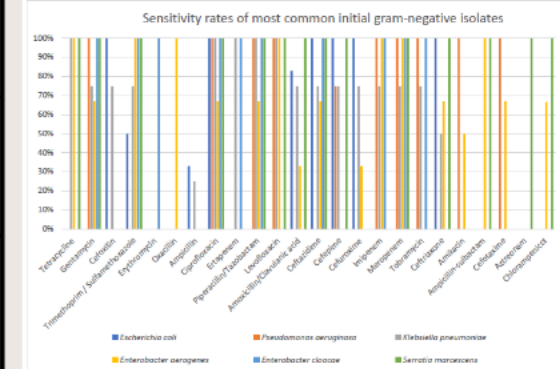


FIGURE 3: Sensitivity rate of most common initial gram-negative bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

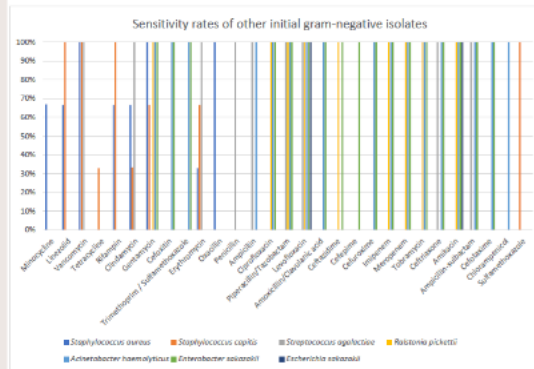


FIGURE 4: Sensitivity rate of other initial gram-negative bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

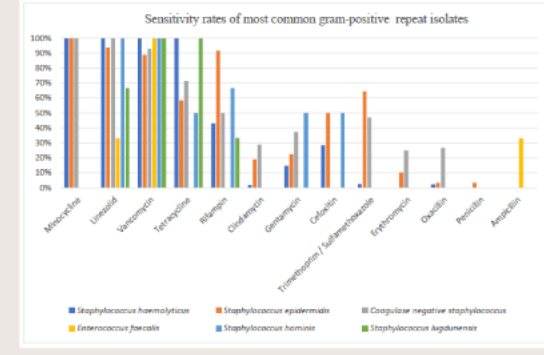


FIGURE 5: Sensitivity rate of most common repeat gram-positive bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

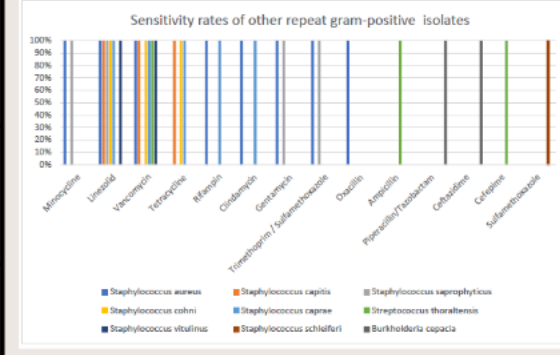


FIGURE 6: Sensitivity rate of other repeat gram-positive bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

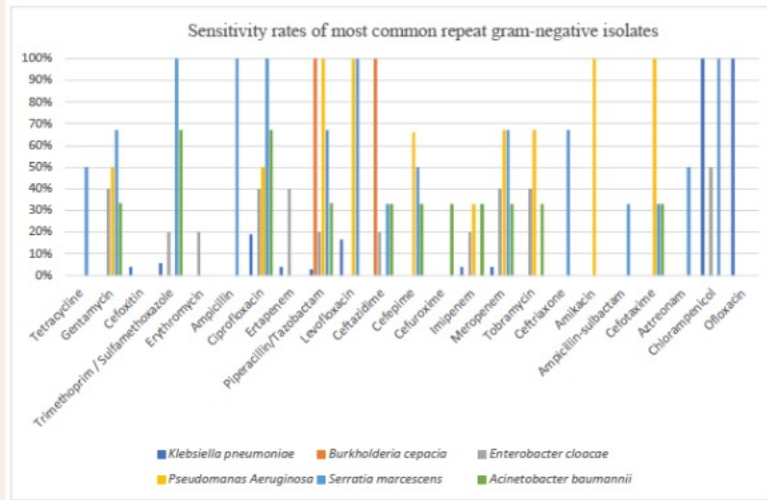


FIGURE 7: Sensitivity rate of most common repeat gram-negative bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

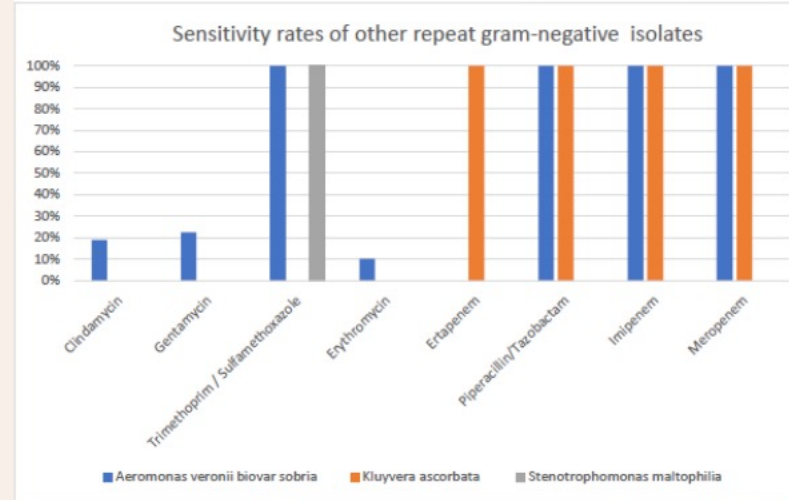


FIGURE 8: Sensitivity rate of other repeat gram-negative bacterial blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.

Figures 1 to Figure 9 shows that the empiric drug of choice of the initial blood isolate are Gentamycin, vancomycin, Linezolid, clindamycin and Trimethoprim / Sulfamethoxazole. Moreover, the empiric drug of choice of hospital acquired blood isolates are Vancomycin, linezolid, and minocycline.

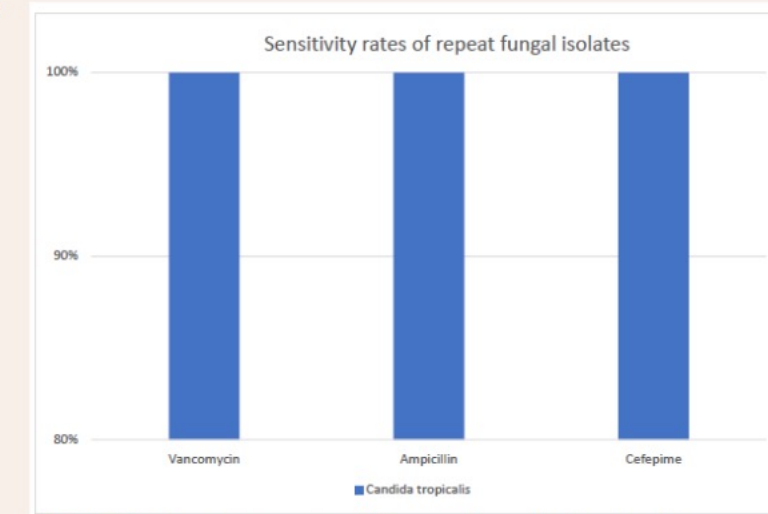
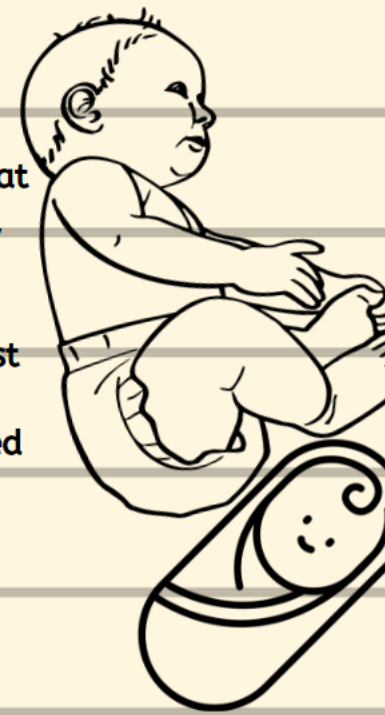


FIGURE 9: Sensitivity rate of Repeat fungal blood isolates among newborns admitted at Neonatal Intensive care unit of a Tertiary Government Hospital in Bataan from January 2020 to December 2022.



Conclusion

In the study, out of 1,397 newborns admitted, 252 neonates had positive baseline and/or repeat blood cultures. Bacteriologic profiles of newborns with bacteremia were seen more on males, born via Normal spontaneous delivery, term, SGA and AGA neonates, and more prevalent on normal birth weight babies. Most common manifestations of bacteremia were difficulty of breathing, jaundice, poor activity and suck respectively, while Urinary tract infection is the most common maternal risk factor from the initial isolates. Lastly, introduction of endotracheal intubation and umbilical vein catheter are both common risk factors in having hospital acquired infection. This study also showed the most common pathogens were Staphylococcus haemolyticus, Klebsiella pneumoniae and Staphylococcus epidermidis. The empiric drug of choice of the initial blood isolate are Gentamycin, vancomycin, Linezolid, clindamycin and Trimethoprim / Sulfamethoxazole. Moreover, the empiric drug of choice of hospital acquired blood isolates are Vancomycin, linezolid, and minocycline.



Recommendations

Measures to improve the sensitivity and specificity of blood cultures should remain an attainable cornerstone of routine practice in neonatal and pediatric medicine. This includes empowerment the need of prenatal checkups and screening examination as well as proper handwashing and aseptic techniques among health care workers. Effective use of blood cultures in pediatric practice is another important component of the management of septic neonates that has immunological immaturity. Another recommendation is to encompass other pediatric ward and pediatric intensive care unit, to comprise older and other pediatric age range and to also include urine, cerebrospinal fluid and Endotracheal aspirate samples. Lastly, basics of standardized routine antibiogram preparation to guide antimicrobial therapy of infections remain important. For this new trends in antimicrobial stewardship, public health initiatives, and future researches must be taken into consideration with the goal of providing additional suggestions to improve the value of cumulative data, and antibiograms in particular, in multiple settings and time line.

