

NICU Quality Improvement

Hospital Sungai Buloh

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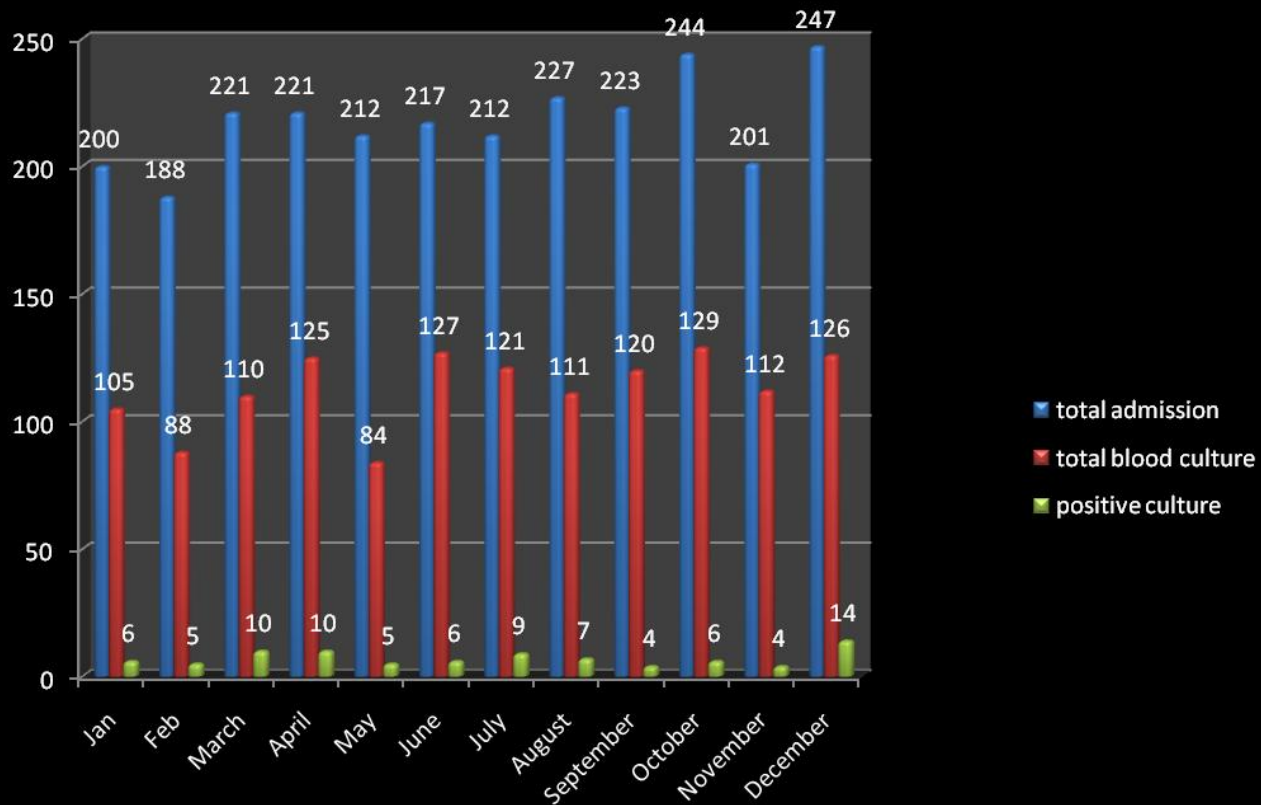
Sister Wirdawati Basar



Introduction

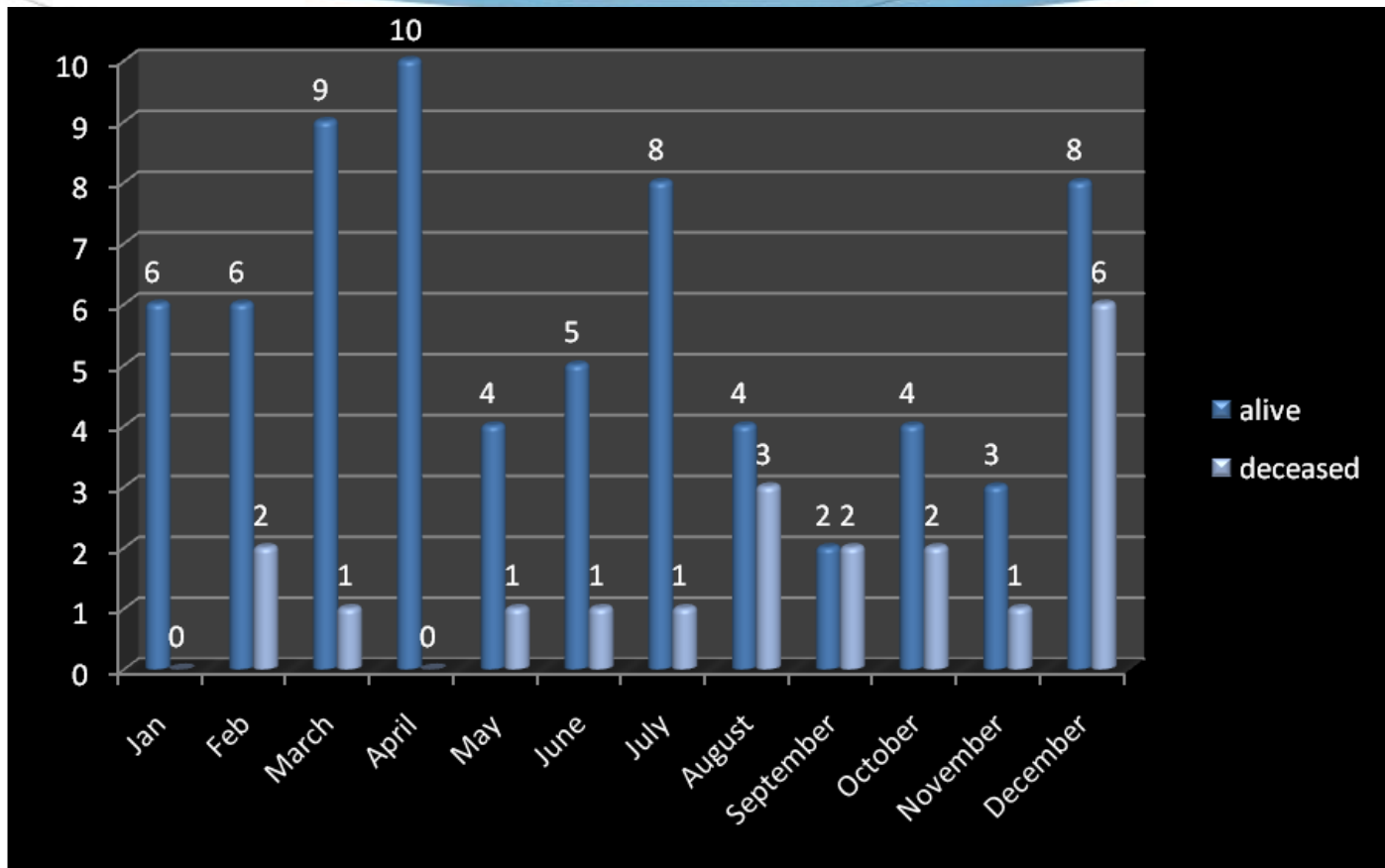
- ◆ Nosocomial bacteremia is a significant problem for infants admitted into NICUs and other hospital units.
- ◆ This is especially true for very low birth weight infants who are at high risk for these infections due to their immature immune systems and need for invasive monitoring and supportive care.
- ◆ Reported nosocomial infection rates range from 6% to 33%, but the rate varies widely among different centers.
- ◆ Mortality rates are high, and infections result in increased length of stay as well as increased hospital costs and charges.

NICU, HSB Blood stream infection, 2010



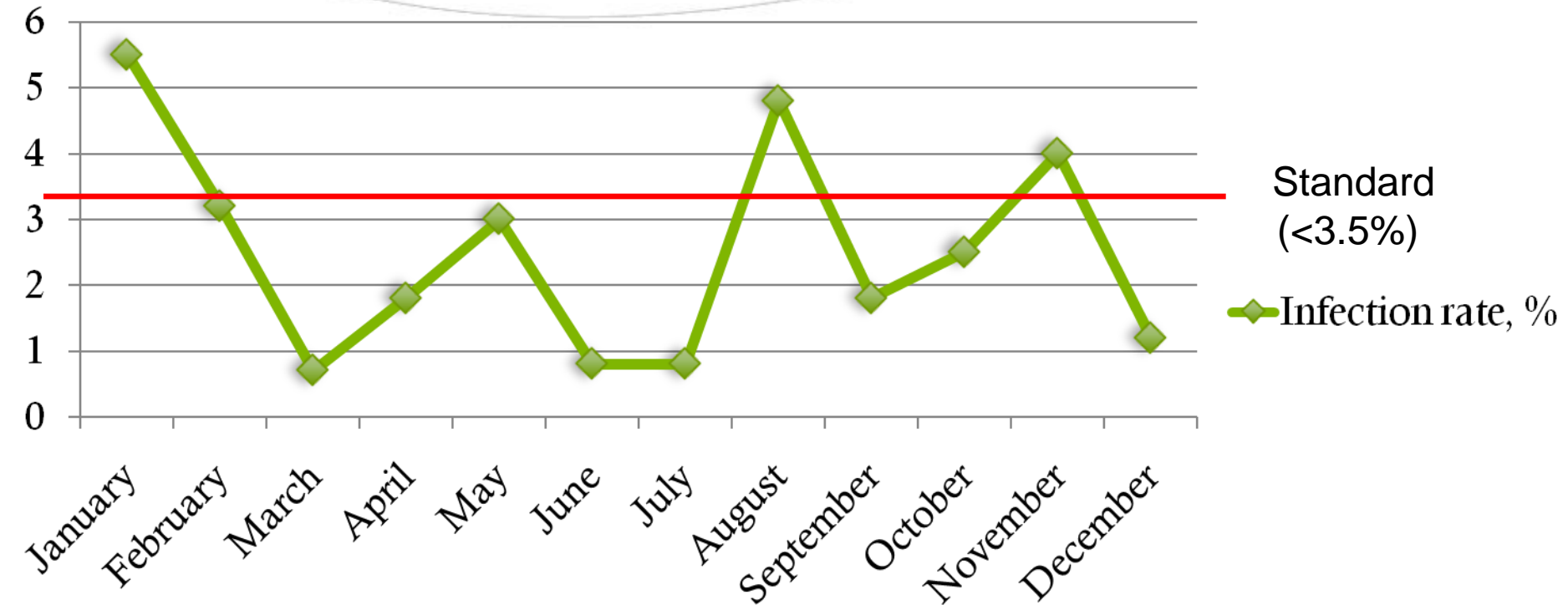
Mortality with positive blood cultures

2010



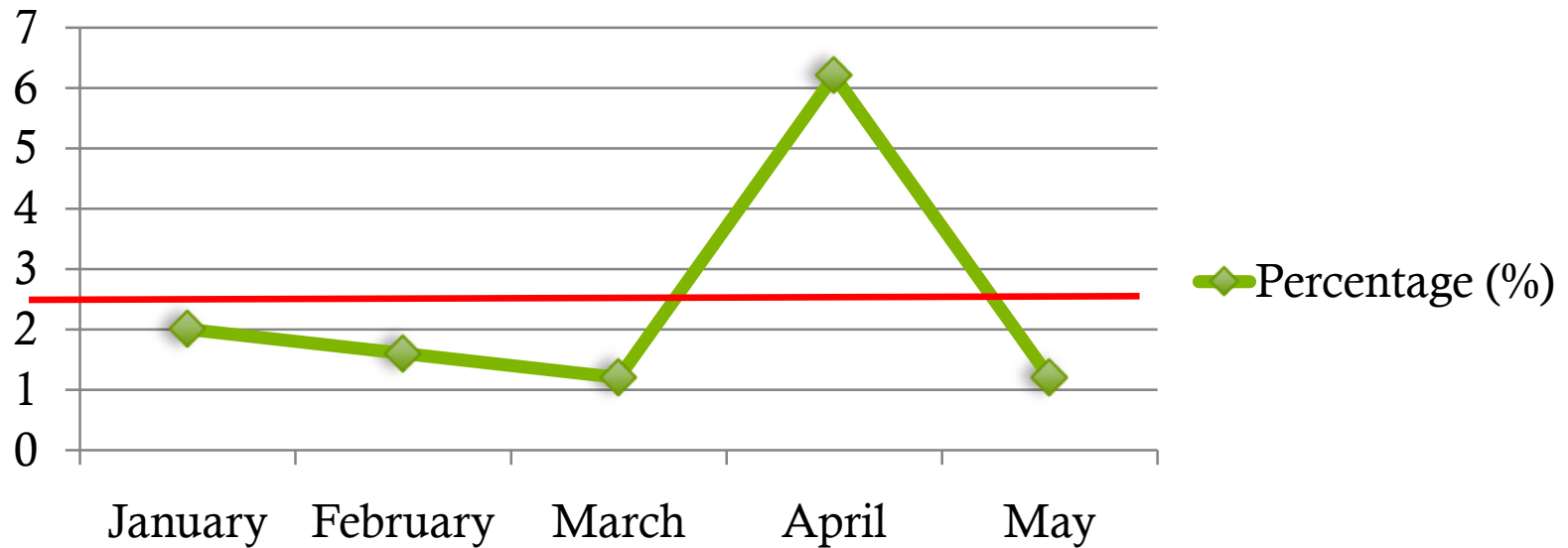
Blood Stream Infection Rate, 2010

Infection rate, %



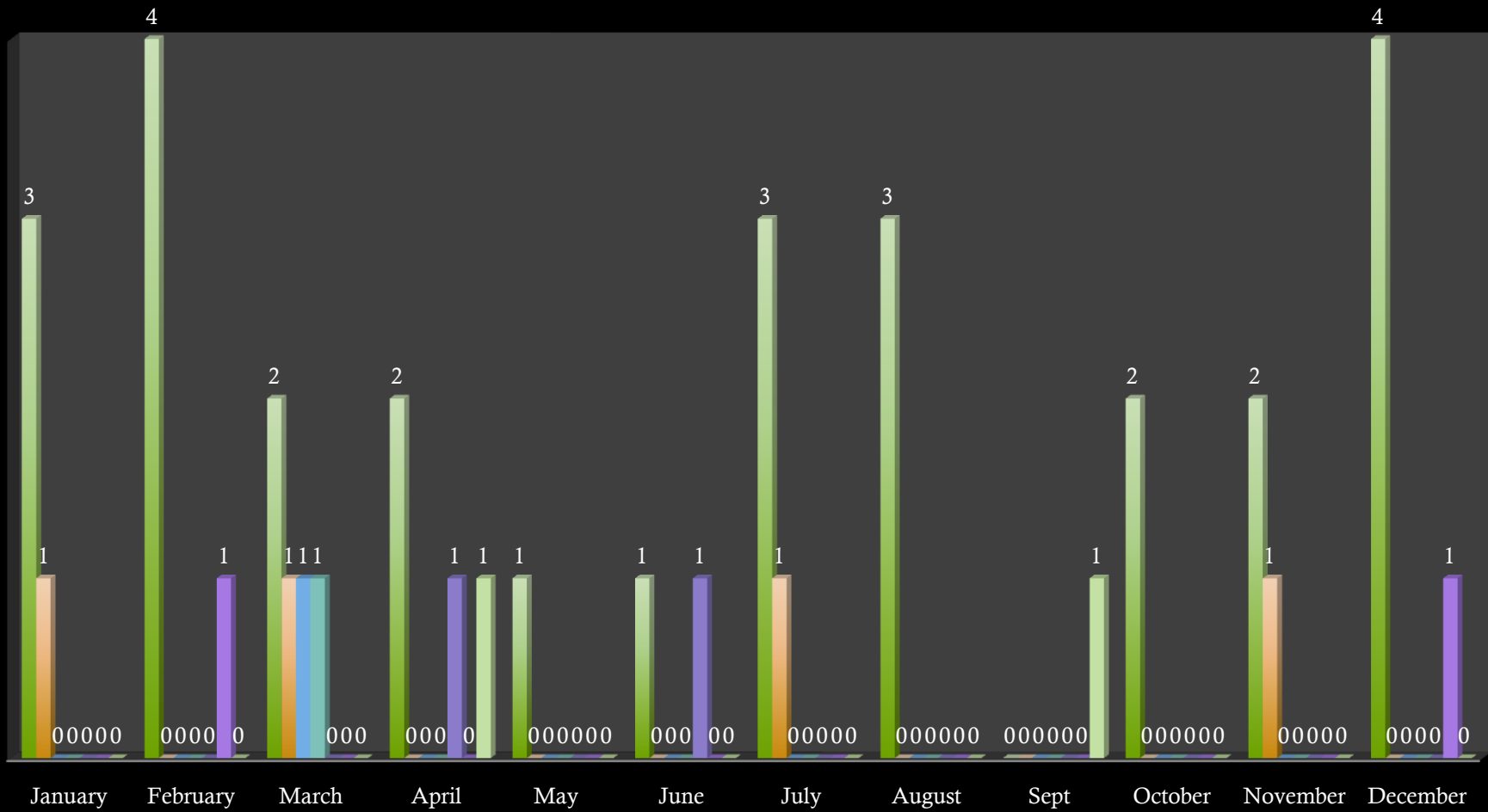
Blood Stream Infection rate 2011

Percentage (%)



GNR 2010

- Klebsiella Pneumonia
- E Coli
- FINC Chryseobacterium
- Proteus Mirabilis
- Acinbobacter Iwofii
- pseudomonas aeruginosa
- Stenotropomonas Maltophilia



Klebsiella infection: 27/86 = **31.4%**

Rate of Klebsiella infection in 2010:

Number of Klebsiella infection x 100

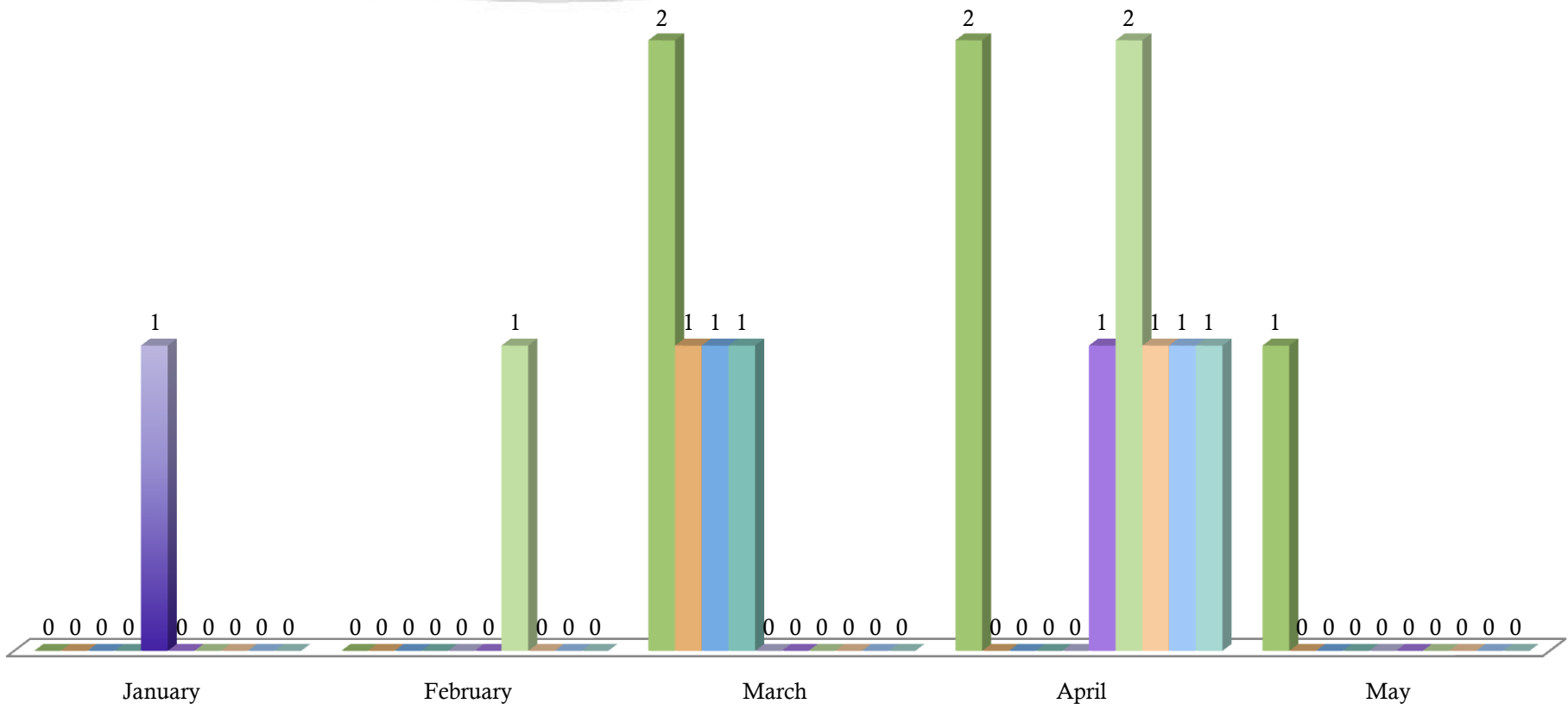
Total number of admissions

= 27/2613 x 100

= **1.03%**

GNR 2011

- Klebsiella Pneumonia
- E Coli
- FINC Chryseobacterium
- Proteus Mirabilis
- Acinbobacter Iwofii
- pseudomonas aeruginosa
- Burkholderia
- Serratia Marcenscens
- Chryseobacterium
- Stenotropomonas Maltophilia

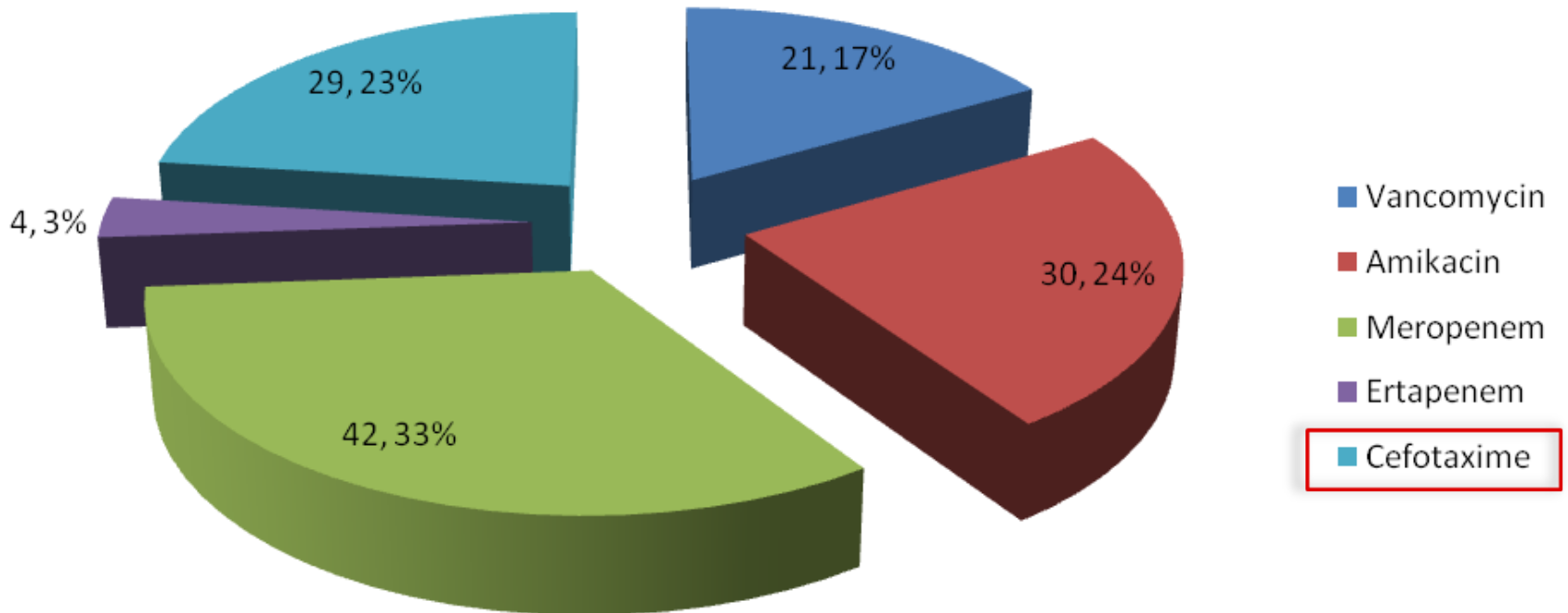


Klebsiella infection: 5/16 = **31%**

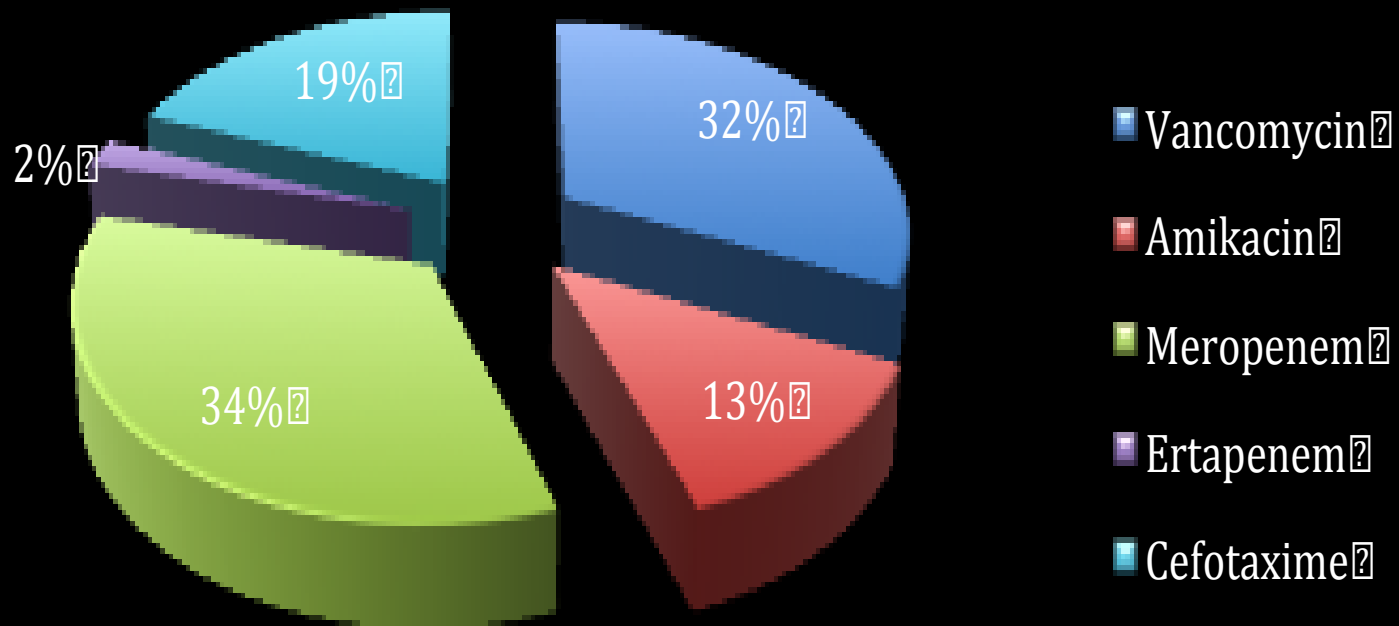
Cefotaxime

- ◆ One of the most commonly used antibiotics in NICUs.
- ◆ Cefotaxime use with ampicillin, as compared with ampicillin and gentamicin, however, was associated with higher mortality when used as empiric treatment for sepsis in the first 3 days of life.
- ◆ Cefotaxime and other third-generation cephalosporin use is a significant risk factor for the development of invasive candidiasis in extremely low-birth-weight infants.
- ◆ Associated with the development and spread of extended-spectrum b-lactamases, which confer resistance to all penicillins and cephalosporins.

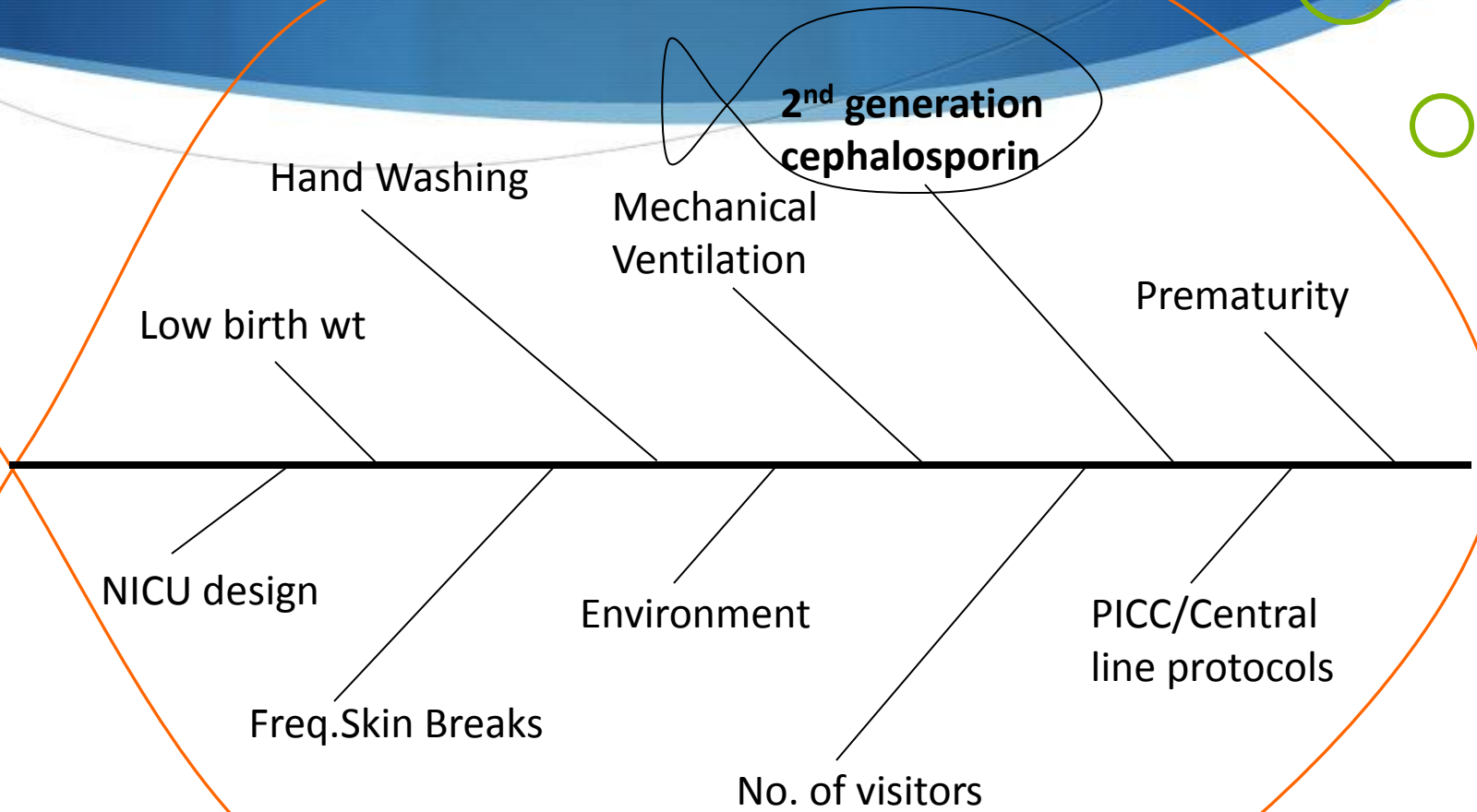
Antibiotic usage in year 2010



Antibiotics 2011



Factors Contributing to Klebsiella pneumoniae ESBL sepsis



Hypothesis

- ◆ By limiting the use of a second generation cephalosporin , the incidence of *Klebsiella pneumoniae* ESBL septicaemia in the Newborn Special Care Unit will decrease

Aim Statement

- ◆ To limit the repeated use of second generation cephalosporins in the treatment of nosocomial infections in the NICU by modifying the antibiotic policy

PICO

- ◆ **Patient population:** All babies admitted to the Level II and III NICU
- ◆ **Intervention:** implementing a new second line antibiotic policy
- ◆ **Comparator:** earlier practice of using a second generation cephalosporin
- ◆ **Outcome:** incidence of *Klebsiella pneumoniae* ESBL septicaemia infection

PDSA Cycles

1. 2011 Jul-2012 August

- P Establish baseline (KP Incidence rates)
- D Develop new antibiotic policy
- S MD ordering and compliance
- A Problems at multiple levels (MD, RN)

2. 2011 August -2011 September

- P List of all health care providers in NICU
- D Begin one-on-one education, slides available intranet, antibiotic order sets created, laminated cards for bedside
- S Checklist of completed education.
- A Barriers/Resistance

3. 2011 October-2011 December

- P Following education, need to evaluate impact on orders
- D Data collection. MDs to remind staff of policy during rounds
- S MD ordering, RN compliance, LOS, death
- A Any improvement ?

NOSOCOMIAL INFECTION

AB choice based on C & S results/clinician evaluation

Off AB if culture sterile > 48 hours

*Cloxacillin + Gentamicin

Antibiotics Warranted?

Pt Condition

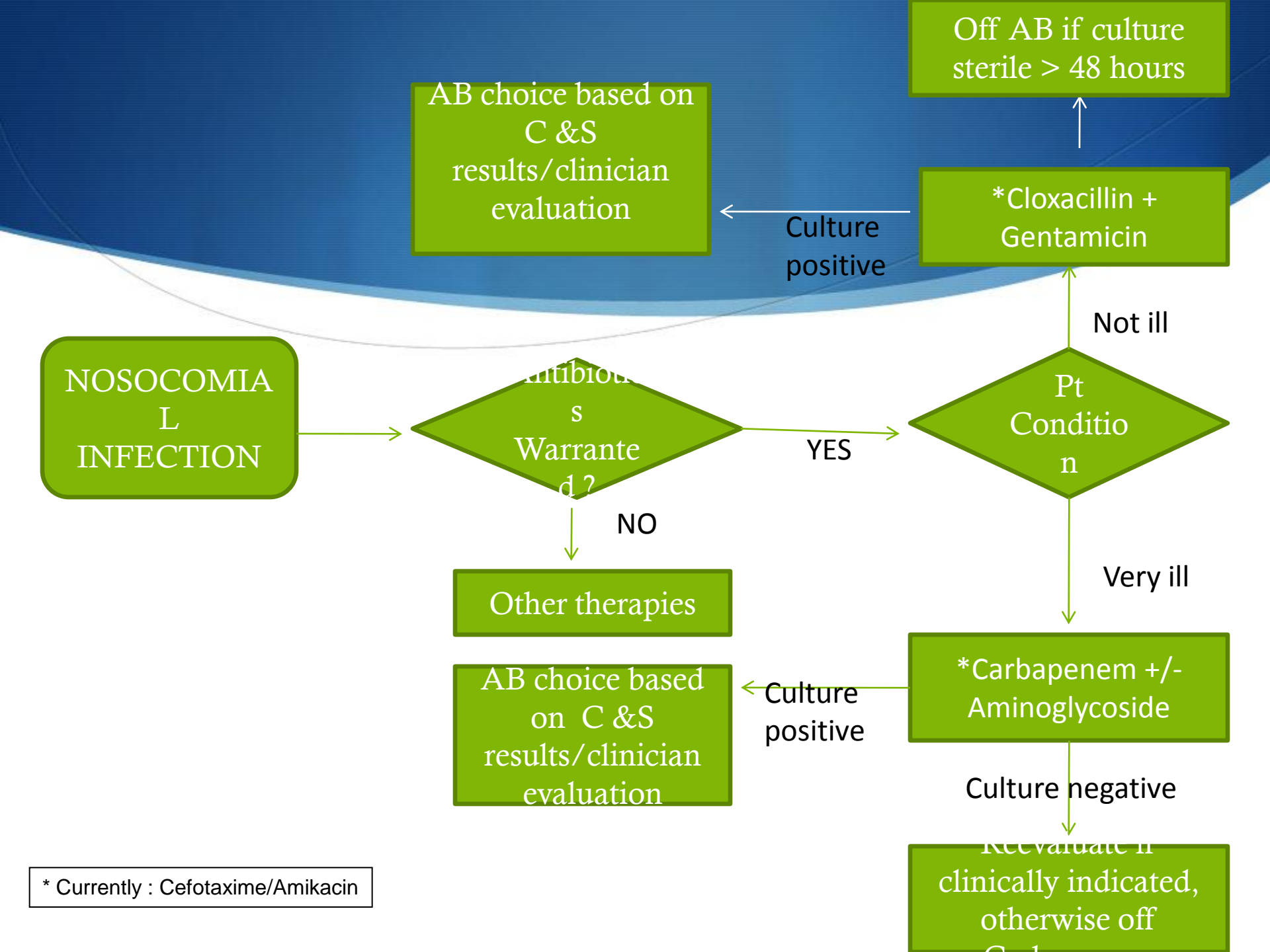
Other therapies

AB choice based on C & S results/clinician evaluation

*Carbapenem +/- Aminoglycoside

Reevaluate if clinically indicated, otherwise off

* Currently : Cefotaxime/Amikacin



Patients

◆ Inclusion Criteria:

- ◆ All newborns and outborns admitted to NICU within July 2011 until December 2012

◆ Exclusion Criteria:

- ◆ With principal diagnosis of sepsis or infection or secondary diagnosis present on admission
- ◆ With length of stay less than 2 days

Outcome Measures

- ◆ Physician ordering practices
 - ◆ New antibiotic policy adherence

◆ Incidence of *Klebsiella pneumoniae* ESBL sepsis  **0%**

◆ Formula:

Number of *Klebsiella* blood stream infection x 100

Total number of admissions

Secondary Outcome Measures

- ◆ Length of stay

- ◆ Death

References

- ◆ Cotten CM, McDonald S, Stoll B, et al. The association of third-generation cephalosporin use and invasive candidiasis in extremely low birth-weight infants. *Pediatrics* 2006;118(2):717–22.
- ◆ Benjamin DK Jr, DeLong ER, Steinbach WJ, et al. Empirical therapy for neonatal candidemia in very low birth weight infants. *Pediatrics* 2003;112(3 Pt 1):543–7.
- ◆ Benjamin DK Jr, Stoll BJ, Fanaroff AA, et al. Neonatal candidiasis among extremely low birth weight infants: risk factors, mortality rates, and neurodevelopmental outcomes at 18 to 22 months. *Pediatrics* 2006;117(1):84–92.
- ◆ Zaoutis TE, Goyal M, Chu JH, et al. Risk factors for and outcomes of bloodstream infection caused by extended-spectrum beta-lactamase-producing *Escherichia coli* and *Klebsiella* species in children. *Pediatrics* 2005;115(4):942–9.
- ◆ Linkin DR, Fishman NO, Patel JB, et al. Risk factors for extended-spectrum beta-lactamase-producing Enterobacteriaceae in a neonatal intensive care unit. *Infect Control Hosp Epidemiol* 2004;25(9):781–3.