



# Antibiotics utilization ratio in a Neonatal Intensive Care Unit

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# Introduction

Antibiotics are one of the most prescribed drugs in Neonatal Intensive Care Units. Despite this, studies on its use are scarce.

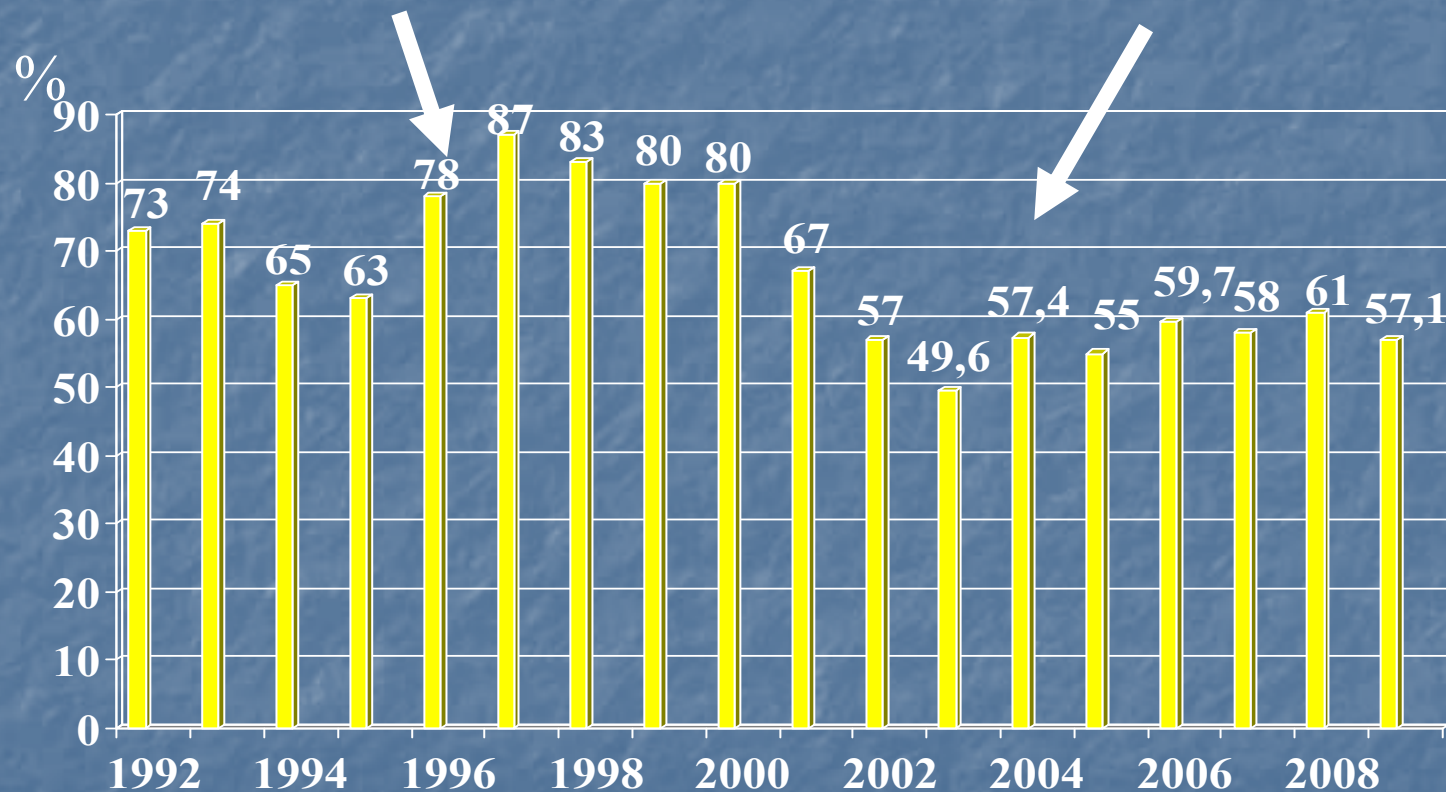
Eickhoff T.C\* - "Antibiotic use audits are recommended because they play a role in modifying antibiotic prescribing practices"

\*Antibiotics and Nosocomial Infections. In: Bennett JV Brachman PS eds .  
*Hospital Infection*. 4<sup>th</sup> Ed. Philadelphia: Lippincott, 1998. 201-4

# At Hospital Dona Estefânia NICU

- Antibiotics use has always been a concern
- Through pharmacy files it is possible to know the most used antibiotics
- Through NICU files the percentage of newborn infants with at least one prescription of antibiotics is known
- More accurate data is only possible with bedside prospective surveillance based on patient daily prescriptions

# Newborns with antibiotics per 100 admitted newborn infants



# Objectives

To assess antibiotics utilization ratio in a medical-surgical NICU

# NICU characteristics and data

- Dona Estefânia Hospital's NICU is a tertiary medical surgical unit seated in a paediatric hospital with a referral maternity
- About 300 newborn infants are admitted each year
- In 2010 30% were operated on and 21% were VLBW
- In 2010 central line and tracheal tube utilization ratio were respectively 51% and 58%

# Data on infections

- The number of newborn infants admitted because of mother-related infection decreased significantly since screening and prevention of group B *Streptococcus* was started.
- In 2010 14.4% of all admitted newborn infants had at least one episode of nosocomial infection. The most common isolate was coagulase negative *Staphylococcus*.
- Rate of CVC-related sepsis was 14.8/1000CVC days
- There were no hospital-acquired systemic infections caused by multiresistant bacteria.

# Antibiotic policy

NICU guidelines for antibiotic prescription:

- Antibiotics are started on all spontaneously born preterm infants with respiratory distress syndrome, born to a mother with amnionitis or other infectious risk.
- Empirical first line antibiotics are ampicillin and gentamicin
- Each course of antibiotics lasts 8-10 days unless Gram negative bacteria or *Staph aureus* are isolated
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# Antibiotic policy

- Empirical second line antibiotics depend on patient and clinical condition: vancomycin and gentamicin for septic newborns with a central line; those antibiotics plus cefotaxime and metronidazole if there is a short gut or abdominal condition.
- Prior to surgery two or three antibiotics are prescribed depending on underlining disease, clinical presentation and postnatal age.
- Prophylactic antibiotics are not used.

# Methods

- Prospective, observational study.
- A daily registry of all antibiotics effectively given to newborn infants was done during four months divided in two periods - February to March and September to October, 2010.
- Number of treated patients, days on antibiotics, treatment/patient days, number of antibiotic courses and number of antibiotics given were registered.

# Methods

- Data were collected every day after the second medical round.
- Registering was stopped when the newborn was discharged, transferred or died.
- Two periods were chosen to prevent bias produced by few or many admissions in one period. Data of the two periods were studied together

# Definitions

- Course of antibiotics - a well-defined period on antibiotics separated by days without them; if there was no interval a new course was considered if there was a complete change or addition of new antibiotics
- Days on antibiotics were counted as days of the course of antibiotics: 10 days on ampicillin and gentamicin = one course, ten days on AB
- Antibiotics utilization ratio was calculated dividing the number of days on antibiotics by the number of days on the NICU x 100

# Population

Patients	113
Admission days	1722
LOS	15.2
Occupation rate	86.4

# Population characteristics

GA (weeks, median, limits)	35 (26-41)
BW (g, median, limits)	2392 (500-4435)
NTISS (median, limits)	17 (5-39)
Operated on	47 (41.6%)
VLBW	25 (22.1%)

# Antibiotics prescription

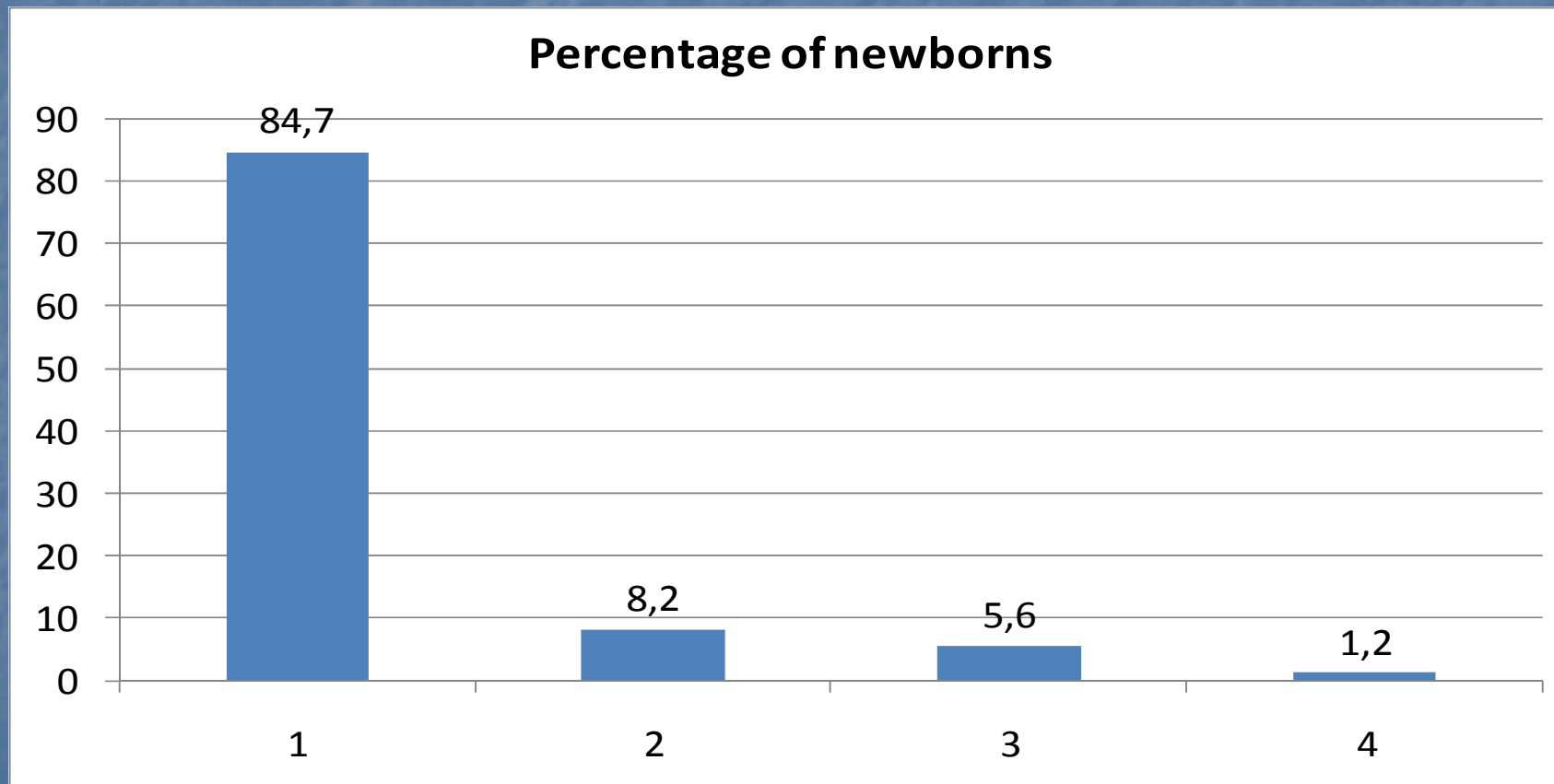
Newborns on antibiotics	85 (75.2%)
Days on antibiotics	771
Antibiotic utilization rate	44.8 (771/1722X100)

# Antibiotics prescription

Number of AB prescriptions	292
Newborns with two AB	27 (31.8%)
More than two AB	58 (68.2%)



# Courses of antibiotics



# Times each antibiotic was given and days of administration

Antibiotic	Prescriptions	Days of administration Total (Mean)
1 - Gentamicin	83	673 (8.1)
2 - Cefotaxime	53	346 (6.5)
3 - Ampicillin	47	243 (5.2)
4 - Metronidazole	39	313 (8)
5 - Vancomycin	35	252 (7.2)
6 - Meropenem	10	74 (7.4)
7 - Flucloxacillin	7	55 (7.9)

# Times each antibiotic was given and days of administration

Antibiotic	Prescriptions	Days of administration Total (Mean)
8 - Amikacin	5	51 (10,2)
9 - Amphotericin B	3	35 (11.7)
10 - Cefuroxime	3	17 (5.7)
11 - Cefazolin	2	2 (1)
12 - Penicillin benzathine	2	9 (4.5)
13 - Erythromycin	1	9 (9)
14 - Trimethoprim	1	1 (1)
15 - Ceftazidime	1	1 (1)

# Summary

- The rate of newborn infants on AB was higher than were found in the last years (about 60%)
- Time on antibiotics was less than 50% of admission time
- Patients with more than one course of antibiotics were few (15%)
- The most prescribed antibiotics follow NICU guidelines.
- As in other studies gentamicin was the most prescribed antibiotic.
- Cefotaxime and metronidazole (2nd and 4th) are justified by the rate of surgical situations.
- The 5th place in the row for vancomycin reflects the high rate of CVC-related infection in this year

# Comments

- There are few data regarding frequency of antibiotics prescription in NICUs. Some studies use different methodologies (DDD) making impossible to compare data
- For those allowing comparison the rate of antibiotic use is high for some - *Zingg and al* refer 18,8% of admission time and 26,9% of admitted neonates on antibiotics; and similar for others - *Fonseca S et al* refer 75,4% of admitted neonates on antibiotics

# Comments

## Difficulties related to measurement of drugs use in the NICU

- Adults Defined Daily Dose (DDD) is not appropriate to use in newborn infants
- It is not possible to know days of therapy through Pharmacy files with accuracy
- On the clinical point of view days of therapy registered bedside is the most direct way to measure drugs use
- Also an index has to be found to compare data between NICUs

# Conclusion

- Patterns of antibiotics use reflect the standard of care delivered and knowledge on its use in the NICU is an essential point to control its prescription.
- Antibiotic prescription is an interesting area to audit and rates of antibiotic use should be a parameter of quality criteria on NICUs evaluation.
- A simple and accurate measure index have to be found aiming to compare data. AB utilization ratio seems to be very useful and simple