UNIUNEA EUROPEANĂ | GUVERNUL ROMÂNIEI | Fondul Social European POSDRU 2007-2013 | Instrumente Structurale 2007-2013 | GUVERNUL ROMÂNIEI MINISTERUL MUNCII, FAMILIEI, PROTECȚIEI SOCIALE ȘI PERSOANELOR VÂRSTNICE OIRPOSDRU REGIUNEA CENTRU | UNIVERSITATEA DE MEDICINĂ ȘI FARMACIE "CAROL DAVILA" BUCUREȘTI

**AD-COR Program inovativ de formare in domeniul cardiologiei pediatrice**
**POSDRU/179/3.2/S/152012**

*Octombrie 2015*

MODUL TEORETIC

# Scaderea infectiilor din spital

## Continut documentat/ validat/ prezentat de:

⇨ Expert formare asistente: FILIP Cristina

*A5 - Planificarea, organizarea si desfasurarea activitatilor de formare a **asistentelor medicale** in domeniul cardiologiei pediatrice*

# Data about neonatal infections

- 4 million annual  neonatal deaths that occur globally
- >99% occur  in developing countries and approximately 36% are attributed to infections

# MS Curie Hospital

- Level III NICU
- Mixt- medical and surgical
- 15 beds until December 2013- now running to open 27 beds
- Regional center from south

# Reality

- >85% of our patients colonised with all the bacterial spectrum from hospitals that are referring the neonates

- Nosocomial infections >30% in the past with high morbidity and mortality

# History

- 2007- Germany- babies transferred for cardiac surgery
- Microbiologic results
- Confirmed  most of them colonised  with all bacterial spectrum from hospital
- Need to decrease mortality and morbidity- best solution

# Decision

- Local company- Chlorhexidine 0,25% was established  after consultations with other professionals to prepare a clean patient for extensive interventions in order to avoid dramatic consequences

# How to do

- At addmission every patient is checked for microbial contamination in certain election parts of the body. Using a nasal, ombilical, axilar and anal swab samples are prepared and sent to the lab.
- The next step is that  every patient is washed with chlorhexidine 0.25% immidiately after admission.
- Small prematures are washed after 7 days. We continue every day washing until discharge.

# How to do

- We assumed that it is safe method to decrease the microbial flora. The double control of washing efficaity is made sometimes in other hospital, in Italy and in Germany. We are informed what kind of bacteria they found after admittance of a washed baby.

# How to do

- Responsible for washing: Nurses had been teached how to do that 6 years ago.
- Today is a regular practice
- Sometimes the doctors especially the chief and are doing survey to verify how they are washing the babyes.
- The parents are informed about our practices .

# Control of the procedure

- Our local staf for infection controling at regular time take probes from different areas in the unit. Possibile septic areas, water, incubators, walls, microflora.Results in this last 5 years are remarcable for infections control.
- New laboratory, better detection

# How to do and to improve

- We announce by labelling – Attention- and Diagnostic on visible graphic the infection or colonisation of the baby. Usually we put the baby in isolation area if it is enough room.
- For the problem is a general one, we decided to create a single room area for every patient , totally 27 beds area. This infrastructure is ready from November  2013.
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# Each patient – each room

# Procedure

- Results: We are reporting nosocomial based on evidence. In less than 5 years the level of nosocomial infection decreased from more than 30 % to 6-13% in our days.
- We consider that this decresing can be attibuted to the implementaion of the procedure.

# Economics

- 2010: 4804 total days of hospitalisation ( 180 patients)
- Rate of nosocomial infectons: 13 (23 patients)
- Medium rate for days of hospitalisation: 22 days
- Cost from Insurance House: 100 euro/day
- **Cost of Practice: 4804 ( days)X1 (euro)=4804 euro/year**
- Cost per case of nosocomial infection:

  22 (days)X100 (euro/day) =2200 euro
- **Total : 2200X23=50.600 euro/year**

# Data about our procedure

## Safety and Impact of Chlorhexidine Antisepsis Interventions for Improving Neonatal Health in Developing Countries

Luke C. Mullany, PhD, Gary L. Darmstadt, MD, James M. Tielsch, PhD

Pediatr Infect Dis J. 2006;25(8):665-675.


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**Impact of Newborn Skin-Cleansing With Chlorhexidine on Neonatal Mortality in Southern Nepal: A Community-Based, Cluster-Randomized Trial**

James M. Tielsch, Gary L. Darmstadt, Luke C. Mullany, Subarna K. Khatry, Joanne Katz, Steven C. LeClerq, Shardaram Shrestha and Ramesh Adhikari

*Pediatrics* 2007;119;e330; originally published online January 8, 2007;
DOI: 10.1542/peds.2006-1192

# Nothing new

- Chlorhexidine is a broad-spectrum antiseptic that has been used extensively for many decades in hospital and other clinical settings.
- It has also been given as maternal vaginal lavage, full-body newborn skin cleansing, and/or umbilical cord cleansing to prevent infection in neonates.

# Where to use

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- Developed countries has focused mainly on antisepsis

  central venous catheters

  prevention of vertical transfer of microorganisms, especially GBS)

# Chlorhexidine effects

- Broad-spectrum antiseptic: Gram-positive,Gram-negative bacteria, some viruses, including HIV.
- Synthesis in 1950, it has been used for hand and wound cleansing and skin and mucosal antisepsis before surgery or other procedures that penetrate these barriers.
- Topically aqueous and alcohol-based solutions, gels, and powders; adult, infant and neonatal skin.

# Chlorhexidine side effects

Reported side effects have been few, delayed:

1. contact dermatitis
2. photosensitivity
3. toxicity - inadvertent application to the ear
4. through a perforated tympanic membrane
5. hypersensitivity -anaphylactic shock.

# Chlorhexidine reported side effects

- Contact dermatitis -5% of preterm (<28 weeks' gestation) extremely low-birth-weight (<1000 g) infants after long-term (>7 days) placement of chlorhexidine-impregnated dressings for central venous catheters.
- Side effect - occlusive placement of the dressing rather than the chlorhexidine itself

# Chlorheidine reported side effects

In the same study:

1. No infants receiving a preplacement scrub with 0.5% chlorhexidine developed dermatitis
2. Contact dermatitis has not been reported in infants receiving full-body wiping, bathing, or umbilical cord cleansing with chlorhexidine.
3. Transient bradycardia was reported in a breast-fed infant whose mother's breast was sprayed with chlorhexidine.

# Chlorheidine reported side effects

- Studies were undertaken in the 1970s and 1980s to investigate the potential for percutaneous absorption or adverse events after neonatal skin or umbilical cleansing with chlorhexidine

**Studies of Absorption of Chlorhexidine After Skin or Umbilical Cord Cleansing of Neonates**

Medscape® www.medscape.com

| Study | Chlorhexidine Delivery Method | Concentration and Application | Sample Size* | Sample Collection Method | # Measured | # (%) With Detectable Chlorhexidine | Range (ng/mL) |
|---|---|---|---|---|---|---|---|
| Newborn skin cleansing | | | | | | | |
| Cowen[23] (UK, 1977) | Skin cleansing; nurses applied cleanser with hand daily | 4.0% ChxD | 10 Preterm | Heel Prick | 10 | 10 (100) | 53–1021 |
| | | | 21 Preterm | Venous | 21 | 5 (25) | 91–460 |
| | | | 3 Term | Venous | 3 | 0 (0) | — |
| O'Neill[25] (USA, 1982) | Skin cleansing; applied (30 mL) with sterile washcloth | 0.4% ChxD | 41 | Venous | 41 | 0 (0) | — |
| O'Brien[26] (USA, 1984) | Full-body bathing for 3 d | 4.0% ChxD | 50 Full-term | Heel Prick | 50 | 0 (0) | — |
| Wilson[27] (South Africa, 2004) | Skin cleansing; aqueous solution applied with soaked cotton balls | 0.25% ChxD | 27 | Venous | 0 | — | — |
| | | 1.0% ChxD | 82 | | 10 | 3 (30) | 13–26 |
| | | 2.0% ChxD | 88 | | 10 | 1 (10) | 27 |
| Umbilical cord cleansing | | | | | | | |
| Aggett[29] (UK 1981) | Umbilical cord cleansing; 3 times daily for 9 d | 1.0% ChxE + 1.0% ChxZO | 25 Term | Venous | 25 | — | 0† |
| | | 1.0% ChxE + 1.0% ChxZO | 23 Preterm | | 23 | — | 32† |
| | | 1.0% ChxZO | 29 Preterm | | 29 | 4 (14) | 16–92 |
| Johnsson[28] (Sweden, 1987) | Umbilical cord cleansing; applied daily to cord stump and periumbilical area | 4.0% ChxD | 32 Vaginal | Venous | 23 | 1 (4) | 496 |
| | | | 36 C-section | | 21 | 0 (0) | — |

ChxD, chlorhexidine digluconate; ChxE, chlorhexidine in ethanol; ChxZO, dusting powder containing chlorhexidine in zinc oxide (3%).

*Sample size indicates number of infants receiving treatment with chlorhexidine, not sample size for the entire study.

†Median level.

# Studies of Absorption of Chlorhexidine After Skin or Umbilical Cord Cleansing of Neonates

- After daily bathing of newborns (n= 34; 29 preterm) for up to 32 consecutive days, while hospitalized, with 4.0% chlorhexidine
- Heel prick samples taken from the first 10 infants were positive for chlorhexidine . Investigators suggested that the samples were contaminated from residual chlorhexidine on the skin and collected venous blood samples from the remaining 24 infants.

# Studies of Absorption of Chlorhexidine After Skin or Umbilical Cord Cleansing of Neonates

- Among these, 5 had detectable chlorhexidine, and all were less than 36 weeks' gestational age at the time of cleansing and were likely to have increased epidermal permeability because of immature skin development.
- There was no indication that the low levels of chlorhexidine detected in the blood samples resulted in any harmful effects.

Medscape® www.medscape.com

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No chlorhexidine was detected in blood samples collected after full-body bathing of 41 full-term infants 1-3 times with a 0.4% chlorhexidine solution.[25] Fifty full-term infants were bathed daily for 3 days with 4% chlorhexidine, and heel prick samples taken on each day 1 hour after bathing were negative[26]; infants were followed up after 1 year, and no long-term adverse effects of the bathing were recorded. In a recent hospital-based study in South Africa, chlorhexidine was detected in sera of 30% (3/10) and 10% (1/10) of infants receiving a single bath with 1% or 2% chlorhexidine, respectively.[27]

# Clorhexidine- side effects

- Larger studies of the impact of chlorhexidine interventions on neonatal outcomes have not measured absorption in newborns but provide for further review of its safety record.
- Repeated vaginal flushings with 0.2% chlorhexidine during delivery were given to 2283 women to assess the effect of vaginal disinfection with chlorhexidine on neonatal morbidity. No adverse events were reported in babies born to mothers in the intervention group.

# Clorhexidine- side effects

- Some areas of the body have higher vascularity (such as the face and scalp), and when included in skin cleansing regimens, these sites may have higher absorption

- In general, the potential for absorption appears to be reduced when chlorhexidine is applied in aqueous or other nonethanol-based formulations.

# Chlorhexidine- side effects

- In summary, after topical applications of chlorhexidine, some percutaneous absorption occurs, particularly in preterm newborns, but only at trace levels.

- The data on safety, however, are incomplete. Data suggested that 1% is the highest tolerable concentration for vaginal and newborn skin cleansing.

# Other measures for decreasing hospital infections:

- VAP
- TPN
- Medication
- Washing
- Microflora
- Separate trating rooms

# Decreasing the hospital infections in a NICU and PICU


- Dr. Catalin Cirstoveanu
- MS Curie Children's Hospital
- Carol Davila University of Medicine
- Neonatal Intensive Care Unit


# *Nursing interventions for preventing* Ventilation Associated Pneumonia

## Introduction:

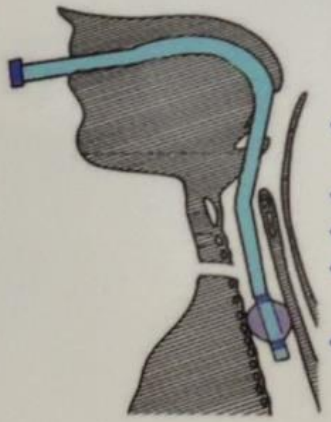
VAP has been targeted by the Department Of Health as an area where considerable improvement could be met 1. Multiple studies demonstrate the incidence of VAP and the effectiveness of a ventilator care bundle within adult patients 2.

## Explanation:

VAP is a pneumonia that occurs in patients who have been on mechanical ventilation for at least 48 hours. It results in increased morbidity and mortality, length of stay and health care costs 3. VAP is the second most common nosocomial infection in paediatric intensive care units, accounting for 20% of all nosocomial infections in the paediatric population 1.

## Characteristics of VAP:

- *A pneumonia that wasn't present or developing at the time of intubation.*
- *specific CXR changes.*
- *A core temperature of >38.5c or <36c with no other recognised cause.*
- *New onset or worsening of purulent bronchial secretions.*
- *Positive culture from respiratory secretions.*
- *Relevant positive culture from alternative site of infection 4.*



## CICU/PICU Nursing Care bundle, The key to prevention of VAP:

- **Elevate the head of the bed:**
  - *15-30% for neonates and 30-40% for infants and older.*
- **Mouth Care:**
  - *Perform every 2hrs appropriate to age, refer to CICU/PICU oral hygiene policy.*
- **Ventilation circuits:**
  - *Keep tubing below the level of the patient so any condensate does not drain in to the lungs.*
  - *Keep the circuit free of any condensation by draining every 2-4hrs without disconnection if possible.*
  - *Keep the end of the ventilator circuit, suction device and manual bagging circuits off the bed, store in a clean none sealed bag when not in use.*
  - *Change ventilator circuits and inline suction devices only when visibly soiled.*
  - *Meticulous hand hygiene before and after contact with the ventilator circuits.*
- **Daily assessment/documentation of readiness to extubate:**
  - *Ensure sedation optimal and COMFORT score target set.*
- **Eliminate routine saline flushing**
- **Correct positioning of NG tube.**
- **Peptic ulcer prophylaxis.**
  - *Appropriate to the age & clinical condition of the child.*
- **DVT prophylaxis:**
  - *Appropriate tot the age & clinical condition of the child.*


**Reference list:**

1)Kingston, M. 2007. Preventing VAP. American Journal of Nursing. Issue 107. vol5) P72cc-72ll.
2)Bahrt, G. 2009. Current methods for combating VAP. Nursing Management. P49-52. http://www.nursingmanagement.com.
3)Richardson, M et al.2010. Establishing nurse-led ventilator-associated pneumonia surveillance in paediatric intensive care. Journal of hospital infection.75, pp220-224.
4)Morinec, J et al. 2012. Journal of Paediatric Nursing. Vol 27, p435-442.
5) UHL PICU CICU VAP Care bundle summary. S, Robinson. C, Westrope. VAP Guideline. Jan 2013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