

# Extended-Spectrum-β-Lactamase producing Enterobacteriaceae in neonates and association with maternal urine cultures

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## INTRODUCTION

- » Enterobacteriaceae (EB) has become a major clinical challenge, with an increasing emergence of Extended Spectrum β-Lactamase producing Enterobacteriaceae (ESBL-PE) in the community.
- » EB are a well-established cause of both early and late onset neonatal sepsis. The burden of EB sepsis is especially high in neonates that are hospitalized in Neonatal Intensive Care Units (NICU).
- » Pregnant women are advised to perform routine urinary cultures at least once during the pregnancy. There are no data about the significance of these cultures for the potential future vertical transmission from mother to neonate.
- » There are no data about association of maternal urinary cultures with neonatal infections with ESBL-PE

## OBJECTIVES

- » The aim of the study was to find whether there is an association between the presence of ESBL-PE in pregnant women's urine cultures and ESBL-PE in corresponding neonates' cultures.
- » The secondary objectives were:
  1. to analyze the effect of ESBL-PE on neonatal morbidity and mortality
  2. to examine neonatal ESBL-PE prevalence trends during the study period

## METHODS

- » Retrospective cohort study of neonates born during the years 2009-2013 whose mothers had performed urinary cultures within one year prior to delivery. Data were obtained from the centralized Clalit Health Services (CHS) warehouse.
- » The cohort included only neonates who had any type of microbiological culture performed during the first three months after birth. Neonates whose cultures were negative to EB were excluded from the cohort.
- » Maternal urine cultures and the neonatal cultures of all types were screened for EB growth.
- » **Outcome variables:**
  1. EB bacterial growth in any neonatal bacteriological culture
  2. Length of hospital stay during 3 months after the birth
  3. Neonatal mortality during the first 6 months

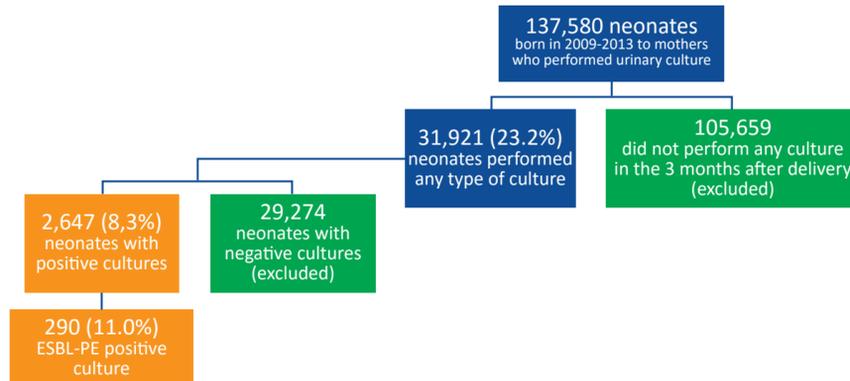
## RESULTS

- » 137,580 neonates were eligible for the study with 31,921 (23.2%) having any kind of bacteriological culture. The final cohort included 2,647 (8.3%) neonates that had any positive EB culture, while 290 (11.0%) neonates had cultures positive for ESBL-PE
- » Maternal urine cultures positivity for ESBL-PE was found to be an independent risk factor for neonatal ESBL-PE in multivariable analysis (OR=3.15 CI 95%:1.22-8.14)
- » The median length of hospital stay in normal weight or LBW neonates was significantly higher in the cohort of neonates with ESBL-PE as compared to the neonates without ESBL-PE (9 days vs. 5 days p<0.001 and 21 vs. 15 respectively p<0.001)
- » The ESBL-PE presence in neonatal culture was strongly associated with 6 months mortality (OR=12.6 CI 95%:4.92-32.29)

## CONCLUSIONS

- » ESBL-PE in maternal urinary culture during pregnancy is an independent risk factor for neonatal ESBL-PE.
- » Neonatal ESBL-PE are associated with increased hospital stay and mortality.
- » Comprehensive infection control policy in NICU should take into consideration the results of maternal urinary cultures.

## Flowchart of the Study Population

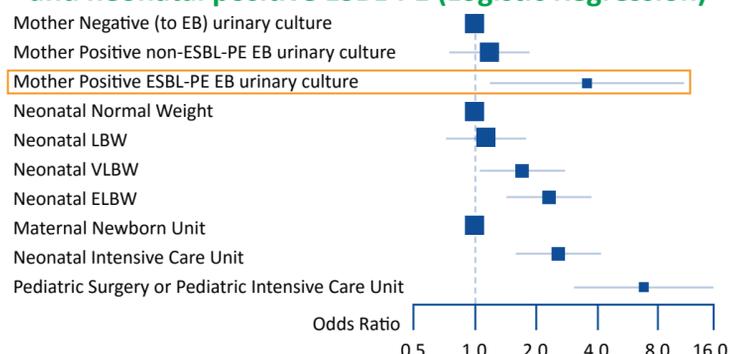


## Neonates Length of Hospital Stay during the 3 months after birth

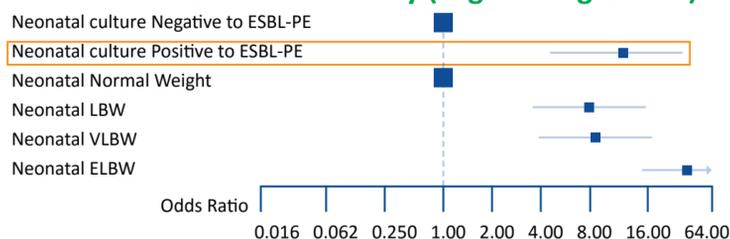
Birth Weight	Neonates with non-ESBL-PE positive cultures		Neonates with ESBL-PE positive cultures		Mann-Whitney P Value
	No of neonates (n)	Median (q1-q3)	No of neonates (n)	Median (q1-q3)	
Normal	1,660	5 (3-8)	140	9 (4-25)	<0.001
LBW	404	15 (7-28)	59	21 (13-36)	<0.001
VLBW	170	42 (26-62)	46	51 (31-74)	<0.195
ELBW	123	79 (9-102)	45	83 (39-99)	<0.698
<b>Total</b>	<b>2,357</b>	<b>6 (3-14)</b>	<b>290</b>	<b>20 (7-57)</b>	<b>&lt;0.001</b>

\*Normal Weight (>=2500 gr); LBW=Low Birth Weight (1500-2499 gr); VLBW=Very Low Birth Weight (1000-1499 gr); ELBW=Extremely Low Birth Weight (<1000 gr)

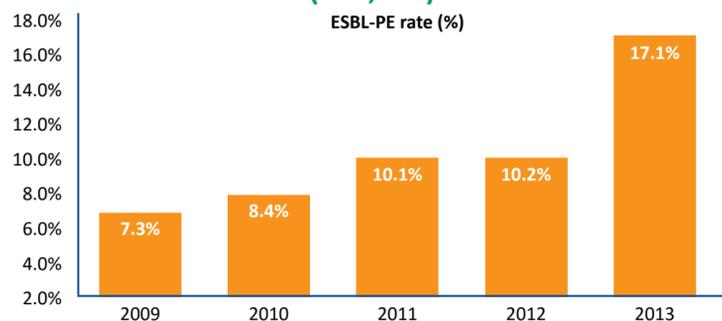
## Association between mother positive ESBL-PE EB urinary culture and neonatal positive ESBL-PE (Logistic Regression)



## Association between neonatal positive ESBL-PE and 6 months neonatal mortality (Logistic Regression)



## Trends for ESBL-PE proportion in the EB positive neonatal cultures (n=2,647)



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