# Risk factors for resistant bacterial colonisation in 24 European neonatal units in the NeoIPC project

P3213

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## Background

- Infants on neonatal units are at risk of severe bacterial infections, particularly those born at <32 weeks
- Infants colonised by resistant bacteria have an increased risk of sepsis
- Most studies look at individual risk factors for infants being colonised during their hospital stay
- Understanding how individual AND neonatal unit-level risk factors contribute to risk of infants being colonised is important
- Allows us to inform infection prevention and control (IPC) strategies focusing on both direct and indirect effects of IPC on high-risk infants

## Methods

- 24 sites in 8 countries conducted 4 cross-sectional surveys in a one-month period
- At each survey clinical data, stool samples were collected from all infants present on the unit
- Stool samples were analysed by PCR for the presence of bacterial resistance genes
- Colonised defined as detection of at least one gene of interest in stool
- Bayesian logistic regression model to assess individual and unit risk factors associated with resistant bacterial colonisation

**Gene targets of interest in stool samples**

- **Carbapenem resistance: *blaKPC, blaNDM, blaVIM, blaIMP, blaOXA-48***
- **Extended-spectrum beta-lactamase: *blaCTX-M* group1, *blaCTX-M* group9**
- **Vancomycin resistance: *vanA, vanB***

## Results

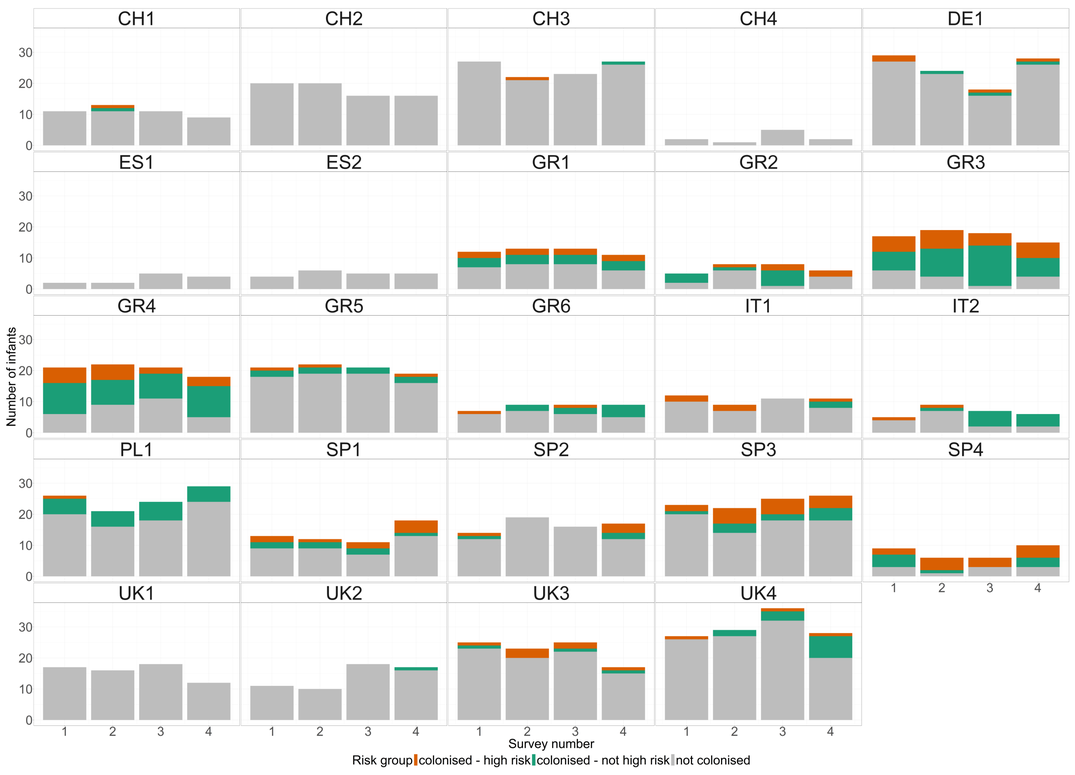



**Figure: Number of infants colonised by antibiotic resistant bacteria (stool) per survey split by high risk (born <32 weeks gestation) and not high risk (born ≥32 weeks gestation) and total number of infants (not colonised) present on the day of the survey.**

| Characteristic | Resistant bacterial colonization status (stool samples) | |
|---|---|---|
| | Not colonised N = 1,050 | Colonised N = 302 |
| **Country** | | |
| Switzerland | 210 (20%) | 2 (0.7%) |
| Germany | 89 (8.5%) | 7 (2.3%) |
| Estonia | 33 (3.1%) | 0 (0%) |
| Greece | 180 (17%) | 158 (52%) |
| Italy | 50 (4.8%) | 19 (6.3%) |
| Poland | 75 (7.1%) | 22 (7.3%) |
| Spain | 175 (17%) | 69 (23%) |
| United Kingdom | 238 (23%) | 25 (8.3%) |
| **Gestational age (weeks)** | 32 (28 - 37) | 33 (30 - 37) |
| **Birthweight (grams)** | 1,715 (975 - 2,830) | 1,820 (1,300 - 2,600) |
| **Postnatal age (days) at survey** | 19 (7 - 42) | 23 (10 - 51) |
| **Length of stay on NICU at survey (days)** | 14 (5 - 31) | 16 (7 - 39) |
| **Surgery prior to survey** | 223 (21%) | 56 (19%) |
| **Skin-to-skin contact (KC) in prior 24 hours to survey** | 655 (62%) | 131 (43%) |
| **Presence of central line within 24 hours** | 224 (21%) | 41 (14%) |
| **Receipt of TPN in prior 24 hours** | 217 (21%) | 40 (13%) |
| **Antibiotic exposure within 14 days** | 578 (55%) | 156 (52%) |
| **Total patients on the unit** | 23 (17 - 32) | 20 (15 - 25) |
| **Proportion of infants colonised on unit** | 0.11 (0.00 - 0.24) | 0.44 (0.25 - 0.71) |
| **Proportion of infants on unit that are high risk (>32 weeks)** | 0.44 (0.36 - 0.58) | 0.38 (0.30 - 0.53) |

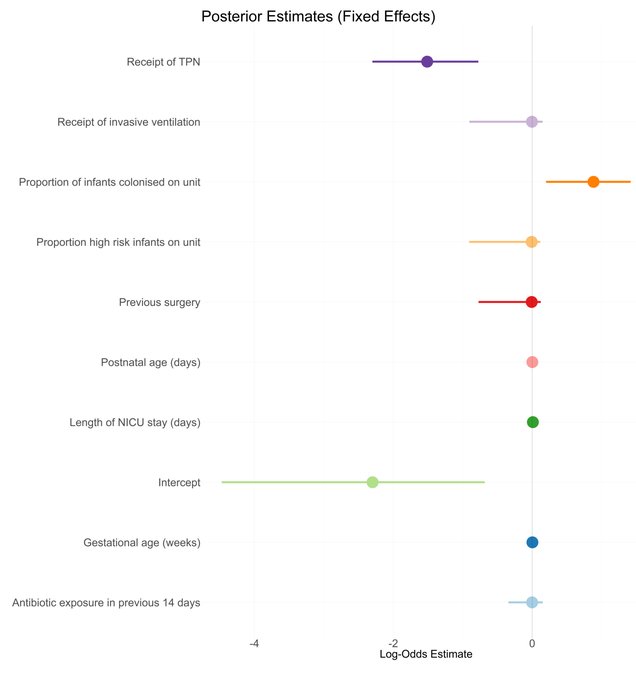
[1]n (%); Median (Q1 - Q3); Country % is column percentage

## Overall

- 943 infants contributed data for 1846 infant-survey observations
- 1447/1846 (78%) possible stool samples collected
- Resistant bacterial colonisation was moderate overall (20%, 301/1447 samples)
- Significant variation between units and countries (p<0.001) (Figure)

## Model Summary

- 781 infants with 1352 infant-survey observations had complete data for model (Table)
- Substantial variation in log-odds of colonisation
  - Between sites (log-odds 2.6, 95%CI: 1.7 - 3.9)
  - Between infants within sites (log-odds 2.0, 95% CI: 1.5 - 2.6)
- Receipt of TPN was associated with lower odds of colonisation
- Higher colonisation pressure on the unit was associated with increased odds of individual colonisation
- Lack of evidence that other clinical predictors associated with odds of colonisation




## Conclusion

- Both low- and high-risk infants were colonised
- Colonisation pressure on neonatal unit is a risk factor for individual colonisation
- Unit-level IPC interventions target both direct and indirect effects of colonisation regardless of risk status
- Interventions focusing only on infants at high risk of sepsis will miss significant resistant bacterial colonisation in low-risk infants

**The NeoDeco trial is a cluster-randomised hybrid implementation-effectiveness trial looking at the impact of implementing optimal kangaroo care on neonatal sepsis and resistant bacterial colonisation prevalence**

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*The NeoIPC Feasibility Study is sponsored by Fondazione Penta ETS*

*The NeoIPC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 965328*

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