

EARLY-ONSET NEONATAL SEPSIS AND MENINGITIS IN BELGIUM : A DECADE-REVIEW

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ABSTRACT

Background: In the late 1990s, Belgium has reached the era of "group B streptococcal (GBS) prevention" and after 1996, some institutions, but not the majority, had implemented intrapartum antibiotic prophylaxis for GBS prevention. Concern exists that one unintended consequence of GBS prevention efforts through chemoprophylaxis may be an increase in the rate of serious neonatal infections due to Gram negative bacteria (GNB). To monitor trends, continued surveillance of neonatal sepsis is needed.

Methods: On a weekly basis, laboratories of the Belgian sentinel network notified each case of neonatal bacteremia or meningitis occurring within 28 days after birth. We reviewed on a year-base data collected from 1991-2001 for early-onset diseases (EOD; < 5 days).

Results: A yearly mean of 47 cases (24-90) were notified by 28 (16-35) laboratories. Overall GBS remained the leading cause and represented annually 37.9% (25-54.7%) of EOD and did not show significant change. It was followed by *E. coli* 11.4%, coagulase negative staphylococci (CNS) 11.9%, *S. aureus* 9.9%, *Listeria* sp. 3.9%, *S. pyogenes* (GAS) 2.5%, *S. pneumoniae* 2.7%, *H. influenzae* 2.7% and others. During the decade, whereas a significant reduction in the rate of *E. coli* and other GNB EOD occurred ($p < 0.01$), significant increases in the rate of EOD due to GAS ($p < 0.001$), *S. aureus* ($p < 0.001$), and CNS ($p < 0.01$), were found. For CNS, we did not have data to distinguish definite or possible infections from conjugal infections.

Conclusions: 1) During the last decade, GBS has remained the leading cause of neonatal EOD. 2) A decline in the rate of *E. coli* and other GNB infections occurred. 3) In the late 1990s, *S. aureus* and CNS were more frequently reported. 4) An increase in GAS occurrence was found. 5) Potential change in pathogens overtime requires confirmation by ongoing surveillance.

BACKGROUND

Early onset (EO) sepsis is still an important cause of morbidity and mortality among newborns. In Belgium, in the 1980s, group B streptococci (GBS) had become the leading cause of neonatal sepsis. Since 1996, after the release of CDC guidelines for the prevention of GBS perinatal disease, progressively hospitals (not all) have implemented the recommended intrapartum chemoprophylaxis. Their practice has not been totally in agreement with CDC guidelines and was less effective. The result is an increasing use of antibiotics during labor to decrease the risk of GBS perinatal infection. Therefore, there is concern that one unintended consequence of GBS prevention efforts might be a change in the spectrum of organisms and particularly an increase in the rate of serious neonatal infections caused by Gram negative bacilli (GNB).

OBJECTIVES

- To assess the type of pathogens involved in early onset sepsis in neonates born in Belgium between 1991 and 2001.
- And to monitor any trends in their distribution

METHODS

Surveillance network

- To monitor health problems, the Belgium Scientific Institute of Health has developed sentinel networks.
- Sentinel laboratories report weekly the occurrence of defined infectious diseases including neonatal sepsis and meningitis occurring within 28 days after birth.

Population data base

- Retrospective review of data reported by sentinel laboratories from 1991 to 2001 for EO sepsis and meningitis.
- Information regarding clinical data or susceptibility patterns of the pathogen was not available, neither the total number of births per center during the same period.

Definition

- EO Disease (EOD) was defined by a positive culture of blood or cerebrospinal fluid drawn within 5 days after birth.

Statistical analysis

- Chi-square tests were used to compare the yearly distributions of pathogens causing EOD.

RESULTS

Evolution of notifications

Between 1991 and 2001, 517 cases of EOD were reported.

Each year, a mean of 28 laboratories (16-35) notified a number of cases fluctuating from 24 to 90 with an average of 47 cases. (see table)

RESULTS

Distribution of pathogens (see table)

Along this decade, GBS was always the most frequent cause of EOD representing on average 37.7% of them.

Far behind came *E. coli* as the cause of 11.4% EOD, and *S. aureus*, 9.9%.

The reported Gram negative bacilli (GNB) other than *E. coli* represented only 4.4% of the cases.

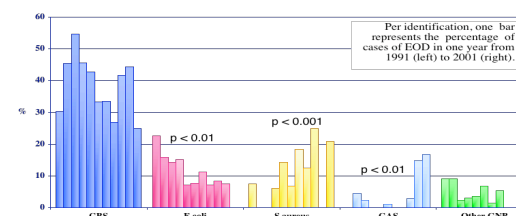
Other neonatal pathogens as group A streptococci (GAS), *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Listeria monocytogenes* accounted respectively for less than 4% of EOD.

Meanwhile coagulase negative staphylococci (SCN) were reported as the agent recovered from 11.9% of infants with positive culture of blood or cerebrospinal fluid.

Distribution of organisms causing 517 cases of EOD among infants born between 1991 and 2001, as reported by the Belgian sentinel network of laboratories.

Organism	Overall, No. With EOD (%)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Evolution
GBS	196 (37.9)	20	20	23	15	12	30	28	15	15	12	6	-
<i>E. coli</i>	59 (11.4)	15	7	6	5	2	7	8	4	3	2	0	↓ ($p < 0.01$)
<i>S. aureus</i>	51 (9.9)	5	0	0	2	4	6	13	7	9	0	5	↑ ($p < 0.001$)
SCN	62 (11.9)	3	2	1	2	2	14	9	13	5	5	6	↑ ($p < 0.01$)
GAS	13 (2.5)	0	2	1	0	0	1	0	0	1	4	4	↑ ($p < 0.01$)
<i>S. pneumoniae</i>	14 (2.7)	3	0	1	0	1	4	1	2	1	1	0	
<i>H. influenzae</i>	14 (2.7)	2	4	1	1	1	2	0	0	0	2	1	
<i>Listeria</i>	20 (3.9)	6	1	3	1	3	1	0	2	2	0	1	
Other GNB	23 (4.4)	6	4	1	1	1	6	1	3	0	0	0	
Others	65 (12.6)	6	4	5	6	2	19	11	10	0	1	1	
Total	517	66	44	42	33	28	90	71	56	36	27	24	

Evolution of some pathogens through the decade



DISCUSSION AND CONCLUSION

- This retrospective analyze gives probably a good overview of the Belgian distribution of pathogens causing neonatal EOD, but it has some important deficiencies: as the lack of information regarding the annual number of births, or as the knowledge regarding prevention or antibiotic policies in the different centers. Furthermore we ignore if all sentinel laboratories declare regularly all their cases. This emphasizes the need to improve the kind of data to collect through the surveillance network.
- Through the decade, GBS remains the leading cause of neonatal EOD. Even if some increase has occurred in antibiotic use during labor for prevention of GBS perinatal disease, we did not observe a significant decline in the prevalence of GBS among the other pathogens causing EOD.
- By the end of the decade, *E. coli* cases significantly declined and no change was observed in the other GNB cases.
- A true increase in *S. aureus* EOD occurred since the mid-1990s.
- Surprisingly, at the end of the decade some concern arises about a significant increase in GAS sepsis.
- CNS were more frequently reported. To attribute any signification to these notifications, it would have been mandatory to know a minimum of clinical data, of any change in the pediatric management of neonates or of any change in the used blood culture system.
- Following the publication of the Belgian guidelines for prevention of GBS perinatal disease by the end of 2003, these changes in pathogens causing EOD will require confirmation by ongoing improved surveillance.

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