

Global Invasive Bacterial Diseases (IBD)
Information and Surveillance Bulletin
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Comments on this Bulletin are Welcome.
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Photo Source: WHO
http://www.who.int/immunization_delivery/adc/en

This first twice-yearly Invasive Bacterial Diseases (IBD) Global Surveillance and Information Bulletin describes sentinel surveillance for invasive bacterial diseases among hospitalized children under five years of age. IBD surveillance is used to provide data guiding use and impact of vaccines that target *Haemophilus influenzae* type b (Hib), *Streptococcus pneumoniae*, and *Neisseria meningitidis*. These organisms cause diseases with a variety of clinical presentations including those of the brain (meningitis), lung (pneumonia), and blood stream (sepsis) among others. These bacteria cause a significant burden of disease. For example, acute respiratory disease, mainly pneumonia, accounts for 17% of the 10.4 million deaths among children <5 years of age globally and *Streptococcus pneumoniae* and Hib account for close to 50% of pneumonia deaths.¹

The WHO Invasive Bacterial Diseases (IBD) Surveillance Network

During the past years, a number of IBD surveillance sites and networks were established to gather data to assess disease burden, estimate vaccine effectiveness, and determine which specific serotypes of *Streptococcus pneumoniae* and *Neisseria meningitidis* that cause the majority of disease in each WHO region and to monitor changes in strain prevalence over time and in response to vaccine introduction. During 2008, some existing surveillance networks were transitioned to a network coordinated by WHO, with financial support targeted to Global Alliance for Vaccines and Immunisation (GAVI) eligible countries. Each participating country has at least one “core sentinel” surveillance site where hospitalized children <5 years of age with signs or symptoms of bacterial meningitis have their cerebrospinal fluid assessed by diagnostic laboratory analysis for the presence of bacteria. All sites use standardized definitions, collect a core dataset, and use standardized quality-controlled laboratory methods. The current WHO Meningitis/Encephalitis system includes 46 WHO Member States (page 3). Some “added” surveillance sites perform additional diagnostic testing including culturing blood for bacterial infection (sepsis). Further specialized “enhanced population-based” sites will collect data to determine the number of children with these diseases in a defined population (disease incidence) and possibly collect information related to pneumonia.

Detection of Invasive Bacterial Diseases (see page 3 for detailed data)

During 2008, more than 22,000 children <5 years of age with suspected invasive bacterial disease were enrolled in the WHO IBD surveillance system worldwide and assessed for possible meningitis. Approximately 14% of the children with probable bacterial meningitis had disease likely caused by an organism against which there is a

¹ The global burden of disease: 2004 update;
http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_part2.pdf;
Watt et al. Burden of disease caused by *Haemophilus influenzae* type b in children younger than 5 years: global estimates. *Lancet* 2009; 374: 903–11;
O'Brien et. al. Burden of disease caused by *Streptococcus pneumoniae* in children younger than 5 years: global estimates. *Lancet* 2009; 374: 893–902

protective vaccine (5.7% to *Neisseria meningitidis* 5.2% were due to *Streptococcus pneumoniae*, and 2.8% to *Haemophilus influenzae*².) Twenty-three percent of all hospitalized children with probable bacterial meningitis subsequently died.

Overall, 32 (70%) of the 46 countries participating in the IBD surveillance system included Hib vaccine in their vaccination schedule during 2008. Among the 22 WHO Region of Africa (AFR) participating countries, 12 countries introduced Hib vaccine prior to 2008, 4 introduced the vaccine in 2008, and 6 did not use Hib vaccine³. Excluding countries that introduced vaccine during 2008⁴, *Haemophilus influenzae* was detected in 13.8% of children with probable bacterial meningitis in AFR countries not using Hib vaccine, and in only 6.4% of children with probable bacterial meningitis in AFR countries using Hib vaccine (Table 1). Since Ministries of Health collect data on the vaccination status of these children, additional and more detailed analysis will likely be forthcoming from these countries.

Table 1. *Haemophilus influenzae* type b (Hib) vaccine use, and probable bacterial meningitis due to *Haemophilus influenzae*, WHO Region of Africa³, 2008.

Hib Vaccine Use	Number of Countries	Number of Reporting Sites	Total Number of Meningitis Cases with Probable Bacterial Meningitis	Total Number of Probable Bacterial Meningitis cases with HI Identified	% of Probable Bacterial Meningitis Cases with HI Identified
Yes	12	15	636	41	6.4
No	6	8	261	36	13.8

Spotlight on GAVI, Hib Initiative, and Transition of IBD Surveillance to WHO

The GAVI Alliance (www.gavialliance.org) has supported the establishment and implementation of many of the current IBD surveillance sites through the **Pneumo Accelerated Development and Introduction Plan (PneumoADIP)**, (www.preventpneumo.org). Since 2000, the GAVI global health partnership has brought together public and private sectors in support of global immunization. The Bill & Melinda Gates Foundation has been the leading private sector member of this Alliance.

The Hib Initiative (www.hibaction.org), financed by GAVI, has supported surveillance networks for meningitis and pneumonia caused by *Haemophilus influenza* type b. The Hib Initiative has united experts from Johns Hopkins Bloomberg School of Public Health, the London School of Hygiene and Tropical Medicine, the Centers for Disease Control and Prevention and WHO in this effort.

² Serotype data is currently unavailable. Based on previous evidence, over 90% of HI cases are expected to be Hib (http://whqlibdoc.who.int/hq/2009/who_ivb_09.02_eng.pdf).

³ All 6 countries will introduce Hib vaccine by the end of 2009.

⁴ The 4 countries that introduced vaccine during 2008 are excluded in an attempt to ensure a true comparison of vaccine using countries with countries not using vaccine.

WHO GLOBAL INVASIVE BACTERIAL DISEASES SURVEILLANCE SYSTEM BULLETIN, REPORTING PERIOD : JANUARY-DECEMBER 2008																																		
MENINGITIS SURVEILLANCE																	PNEUMONIA AND SEPSIS SURVEILLANCE																	
Region	Total No. of Reporting Sites	Number of suspected meningitis cases	% of suspected meningitis cases that had an LP performed		% of LPs performed that have a culture result recorded	No. (%) of suspected meningitis cases with probable bacterial meningitis**		% of LPs performed that have a culture result recorded	% of probable bacterial meningitis cases identified by culture or latex	% of probable bacterial meningitis cases with pneumococcus identified by culture or latex	% of probable bacterial meningitis cases with meningococcus identified by culture or latex	No. (%) of CSF isolates forwarded to regional ref lab for typing		% of sites that report data according to agreed timeline	No (%) of suspected meningitis cases that died		Number of children who met the pneumonia case definition	% of hospitalized pneumonia cases that had a blood culture preformed	Number of cases that met the eligibility criteria for a blood culture	% of cases that meet the criteria for a blood culture that had a blood culture preformed	% of blood cultures collected that have a culture result recorded	No. (%) of all blood cultures with a bacterial pathogen identified by culture		No. (%) of cases with a blood culture performed with culture or latex		No. (%) of cases with a blood culture performed with pneumococcus identified by culture or latex		No. (%) of blood isolates forwarded to regional ref lab for typing		No (%) of suspected pneumonia and sepsis cases that died				
			Target 90%	Target 90%	Target 90%	Regional target to be defined	Regional target to be defined	Regional target to be defined	Target 80%	Target 80%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
	No.	No.	No.	%	No.	No.	%	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	%	%	No.	%	No.	%	No.	%	No.	%	No.	%		
AFR	27	8,640	8,583	99	99	1,026	12	98	106	10	170	17	91	9			27	100	461	5														
AMR ¹		3,713	3,478	94		395	11		12	3	43	11	15	4					500	13					14		80				322	3		
EMR ¹	107	7,908	7,533	95	67	3,884	49	83	19	0	60	7	148	4			162	97	224	3	1,051	49	2,550	44	100	108	4	4	0	27	1	Refer to footnote	32	0
EUR ²	7	130	122	94	100	116	89	100	1	7	12	10	66	57			7	100	6	5														
SEAR ³		1,104	435	39	100	105	24		8	8	11	11	3	3	0	0			51	5	1,198	59	4,144	50	86	91	4	1	0	2	0	0	0	
WPR ⁴		602				114	19	30			3		1						33	5	2,286	100	38	100	102	26	1	0	0	14	1		2	0
Total		22,097	20,151			5,640																												

Performance indicator

**Probable bacterial meningitis – a suspected case with examination of CSF showing at least one of the following 1) turbid appearance,

2) WCC (>100 cells / mm3), 3) WCC (10-100 cells / mm3) AND either an elevated protein (>100 mg/dl) or decreased glucose (<40 mg/dl).

(Note: If protein and glucose results are not available just use parts 1 and 2 of definition).

1. There was no functional RRL in 2008 in EMR

2. All EUR results are from Ukraine. All blood cultures are obtained from suspect meningitis cases. During 2008, PCR tests were performed in the national laboratory which confirmed 52 cases by PCR: 38 cases with meningococcus, 8 cases with pneumococcus, and 6 cases with Hib. Totally 85 out of 116 (65%) probable cases of bacterial meningitis were laboratory confirmed by all methods.

3. SEAR: Data available for Q4 only

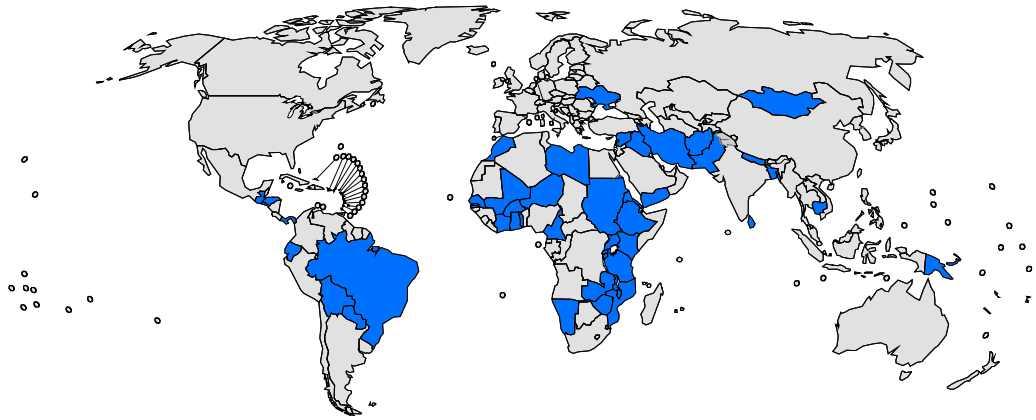
4. Mongolia: Suspected meningitis cases are defined based on the variable "admission diagnosis". Cambodia: Suspected meningitis cases are defined based on the variable "diagnosis" including the values Meningitis and meningoenephalitis. Papua New Guinea: Data collection varies in time from 3-10 months in 2008 depending on the site collection.

The data used from this bulletin or from the website are in the public domain. While there should be no restrictions on the use of information, users are asked to acknowledge the source of the data at: <http://www.who.int/nvui>. Most of the information provided at this web site is based on original data.

WHO gratefully acknowledges the contribution of participating member states and their efforts to ensure high standards of completeness and accuracy, and their willingness to share data in the interests of collaboration on improving the health of children.

Meningitis/Encephalitis Surveillance

Countries Participating in the WHO Network, 2008



Yes (46 Member States or 24%)

Data collected from WHO Regions and partners

Slide date: 13 November 2009

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
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Country	Year of Introduction Of Hib Vaccine for the countries that have Hib vaccine in the National immunization schedule in 2008*	Year of Introduction of pneumococcus vaccine for the countries that have pneumococcus vaccine in the National immunization schedule in 2008*	Total No. of Reporting Sites		Number of suspected meningitis cases
			No.	No.	
AFR			27	8,640	
Burkina Faso	2006		1	288	
Burundi	2004		1	38	
Cameroon			1	226	
Côte d'Ivoire			1	342	
Eritrea	2008		1	20	
Ethiopia	2007		1	680	
Gambia	1987		1	44	
Ghana	2002		1	217	
Kenya	2001		1	523	
Malawi	2002		1	1,769	
Mali			1	195	
Mozambique	2007		1	131	
Namibia			1	531	
Niger	2008		1	409	
Rwanda	2002		1	82	
Senegal	2005		1	313	
Swaziland			1	32	
Togo	2008		1	369	
Uganda	2002		4	1,459	
United Republic of Tanzania			3	113	
Zambia	2004		1	64	
Zimbabwe	2008		1	795	
AMR				3,713	
Bolivia (Plurinational State of)	2000			231	
Brazil	1999			2,476	
Ecuador	2003			415	
El Salvador	2002			75	
Guatemala	2005			64	
Honduras	1999			67	
Panama	2000			199	
Paraguay	2002			186	
EMR			107	7,908	
Afghanistan			1	127	
Iran (Islamic Republic of)			1	423	
Iraq			4	58	
Libyan Arab Jamahiriya	2007		2	120	
Morocco	2007		78	2,175	
Pakistan			3	2,616	
Sudan	2007		6	533	
Syrian Arab Republic	2001		7	875	
Yemen	2005		5	981	
EUR			7	130	
Ukraine ²	2006		7	130	
SEAR				1,104	
Bangladesh				1,048	
Nepal				10	
Sri Lanka	2008			46	
WPR				602	
Cambodia				398	
Mongolia	2008			38	
Papua New Guinea	2008			166	
Total				22,097	

Performance indicator

*Indicates the year of introduction in the entire Country and in the national immunization schedule. The Sudan did not introduce nationwide but WHO UNICEF estimate that in 2008 86% of the children received 3 doses of Hib containing vaccine Hib (containing) vaccine introduction (nationwide) in 2009: Cameroon, Côte d'Ivoire, Mozambique, Namibia, Swaziland, United Republic of Tanzania, Afghanistan, Pakistan; Bangladesh and Nepal