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COMMUNICABLE DISEASES SURVEILLANCE BULLETIN

MARCH 2009

NICD NHLS

FOREWORD

The March 2009 edition of the Communicable Diseases Surveillance Bulletin contains a review of key findings from some of the surveillance programmes of the National Institute for Communicable Diseases (NICD) for 2008. A similar review of data from the preceding year has been published in the first bulletin of the year since 2006[1,2,3]. As the number of surveillance programmes operated at the NICD continues to expand it is no longer possible to include surveillance reports from all programmes in one bulletin. For this reason results from additional surveillance programmes will be published throughout the year.

In 2008, an editorial board was established to assist with decision making regarding bulletin format and content and to ensure that the bulletin adequately represents the activities of the NICD. Input from this board has led to several improvements in bulletin format and content. These include revision of the bulletin tables and identification of key areas of information for publication.

The Communicable Diseases Surveillance Bulletin aims to disseminate timeous data from surveillance programmes at the NICD. It is hoped that data from this publication will inform key partners at all levels, from health-care facility staff to policy-makers and planners.

Cheryl Cohen, Editor

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NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES

WEB

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SUSPECTED MEASLES CASE-BASED SURVEILLANCE, SOUTH AFRICA, 2008

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The NICD is accredited by the World Health Organization (WHO) to perform measles and rubella IgM testing for national case-based surveillance. Blood and urine specimens from suspected measles cases nationally are submitted to NICD for confirmation. Approximately 60% of suspected measles cases from Free State Province are tested in that province. The numbers presented here represent specimens received by the NICD and may differ from those presented by the National Department of Health as they may receive information on cases where no specimens were taken.

All blood specimens were tested by Enzygnost (Dade-Behring, Marburg, Germany) diagnostic kits for the presence of anti-measles and anti-rubella immunoglobulin M (IgM). Amplification of ribonucleic acid (RNA) for genotyping was attempted on all cases testing positive or equivocal for anti-measles IgM. For molecular analysis RNA was extracted directly from clinical specimens (urine if available, otherwise serum) and tested for the presence of Measles virus by reverse transcriptase polymerase chain reaction (RT-PCR).

During 2008 the NICD tested 4777 specimens from cases of rash and fever for suspected measles case-based surveillance. Of these specimens 42 were from patients with onset of symptoms in 2007. Of the remaining 4735 specimens the largest number, 1025 (21.6%) were from KwaZulu-Natal Province, followed by 867 (18.3%) from Gauteng Province. In addition 61 specimens were tested at the NHLS Universitas Academic Laboratory at the University of the Free State (Figure 1). Case-based surveillance requires that both blood and urine specimens are submitted. During 2008 blood and urine specimens were received from 63% of cases, blood only from 32% and urine only from 5% (Figure 2). Of the 4796 blood specimens 40 (0.8%) were positive for measles IgM antibodies, and 2160 (45%) for rubella IgM antibodies (Table 1).

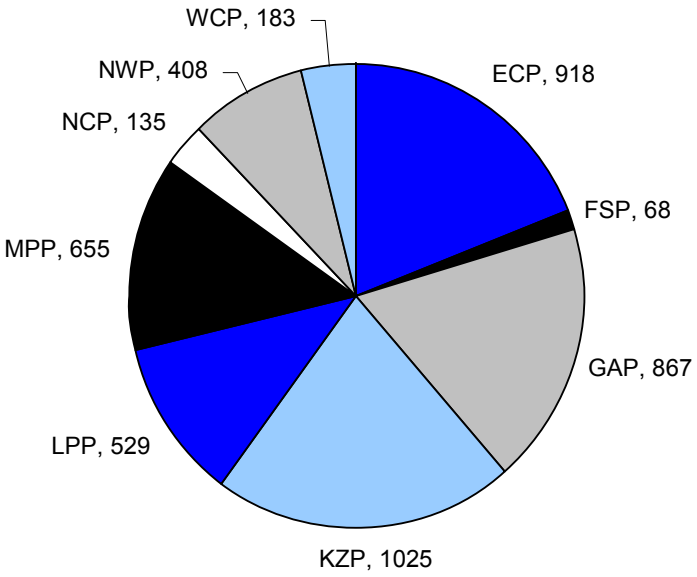

Figure 1: Number of specimens received for measles case-based surveillance per province, South Africa, 2008.

Measles
Of the 40 patients with positive measles results, the majority were from Gauteng (12 cases), and the Eastern Cape Province (7 cases). Ages of patients with positive measles results ranged from 9 months to 46 years (median 3 years). Urine specimens accompanied 22 of the 40 specimens (55%) with positive measles IgM results. Nine of the measles IgM-positive patients had dual measles IgM and rubella IgM positive results, and seven of these were found to be rubella PCR positive. Measles was confirmed by PCR on urine in only one patient. The virus was identified as genotype D8, suggesting importation.

Rubella
There were 2162 rubella IgM positive cases in 2009, an increase from 1064 in 2008 (Table1) (Figure 3). Patients with positive rubella IgM results were aged between 4 months and 75 years (median 7 years). This age distribution has been constant since case-based surveillance began. Amongst the 4500 patients with age and sex recorded from whom specimens were submitted 308 were females aged between 12 and 49 years.

Discussion
Numbers of measles IgM positive cases have remained at relatively low levels with only one of these cases able to be confirmed as measles on urine PCR. This suggests that some measles IgM-positive cases may be due to the presence cross-reacting antibodies. Unfortunately urine specimens were only submitted on 55% of cases. Attempts to improve the collection of urine specimens should continue. IgM is still recommended as the gold standard for the diagnosis of measles but in the elimination phase PCR results are useful to assist with decisions regarding response to IgM positive cases. Further refinements to the strategy for PCR diagnosis of measles are under consideration. South Africa remains at risk for importation of measles infection.

Table1: Number and rate of suspected measles cases (SMC) with specimens submitted and measles and rubella IgM positive cases from suspected measles case-based surveillance, South Africa, 2006 & 2007

		Provinces									
Indicator	**Year**	**ECP**	**FSP***	**GAP**	**KZP**	**LPP**	**MPP**	**NCP***	**NWP***	**WCP**	**TOTAL**
Number of SMC*	2007	602	70	605	421	407	354	143	221	407	3230
	2008	918	76	868	1025	529	655	135	408	183	4796
SMC/ 100 000 population	2007	8.5	2.4	6.2	4.3	7.6	9.8	13.0	6.6	8.4	6.8
	2008	13.0	2.6	9.1	10.4	9.2	19.9	14.7	10.5	3.7	9.9
Measles IgM positive	2007	6	1	9	3	2	6	0	1	2	30
	2008	7	1	11	6	1	3	2	5	4	40
Rubella IgM positive	2007	293	20	141	213	119	60	36	65	118	1064
	2008	488	18	301	612	196	304	34	171	38	2162

* Includes specimens tested at UFS

Provinces of South Africa: EC – Eastern Cape, FS – Free State, GA – Gauteng, KZ – KwaZulu-Natal, LP – Limpopo, MP – Mpumalanga, NC – Northern Cape, NW – North West, WC – Western Cape

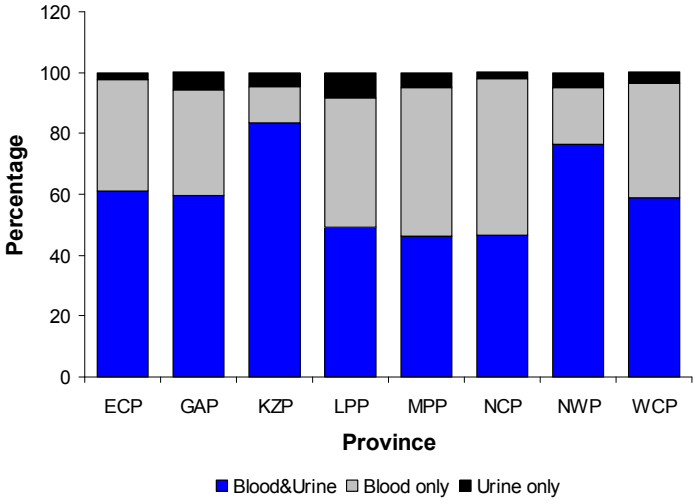

Figure 2: Type of specimen received for measles case-based surveillance by province, South Africa, 2008

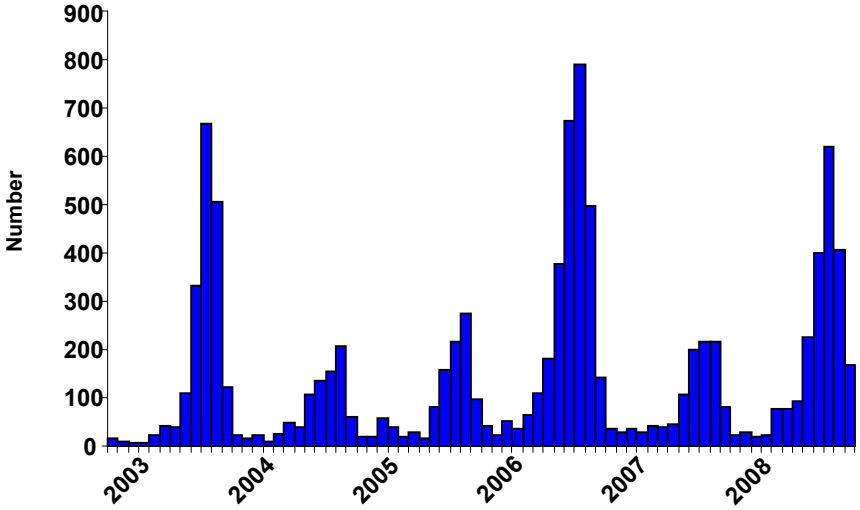

Figure 3: Number of rubella IgM positive patients by month, South Africa, 2003-2008

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ACUTE FLACCID PARALYSIS (AFP) SURVEILLANCE, 2008

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Acute flaccid paralysis (AFP) surveillance, as part of the WHO worldwide campaign to eradicate poliomyelitis, has continued throughout the year. All cases of AFP including Guillain-Barré syndrome, in children less than 15 years of age, or a patient of any age diagnosed as polio by a medical doctor must be regarded as possible polio cases until proven otherwise.

1. National Polio Isolation Laboratory

The NICD serves as national isolation laboratory for South Africa as well as six other Southern African countries i.e. Angola, Botswana, Lesotho, Mozambique, Namibia, and Swaziland.

During the year 1958 stool specimens were received from patients with AFP from these seven countries. Of these 58 were from patients with onset of paralysis prior to 2008. Of the remainder 667 were from 345 South African cases, and 1233 from the six other countries served by the NICD (Figure 1). In early January a further 18 specimens were received from South African cases with onset of paralysis in 2008, bringing the total number of cases in 2008 to 351.

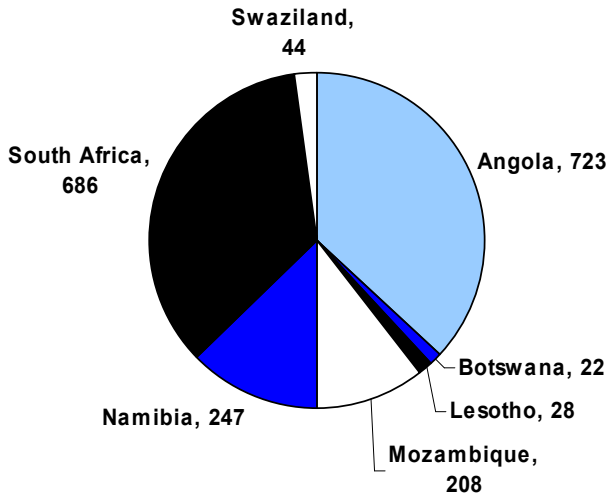

Figure 1: Number of stool specimens from AFP cases received for virus isolation by country

South African cases

Of the 351 South African cases with onset of paralysis in 2008, one specimen only was received from 53 cases, and two or more specimens from 292. The date of onset of paralysis was known for 309 (88%) cases. Two specimens taken at least 24 hours apart and within 14 days of onset were received from 228/351 (65%) cases (range per province 47% to 84%). Non-polio enteroviruses were isolated from 57, and non-enteroviruses from 31 of the 685 specimens (non-polio isolation rate 13%), and poliovirus, identified as Sabin type poliovirus from 9 specimens of four patients (Figure 2).

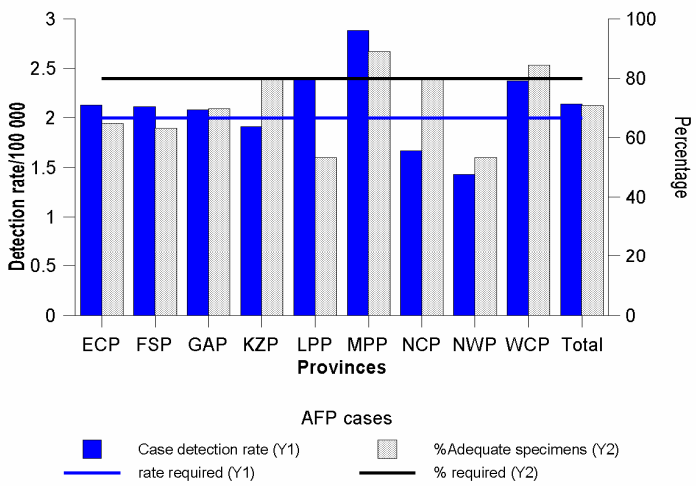

Figure 2: AFP case detection and stool adequacy rate, South Africa, 2008 (only patients from whom stool specimens were received included)

Other southern African countries

Of the 1272 specimens received from the six southern block countries served by the NICD, 39 were from patients with onset of paralysis prior to 2008. Two adequate stool specimens were received from 562 (90%) of the 625 patients with onset of paralysis in 2008 (range per country 74% to 100%). Non-polio enteroviruses were isolated from 139/1233 specimens with a non-polio enterovirus isolation rate of 11% (range per country 2% to 40%). Poliovirus was isolated from 85 specimens, 8 of which were identified as wild type polio 1, 46 as wild type polio 3, and the remainder as Sabin strains. The wild type isolates were from 28 patients in Angola with dates of onset ranging from 10 January 2008 to 30 November 2008.

2. Polio Molecular Unit

During 2008, the unit received 1516 poliovirus isolates which were characterized as vaccine or wild type using two intratypic differentiation methods, PCR and ELISA. These isolates were sent to the NICD from national and regional laboratories throughout Africa. Original specimens from AFP cases were received from several southern African countries and any polio isolates were treated as above.

PV1 wild type isolates are distributed into three genotypes, India (SOAS), West African (B (WEAF-B) and East African (EAAF), (data not shown) (Figure 3). The WEAF-B genotype consists of viruses from Nigeria (NIE), Niger (NIG), Benin (BEN), Sudan (SUD) and Burkina Faso (BFA) while SOAS viruses are from Angola and DRC.

Wild type PV3 is divided into two genotypes, WEAF-B and SOAS (Figure 4). The wild-type 3 cases were identified in Chad, Sudan, Niger, Nigeria and Angola.

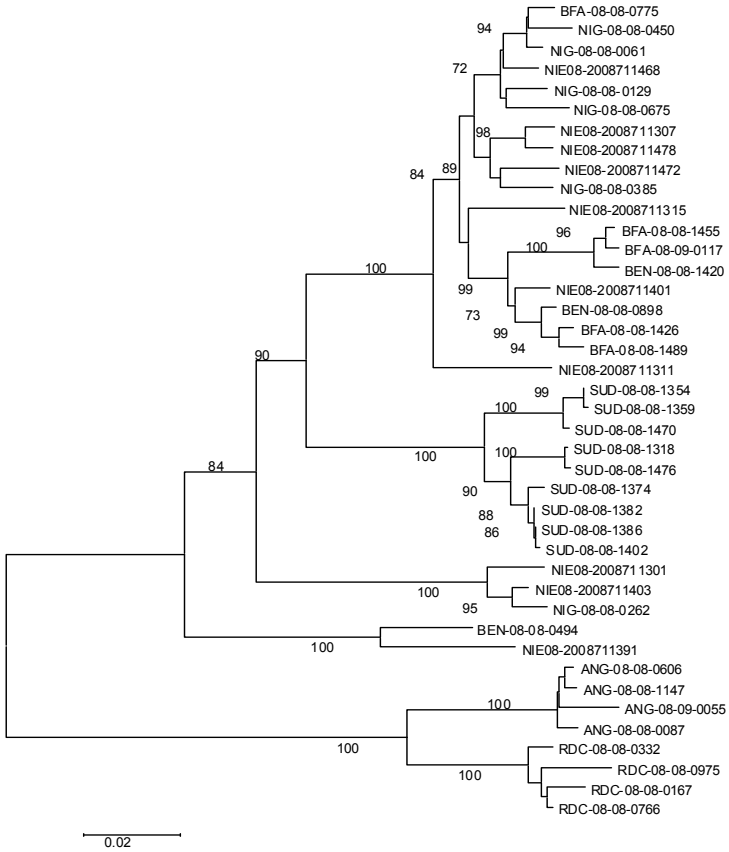

Figure 3: Representative of neighbor-joining tree of the VP1 gene of polio wild-type 1 viruses. Bootstrap values of greater than 70% are shown at the branch nodes.

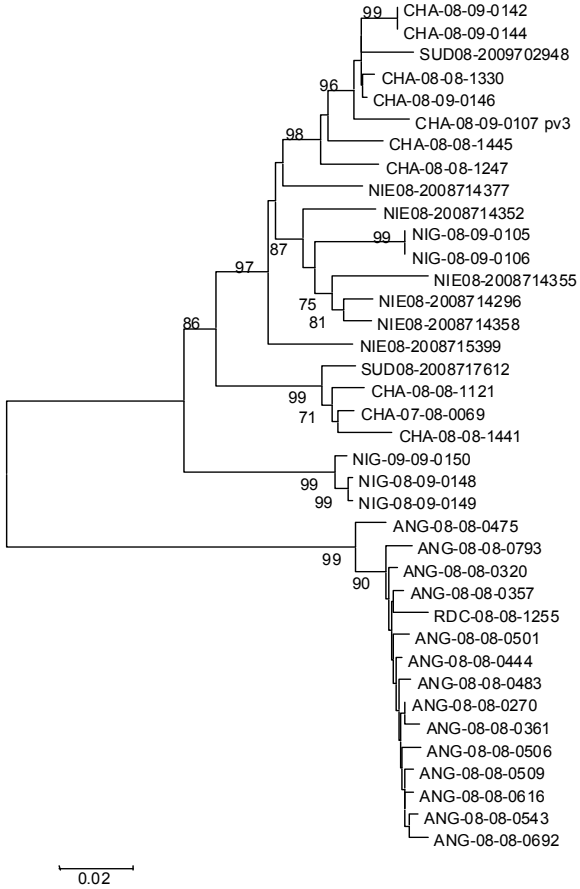

Figure 4: Representative of neighbor-joining tree of the VP1 gene of polio wild-type 3 viruses. Bootstrap values of greater than 70% are shown at the branch nodes.

RESPIRATORY VIRUS SURVEILLANCE, SOUTH AFRICA, 2008

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"Viral watch" surveillance system

During 2008 a total of 1865 specimens was received for detection of respiratory virus. Of these 1379 (73.9%) were received from the Viral Watch programme, started in 1984 and expanded substantially in 2005, which was specifically designed to monitor influenza activity in the community, and detect the type of influenza strains prevalent. During 2008 the programme was rolled out in the Northern Cape and North West Provinces, adding a further 18 practitioners to the programme, bringing the total country-wide to 170 in all provinces. Throat swabs are submitted from these centres throughout the year from patients with respiratory tract infections of recent onset i.e. within 48 - 72 hours, and without obvious bacterial cause, and transported to the laboratory in viral transport medium for isolation of virus. Specimens are tested at the NICD from all provinces other then KwaZulu-Natal and the Western Cape where testing is performed at the provincial virology laboratories, and positive specimens sent to NICD for confirmation, serotyping and sequencing.

A total of 441 influenza isolates were made, of which 398 (90.3%) were from Viral Watch sites. The isolates were further identified as 374 influenza A, of which A/ Brisbane/59/07–like (H1N1) accounted for the majority (345). Only 14 of the influenza A isolates were identified as A/Brisbane/10/07-like (H3N2). Both influenza B lineages circulated and 44 of the 67 influenza B isolates were identified as B/Florida/04/06-like (B Yamagata lineage).

The first influenza isolate of the season was made from a specimen collected on 25 April, and the last from a specimen collected on 7 October.

A further 64 respiratory isolations were made during the year including 51 respiratory syncytial virus, 4 parainfluenza type 3 virus, and 7 adenovirus.

Characterisation of the 2008 influenza isolates

Partial sequencing of the HA1 subunit of the hemagglutinin (HA) gene was performed to determine genetic drift away from the recommended 2008 vaccines strains. Phylogenetic analysis of the H1N1 subtypes showed genetic drift away from the vaccine strain A/ SolomonIslands/3/06. The South African isolates clustered within clade 2B which was characterised by the reference strain A/Brisbane/59/07.

This season saw the emergence of antiviral drug resistant H1N1 viruses. The resistance causing mutation at the active site of the neuraminidase (NA) gene, H275Y, was identified in 100% of the South African H1N1 isolates. Phylogenetic analysis of the NA gene revealed that the South African isolates clustered within the 'European' cluster belonging to clade 2B.

Phylogenetic analysis of the H3N2 subtypes showed that the isolates clustered together with the vaccine strain A/ Brisbane/10/07. Amino acid changes at residue 173

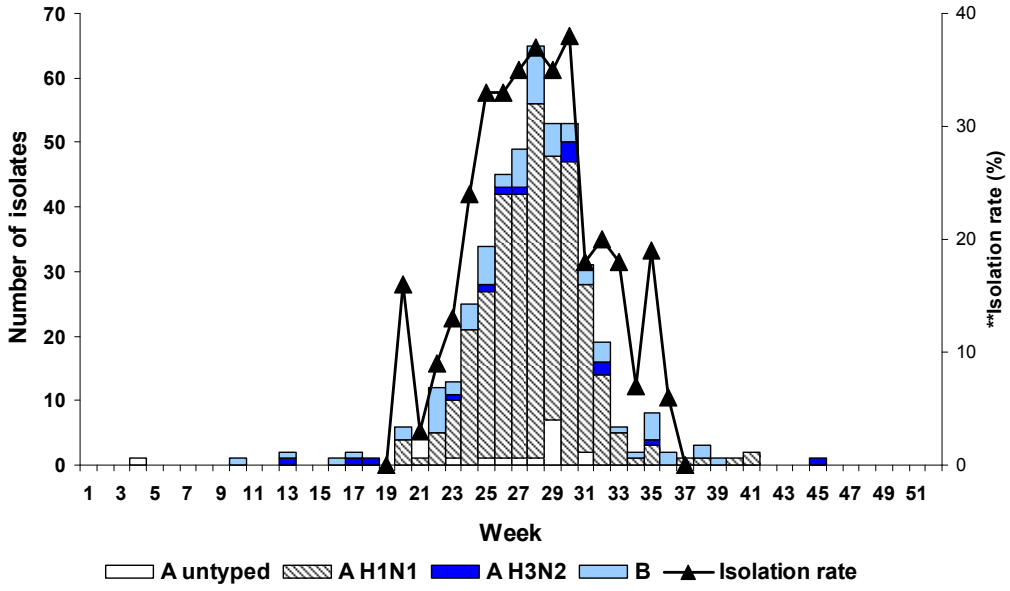

Figure 1: Number of influenza virus isolates by virus type and epidemiologic week, South Africa, 2008*
*Virological surveillance at 170 sentinel sites in 9 provinces and routine diagnostic specimens
**Isolation rate calculated on specimens tested at NICD only

(Continued on page 7)

distinguished three subgroups; two of the subgroups were characterised by A/Johannesburg/5/2008 (K173Q) and A/Johannesburg/15/2008 (K173N, 3L5, K83N and L157S). The third group, of lesser importance, was characterised by A/Wisconsin/3/2007 (K173E).

Isolates from both lineages of influenza B, were shown to be similar to those isolated during the 2007 influenza season. Isolates from the B/Victoria lineage were closely related to the reference strain B/Malaysia/2506/ and isolates from the B/Yamagata lineage were closely related to the vaccine strain B/Florida/4/2006.

Due to the genetic drift observed within the H1N1 isolates it was recommended at the WHO Consultation on the Composition of Influenza vaccine for the Southern Hemisphere that the H1N1 virus be updated. The recommended composition of influenza virus vaccine for the 2009 southern hemisphere influenza season is A/Brisbane/59/2007 (H1N1)-like virus, A/Brisbane/10/2007 (H3N2)-like virus and B/Florida/4/2006-like virus.

Respiratory morbidity data mining surveillance system
During 2008 there were 1037599 consultations reported to the NICD through the respiratory morbidity data mining surveillance system. Of these 2.8% (28775) were due to influenza or pneumonia (ICD codes J10-18). The timing of the peak in respiratory consultations was similar to the timing of the peak in influenza virus isolations (Figure 2).

Influenza-associated mortality surveillance programme
In 2008, a surveillance programme for surveillance of influenza-associated mortality in South Africa was introduced. Monthly mortality incidence for all-cause, all respiratory causes, pneumonia and influenza (P&I), diabetes, ischaemic heart disease, cerebrovascular disease and malignant diseases in the population over 65 years of age is compiled using routine national mortality data from death certificates provided by Statistics South Africa. Data available in 2008 covered the period 1998-2005. The influenza-related excess mortality was estimated using a classical Serfling-type linear regression model, in which mortality in excess of a seasonal baseline is attributed to influenza. Influenza was responsible for an estimated 827 annual excess P&I (range 418-1,583) and 7,716 (range 5,164-11,030) all-cause deaths (range 5,164-11,030) in South African seniors over the surveillance period.

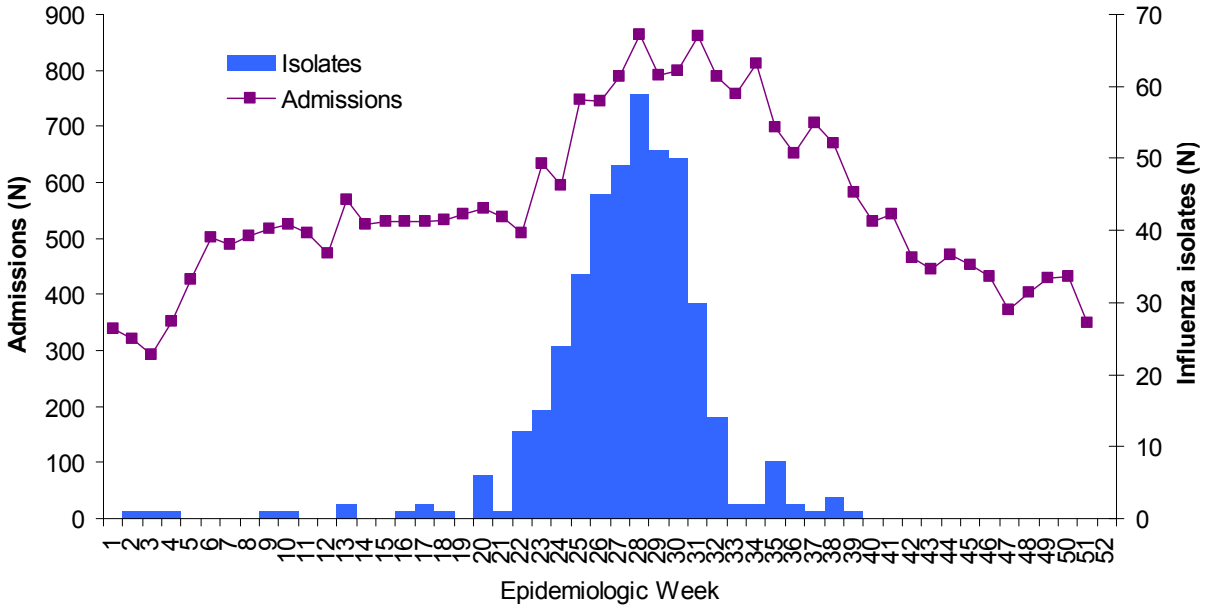

Figure 2: Number of private hospital admissions* with a discharge diagnosis of pneumonia and influenza (P&I) and viral isolates**, South Africa, 2008

* Hospitalisations data from weekly reports of admissions to the Netcare hospital group. Discharge diagnosis is according to ICD coding by clinicians and does not represent laboratory confirmation of aetiology
** Viral isolation data from the Viral Watch sentinel surveillance programme

VIRAL HAEMORRHAGIC FEVERS, SOUTH AFRICA, 2008

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CCHF Laboratory-confirmed cases

Eleven cases of Crimean-Congo haemorrhagic fever (CCHF) were laboratory confirmed in South Africa in 2008 (Table 1), compared to only one case confirmed in 2007. These cases were reported from the Northern Cape (n=5), the Free State (n=3), Eastern Cape (n=1), Mpumalanga (n=1) and the North West (n=1) Provinces. The mortality rate for these cases was 18 % (2/11). Ten of these cases were males between 32 to 57 years old and seven of them had known tick bite exposures. The only female case was a 38-year-old pregnant woman from the Free State. She did not have any known source of exposure but lived on a farm close to Twee Rivieren in the Free State. She was only admitted to hospital after 10 days of illness, and at the time of admission was suffering from hypotension, a depressed level of consciousness and haemorrhage from multiple sites. The patient died within 48 hours after admission. Atypical clinical presentation included the patient's platelet count of 209 x 10^9/l (CCHF patients usually suffer severe thrombocytopenia) and rhabdomyolysis. Three CCHF cases were confirmed during the winter months of June-July when tick activity is thought to be lower. Cases of CCHF have been reported during the winter months in the past and their occurrence may be linked to milder winter conditions in some years which allow for tick activity and subsequent virus transmission. Since the first recognition of CCHF in South Africa in 1981, the majority of cases have been reported from the Northern Cape and Free State Provinces. During 2008, cases were also reported from other provinces that do not typically report CCHF, i.e. Mpumalanga and North West Provinces. Fifteen cases of CCHF have been recorded from the North West Province, with the last case originating from Mafikeng in 2004. Only five cases have been reported from Mpumalanga since 1981. These cases originated from Lydenburg (1985; n=2); Middelburg (1988 and 1991); Barberton (1990) and Lothair (1994). A single case of CCHF has been reported from the Eastern Cape previously (Steytlerville in 1988).

A total of 198 cases of CCHF has been diagnosed in southern Africa since the presence of the disease was first recognized in 1981 up until the end of 2008, including seventeen in Namibia, one in DRC, one in Tanzania, and 179 cases in South Africa. The largest group of cases, 92/198 (46,5%), arose from known tick bite or the squashing of ticks; 74/198 (37.3%), arose from known or potential contact with fresh blood or other tissues of livestock and/or ticks; 7/187 (3.7%) nosocomial infections arose from contact with blood or fomites of known CCHF patients, while in 25/198 (12.6%) cases there was no direct evidence of contact with livestock or ticks, but the patients lived in or visited a rural environment where such contact was possible. Most patients were employed in the livestock industry, and males constitute 167/198 (84.3%) of all cases of the disease diagnosed to date. The case fatality rate fluctuated around 30% in the first few years when CCHF was initially recognized in South Africa, but gradually declined to an overall rate of 19.9% (29/146) for the period of 1981-1998, most likely as a result of increased awareness leading to earlier recognition and institution of appropriate supportive therapy. The case fatality rate was 57.5% (23/40) for a period of 1999-2007 but declined to 18.1% in 2008 suggesting that there is an increase in awareness of the disease among clinicians, resulting in timely hospital admission and administration of treatment. Although there is no specific treatment for CCHF, there is some evidence that ribavirin can improve the prognosis if administered before day 5 after onset of illness.

Table 1: Laboratory confirmed cases of CCHF in South Africa, 2008

Patient	Age/Sex	Location of exposure	Month of exposure	Source of infection	Laboratory results			Outcome Died/survived
					Virus isolation	PCR	IgG/IgM	
AS	54/M	Heilbron/FS	February	Tick	Positive	Positive	Positive	Survived
MB	32/M	Onseepkans/NC	February	Tick	Positive	Positive	Positive	Survived
SF	64/M	Kimberley/NC	March	Tick	Positive	Positive	Positive	Survived
PR	37/M	Ermelo/MP	June	Tick	Positive	Positive	Positive	Survived
NT	38/F	Twee Rivieren/FS	June	Unknown	Positive	Positive	Positive	Died
ES	39/M	Adelaide/EC	July	Tick	Positive	Positive	Positive	Died
JS	44/M	Calvinia/NC	September	Sheep	Positive	Positive	Positive	Survived
WS	55/M	Calvinia/NC	October	Sheep	Positive	Positive	Positive	Survived
GC	37/M	Klerksdorp/NW	October	Tick	Positive	Positive	Positive	Survived
HC	57/M	Prieska/NC	December	Unknown	ND	ND	Positive	Survived
HCl	45/M	Heilbron/FS	December	Tick	Positive	Positive	Positive	Survived

Key to abbreviations: M - Male; F - Female; FS - Free State; NC - Northern Cape; MP - Mpumalanga Province; EC - Eastern Cape; NW - North West; ND – Not done

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RVF outbreak

Small, focal outbreaks of RVF in South Africa were reported during the first half of 2008 from Mpumalanga, Limpopo, Gauteng and North West Provinces. A total of 17 human cases were laboratory-confirmed during the outbreak either by nucleic acid detection and virus isolation or IgM ELISA. All of these cases were linked to occupational exposures and included veterinarians, veterinary students, farmers and farm workers, and also a staff member from a veterinary clinical research farm. Eleven of the 17 cases were confirmed retrospectively using specimens collected during field epidemiology investigation. Most of the cases suffered from mild febrile illness but 5 of the patients were hospitalized. All patients recovered without any sequelae. Prior to this outbreak, RVF was confirmed in 1999 in aborted buffalo in the Kruger National Park; no human cases were confirmed during this outbreak. The last reported RVF cases in humans in South Africa prior to the 2008 outbreak were more than 30 years ago, in the mid-eighties. Molecular analysis of RVFV isolates recovered during the 2008 outbreak in South Africa show their close genetic relation to virus isolates from the 2006-2007 East Africa outbreaks of the disease (Figure 1).

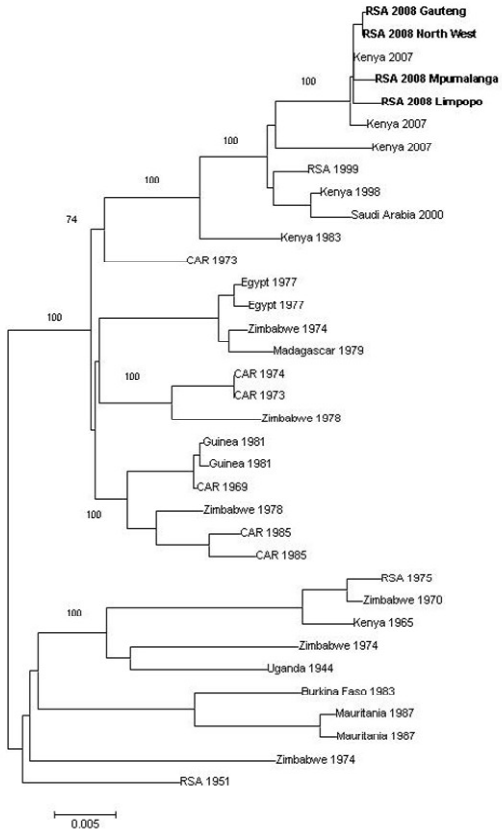

Figure 1: Phylogenetic tree of complete RVF virus M segments of historical and recent isolates. Isolates from the South African 2008 outbreak are indicated in bold.

Arenavirus outbreak

In September and October 2008 a nosocomial outbreak of an undiagnosed haemorrhagic fever broke out after medical evacuation of a female travel guide from Zambia to South Africa. The index patient was airlifted in critical condition from Lusaka on September 12 to a hospital in Johannesburg where she died on September 14. Three secondary infections were recognized in a paramedic (case 2) who attended the index case during air transfer from Zambia, in a nurse (case 3) who attended the index case in the intensive care unit, and in a hospital cleaner (case 4) who cleaned the ward where the index case died. One tertiary case was a nurse (case 5) who attended case 2 after his transfer from Zambia on 26 September to the same hospital where the index case was admitted. The course of the disease in cases 1 through 4 was fatal; only case 5, who received ribavirin treatment, recovered. Once the epidemiological link between the index case and case 2 had been realized, laboratory screening for evidence of infection with VHF agents was carried at SPU-NICD on blood specimens from cases 2 and 3; all tests yielded negative results. However, histopathological examination of liver and skin samples from case 2 and 3 performed at the Department of Anatomical Pathology of the University of the Witwatersrand and NHLS, demonstrated hepatocyte necrosis and skin vasculitis compatible with VHF. The first indication that an Old World arenavirus might be associated with the outbreak followed results of immunohistochemical testing of liver and skin samples from patient 2 and 3 which was done at the Centers for Disease Control and Prevention (CDC) in Atlanta, GA, USA.. These initial findings were confirmed by PCR and virus isolation at SPU-NICD and soon afterwards at CDC. Clinical specimens from the index case were not available locally but were eventually traced by a SPU staff member in Zambia and sent to the CDC where they tested positive by PCR and virus isolation. In collaboration with the Columbia University in New York, CDC in Atlanta, and 454 Life Science Laboratory in Branford, USA, RNA extracts from serum and tissues of outbreak victims were subjected to unbiased pyrosequencing. Full genome sequence followed by detailed phylogenetic characterisation confirmed that the outbreak was caused by a novel Old World arenavirus. The successful international collaboration during this highly tragic outbreak highlighted the importance of a global VHF diagnostic and outbreak response network to the emerging and dangerous pathogens.

Figure 2: Prof Janusz T. Paweska and Mrs Patricia Leman dressed in suits while performing tests in BSL-4 containment on samples from arenavirus outbreak victims in South Africa, 2008.

(Continued on page 10)

A number of South American arenaviruses (Junin, Machupo, Guanarito and Sabia viruses) and the African Lassa virus are restricted to BSL-4 containment due to their aerosol infectivity and rapid onset of disease. Arenaviruses are transmitted by specific rodent species in which they establish persistent infection with long-term virus shedding primarily in urine and without overt disease. Humans are most frequently infected through contact with infected rodent excreta, usually via inhalation of dust or aerosolized virus-containing materials or ingestion of contaminated food. Transmission may also occur by inoculation with infected body fluids and tissue transplantation. The Lassa fever virus, which has its reservoir in rodent species of the *Mastomys* genus, causes an estimated 100 000 – 500 000 human infections annually in West African countries. Lassa fever is typically subclinical or associated with mild febrile disease in humans but about 20% of cases may develop severe systemic disease, resulting in death in 5% of patients. Three other African arenaviruses (Ippy, Mobala and Mopeia) are not known to be associated with human disease. The newly discovered arenavirus was provisionally named Lujo virus (LUJV) in recognition of its origin: **Lu**saka, Zambia and **Jo**hannesburg, South Africa. It is the only VHF-associated arenavirus from the Old World discovered in four decades.

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HUMAN RABIES IN SOUTH AFRICA, 2008

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Human rabies remains a significant public health concern in many developing countries of Asia and Africa, and the World Health Organization estimates that globally 55 000 human rabies deaths occur annually. Throughout Africa, it is estimated that up to 24 000 human deaths occur annually. Most African countries only report clinically-diagnosed cases, with South Africa being one of the few countries that confirm cases by laboratory testing.

In South Africa 10 to 30 human rabies cases are laboratory confirmed each year but a large number remains unconfirmed and/or unreported. In southern Africa genotype 1 lyssavirus, or rabies virus (canid biotype), circulating in domestic dogs, black-backed jackal and bat-eared fox, and in herpestid species (mongoose biotype), genotype 2 or Lagos bat virus in fruit bats, genotype 3 or Mokola virus (reservoir currently not known) and genotype 4 or Duvenhage virus in insectivorous bats have been identified. Only Duvenhage virus infection has been associated with human infection in South Africa, with the first case recognized in 1970 and the second, 36 years later in North West Province, interestingly about 80 km from the location where the first infection occurred.

Molecular epidemiological studies, in collaboration with the University of Pretoria, on rabies viruses associated with human disease in South Africa show that for the last 3 decades most of the cases were associated with the canid biotype rabies virus. Despite the prevalence of mongoose rabies in the country, only a few cases could be associated with infection of rabies virus of the mongoose biotype. No additional human rabies cases could be attributed to infection with Duvenhage virus infection, and also no cases could be attributed to infection with Mokola or Lagos bat viruses. These results indicated that rabies-related viruses do not contribute significantly to the public health burden of rabies in South Africa; however, their detailed ecology and epidemiology needs to be further investigated.

A total of 17 human rabies cases was confirmed in South Africa in 2008 compared to 14 cases confirmed in the previous year (Table 1). These cases where reported from the Eastern Cape (n=8); KwaZulu Natal (n=5); Limpopo (n=3) and Mpumalanga (n=1) Provinces. Thirteen of these cases were positively linked to dog exposures but a source of exposure could not be established for the remaining cases (Table 1). In addition, four cases were confirmed from Namibia (Table 2).

Rabies has been reported in Southern Africa for more than a hundred years but prior to the 1950s was primarily associated with wild herpestids. During the 1950s canine rabies was introduced into the KwaZulu-Natal Province but was rapidly controlled. The virus was reintroduced in the KwaZulu-Natal domestic dog population during the early 1980s and an epizootic of the disease has raged ever since. Factors compounding the problem are the great number of free-roaming dogs (stray and community owned) in very poor and rural settings.

Current statistics seem to suggest that control programs are no longer adequate. For example, the virus was recently reintroduced to Limpopo Province with evidence indicating that the source was Zimbabwe. During 2008 rabies has also begun to spread in Mpumalanga, particularly the Ehlanzeni district, where control measures have been effective for many years. Public awareness of the requirement and urgency of rabies post-exposure prophylaxis is drastically lacking, highlighted by the observation that more than half of the laboratory confirmed cases during 2008 did apparently not seek any medical intervention after the exposure event.

Table 1: Laboratory confirmed human rabies cases, South Africa, 2008

Patient	Age/Sex	Location of Exposure	Date of Exposure and animal involved	Date admitted	Date of Death	Hospital of Admission	Final Hospital
SR	60/M	50km N Polokwane/LP	December 07/ Dog	2008/01/18	2009/01/22	Botlokwa	Botlokwa
TG	78/F	Eshowe/KZN	December 07/Dog	2008/01/23	2008/01/25	Mbolongowane	Mbolongowane
MMk	8/F	Mtubatuba/KZN	Unknown	Unknown	2008/01/21	Unknown	Unknown
MP	Unknown /M	Tshikunda/LP	Unknown	2008/02/05	2008/02/09	Tshilidzini	Tshilidzini
ML	10/M	Mtalala, Port St Johns/EC	Unknown/Dog	2008/02/10	2008/02/12	Isilimela	Isilimela
NN	4/M	Thulamela/LP	Unknown/Dog	2008/03/05	2008/03/09	Donald Fraser	Unknown
SM	5/M	Lusikisiki/EC	February 08/Dog	2008/03/05	2008/03/06	Holy Cross	Holy Cross
TN	7/F	Eshowe/KZN	February 08/Dog	2008/03/27	2008/03/27	Mbolongowane	Mbolongowane
SLM	14/M	Sterkspruit/EC	February 08/Dog	2008/04/04	2008/04/08	Empilisweni	Empilisweni
NR	19/M	Umlazi/KZN	April 08/Dog	2008/05/13	2008/05/14	Prince Mshiyeni	Prince Mshiyeni
SIM	11/F	Flagstaff/EC	February 08/Dog	2008/05/02	Unknown	Holy Cross	NMAH
CV	5/F	Kwanyuswa/KZN	April 08/Dog	2008/05/27	2008/05/28	RK Khan	RK Khan
MM	80/M	Port St Johns/EC	February 08/Dog	2008/05/22	2008/05/23	St Patrick's Bizana	St Patrick's Bizana
NT	15/M	Mt Ayliff/EC	May 08/Dog	2008/07/10	2008/07/11	Mt Aylifff	Mt Aylifff
TT	11/M	Mthatha/EC	Unknown	Unknown	2008/08/14	NMAH	NMAH
TM	8/M	Themba/MP	Unknown	2008/10/01	Unknown	Themba	Themba
LG	5/M	Elundini/EC	August 08/Dog	2008/09/18	2008/09/21	Taylor Bequest	NMAH

Key to abbreviations: M - Male; F - Female; LP - Limpopo Province; KZN - KwaZulu Natal; MP - Mpumalanga Province; EC - Eastern Cape; NMAH- Nelson Mandela Academic Hospital

Table 2: Laboratory confirmed human rabies cases, countries neighbouring South Africa, 2008

Patient	Age/Sex	Location of Exposure	Date of Exposure and animal involved	Date admitted	Date of Death	Hospital of Admission	Final Hospital
PS	24/M	Namibia	Unknown	2008/01/08	Unknown	Namibia	Namibia
PSA	41/M	Namibia	Unknown	2008/04/14	Unknown	Namibia	Namibia
SA	10/M	Onoame, Nambia	Unknown	2008/07/23	Unknown	Unknown	Unknown
TS	3/M	Okatole-Odibo, Namibia	Unknown/Dog	2008/11/09	2008/11/11	Oshakati	Oshakati

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MICROBIOLOGICAL SURVEILLANCE FOR SEXUALLY TRANSMITTED INFECTIONS REPORT ON THE FINDINGS FROM GAUTENG PROVINCE IN 2008

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The sexually transmitted infections (STI) microbiological surveillance was undertaken in Gauteng Province (Johannesburg) between January and April 2008. The aim of the surveillance was to determine a) the aetiology of the male urethritis syndrome (MUS), vaginal discharge syndrome (VDS) and genital ulcer syndrome (GUS), b) the prevalence of HIV co-infection in patients with these syndromes, and c) the antimicrobial susceptibility of *Neisseria gonorrhoeae* isolates to ciprofloxacin.

1. Aetiological Findings

A total of 625 consecutive STI patients were recruited (191 VDS, 291 MUS, 144 GUS). One GUS patient presented with VDS at the same time.

Pathogens were detected by multiplex polymerase chain reaction (M-PCR) on swabs collected from VDS, MUS and GUS cases. Smears from VDS cases were examined for the presence of bacterial vaginosis (BV) and Candida by microscopy. In men with urethral dischahrge, *Neisseria gonorrhoeae* was the most common aetiological agent (79%, 229/291) followed by *Chlamydia trachomatis* (21%, 62/291) (Table 1). Candida was the most common aetiological agent followed by BV and TV in women with VDS (31%, 60/191; 30%, 67/191; and 25%, 48/191 respectively). These data were compared to the data from 2007 (Table 2). No pathogen was detected among 6.5% (19/291) of MUS cases and 11% (21/191) of VDS cases.

The number of GUS patients recruited in 2008 was significantly higher than that of GUS patients recruited in 2007 (144 vs 76). In both 2007 and 2008 surveys, herpes was the most frequent cause of genital ulceration accounting for 53% (40/76) and 62% (89/144) of GUS cases respectively (Table 3). Syphilis was the second most frequent cause of genital ulceration for each year of surveillance. Lymphogranuloma venereum and chancroid accounted for only 1% of GUS cases in each year. No cases of donovanosis have been detected.

Table 1: The prevalence of the STI pathogens patients with MUS in Johannesburg for the 2007 and 2008 surveys.

Pathogen	MUS		
	2007 (n=217)	2008 (n=291)	*P* value
Neisseria gonorrhoeae	154 (71%)	229 (79%)	0.048
Chlamydia trachomatis	53 (24%)	62 (21%)	0.406
Trichomonas vaginalis	28 (13%)	10 (3%)	< 0.001

Table 2: The prevalence of the STI pathogens and bacterial infections among patients with VDS in Johannesburg for the 2007 and 2008 surveys.

Pathogen or conditon	VDS		
	2007 (n=206)	2008 (n=191)	*P* value
Neisseria gonorrhoeae	27 (13%)	32 (17%)	0.337
Chlamydia trachomatis	32 (16%)	37 (19%)	0.346
Trichomonas vaginalis	70 (34%)	48 (25%)	0.043
Bacterial vaginosis	74 (36%)	57 (30%)	0.168
Candidiasis	53 (26%)	60 (31%)	0.192

Table 3: Aetiology of GUS in Johannesburg for the 2007 and 2008 surveys

Pathogen	2007 (n=76)	2008 (n=144)	*P* value
Herpes simplex virus	40 (53%)	89 (62%)	0.227
Treponema pallidum	5 (7%)	6 (4%)	0.435
Haemophilus ducreyi	1 (1%)	1 (1%)	0.644
Chlamydia trachomatis L1-L3	1 (1%)	1 (1%)	0.644
Klebsiella granulomatis	0 (0%)	0 (0%)	N/A

(Continued on page 13)

The prevalence of HIV co-infection among patients with MUS, VDS and GUS is shown in Table 4.

Table 4: HIV seroprevalence for patients with MUS, VDS and GUS in Johannesburg (2007 and 2008)

Syndrome	2007	2008	*P* value
MUS	81/211 (39%)	108/291 (37%)	0.740
VDS	104/199 (52%)	103/187 (55%)	0.551
GUS	57/76 (75%)	98/143 (68%)	0.335

Comments

The relative prevalence of TV in both men and women decreased significantly in the second survey. Gonorrhoea, on the other hand, remained the most common cause of MUS with the relative prevalence increasing significantly by 8% in 2008. Genital herpes continues to be the major cause of GUS. Syphilis remains an infrequent but important cause of genital ulceration and chancroid has almost disappeared as a cause of ulceration in the GUS patient group. These data confirm that the HIV prevalence observed from the STI patient group in Johannesburg still remains high and these STI patients are still an important group to target for HIV prevention initiatives.

2. Antimicrobial Susceptibility Findings

In the 2007 survey 47/149 (32%) isolates were resistant to ciprofloxacin and in 2008 there was 7% decrease (49/199, 25%) in the number of ciprofloxacin resistant isolates. This decrease was however not statistically significant (*P* = 0.182).

Given that a) gonorrhoea still remains the most frequent cause of MUS (Table 1), b) MUS is the most common STI presentation in men, and c) the high prevalence of HIV co-infection among MUS patients (Table 3), it is important to ensure the availability of the newly recommended cefixime (in the revised Essential Drugs Programme Primary Care guidelines) as first-line anti-gonococcal therapy in as many primary health care facilities as possible. In clinics without access to single dose oral cefixime, 250 mg of intramuscular ceftriaxone should be used instead.

Acknowledgements

Thanks for the successful completion of this surveillance go to: the Gauteng team: a) Sr. Martha Sello, Mr. Alex Vezi, the late Mr. Sipho Mbabela, b) Dr. Simba and staff at Alexandra Health Centre, c) Laboratory Staff at the STI Reference Centre, and d) PEPFAR and CDC-South Africa (funding through the NICD:CDC Co-operative Agreement).

ANTHRAX, PLAGUE AND BOTULISM IN SOUTH AFRICA, 2008

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Incidence of these diseases is low in humans in South Africa, but the results of laboratory investigations of suspected cases are reported here, because of their potential public health impact. Most suspected cases of anthrax were from the Northern Cape Province, with a few suspected cases from other endemic areas. For anthrax the laboratory receives samples from humans and animals as well as soils, dust and powders. For botulism the samples received were clinical samples and suspected food products. All laboratory investigations for these 3 pathogens were negative for 2008. Surveillance for plague is mainly in the form of rodent and flea sampling in a growing number of historic plague endemic sites throughout South Africa. All results were negative for 2008.

Table: Number of specimens received from specimens from human and environmental sources for the diagnosis of anthrax, botulism and plague, South Africa, 2008.

Test Requested	Specimen type/source	Number received
Anthrax	Human	16
	Powder	1
Botulism	Human	9
	Food products	11
Plague	Rodent sera	860
	Fleas	58

GERMS-SA SURVEILLANCE REPORT, SOUTH AFRICA, 2008

Introduction

The Group for Enteric, Respiratory and Meningeal disease Surveillance in South Africa (GERMS-SA) has coordinated ongoing, national, population-based, laboratory-based, surveillance for several bacterial and fungal diseases since 2003. The system has been previously described (1). Further details are available in the GERMS-SA Annual Report 2008 (access at www.nicd.ac.za). In this edition of the Communicable Diseases Surveillance Bulletin, we report summarised results, by pathogen/disease under surveillance, for 2008.

In 2008, a surveillance audit was performed for NHLS laboratories in 8 provinces (excluding KwaZulu-Natal) between 1 January and 31 December 2008, using the NHLS Corporate Data Warehouse (CDW). For all diseases under surveillance except cryptococcosis, the audit was designed to detect additional cases, with laboratory-confirmed disease, not already reported to GERMS-SA by participating laboratories. For cryptococcosis, the audit was designed to obtain data, from cases, which were no longer reported by NHLS laboratories in 8 provinces. The audit did not include *P. jirovecii* and diarrhoeagenic *E. coli*. Approximately 3,400 additional cases, detected by audit, were recorded on the surveillance database and are reported here. Incidence rates were calculated using mid-year population estimates for 2007 and 2008 from Statistics South Africa, unless otherwise specified.

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CRYPTOCOCCUS spp.

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Results

During 2008, 8240 patients with laboratory-confirmed, incident cryptococcal episodes, were reported to the Mycology Reference Unit (MRU). The overall incidence rate for the general South African population increased from 15/100000 in 2007 to 17/100000 in 2008 (Table 1). The incidence amongst HIV-infected individuals increased from 133/100000 in 2007 to 146/100000 in 2008, and amongst people sick with AIDS remained stable at 12/1000 for both years (1). Incidence rates increased in 6 provinces from 2007 to 2008, but remained stable in the remaining three provinces (Free State, Limpopo and Northern Cape) (Table 1). The peak incidence of cryptococcosis was recorded amongst patients aged 30-34 years (Figure 1). Two hundred and twenty-five children, younger than 15 years, had laboratory-confirmed cryptococcosis, detected by the surveillance programme. Where gender was known (8137/8240, 99%), 53% patients were female. Most patients (7730/8240; 94%) were diagnosed with meningitis

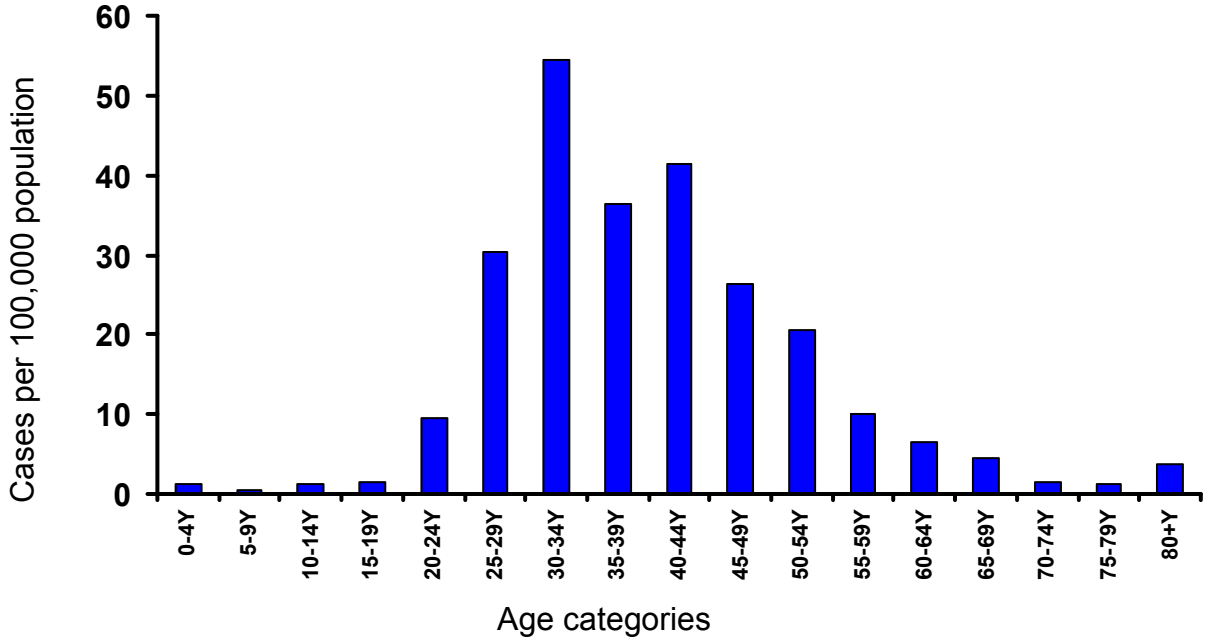

Figure 1: Age-related incidence of cryptococcosis in the general population, South Africa, 2008 (n = 8240, ages unknown in 7% [548/8240] cases).

(Continued on page 15)

(laboratory tests on cerebrospinal fluid positive for *Cryptococcus* species), and 475/8240 (5.7%) were diagnosed with fungaemia (Table 2). The remainder of case patients (n=32) were diagnosed by culture of urine, sputum, pleural fluid and other specimen types. At enhanced surveillance sites, 2102 patients were diagnosed with cryptococcosis, with viable isolates received from 1585/2102 (75%) patients. Of 1582 isolates which were typed, 1542 (97%) were identified as *Cryptococcus neoformans*; the remaining 40 were identified as *Cryptococcus gattii*. Outcome at the end of the hospital admission was known for 1677/2102 (80%) patients at enhanced surveillance sites; 523/1677 (31%) of these patients died.

Table 1: Number of cases and incidence rates of *Cryptococcus* species as reported to MRU by province, South Africa, 2007 and 2008.

Province	2007*		2008*	
	n	Cases/100 000**	n	Cases/100 000**
Eastern Cape	1023	14	1359	19
Free State	528	18	542	18
Gauteng	2076	22	2158	23
KwaZulu-Natal	1286	13	1442	15
Limpopo	471	8	455	8
Mpumalanga	743	23	809	25
Northern Cape	61	7	62	7
North West	590	15	787	20
Western Cape	441	9	626	13
South Africa	**7219**	**15**	**8240**	**17**

*A similar surveillance audit was performed for NHLS laboratories in 8 provinces (excluding KwaZulu-Natal) in 2007 and 2008, detecting additional microscopy (India ink) and culture-confirmed cases. In 2008, patients diagnosed with the cryptococcal antigen test alone were also detected by audit.
**Incidence rates were calculated based on population denominators provided by Statistics South Africa.

Table 2: Number and percentage of cases of cryptococcal disease as reported to MRU by specimen type, South Africa, 2008.

Site of specimen	n	%
CSF	7730	94.0
Blood	475	5.7
Other	32	0.3
Unknown	3	<0.1
Total	**8240**	

Discussion

Overall, the number of patients with incident, laboratory-confirmed cryptococcosis increased by >1000 in 2008, compared with 2007. The increased case numbers are unlikely to only reflect improved detection of case patients by the surveillance programme in 2008 compared with 2007, because active case-finding methods did not change substantially. The reported increase may also represent a complex interplay of factors, including an increased pool of patients at risk for cryptococcosis (with "maturation" of the South African AIDS epidemic), and late access to highly active antiretroviral treatment (HAART), or may be explained by increased specimen submission to laboratories for diagnosis of cryptococcosis, either due to increased clinician awareness of the disease or changed clinical practices with better access to life-saving HAART. Stable incidence rates in three provinces (Free State, Limpopo and North West) may indicate that the National HIV/AIDS Comprehensive Care, Management and Treatment (CCMT) Programme has made an impact, although this will only be confirmed with ongoing surveillance data. Most patients continued to be diagnosed with meningitis, which reflects clinician specimen-taking practices. The demographic profile of patients with cryptococcosis continued to mirror the profile of HIV-infected patients in South Africa. Very few children were diagnosed with cryptococcosis, and a constantly low proportion of all patients were infected with *C. gattii*. The in-hospital mortality of patients with cryptococcosis remained unchanged, and unacceptably high, and may be due to patients entering the health care system with advanced cryptococcal disease.

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PNEUMOCYSTIS JIROVECII PNEUMONIA

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In 2008, 407 cases of *Pneumocystis* pneumonia (PCP) were reported to the Parasitology Reference Unit through the GERMS-SA surveillance system (Table 1).

Table 1: Number of *Pneumocystis* pneumonia cases reported by province, 2006-2008

Province	2006*	2007	2008
Eastern Cape	25	30	30
Free State	6	16	19
Gauteng	177	144	221
KwaZulu Natal	7	20	29
Limpopo	0	0	1
Mpumalanga	17	12	14
Northern Cape	0	0	3
North West	0	13	25
Western Cape	72	51	65
South Africa	304	286	407

* May to December 2006 only

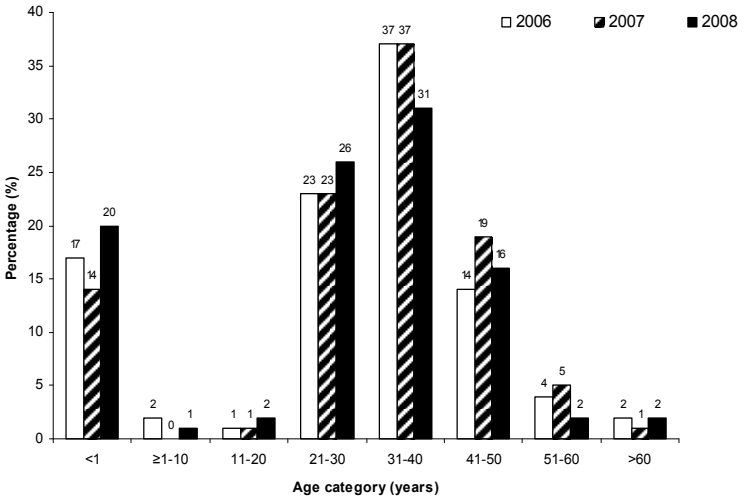

Figure 1: Percentage of PCP cases reported by age group, South Africa, 2006-2008
(2006: n=206; 2007: n=225 & 2008: n=342)

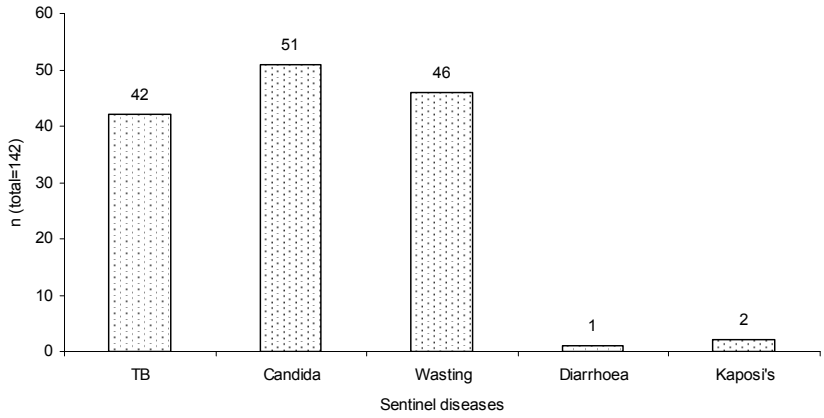

Figure 2: Number of cases reported to have HIV-associated sentinel diseases, South Africa, 2008

The number of cases reported for 2008 has increased by almost a third compared to the previous years. This might be attributable to increased awareness and testing for the disease by clinicians. Despite this increase in numbers, PCP still remains severely under-reported, the main reasons being that there are only 8 NHLS laboratories testing for PCP, and induced sputum requires specialized equipment and trained personnel to obtain adequate samples for testing.[1]

Numbers of PCP isolates peak in children less than one year of age and in the 21 to 50 year age group (Figure 1). Of cases with known gender 67% (221/332) were female. Of 350 cases on the database, 144 were from Enhanced Surveillance Sites with accompanying case report forms. During admission, 102/144 (71%) of cases tested positive for HIV. Thirty-nine of these patients (38%) were on ARV treatment during their hospitalization. In-hospital mortality rate of cases was 30% (78/111). 98% (109/111) of cases that recovered were discharged with a LRTI as a final diagnosis. Most of the cases had concurrent infections, of which Candida was the most common (Figure 2).

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SALMONELLA ENTERICA SEROTYPE TYPHI

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[1]Enteric Diseases Reference Unit, National Institute for Communicable Diseases

Table 1: Number of invasive and non-invasive *Salmonella* Typhi isolates (n =82) reported to EDRU by province, South Africa, 2008, including audit isolates (n=2).

Province	Invasive *Salmonella* Typhi	Non-invasive *Salmonella* Typhi
Eastern Cape	9	1
Free State	1	0
Gauteng	21	1
KwaZulu-Natal	8	3
Limpopo	2	0
Mpumalanga	18	8
Northern Cape	0	0
North West	0	0
Western Cape	9	1
South Africa	68	14

Table 2: Number of *Salmonella* Typhi isolates reported to EDRU (n =82) by age category, 2008.

Age category (years)	Cases of *Salmonella* Typhi
Neonate	0
< 1	2
1 - 4	7
5 - 14	35
15 - 24	15
25 - 34	6
35 - 44	7
45 - 54	3
55 - 64	2
≥ 65	2
Unknown	3
Total	82

Salmonella Typhi isolates from both invasive and non-invasive sites are included in these analyses, as both add to burden of infection in South Africa and thus represent a public health risk, although data may not reflect actual burden of disease.

Two isolates of *Salmonella* Paratyphi A from Gauteng Province were received; four isolates of *Salmonella* Paratyphi B were received, two from Eastern Cape and one each from Western Cape and Kwazulu-Natal and one isolate of *Salmonella* Paratyphi C was received, from Mpumalanga Province.

Numbers of *Salmonella* Typhi isolates were regarded as a substantial underestimate and thus incidence rates were not calculated. These results are for culture-confirmed cases and thus exclude those patients in whom a serological diagnosis was made without culture.

Salmonella Typhi isolation by month does not show marked seasonality, although increased numbers of cases were identified in January 2008 and case numbers increased towards the end of 2008. No major outbreaks were detected in 2008.

Certain antimicrobials are tested for epidemiological purposes only and should not be used for treatment of typhoid fever. All *Salmonella* Typhi isolates received in 2008 were susceptible to ciprofloxacin (Table 3), the treatment of choice, although the occurrence of nalidixic acid resistance is cause for concern. Nalidixic acid resistance may be used as a marker for quinolone

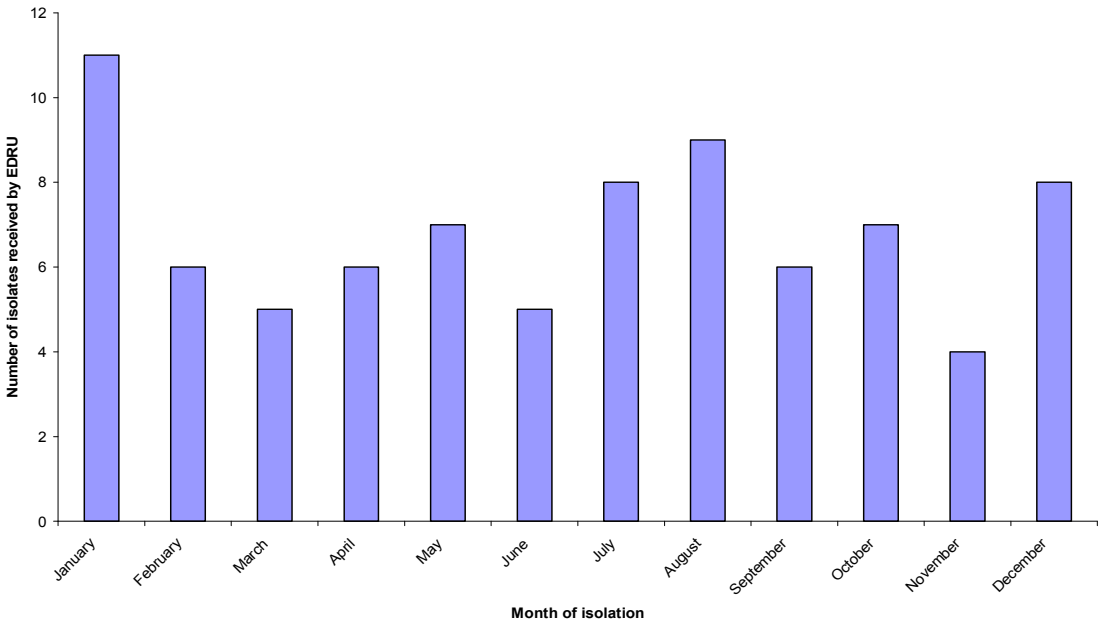

Figure 1: Number of *Salmonella* Typhi isolates reported to EDRU by month of isolation, 2008.

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resistance; it is indicative of the potential for an organism to develop fluoroquinolone resistance.[1] Response to ciprofloxacin may be poor in the presence of nalidixic acid resistance. The *Salmonella* Paratyphi A isolates were both resistant to nalidixic acid, but susceptible to ampicillin, co-trimoxazole and chloramphenicol. Two of the *Salmonella* Paratyphi B isolates were resistant to ampicillin; one of these was also resistant to chloramphenicol and streptomycin, but the other was susceptible to the remaining antimicrobials tested. The *Salmonella* Paratyphi C was fully susceptible to all antimicrobials tested.

Table 3. Results of antimicrobial susceptibility testing for all *Salmonella* Typhi isolates (n = 80) received by EDRU, 2008, excluding isolates identified by audit.

Antimicrobial tested	Susceptible (%)	Intermediate (%)	Resistant (%)
Ampicillin	74 (92.5)	0 (0.0)	6 (7.5)
Cotrimoxazole	74 (92.5)	0 (0.0)	6 (7.5)
Chloramphenicol	76 (95.0)	0 (0.0)	4 (5.0)
Nalidixic acid	77 (96.3)	0 (0.0)	3 (3.7)
Ciprofloxacin	79 (98.8)	0 (0.0)	1 (1.2)
Tetracycline	77 (96.3)	0 (0.0)	3 (3.7)
Kanamycin	79 (98.8)	0 (0.0)	1 (1.2)
Streptomycin	75 (93.8)	0 (0.0)	5 (6.2)
Imipenem	80 (100.0)	0 (0.0)	0 (0.0)
Ceftriaxone	80 (100.0)	0 (0.0)	0 (0.0)

Reference

1. Crump JA, Barrett TJ, Nelson JT, Angulo FJ. Reevaluating fluoroquinolone breakpoints for *Salmonella enterica* serotype Typhi and for non-Typhi salmonellae. Clin Infect Dis 2003;37(1):75-81.

NON-TYPHOIDAL *SALMONELLA ENTERICA* (NTS)

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Non-typhoidal salmonellosis may reflect both a food-borne component of disease, for which data is poorly captured in South Africa, the patients normally presenting with gastro-enteritis, or may be an AIDS defining illness, in which case the organism frequently becomes invasive.

Table 1: Number* of invasive and non-invasive non-typhoidal *Salmonella* cases (n =2353) reported to EDRU by province, South Africa, 2008 including those identified on audit.

Province	Non-invasive non-typhoidal *Salmonella*	Invasive non-typhoidal *Salmonella*
Eastern Cape	229	105
Free State	61	30
Gauteng	506	490
KwaZulu Natal	192	112
Limpopo	59	14
Mpumalanga	121	46
Northern Cape	22	20
North West	53	28
Western Cape	177	88
South Africa	1420	933

*Incidence rates have not been calculated as there may be regional differences in specimen collection practices.

Table 2: Case numbers and incidence rates for invasive* non-typhoidal *Salmonella* (n=2353) reported to EDRU by age category in 2008, including those identified on audit.

Age Category (years)	Cases		
	Non-invasive	Invasive	Incidence rate/100000 (invasive disease)
Neonate	61	63	
< 1	271	122	17.60†
1 - 4	185	102	2.52
5 - 14	137	50	0.50
15 - 24	112	49	0.51
25 - 34	152	203	2.46
35 - 44	170	167	2.95
45 - 54	105	80	1.91
55 - 64	90	32	1.12
≥ 65	49	30	1.17
Unknown	88	35	-
Total	1420	933	1.93

*Incidence rates for non-invasive non-typhoidal *Salmonella* have not been calculated because not all cases of gastroenteritis due to non-typhoidal *Salmonella* may be cultured in clinical practice. †Combined incidence rates are calculated for neonates and children under one year of age. One mixed *Salmonella* infection was identified on blood culture.

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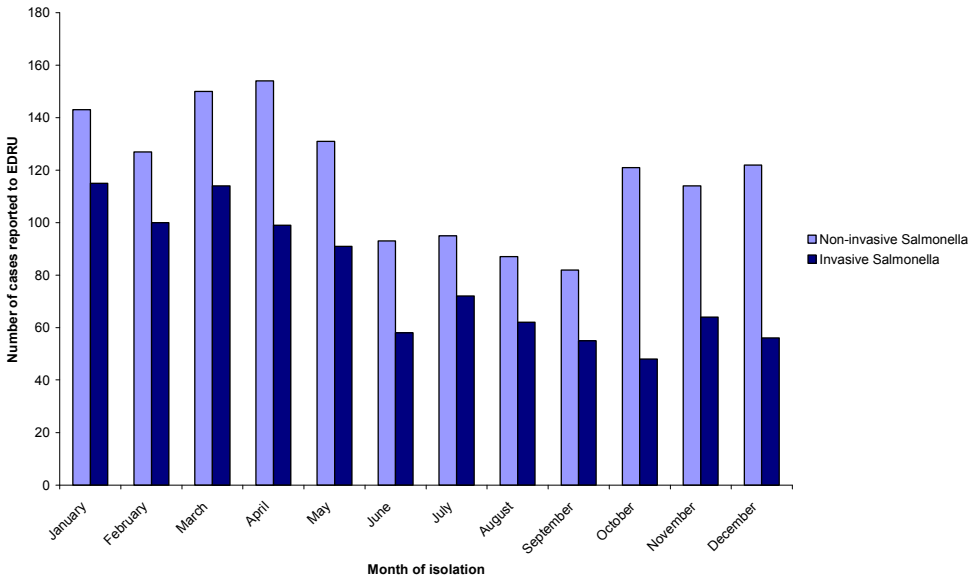

Figure 1: Number of non-invasive and invasive non-typhoidal *Salmonella* cases reported to EDRU by month of isolation, 2008, including those identified on audit.

Both invasive and non-invasive disease appears to have a seasonal prevalence in the warmer months.

Table 3: Number of non-typhoidal *Salmonella* cases reported to EDRU by anatomical site of isolation*, 2008, including those identified on audit.

Specimen	n	%
CSF	34	1.4
Blood culture	804	34.2
Stool	1099	46.7
Other	416	17.7
Total	2353	100

*Note that many cases had multiple isolates of the same serotype, including those with isolates from an invasive site and a second isolate from stool.

Table 4. Results of antimicrobial susceptibility testing for all non-typhoidal *Salmonella* isolates (n = 1845) tested by EDRU, 2008, excluding isolates identified on audit.

Antimicrobial tested	Susceptible (%)	Intermediately resistant (%)	Resistant (%)
Ampicillin	1226 (66.5)	2 (0.1)	617 (33.4)
Cotrimoxazole	1220 (66.1)	0 (0.0)	625 (33.9)
Chloramphenicol	1281 (69.4)	35 (1.9)	529 (28.7)
Nalidixic acid	1382 (74.9)	0 (0.0)	463 (25.1)
Ciprofloxacin	1838 (99.6)	3 (0.2)	4 (0.2)
Tetracycline	847 (45.9)	342 (18.5)	656 (35.6)
Kanamycin	1686 (91.4)	72 (3.9)	87 (4.7)
Streptomycin	1246 (67.5)	0 (0.0)	599 (32.5)
Imipenem	1845 (100.0)	0 (0.0)	0 (0.0)
Ceftriaxone	1508 (81.7)	0 (0.0)	337 (18.3)

Certain antimicrobial agents are tested for epidemiological reasons only and should not be used for treatment. Nalidixic acid resistance is a cause for concern because it is a marker of increasing resistance to the quinolones and is associated with poor response to fluoroquinolone treatment in clinical cases.[1] Of those NTS isolates tested, 337 (18.3%) were noted to be extended spectrum beta-lactamase (ESBL) producers. Multi-drug resistant serotypes included primarily *Salmonella* Typhimurium and *Salmonella* Isangi (Table 5).

Table 5. Commonest invasive and non-invasive non-typhoidal *Salmonella* serotypes (n = 1520) reported to EDRU by province, 2008, excluding isolates identified on audit.

	Dublin	Enteritidis	Isangi	Typhimurium	Virchow
Eastern Cape	12	16	101	86	0
Free State	1	20	1	34	0
Gauteng	17	151	71	443	5
KwaZulu-Natal	8	35	67	103	5
Limpopo	0	5	7	8	1
Mpuma-langa	7	17	0	70	4
Northern Cape	0	8	0	17	0
North West	0	5	4	12	14
Western Cape	6	62	13	83	1
South Africa	51	319	264	856	30

SHIGELLA

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[1]Enteric Diseases Reference Unit, National Institute for Communicable Diseases

Shigella infection is largely due to water-borne outbreaks in South Africa. Although water-borne outbreaks did occur in 2008, the impact on burden of disease due to *Shigella* appeared less than in 2007.

Table 1: Number of invasive and non-invasive *Shigella* isolates (n =1514) reported to EDRU by province, South Africa, 2008, including audit cases.

Province	Invasive *Shigella*	Non-invasive *Shigella*
Eastern Cape	7	180
Free State	1	84
Gauteng	30	480
KwaZulu-Natal	13	129
Limpopo	1	32
Mpumalanga	3	93
Northern Cape	0	28
North West	1	22
Western Cape	14	396
South Africa	70	1444

Table 2. Case numbers* and incidence rates for *Shigella* (invasive and non-invasive) reported to EDRU by age category, 2008. No mixed infections were identified.

Age category (years)	Cases*	Incidence rate/100000
Neonate	11	
< 1	126	14.08†
1 - 4	509	12.58
5 - 14	269	2.69
15 - 24	79	0.82
25 - 34	178	2.16
35 - 44	111	1.96
45 - 54	79	1.89
55 - 64	38	1.33
≥ 65	48	1.88
Unknown	66	-
Total	1514	3.14

*Cases may be underreported due to local clinical practices. †Combined incidence rates are calculated for neonates and children less than one year of age.

The predominant burden of disease is in the under five-year age group (table 2).

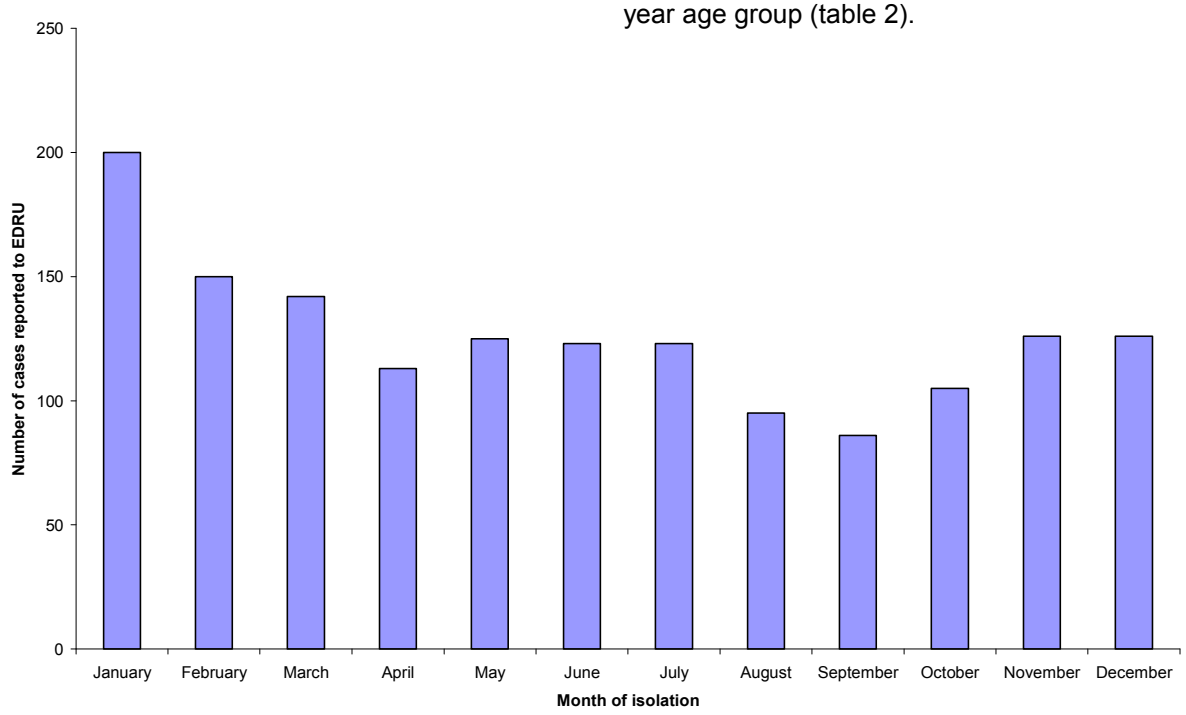

Figure 3. Number of non-invasive and invasive *Shigella* isolates reported to EDRU by month of isolation, 2008, including audit specimens. Higher isolation rates in January to March and increasing numbers from October to December in 2008 suggest seasonality.

(Continued on page 21)

Table 3: Results of antimicrobial susceptibility testing for *Shigell*a isolates (n =1304) received by EDRU, 2008.

Antimicrobial tested	Susceptible (%)	Intermediately resistant (%)	Resistant (%)
Ampicillin	683 (52.3)	2 (0.2)	619 (47.5)
Cotrimoxazole	222 (17.0)	1 (0.1)	1081 (82.9)
Chloramphenicol	875 (67.1)	2 (0.2)	427 (32.7)
Nalidixic acid	1286 (98.6)	0 (0.0)	18 (1.4)
Ciprofloxacin	1303 (99.9)	0 (0.0)	1 (0.1)
Tetracycline	585 (44.9)	24 (1.8)	695 (53.3)
Kanamycin	1296 (99.4)	1 (0.1)	7 (0.5)
Streptomycin	560 (42.9)	0 (0.0)	744 (57.1)
Imipenem	1304 (100)	0 (0.0)	0 (0.0)
Ceftriaxone	1298 (99.5)	0 (0.0)	6 (0.5)

Quinolone resistance remains low. Eight of 1304 (0.6%) isolates tested were ESBL-producers. Certain antimicrobials were tested for surveillance purposes only and should not be used for treatment.

Table 4: Commonest* invasive and non-invasive *Shigella* serotypes (n = 949) reported to EDRU by province, 2008. Audit specimens are excluded.

	S. dysenteriae type 1	*S. flexneri* type 1b	*S. flexneri* type 2a	*S. flexneri* type 6	*S. sonnei* phase I/II
Eastern Cape	0	17	57	19	25
Free State	0	7	26	9	10
Gauteng	0	48	113	37	121
Kwazulu-Natal	0	22	41	10	26
Limpopo	0	2	5	1	1
Mpumalanga	0	7	22	12	12
Northern Cape	0	3	9	7	3
North West	0	1	6	0	1
Western Cape	1	58	127	32	51
South Africa	1	165	406	127	250

*Including *Shigella dysenteriae* type 1. Although these isolates are currently rare in South Africa, the potential for future epidemics remains while these strains are in circulation.

DIARRHOEAGENIC *ESCHERICHIA COLI* (DEC)

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Actual burden of disease due to diarrhoeagenic *E. coli* is probably greatly underestimated in South Africa, as management is primarily syndromic and centres on specimen rehydration. As a result, clinicians are unlikely to prioritise stool taking in uncomplicated cases of diarrhoea. Disease in the past appears to have been primarily associated with water-borne outbreaks, due to high level of faecal contamination in water sources and this trend appears to be continuing. No audits were conducted for DEC in 2008.

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Table 1: Number of diarrhoeagenic *Escherichia coli* isolates (n = 377) reported to EDRU by province, South Africa, 2008, representing 362 infectious episodes, including those patients who had more that one pathotype (see below).

	DAEC	EAggEC	EHEC/ STEC	EIEC	EPEC	ETEC
Eastern Cape	5	17	2	1	45	13
Free State	1	2	7	1	3	0
Gauteng	13	15	0	3	110	3
Kwazulu-Natal	1	0	0	0	1	0
Limpopo	0	2	0	0	6	0
Mpumalanga	42	30	0	7	17	15
Northern Cape	0	2	0	0	1	1
North West	1	0	0	1	2	0
Western Cape	2	1	1	0	2	1
South Africa	65	69	10	13	187	33

DAEC, Diffusely adherent *E. coli*; EAggEC, enteroaggregative *E. coli*; EHEC, STEC, Shiga-toxigenic *E. coli* enterohaemorrhagic *E. coli*; EIEC, enteroinvasive *E. coli*; EPEC, enteropathogenic *E. coli*; ETEC, enterotoxigenic *E. coli*

Incidence rates have not been calculated as numbers are not viewed as being fully representative. A range of serotypes were associated with STEC/EHEC, including O26 and O111. Serotypes associated with EPEC included O55, O111, O119, O127 and O142. Diverse serotypes were also noted for other enterovirulent *E. coli* isolates. Identification of both EHEC and STEC was incidental.[1]

Table 2: Number of diarrhoeagenic *E. coli* isolates (n = 377) reported to EDRU by age category, 2008.

Age category (years)	DAEC	EAggEC	EHEC/ STEC	EIEC	EPEC	ETEC
Neonate	4	6	1	0	14	4
< 1	12	27	5	1	79	5
1 - 4	17	10	2	2	70	12
5 - 14	4	3	0	2	1	1
15 - 24	6	1	0	1	5	1
25 - 34	9	7	0	3	3	3
35 - 44	6	5	0	1	2	2
45 - 54	0	2	1	1	4	0
55 - 64	3	2	0	0	2	2
≥ 65	0	1	0	1	1	0
Unknown	4	5	1	1	6	3
Total	65	69	10	13	187	33

The predominance of isolates received in children under the age of one year may reflect culturing practices; infants are more likely to have stools taken for culture due to the devastating effects of diarrhoea in children of this age. Seasonality is not reflected as it is believed that the current specimen taking and laboratory diagnostic practices may not be optimal to accurately reflect burden of illness in South Africa of disease due to diarrhoeagenic *E. coli*.

Reference

1. Werber D, Frank C, Wadl M, Karch H, Fruth A, Stark K. Looking for tips to find icebergs - surveillance of haemolytic uraemic syndrome to detect outbreaks of Shiga toxin-producing *E. coli* infection. Website, 2008 http://www.eurosurveillance.org/edition/v13n09/080228_4.asp

VIBRIO CHOLERAE

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Imported cases of cholera add to burden of infection in South Africa and thus represent a public health risk. In 2008, a number of cases were known to be imported, including one in January, from Mozambique, and numerous cases in November, from Zimbabwe. A cluster of two cases in April in Gauteng and in May to July in Mpumalanga could not be linked to known contact with cholera patients from outside South African borders.

Table 1: Number of *Vibrio cholerae* O1 isolates (n =185) reported to EDRU by province, South Africa, 2008, excluding audit cases (n=12).

Province	*Vibrio cholerae* O1 El Tor Inaba	*Vibrio cholerae* O1 El Tor Ogawa
Eastern Cape	0	1
Free State	0	1
Gauteng	3	24
KwaZulu Natal	0	0
Limpopo	0	114
Mpumalanga	1	34
Northern Cape	0	1
North West	1	1
Western Cape	0	4
South Africa	5	180

Table 2. Age distribution of patients presenting with *V. cholerae* O1, reported to EDRU in 2008, including audit cases.

Age category (years)	Cases of *V. cholerae* O1
Neonate	1
< 1	3
1 - 4	12
5 - 14	16
15 - 24	55
25 - 34	40
35 - 44	19
45 - 54	12
55 - 64	15
≥ 65	10
Unknown	14
Total	197

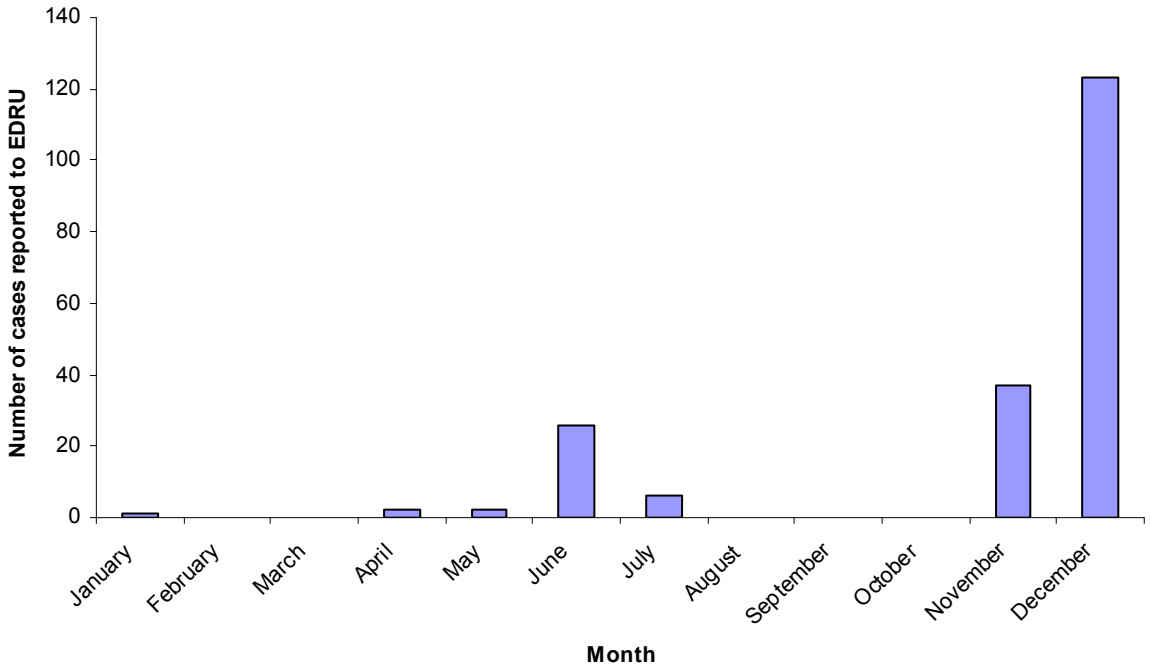

Figure 4. Number of cases of cholera reported to EDRU by month, 2008 (cases imported into South Africa and audit cases included)

The case distribution highlights the two major outbreaks in the Barberton district in the middle months of the year, that was contained, and the epidemic that started in November 2008, following an epidemic in Zimbabwe and which is currently ongoing.

(Continued on page 24)

Table 3. Antimicrobial susceptibility patterns of four outbreak clusters of *V. cholerae* O1 reported to EDRU in 2008.

Antimicrobial tested	Susceptible (%)	Intermediately resistant (%)	Resistant (%)
Ampicillin	151 (83)	0 (0.0)	31 (17)
Cotrimoxazole	0 (0.0)	0 (0.0)	182 (100.0)
Chloramphenicol	89 (48.9)	88 (48.4)	5 (2.7)
Nalidixic acid	0 (0.0)	0 (0.0)	182 (100.0)
Ciprofloxacin	182 (100.0)	0 (0.0)	0 (0)
Tetracycline	158 (86.8)	18 (9.9)	6 (3.3)
Kanamycin	151 (83.0)	13 (7.1)	18 (9.9)
Streptomycin	2 (1.1)	0 (0.0)	180 (98.9)
Imipenem	182 (100)	0 (0.0)	0 (0.0)
Ceftriaxone	150 (82.4)	0 (0.0)	31 (17.6)
Erythromycin[3]	164 (92.1)	0 (0.0)	14 (7.9)

Where standard CLSI breakpoints do not exist, susceptibilities have been determined according to the methods of Ng *et al*.[1] Note that these patterns are cumulative and cannot be used to predict treatment for current or future outbreaks. Antimicrobial treatment should be reserved for cases of severe dehydration in hospitalised patients, as resistance is rapidly emerging to antimicrobials in this organism. Note certain antimicrobials are tested for epidemiological purposes only and are not suitable for treatment.

The organism in all outbreaks has been multidrug resistant, but as these resistance patterns have not been consistent between outbreaks, cumulative (for the year) resistance patterns cannot be used to guide patient management in severely dehydrated patients.

Reference

1. Ng L.-K., Sawatsky P., Galas M. et al. Can Etest be used to determine *Vibrio cholerae* susceptibility to erythromycin? Antimicrob Agents Chemother 2003;47(4):1479-1480.

NEISSERIA MENINGITIDIS

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[1]Respiratory and Meningeal Pathogens Reference Unit, National Institute for Communicable Diseases

In 2008, 397 cases of meningococcal disease were reported to RMPRU, and an additional 59 cases were identified on audit: a total of 456 cases of laboratory-confirmed meningococcal disease identified by the surveillance system during the year (Table 1). The number of cases reported increased during the winter and spring months (Figure 1). Of all cases reported to RMPRU, cerebrospinal fluid (CSF) was still the most common specimen yielding meningococci (Table 2). However, the number of cases diagnosed on blood culture (meningococcaemia) increased in 2008 compared to 2007 (p=0.02).

Table 1: Number of cases and incidence rates of meningococcal disease as reported to RMPRU by province, South Africa, 2007 and 2008.

Province	2007		2008	
	n	Cases/100,000	n	Cases/100,000
Eastern Cape	18	0.25	28	0.40
Free State	39	1.31	21	0.71
Gauteng	260	2.78	224	2.36
KwaZulu-Natal	33	0.34	34	0.34
Limpopo	9	0.16	5	0.09
Mpumalanga	25	0.76	35	1.06
Northern Cape	9	0.98	8	0.87
North West	33	0.85	14	0.36
Western Cape	77	1.59	87	1.76
South Africa	503	1.05	456	0.94

(Continued on page 25)

Table 2: Number and percentage of cases of meningococcal disease as reported to RMPRU by specimen type, South Africa, 2007 and 2008.

Site of specimen	2007		2008	
	n	%	n	%
CSF	385	77%	316	69%
Blood	116	23%	133	29%
Other	2	0.4%	7	1.5%
	503		456	

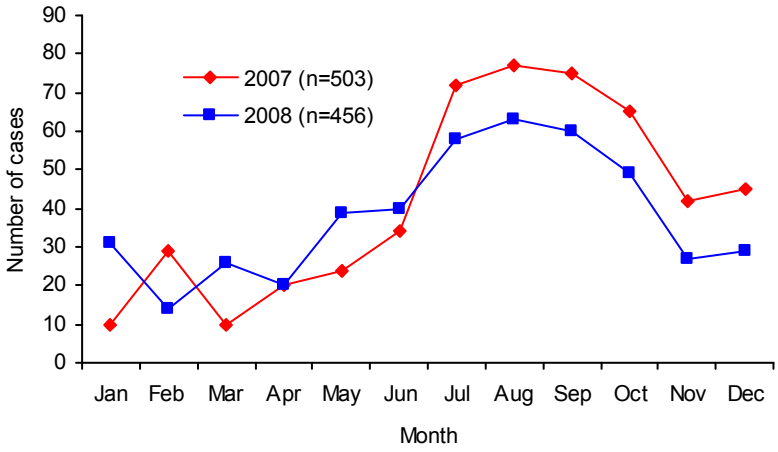

Figure 1: Number of cases of laboratory-confirmed meningococcal disease in South Africa as reported to RMPRU by month and year (2007-2008).

Cases of W135 disease were reported from all provinces. In Gauteng Province, the incidence of meningococcal disease was estimated at 2/100,000 population, and most of that disease was due to W135 (103/162, 64%) (Table 3). The preponderance of serogroup B disease in Western Cape Province was still noted: 35/78 (45%) of all cases serogrouped. Disease confirmed to be caused by serogroup C increased in Gauteng Province, from four cases in 2007 to 21 cases in 2008. Burden of overall disease was greatest in children less than five years of age. Age and serogroup-specific incidence rates show that infants were at greatest risk of disease for all serogroups (Figure 2).

Table 3: Number of cases of meningococcal disease reported to RMPRU by serogroup and province (n=456, 342 (75%) with specimens or viable isolates available for serogrouping), South Africa, 2008.

Province	Serogroup						
	No serogroup available	A	B	C	W135	Y	Total
Eastern Cape	6		9	4	6	3	28
Free State	6		5	2	6	2	21
Gauteng	62	3	28	21	103	7	224
KwaZulu-Natal	8		3	2	20	1	34
Limpopo	2				3		5
Mpumalanga	12		1	4	18		35
Northern Cape	3		1		2	2	8
North West	6		3		4	1	14
Western Cape	9		31	11	35	1	87
South Africa	114	3	81	44	197	17	456

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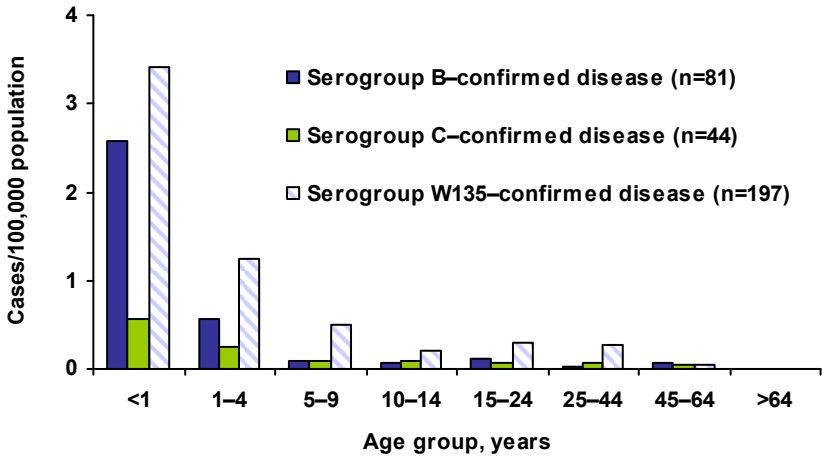

Figure 2: Reported age-specific incidence rates for confirmed serogroups B, C and W135, South Africa, 2008 (of 456 cases reported, 439 had known age, and 342 had specimens or viable isolates available for serogrouping).

Preliminary analysis of case-fatality rates, as calculated in enhanced surveillance sites where in-hospital outcome is specifically looked for was 42/162 (26%), and has increased during the last three years (30/224, 13% in 2006, 40/200, 20% for 2007; p=0.002 for chi-squared test for trend comparing all three years). Only 3/287 (1%) isolates had penicillin minimum inhibitory concentrations (MICs) > 0.06µg/ml, and would be considered intermediately resistant.[1]

Discussion

Overall incidence of disease did not change substantially from 2007. Serogroup W135 disease remained stable compared to 2007[2;3]. The increase in serogroup C in Gauteng Province highlights the importance of surveillance to monitor meningococcal strain fluctuations. Case-fatality rates have increased over the last three years, and may be related to an increase in proportion of cases presenting with meningococcaemia, as well as other pathogen and/or host factors.[3;4]

Reviewing several years, intermediate penicillin resistance was detected among all meningococcal serogroups in South Africa and there was no observed increase in prevalence over the study period.[5] The prevalence of intermediate resistance remained low in 2008. The clinical relevance of increasing MICs is unclear, and penicillin is, at present, still being recommended as the drug of choice for therapy of confirmed meningococcal disease.

References

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HAEMOPHILUS INFLUENZAE

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Results

The number of cases of *Haemophilus influenzae* invasive disease reported in 2008 to RMPRU was 280, while an additional 112 cases were identified during the national audit (total number of cases available for analysis was 392). Of these, 207 (53%) had isolates or specimens available for serotyping, and 90/207 (43%) were confirmed as serotype b (Table 1). Serotype b isolates were more likely to be isolated from CSF than non-typeable *H. influenzae* (47/90, 52% vs. 7/74, 9%, p<0.001) (Table 2).

In 2008, a total of 62 cases of Hib were reported in children <5 years (Figure 1); four cases were identified on polymerase chain reaction (PCR) testing of transport specimens. Serotype b is the more common *H. influenzae* causing disease in infants (Figure 2). Since 2002, rates of Hib disease as recorded by our surveillance network in infants <1 year of age have increased, and there seems to be a continued increase in 2008 (p=0.002, chi-squared test for trend, 2002 to 2008) (Figure 3).

Thirteen percent of serotype b strains were resistant to ampicillin (MIC>1mg/L[1]) (all producing beta lactamase), 11 of 82 isolates tested, while 14% (10/71) of non-typeable strains were resistant.

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Table 1: Number of cases of *Haemophilus influenzae* disease reported to RMPRU by serotype and province (n=392, 207 (53%) with specimens or viable isolates available for serotyping), South Africa, 2008.

Province	Serotype								
	No serotype available	a	b	c	d	e	f	Non-typeable	Total
Eastern Cape	20		6	1		1	1	3	32
Free State	7		9				3	5	24
Gauteng	74	6	35	3	4	1	12	35	170
KwaZulu-Natal	19		14				1	8	42
Limpopo	2		2						4
Mpumalanga	11	1	6				1	2	21
Northern Cape	2		2						4
North West	3		3						6
Western Cape	47	2	13	1	1	3	1	21	89
South Africa	185	9	90	5	5	5	19	74	392

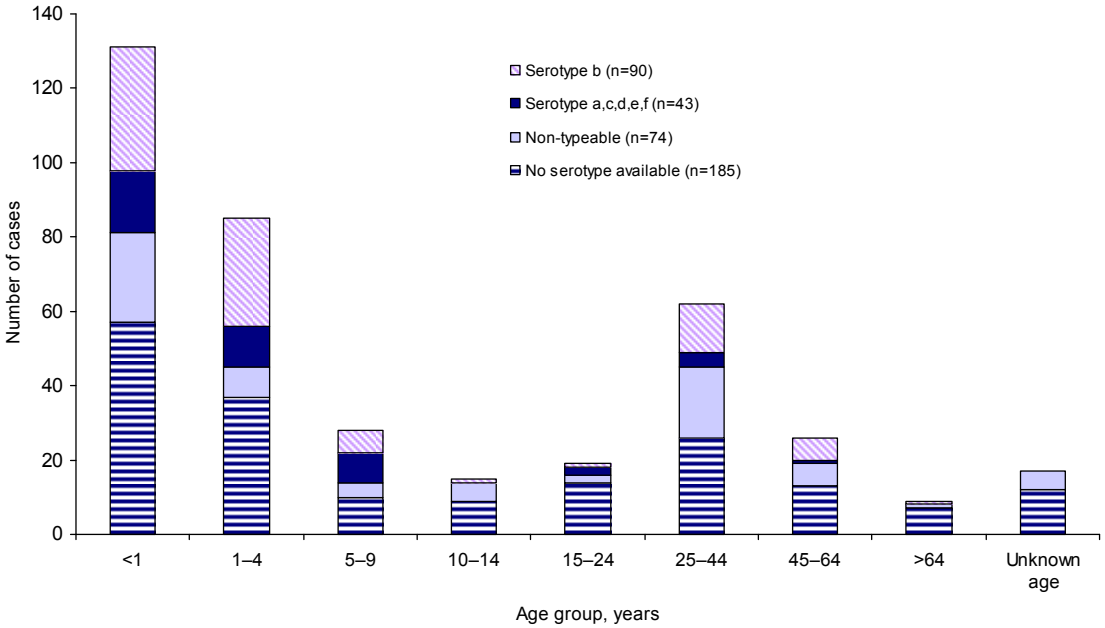

Figure 1: Number of cases of *Haemophilus influenzae* reported to RMPRU by serotype and age group, South Africa, 2008 (of 392 cases reported, 375 had known age, and 207 had specimens or viable isolates available for serotyping).

Table 2: Number and percentage of cases of *Haemophilus influenzae* disease as reported to RMPRU by specimen type, South Africa, 2008.

Site of specimen	No serotype available		Serotype b		Serotypes a, c, d, e, f		Non-typeable	
	n	%	n	%	n	%	n	%
CSF	41	22	47	52	16	37	7	9
Blood	91	49	39	43	25	58	56	76
Other	53	29	4	4	2	5	11	15
Total	185		90		43		74	

Discussion

Since the introduction of the *H. influenzae* serotype b (Hib) conjugate vaccine into the Expanded Programme on Immunisation (EPI) for South Africa in 1999, there has been a reduction in cases reported due to this serotype.[2] The recent increase in reported cases of Hib disease in children <1 year needs to be monitored carefully, and further analysis of these cases will follow.

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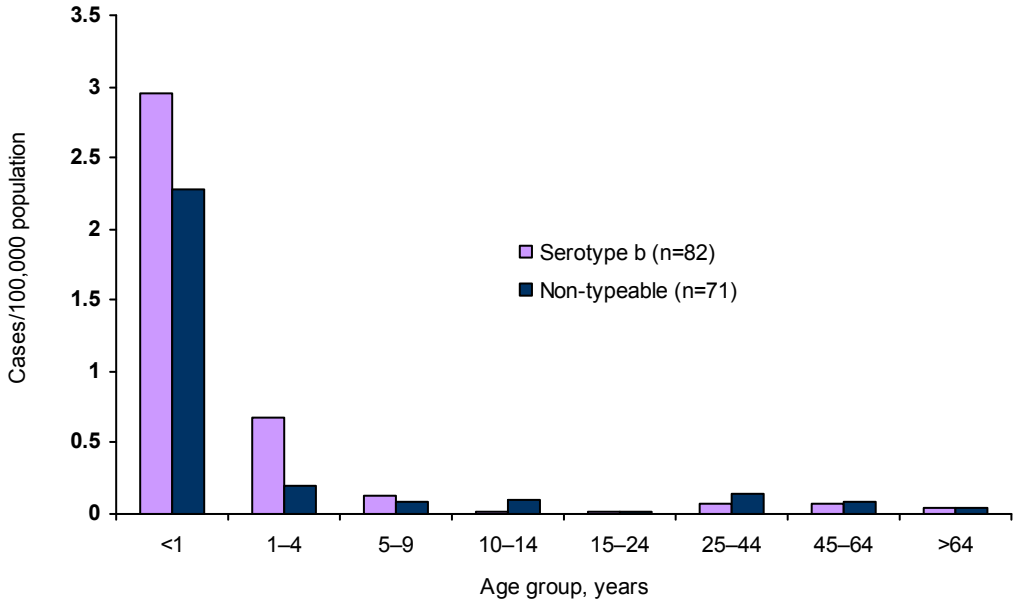

Figure 2: Reported age-specific incidence rates of serotype b and non-typeable *Haemophilus influenzae* disease, South Africa, 2008 (of 392 cases reported, 375 had known age, and 192 had viable isolates available for serotyping).

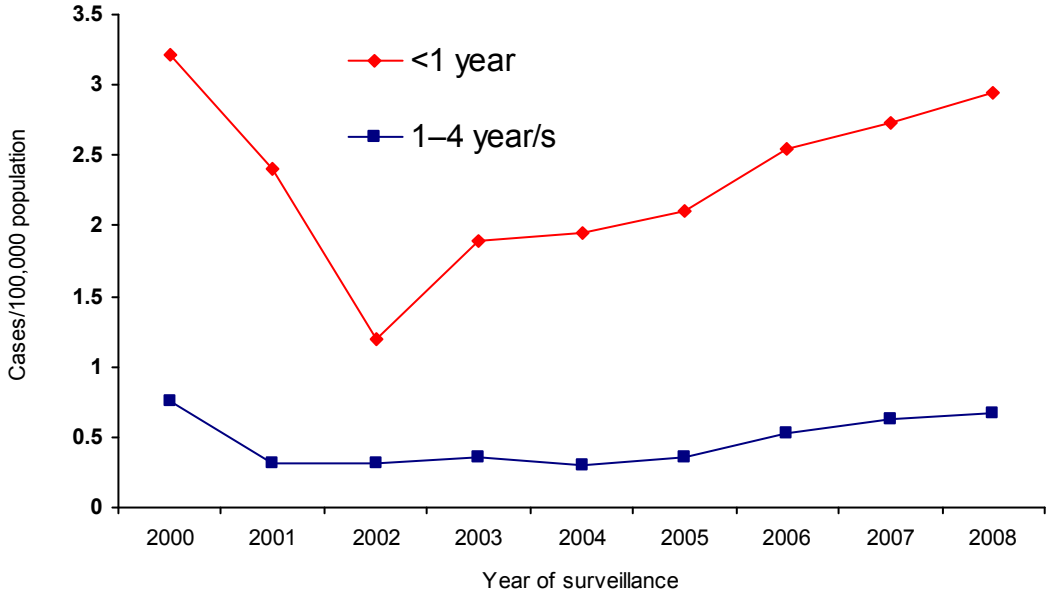

Figure 3: Incidence rates of *Haemophilus influenzae* serotype b disease in children <5 years, South Africa, 2000-2008 (excluding cases identified using polymerase chain reaction (PCR) on specimens – only done in 2007 and 2008).

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1. Clinical and Laboratory Standards Institute (CLSI) (Formerly NCCLS). Performance Standards for Antimicrobial Susceptibility Testing; Seventeenth Informational Supplement. Wayne, Pennsylvania: NCCLS, 2007.

2. von Gottberg A, de Gouveia L, Madhi SA, du Plessis M, Quan V, Soma K, Huebner R, Flannery B, Schuchat A, Klugman K. Impact of conjugate *Haemophilus influenzae* type b (Hib) vaccine introduction in South Africa. *Bull World Health Organ* 2006;84:811-18.

STREPTOCOCCUS PNEUMONIAE

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Results

Incidence of reported invasive pneumococcal disease varied widely by province (Table 1). The age group at highest risk of disease in South Africa was infants <1 year of age (Figure 1). The majority of episodes reported to RMPRU were diagnosed from positive blood culture specimens (Table 2).

Penicillin non-susceptible isolates (meningitis breakpoints, MIC>0.06mg/L[1]), have decreased slightly from 2007 (1430/3330, 43% in 2007 compared to 1246/3288, 38% in 2008, p<0.0001), and this ranged from 33% to 47% in different provinces (Table 3). Non-susceptible isolates were common in children less than 5 years of age (Figure 2). A non-meningitis pneumococcus with an MIC of ≤2mg/L according to updated CLSI guidelines can be considered susceptible.[1] Using these breakpoints, all isolates not culture from CSF were susceptible to penicillin.

Table 1: Number of cases and incidence rates of invasive pneumococcal disease reported to RMPRU by province, South Africa, 2007 and 2008.

Province	2007		2008	
	n	Cases/100 000	n	Cases/100 000
Eastern Cape	354	5.00	359	5.07
Free State	316	10.64	319	10.73
Gauteng	2272	24.27	2357	24.78
KwaZulu-Natal	538	5.48	573	5.79
Limpopo	146	2.56	113	1.96
Mpumalanga	282	8.62	258	7.83
Northern Cape	56	6.12	85	9.23
North West	201	5.18	192	4.93
Western Cape	567	11.69	587	11.87
South Africa	4732	9.89	4843	10.03

Table 2: Number and percentage of cases of invasive pneumococcal disease cases reported to RMPRU by specimen type, South Africa, 2007 and 2008.

Site of specimen	2007		2008	
	n	%	n	%
CSF	1725	36%	1752	36%
Blood	2586	55%	2650	55%
Other	421	9%	441	9%
	4732		4843	

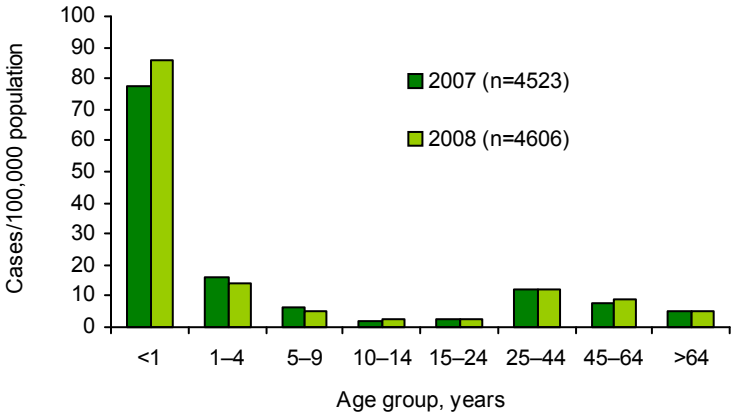

Figure 1: Reported age-specific incidence rates for invasive pneumococcal disease, South Africa, 2007 and 2008 (2007: 4732 cases reported, age known in 4523; 2008: 4843 cases reported, age known in 4606).

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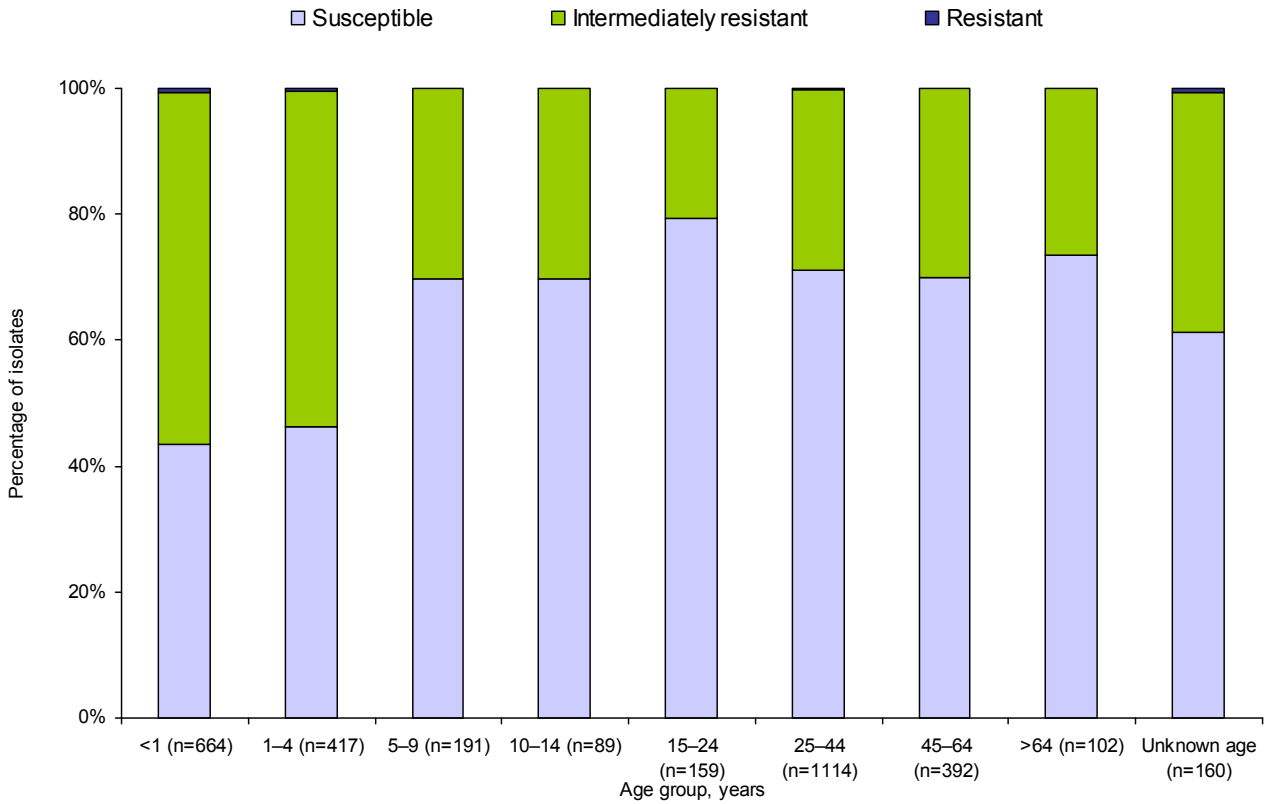

Figure 2: Number of cases of IPD reported to RMPRU in 2008 by age group and penicillin susceptibility (non-susceptible MIC>0.06mg/L[1]) to penicillin (4843 cases reported, 3822 with viable isolates).

The percentage of disease in 2008 in children <5 years due to the seven serotypes in the vaccine (4, 6B, 9V, 14, 18C, 19F and 23F), and serotype 6A (ongoing evidence for cross-protection within this serogroup[2]), in South Africa ranges from 65% to 79% by province according to our data (Table 4). Newer valency vaccines will be licensed in the near future, and these show additional coverage for serotypes causing disease in our children (Table 4, Figure 3).

Table 3: Number and percentage of penicillin non-susceptible isolates from invasive pneumococcal disease cases reported to RMPRU by province, South Africa, 2008.

Province	No isolate available	Susceptible		Intermediately resistant		Resistant	
	n	n	%	n	%	n	%
Eastern Cape	169	116	61	74	39		0.0
Free State	94	136	60	89	40		0.0
Gauteng	789	1012	65	552	35	4	0.3
KwaZulu-Natal	94	252	53	226	47	1	0.2
Limpopo	66	28	60	19	40		0.0
Mpumalanga	131	75	59	51	40	1	0.8
Northern Cape	13	48	67	24	33		0.0
North West	95	64	66	33	34		0.0
Western Cape	104	311	64	168	35	4	0.8
South Africa	1555	2042	62	1236	38	10	0.3

Table 4: Number and percentage of cases reported in children less than 5 years of age caused by the serotypes contained in the 7-valent, 10-valent and 13-valent vaccine, South Africa, 2008.

Province	Total isolates available for serotyping	7-valent serotypes (incl 6A)		10-valent serotypes		13-valent serotypes	
		n	%	n	%	n	%
Eastern Cape	56	39	70	41	73	48	86
Free State	71	52	73	58	82	63	89
Gauteng	511	330	65	387	76	430	84
KwaZulu-Natal	176	135	77	141	80	157	89
Limpopo	7	5	71	6	86	6	86
Mpumalanga	43	33	77	33	77	38	88
Northern Cape	28	19	68	20	71	22	79
North West	19	15	79	16	84	16	84
Western Cape	185	144	78	145	78	164	89
South Africa	1096	772	70	847	77	944	86

7-valent serotypes: 4, 6B (6A), 9V, 14, 18C, 19F, 23F
10-valent serotypes: 4, 6B (6A), 9V, 14, 18C, 19F, 23F, 1, 5, 7F
13-valent serotypes: 4, 6B, 9V, 14, 18C, 19F, 23F, 1, 5, 7F, 19A, 3, 6A
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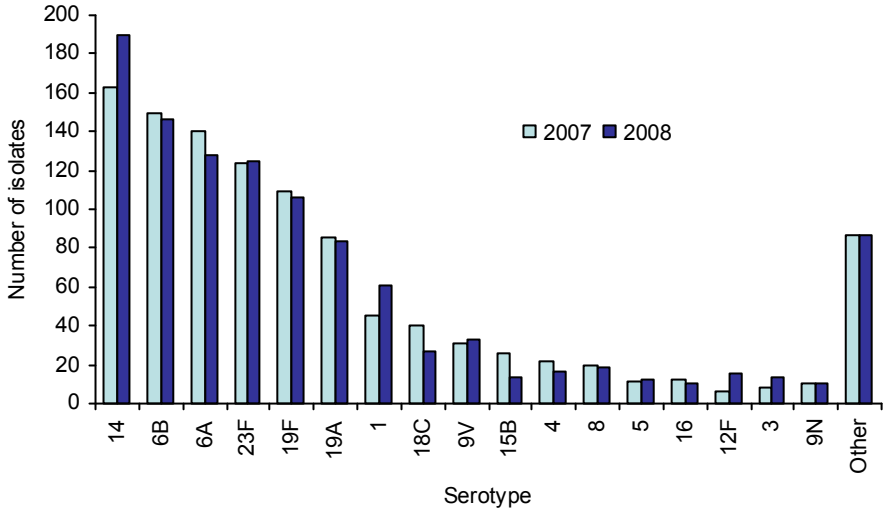

Figure 3: Descending order of pneumococcal serotypes causing IPD in children <5 years, South Africa, 2007 (n=1471, 1090 [74%] with viable isolates) and 2008 (n=1464; 1096 [75%])

Discussion

Our data for 2008 show no further increases in penicillin resistance. As has been documented for many years now, most isolates are intermediately resistant to penicillin, and if these pneumococci are isolated from patients with pneumonia, the new 2008 CLSI breakpoints will classify them as susceptible.[1] We will continue to use the meningitis MICs as a more sensitive method to monitor trends over time.

PREVENAR® (7-valent conjugate pneumococcal vaccine, PCV7) was launched in South Africa in the private sector in 2005 by Wyeth South Africa (Pty) Ltd, and is at present the only vaccine for the prevention of pneumococcal disease in children <2 years. This vaccine will be introduced into the Expanded Programme on Immunisation (EPI) in South Africa from 1 April 2009. New vaccine formulations containing 10 (PCV10) or 13 serotypes (PCV13) will be available in 2009 and 2010. These vaccines have the potential to markedly reduce the burden of invasive pneumoccal disease in the future. Ongoing surveillance is essential to document this reduction and monitor ongoing patterns of serotype distribution.

References

1. Clinical and Laboratory Standards Institute (CLSI) (Formerly NCCLS). Performance Standards for Antimicrobial Susceptibility Testing; Eighteenth Informational Supplement. Wayne, Pennsylvania: NCCLS, 2008.

2. Whitney CG, Farley MM, Hadler J, Harrison LH, Bennet NM, Lynfield R, Reingold A, Cieslak PR, Pilishvili T, Jackson D, Facklam RR, Jorgensen JH, Schuchat A. Decline in invasive pneumococcal disease after the introduction of protein-polysaccharide conjugate vaccine. *N Engl J Med* 2003; 348: 1737-46.

Table 1: Provisional number of laboratory confirmed cases of diseases under surveillance reported to the NICD - South Africa, corresponding periods 1 January - 31 December 2007/2008*

Disease/Organism	Cumulative to 31 Dec, year	EC	FS	GA	KZ	LP	MP	NC	NW	WC	South Africa
Anthrax	2007	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0
Botulism	2007	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0
Cryptococcus spp.	2007	1023	528	2076	1286	471	743	61	590	441	7219
	2008	1359	542	2158	1442	455	809	62	787	626	8240
Haemophilus influenzae, invasive disease, all serotypes	2007	28	23	201	67	5	23	3	4	66	420
	2008	32	24	170	42	4	21	4	6	89	392
Haemophilus influenzae, invasive disease, < 5 years											
Serotype b	2007	1	2	25	11	0	2	1	2	15	59
	2008	5	7	22	9	2	3	2	2	10	62
Serotypes a,c,d,e,f	2007	1	1	19	2	0	0	0	0	6	29
	2008	2	2	18	0	0	1	0	0	6	29
Non-typeable (unencapsulated)	2007	0	1	32	9	0	2	0	0	4	48
	2008	3	3	15	3	0	1	0	0	8	33
No isolate available for serotyping	2007	12	7	49	16	2	6	2	0	17	111
	2008	11	0	45	9	1	8	0	2	16	92
Measles	2007	6	1	9	3	2	6	0	1	2	30
	2008	7	1	11	6	1	3	2	5	4	40
Neisseria meningitidis, invasive disease	2007	18	39	260	33	9	25	9	33	77	503
	2008	28	21	224	34	5	35	8	14	88	457
Novel Influenza A virus infections	2007	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0
Plague	2007	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0
Rabies	2007	5	0	0	8	1	0	0	0	0	14
	2008	8	0	0	5	3	1	0	0	0	17
**Rubella	2007	295	19	144	240	120	62	36	66	118	1100
	2008	488	18	301	612	197	303	34	171	38	2162
Salmonella spp. (not typhi), invasive disease	2007	77	48	458	105	24	31	13	41	83	880
	2008	105	30	491	112	14	46	20	28	88	934
Salmonella spp. (not typhi), isolate from non-sterile site	2007	195	45	356	109	54	133	23	58	158	1131
	2008	229	61	505	192	59	121	22	53	177	1419
Salmonella typhi	2007	12	1	21	10	6	12	0	2	7	71
	2008	10	1	22	11	2	26	0	0	10	82
Shigella dysenteriae 1	2007	0	1	0	0	0	0	0	0	0	1
	2008	0	0	0	0	0	0	0	0	1	1
Shigella spp. (Non Sd1)	2007	206	84	458	130	27	133	52	41	358	1489
	2008	187	85	510	142	33	96	28	23	409	1513
Streptococcus pneumoniae, invasive disease, all ages	2007	354	316	2272	539	146	282	56	201	566	4732
	2008	359	319	2357	573	113	258	85	192	587	4843
Streptococcus pneumoniae, invasive disease, < 5 years	2007	126	107	636	208	38	77	20	45	213	1470
	2008	99	110	665	203	23	76	34	42	212	1464
Vibrio cholerae O1	2007	0	0	0	0	0	0	0	0	0	0
	2008	1	1	28	0	121	39	1	2	4	197
Viral Haemorrhagic Fever (VHF)											
Crimean Congo Haemorrhagic Fever (CCHF)	2007	0	0	0	0	0	0	1	0	0	1
	2008	1	3	0	0	0	1	5	1	0	11
†Other VHF (not CCHF)	2007	0	0	0	0	0	0	0	0	0	0
	2008	0	0	12	0	2	6	0	0	0	20

Footnotes

*Numbers are for cases of all ages unless otherwise specified. Data presented are provisional cases reported to date and are updated from figures reported in previous bulletins.

**Rubella cases are diagnosed from specimens submitted for suspected measles cases; †Other VHF = Rift Valley Fever 17 (6 MP, 9 GA, 2 LP) and Arenavirus 3 (GA)

Provinces of South Africa: EC – Eastern Cape, FS – Free State, GA – Gauteng, KZ – KwaZulu-Natal, LP – Limpopo, MP – Mpumalanga, NC – Northern Cape, NW – North West, WC – Western Cape

U = unavailable, 0 = no cases reported

Table 2: Provisional laboratory indicators for NHLS and NICD, South Africa, corresponding periods 1 January - 31 December 2007/2008*

Programme and Indicator	Cumulative to 31 Dec, year	EC	FS	GA	KZ	LP	MP	NC	NW	WC	South Africa
Acute Flaccid Paralysis Surveillance											
Cases < 15 years of age from whom specimens received	2007	46	33	66	54	35	26	12	22	31	325
	2008	59	20	56	67	49	38	6	15	32	342
Laboratory Programme for the Comprehensive Care, Treatment and Management Programme for HIV and AIDS											
CD4 count tests											
Total CD4 count tests submitted	2007	211665	89425	400537	487710	120578	133361	12592	148353	144564	1748785
	2008	291077	119938	537975	804791	192605	179556	12097	196567	184443	2519049
Tests with CD4 count < 200/µl	2007	80374	34549	156398	170047	52006	49673	2741	51006	36755	633549
	2008	109966	41191	202540	233102	68134	66330	10651	66177	53520	851611
Viral load tests											
Total viral load tests submitted	2007	82866	33511	159979	185522	44050	40042	6323	55984	47018	655295
	2008	123219	51647	245817	290243	83674	64098	1276	81078	62166	1003218
Tests with undetectable viral load	2007	34109	17365	87444	104392	21891	20020	249	32037	37893	355400
	2008	61269	31317	146547	165331	48464	34548	815	50926	50135	589352
Diagnostic HIV-1 PCR tests											
Total diagnostic HIV-1 PCR tests submitted	2007	16764	5903	39473	42630	9024	7102	2146	10538	14518	148098
	2008	24873	9751	51879	60846	14819	10840	553	14261	16712	204534
Diagnostic HIV-1 PCR tests positive for HIV	2007	3047	1421	7508	8274	1985	1782	19	2270	1554	27860
	2008	3253	1744	7373	9433	2627	2102	448	2394	1579	30953

Footnotes

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Provinces of South Africa: EC – Eastern Cape, FS – Free State, GA – Gauteng, KZ – KwaZulu-Natal, LP – Limpopo, MP – Mpumalanga, NC – Northern Cape, NW – North West, WC – Western Cape

U = unavailable, 0 = no cases reported

ERRATUM

November 2008; 6:4:18. **Table 1: Provisional number of laboratory confirmed cases of diseases under surveillance reported to NICD, South Africa, corresponding periods 01 January - 30 September 2007/2008**. In the initial pdf publication circulated, the numbers presented in the table were incorrect. This has been subsequently corrected. The correct figures can be found in the corrected version of this publication available at: http://www.nicd.ac.za/pubs/survbull/2008/CommDisBullNov08_Vol0604.pdf

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