NATIONAL HEALTH LABORATORY SERVICE
NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES

COMMUNICABLE DISEASES
SURVEILLANCE BULLETIN

VOLUME 9. NO 4 November 2011

FOREWORD

The recent identification of patients infected with enterobacteriaceae carrying the New Delhi metallo-β- lactamase in South Africa has brought renewed public attention to the problem of antimicrobial drug resistance in an era of rapid global travel. The article included in this month's bulletin summarises the main features of the organisms as well as the challenges related to identification and control.

The diagnosis of pertussis may be challenging due to the non-specific clinical presentation and difficulties in making a laboratory diagnosis. For this reason, it is likely that the diagnosis is very often missed. Data presented here, summarising numbers of laboratory-confirmed pertussis cases diagnosed at the National Health Laboratory Service over a 4 year period, highlight the fact that cases of pertussis do occur in South Africa and that there is a need for more robust surveillance programmes to better understand the epidemiology of the disease.

Ongoing evaluation of surveillance programmes is important because it allows for critical review to occur and improvements to be made. The evaluation of the acute flaccid paralysis (AFP) surveillance programme in Mpumalanga included in this edition highlighted challenges with case- and specimen-handling as well as challenges with access to hard-to-reach populations. Such challenges are likely not unique to the AFP surveillance programme. Hopefully interventions introduced as a result of this evaluation will serve to strengthen the polio surveillance programme as well as other related programmes.

Cheryl Cohen, Editor

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EVALUATING THE ACUTE FLACCID PARALYSIS SURVEILLANCE SYSTEM — MPUMALANGA PROVINCE, SOUTH AFRICA, 2005-2009

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Abstract
Background: Acute flaccid paralysis (AFP) surveillance was launched in South Africa in 1997 to monitor polio eradication. **Methods:** Using US CDC's updated guidelines, the Mpumalanga Province's (MP) AFP surveillance system was evaluated. **Results:** Between 2005-2009, 161 AFP cases were notified; the case detection rate per year was 2 cases/ million children <15 years, with one polio compatible case identified. Four of ten WHO targets, and five of seven timeliness indicators for effective surveillance were met. **Conclusion:** AFP surveillance in MP is adequate, however, case identification and specimen handling must be improved. Providing fax machines and increasing access for hard-to-reach populations are recommended.

Introduction
Poliomyelitis is a highly infectious and incurable viral disease. Currently, four countries worldwide (Afghanistan, India, Pakistan and Nigeria) continue to report indigenous wild poliovirus transmission.

Only immunizations interrupt poliovirus transmission.[1-2] Development of epidemiologic and laboratory surveillance systems form part of the strategy to identify all acute flaccid paralysis (AFP) cases and disrupt transmission. A case of

AFP is defined as sudden weakness or paralysis in the leg (s) and/or arm(s), not caused by injury, including Guillain Barré syndrome, in a child <15 years of age or a patient of any age.[3] AFP is a group of syndromes presenting like poliomyelitis in the early stages.[3] To ensure no poliomyelitis case goes undetected, surveillance targets AFP (symptom) rather than poliomyelitis (disease).[3] Passive AFP surveillance was implemented in South Africa in 1997 and the country was certified polio-free in 2006.[3]

Our study evaluated how the AFP surveillance system in Mpumalanga province (MP) performed over a previous 5 year period and assessed the knowledge levels about AFP among relevant health care workers (HCW's).

Methods

A cross-sectional study was conducted, analyzing MP's AFP notified cases aged <15 years old between January 2005 and December 2009. Additionally, Infection Control Nurses (ICNs) at all MP health facilities (231 clinics, 44 community health centres (CHCs), 28 public hospitals and five private hospitals) were interviewed using self-administered questionnaires to assess their knowledge level about AFP. Evidence regarding performances were analysed using system attributes according to the CDC updated guidelines:[4] sensitivity, positive predictive value (PPV), timeliness, completeness, simplicity, flexibility, acceptability, representativeness and stability. The WHO indicators for evaluating timeliness of AFP surveillance systems were used (see table 3). Sensitivity was calculated by dividing the notified AFP cases, by the sum of these cases and missed AFP cases which were later discovered by weekly retrospective hospital record reviews. AFP knowledge levels among HCW's, as well as usefulness of the surveillance system were determined from the questionnaires.

Data was analysed using STATA 11 (StataCorp®) and Epi Info 3.5.1 (CDC). Ethical approval was obtained from MP.

Results

Between January 2005 and December 2009, 161 AFP cases aged <15 years old were notified through MP's AFP surveillance system (Figure 1). Most cases were male (53%) and approximately 60% of them were five years old or younger. One case was determined to be compatible with poliomyelitis because no other medical reason was found for the patient's residual paralysis.

Knowledge

The questionnaire response rate was 54% (167/308). The proportions of health facilities that responded were 55.8% (129/231) of clinics; 48% (21/44) of CHCs; 50% (14/28) of public hospitals; and 60% (3/5) of private hospitals. Overall, 49% (81/167) of HCW's felt well informed about AFP. Of these HCW's, 79% (64/81) managed to identify the first three AFP signs and symptoms (floppy muscle, fever and muscle pain) correctly; 43% (35/81) knew AFP was transmitted fecal-orally; however, 36% (29/81) perceived AFP was airborne and 21% (17/81) thought it was transmitted both routes.

AFP case detection rate

MP's AFP case detection rate reached the WHO target of ≥ 1 AFP case/100 000 children in 2005 and ≥ 2 AFP cases/100 000 children per year between 2006 and 2009 (Figure 2).

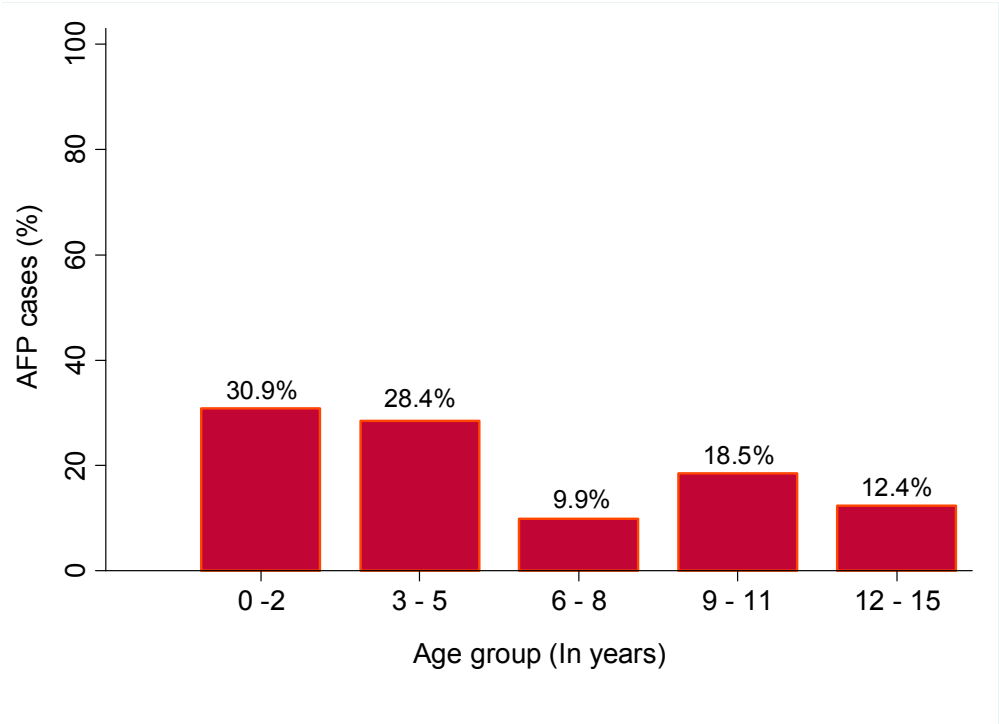

Figure 1: Age distribution of acute flaccid paralysis (AFP) cases notified in MP between January 2005 and December 2009, (N=161).

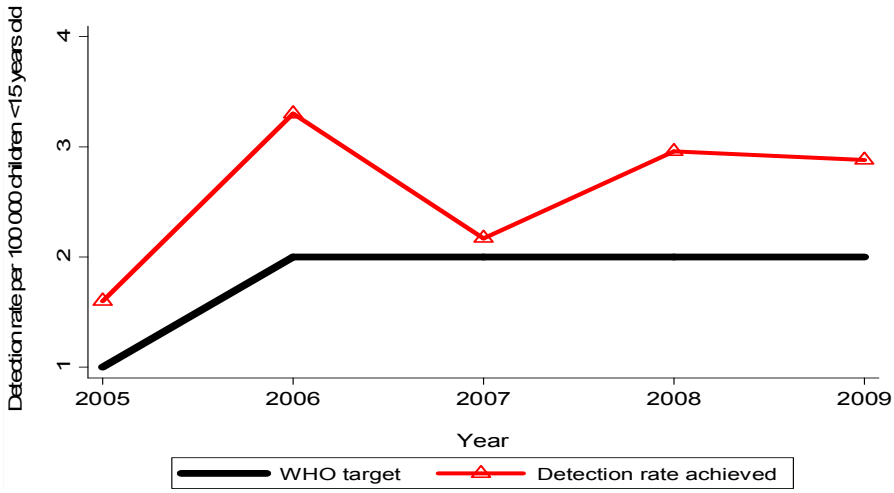

Figure 2: Acute flaccid paralysis case detection rate per 100 000 children less than 15 years old in MP, 2005 – 2009 (N=161).

Surveillance attributes

Four attributes met the WHO targets set for an effective surveillance system. These attributes were: usefulness, completeness, acceptability and five of the timeliness indicators. Results of all the attributes that did not meet the desired targets are outlined below:

Sensitivity[a]

The AFP surveillance system missed 24 AFP cases which were later discovered by retrospective hospital record reviews. As a result, the sensitivity of the surveillance system did not meet the WHO target (100%), but instead ranged between 81% and 91% through the years.

Positive Predictive Value[b]

Six suspected AFP cases detected by surveillance system were denotified by the Polio Expert Committee because they were not true AFP cases. Consequently, PPV ranged between 92% and 100% between 2005 and 2009. The WHO PPV target (100%) was met in 2005 and 2007.

Stability[c]

All private hospitals reported that they had access to reporting facilities such as fax machines and internet which were functional all the time. On the contrary, 89% of public hospitals and 67% of clinics and community health centers had access to these reporting facilities however; they were functional less than 25% of the time (Figure 3). Thirty-five percent of health facilities reported that they had backup storage of surveillance data. The surveillance system was therefore not stable.

Timeliness[d]

Overall timeliness of the arrival of stool specimens to the laboratory 3 days (72 hours) after collection between 2005 - 2009 was continuously below the WHO target of 80% reaching a minimum of 44% in 2008. Amongst all the suspected AFP cases that did not have two stool samples collected in time (140/161), a 60 day follow-up investigation was delayed for 17% to 75% of these cases between 2005 - 2008. This was below the WHO target of 80%. Timeliness of 60 day follow-up investigations improved to 100% in 2009. The performance of all timeliness indicators is summarised in table 1.

Representativeness[e]

Farms, informal settlements, rural areas and the boundaries of some catchment areas were reported as hard-to-reach by some facilities (21%, 35/167) mostly because mobile clinics were not functional. Efforts to reach these areas had been made by some facilities (34%, 12/35) with no success. The surveillance system was therefore not representative.

Simplicity[f]

Amongst the facilities that had ever managed an AFP case (26%, 43/167): 42% (18/43) found collecting stool specimens difficult; 19% (8/43) had faced difficulties (unavailability of: transport, cooler boxes, icepacks, and labels) transporting stool specimens to the laboratory; and 23% (10/43) found completing case investigation forms difficult. The surveillance system was therefore not simple.

Flexibility[g]

Some respondents (26%, 38/145) perceived the Mpumalanga AFP surveillance system flexible enough to change and one example in place was the fortnightly surveillance activities as opposed to monthly. More evidence was required to determine if the surveillance system was flexible or not.

[a]Sensitivity refers to the proportion of actual AFP cases in MP that were detected and notified through the AFP surveillance system
[b]PPV refers to the proportion of AFP cases notified through the Mpumalanga AFP surveillance system that actually meet the AFP case definition
[c]Stability refers to the reliability of methods for obtaining and managing data of the AFP surveillance system
[d]Timeliness refers to the availability of data in time for appropriate action to be taken. Aspects of timeliness are data collection, management, analysis, interpretation or dissemination
[e]Representativeness refers to the degree to which the AFP surveillance system operating in each health facility is able to reach all areas and groups within the facility's catchment area
[f]Simplicity refers to the ease of operation of the AFP surveillance as a whole
[g]Flexibility refers to the ability of the AFP surveillance system to adapt to changing needs

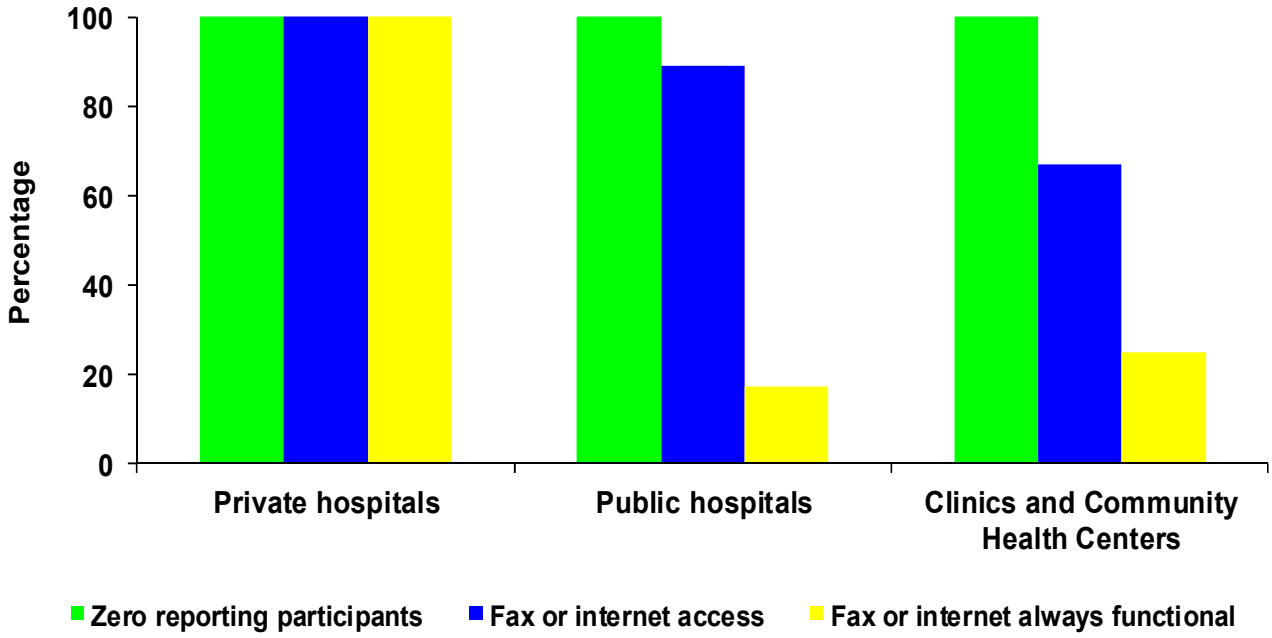

Figure 3: Completeness of reporting sites and stability of the AFP surveillance system in MP.

Discussion

Re-importation of poliovirus in South Africa remains a threat, with relatively nearby African countries such as Angola and Nigeria still reporting wild poliovirus transmission.

MP's AFP surveillance system exceeded the WHO case detection rate targets; however, the system had low sensitivity, missing 24 cases. This low sensitivity may be due to absent staff or staff not solely designated to AFP surveillance (ICNs in some health facilities, communicable disease coordinators in some sub-districts). In addition, the system erroneously detected six cases that did not meet the AFP case definition maybe due to poor case detection knowledge.

Delayed arrival of stool specimens to the laboratory was mainly due to unavailability of after hours and weekends specimen transport from health facilities, plus further delays by the receiving depot in dispatching specimens to the Enterovirus Testing Laboratory. There was also insufficient training of staff on proper specimen receiving and dispatching procedures, e.g. specimens did not arrive at the laboratory on ice, thus compromising integrity.

Residual paralysis 60 days after AFP onset, with no alternative diagnosis, requires immediate control measures because poliovirus may be the cause of paralysis. Poor timeliness of 60 day follow-up investigations was possibly due to absence of dedicated HCW's, as well as high staff workload (Morgan B, 2010, personal communication). Identification of a polio-compatible AFP case during this evaluation suggests deficiencies in the surveillance system that hinder efforts to verify that wild poliovirus is no longer being transmitted in MP.[5]

The surveillance system had good completeness despite instability from absent or non functioning fax machines and computers at health facilities. Supplementing paper-based with a computer-based system should facilitate data management, analysis, use, follow-up of suspected AFP cases, dissemination and monitoring of progress towards eradication at all levels.[6] Flexibility of the surveillance system was not measured; however, implementation of the suggested changes may allow future flexibility assessment.

Conclusion

MP's AFP surveillance system met four of the ten WHO targets, and five of the seven timeliness indicators for an effective surveillance system.

Improvements are expected in the timeliness of stool specimens' arrival to the laboratory and in proper handling given the training provided to staff on correct procedures. Planning for specimen transportation/storage for after hours and weekends should be done. Regular AFP workshops may reduce AFP case identification knowledge gap among health care workers, especially the new staff. Provision and maintenance of fax machines and computers may improve stability of the surveillance system. Increasing access for hard-to-reach groups is necessary at remote sites to address pockets of non-immunized children living in conditions conducive for poliovirus spread.[7]

Table 1: Timeliness indicators of MPs AFP surveillance system between 2005 and 2009.

Indicator for timeliness	WHO target (%)	Timeliness achieved (%)
Weekly AFP zero reports received at the province by Monday 12 noon	>80	90
AFP cases investigated within 48 hours of notification	>80	97
AFP cases with two adequate stool specimens collected 24-48 hours apart and less than 14 days of onset (stool adequacy)	>80	99
AFP cases with stool specimens arriving at NICD within 3 days of being sent	>80	56
AFP specimens with laboratory results sent within 28 days of specimen receipt	>80	97
AFP specimens stool specimens arriving at laboratory in good condition.	>80	100
AFP cases with a follow-up exam performed at least 60 days after paralysis onset	>80	46
Average timeliness	**>80**	**83.6**

Acknowledgments
This study received financial support from the South African Field Epidemiology and Laboratory Training programme (SAFELTP) funded by the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not reflect the views of SAFELTP or CDC. We are very grateful for the dedication of the ICNs, the communicable disease coordinators and the AFP Surveillance Officer who are the backbone of this surveillance system. Special thanks to Dr Seymour Williams who assisted with editing this report.

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DISSEMINATION OF NDM-1 ENTEROBACTERIACEAE IN SOUTH AFRICA

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Introduction
Carbapenems, such as imipenem and meropenem, are the most potent β-lactam antimicrobial drugs for highly resistant gram-negative bacteria. The develoment of antimicrobial resistance may occur as a result of natural mutations of bacterial as a consequence of overuse of antibiotics. Resistance to carbapenems in Entero-bacteriaceae may be mediated by three mechanisms: hyperproduction of an AmpC (Class C) type cephalo-sporinases combined with decreased drug permeability through the outer membrane, decreased affinity of penicillin-binding proteins that constitute target proteins for carbapenems, and carbapenem-hydrolyzing β-lactamases. These carbapenemases may be either plasmid-mediated metallo-β-lactamases (imipenem active metallo-β-lactamases (IMP), Verona-integron encoded metallo-β-lactamases (VIM), German imipenemase (GIM-1) and new New Delhi metallo-β-lactamase (NDM)-type 1) that are zinc-dependent or chromosomally encoded, zinc-independent and clavulanate-inhibited enzymes (not metalloenzyme carbapenemase (NMC-A), imipenem-hydrolyzing β-lactamases (IMI-1), *Serratia marcescens* enzyme SME-1/SME-2).[1,2] Acquired carbapenemases have a high structural diversity and in most instances hydrolyse not only carbapenems, but also oxyimino-cephalosporins and cephamycins.[3] The zinc ion is an essential cofactor for the observed biological function of these metallo-enzymes.[2]

The metallo-β-lactamases were discovered in the mid-1960, in species with low pathogenic potential (*Stenotrophomonas maltophilia*, *Aeromonas* species, *Bacteroides fragilis*, and *Pseudomonas* species). In the

1990s, the spread of genes encoding metallo-β-lactamases carried on mobile DNA elements among major Gram-negative pathogens such as Enterobacteriaceae become of great concern.[4]

The Health Protection Agency (HPA) from the United Kingdom recognises and reports on three major carbapenemase groups routinely: (i) metallo-beta-lactamases; (ii) *Klebsiella pneumoniae* carbapenemases (KPC enzymes) and (iii) oxacillin-hydrolyzing (OXA)-enzyme. The metallo-beta-lactamase, NDM-1 has emerged since 2008 amongst Enterobacteriaceae, particularly *K. pneumoniae*, *Escherichia coli*, *Citrobacter freundii*, *Enterobacter cloacae* and *Morganella morganii*.[5]

Epidemiology of organisms

Current data indicate an increase in the spread not only of NDM-1, but also of other carbapenemase-producing Enterobacteriaceae worldwide.[3] The majority of cases in many reports had a history of recent travel and hospital admission on the Indian subcontinent. The data presented by Walsh show the potential for widespread dissemination of these enzymes in the environment in central New Delhi.[6] Some studies have determined the risk of healthcare-associated acquisition of NDM-1 and other carbapenemase-producing Enterobacteriaceae in different parts of the world.[3]

Laboratory detection

Carbapenem resistance mediated by NDM-1 enzyme has been detected by clinical laboratories with routine phenotypic testing methods, including disc diffusion testing.[2] Any Enterobacteriaceae isolate that exhibits a minimum inhibitory concentration (MIC) above the cut-off values or with clinical resistance to ertapenem, imipenem or meropenem should trigger further testing. Carbapenemase activity can be screened by using the modified Hodge test (detection of KPC-enzymes) and, as with other metallo-beta-lactamases, synergy can be detected by EDTA-imipenem disc or Etest. Commonly used automated susceptibility systems show good sensitivity but poor specificity for detection of carbapenem resistance mediated by NDM-1 and other carbapenemases.[2]

Public Health Importance

Key components of public health practices for containment of these resistant organisms include (a) dissemination of national guidelines for microbiological laboratory detection, and (b) recommendations for active surveillance and additional infection control precautions for patients who have received healthcare from countries where NDMs are endemic. Laboratory and epidemiological support should be readily available for the investigation of suspected cases and for the control of secondary transmission.

Dissemination in South Africa

A cluster of patients with colonisation and/or infection with highly-resistant bacteria producing the enzyme NDM-1 were recently identified in a Gauteng hospital.[7] Most of the patients had underlying conditions that would place them at greater risk of acquiring these organisms, and had been hospitalised for an extended period. Clinicians should be aware of the possibility of NDM-1-producing Enterobacteriaceae in patients who have received medical care in India or Pakistan and Bangladesh, and should specifically enquire about this risk factor when carbapenem-resistant Enterobacteriaceae are identified. Carbapenem-resistant isolates from patients admitted to hospitals can be forwarded to the Antimicrobial Resistance Reference Laboratory at the Centre for Opportunistic, Tropical and Hospital Infections at the NICD for further characterization.

Management

The optimal treatment of such infections is not well established and clinical outcome data remain sparse. Due to complexities regarding treatment options and decreased susceptibility to polymyxin B during treatment of carbapenem resistant Enterobacteriaceae it is essential to fully investigate patients with culture and susceptibility.[8]

A multidisciplinary team of specialists such as infectious diseases, microbiologist, physician, intensivist and others with experience should be involved in management of these patients. A recent meta-analysis on efficacy and safety of tigecycline for the treatment of infectious diseases indicated lower efficacy on multidrug-resistant organisms in comparison to standard regimens.[9]

Control interventions

Screening of colonisation with multidrug-resistant organisms upon admission to hospitals has been advocated in patients who have received healthcare in endemic countries or epidemic facilities.[3] Further interventions include pre-emptive isolation or clustering of these patients and barrier precautions for the period while the screening results are pending, and continued for colonised patients.[3]

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LABORATORY-CONFIRMED PERTUSSIS IN THE PUBLIC HEALTH SECTOR, 2008-2011

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Introduction

Worldwide, pertussis is an increasingly recognised disease even in countries with high vaccination coverage rates. This resurgence has been attributed to waning immunity over time, particularly in the absence of widespread community-level circulation of the organism which previously would have boosted immunity.[1-4] Furthermore, there is increasing recognition of the importance of pertussis not only in infants (among whom severe morbidity and mortality risks are highest), but also in adolescents and adults who usually present with atypical clinical manifestations and constitute the major reservoir for infection of younger children.[1-4] Reliable country-specific epidemiological data is critical in informing national control strategies and immunisation policies. Although it is a notifiable condition in South Africa, the available passive surveillance data from the Department of Health regarding pertussis is suboptimal and limited, and there is an urgent need for additional robust, reliable surveillance data.

As a first step towards understanding pertussis epidemiology in South Africa, we present a short report on the findings of a data mining exercise that aims to provide baseline information on laboratory-confirmed pertussis cases diagnosed within the public-health sector in South Africa between 1 January 2008 and 31 October 2011.

Methods

Data on all *Bordetella pertussis* cases diagnosed by PCR and/or culture by the National Health Laboratory Service (NHLS) between 1 January 2008 and 31 October 2011 were obtained from the NHLS Corporate Data Warehouse. Data from KwaZulu-Natal Province were limited to 2011 only. The data were analysed by basic descriptive variables including time (date of specimen collection as a proxy for date of illness onset), place (location of referring healthcare facility as a proxy for provincial location of the case) and age at diagnosis.

Results

A total of 311 NHLS laboratory-confirmed pertussis cases were identified. The number of pertussis cases diagnosed each year is increasing (Figure 1). The majority of cases were from Gauteng (n=122, 39%), Free State (n=106, 34%) and Western Cape (n=69, 22%) provinces (Table). Children less than 3 months old accounted for 67% (192/287) of the cases with known age (Figure 2). Children less than 6 weeks (age of first vaccination) accounted for 22% (64/287) of cases with known age.

Discussion

Pertussis remains an important public health issue and continues to circulate, largely unrecognised, in South Africa. The observed increase in laboratory-confirmed pertussis cases over time may be attributed to the increasing awareness of the disease and the available laboratory tests, as well as improved laboratory diagnostic capabilities. Nonetheless, increases in disease incidence are being observed elsewhere, including countries with

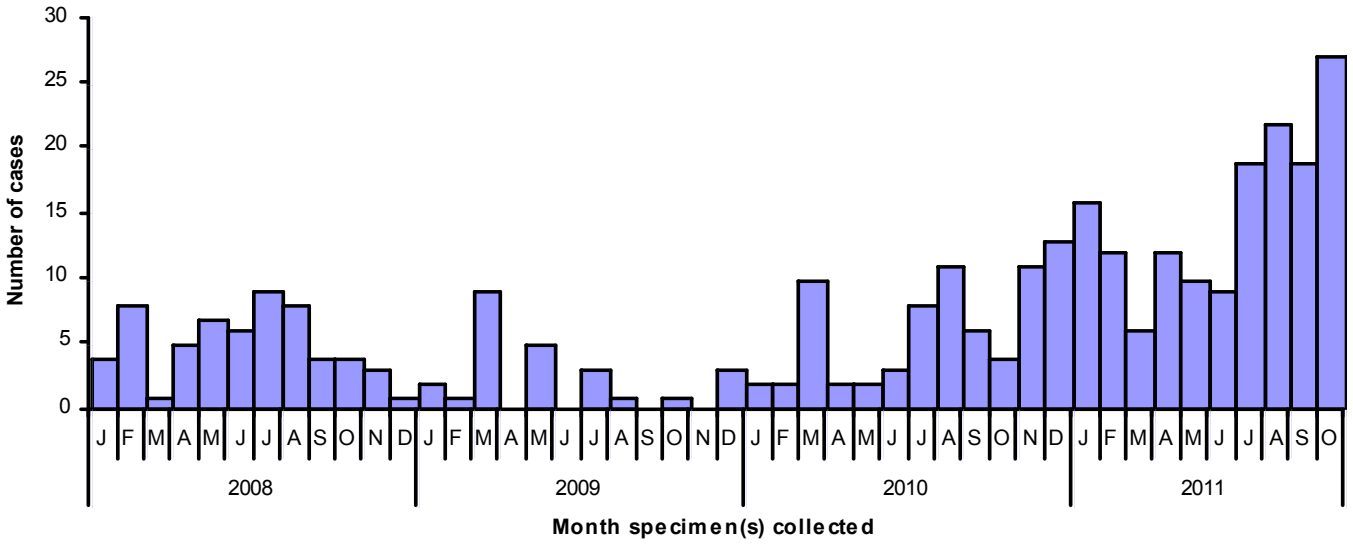

Figure 1: Laboratory-confirmed *Bordetella pertussis* cases by month of specimen collection, South Africa, 2008 – 31 October 2011

Table: Number of laboratory-confirmed *Bordetella pertussis* cases by province and year, South Africa, 2008 – 31 October 2011

	n (%)				
Province	**2008**	**2009**	**2010**	**2011***	**Total 2008-2011***
Eastern Cape	2 (3)	0 (0)	0 (0)	0 (0)	**2 (<1)**
Free State	12 (20)	6 (24)	19 (26)	69 (45)	**106 (34)**
Gauteng	44 (73)	6 (24)	14 (19)	58 (38)	**122 (39)**
KwaZulu-Natal	n/a	n/a	n/a	2 (1)	**2 (<1)**
Mpumalanga	0 (0)	0 (0)	0 (0)	1 (<1)	**1 (<1)**
North West	0 (0)	0 (0)	0 (0)	1 (<1)	**1 (<1)**
Northern Cape	1 (2)	0 (0)	2 (3)	4 (3)	**7 (2)**
Western Cape	0 (0)	13 (52)	39 (53)	17 (11)	**69 (22)**
Unknown	1 (2)	0 (0)	0 (0)	0 (0)	**1 (<1)**
Total	**60 (100)**	**25 (100)**	**74 (100)**	**152 (100)**	**311 (100)**

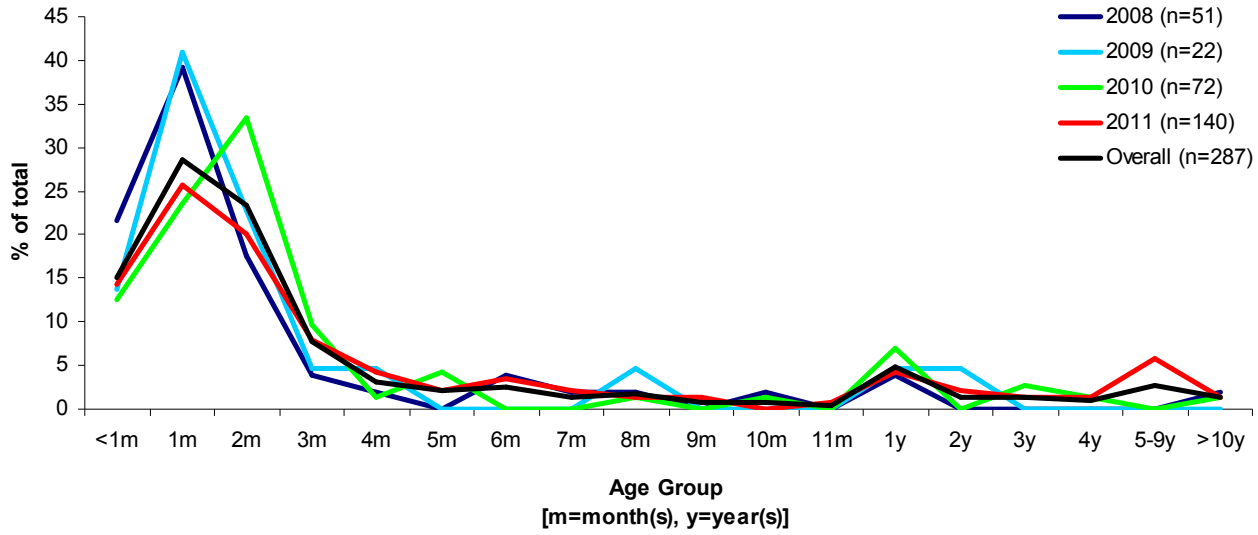

Figure 2: Age distribution of laboratory confirmed *Bordetella pertussis* cases by year, South Africa, 2008 – 31 October 2011 (age known for 92% (n=287) of cases)

high routine vaccination coverage.[1-4] We found the majority of confirmed cases originated from three provinces; this is likely multifactorial and reflects differences in access to and utilisation of healthcare services and NHLS laboratories as well as healthcare workers' index of suspicion for disease. It is likely that more severe cases will be investigated, so these data probably dramatically underestimate the community level disease burden.

We have demonstrated a large proportion of the laboratory-confirmed cases to be young infants, including infants within the age groups targeted by routine vaccinations through the South African Expanded Programme on Immunisations (EPI). This is most likely a surrogate for unrecognised infections among adolescents and adults with waning immunity, who may present with atypical symptoms and for whom, clinically, there remains a very low index of suspicion in South Africa. This has been well-documented by surveillance activities in the US and Europe which show an increasing incidence of pertussis in adolescent and adult populations, despite a decreasing incidence in childhood.[5] The situation in South Africa is likely no different; therefore we potentially have a large reservoir of pertussis in a population with diminishing immunity.

Recommendations

We encourage healthcare workers throughout South Africa to familiarise themselves with the broad clinical presentation of pertussis, which often does not meet the classical definition[6]; i.e. a cough lasting longer than 2 weeks with paroxysms of coughing, inspiratory whoop and/ or post-tussive vomiting. Pertussis should also be considered in persons of all ages with cough, who are in contact with a known pertussis case, and in all infants with apnoea. Furthermore there is a need for increased awareness of, and clinical suspicion for, pertussis in adolescents and adults who represent an important source of infections for non-immune infants. We encourage the collection of appropriate specimens, namely naso-pharyngeal swabs/aspirates, from all suspected cases for laboratory investigations by PCR and bacterial culture (via direct bedside inoculation of specimen onto suitable culture

media). In addition, it is essential for healthcare workers to familiarise themselves with the latest patient treatment, infection prevention and control, and post-exposure prophylaxis recommendations.[7-9]

There is a demonstrated need for more robust surveillance data to truly understand the epidemiology of pertussis in South Africa. Armed with such information we may better understand the possible impact of the various vaccination strategy options, including: introducing a pertussis booster dose at 6 years of age by replacing the current tetanus and diphtheria (Td) vaccine scheduled for this age with the tetanus, diphtheria and acellular pertussis (TdaP) vaccine, as well as cocooning vaccination strategies where possible. Nonetheless, in the interim, there is a need to continue to strengthen the routine EPI to prevent disease in vulnerable children.

Acknowledgements
We acknowledge the NHLS Corporate Data Warehouse for providing the necessary data for this project.

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ERRATUM

In the foreword of volume 9 number 3, when addressing the subject of surveillance of sexually transmitted infections (STIs) in South Africa, it states "updated surveillance data from Gauteng Province demonstrate ongoing high levels of resistance to ceftriaxone amongst *Neisseria gonorrhoeae* isolates" - this should read 'ciprofloxacin' and not 'ceftriaxone'. We would like to apologise for this error. This has been corrected in the available online version of the bulletin.

Table 1: Provisional number of laboratory confirmed cases of diseases under surveillance reported to the NICD - South Africa, corresponding periods 1 January - 30 September 2010/2011*

Disease/Organism	Cumulative to 30 Sept, year	EC	FS	GA	KZ	LP	MP	NC	NW	WC	South Africa
Anthrax	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
Botulism	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
Cryptococcus spp.	2010	936	332	1536	811	389	570	47	375	350	5346
	2011	884	272	1410	813	358	487	42	355	346	4967
Haemophilus influenzae, invasive disease, all serotypes	2010	34	21	138	24	9	11	10	6	70	323
	2011	24	17	113	34	4	18	10	6	75	301
Haemophilus influenzae, invasive disease, < 5 years											
Serotype b	2010	5	8	20	5	3	7	5	1	12	66
	2011	2	2	14	10	0	3	3	2	10	46
Serotypes a,c,d,e,f	2010	0	1	7	0	1	1	0	0	8	18
	2011	1	1	8	1	0	0	0	0	4	15
Non-typeable (unencapsulated)	2010	1	1	39	4	0	0	1	1	11	58
	2011	0	2	22	5	0	0	0	0	9	38
No isolate available for serotyping	2010	9	2	15	0	2	1	0	1	5	35
	2011	9	4	17	5	3	4	5	1	7	55
Measles	2010	1297	646	1419	3796	289	1812	322	739	1762	12082
	2011	1	2	34	23	1	1	8	6	6	82
Neisseria meningitidis, invasive disease	2010	20	19	154	27	10	19	17	8	46	320
	2011	30	20	111	16	6	13	6	5	38	245
***Novel Influenza A virus infections	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
Plague	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
Rabies	2010	2	0	1	3	3	1	0	0	0	10
	2011	0	0	0	1	3	0	0	0	0	4
**Rubella	2010	262	77	193	284	37	137	40	168	260	1458
	2011	199	23	398	183	321	252	44	213	79	1712
Salmonella spp. (not typhi), invasive disease	2010	35	17	271	60	12	14	12	9	55	485
	2011	10	17	193	50	3	20	6	7	54	360
Salmonella spp. (not typhi), isolate from non-sterile site	2010	155	37	495	165	11	67	6	30	130	1096
	2011	106	21	370	133	11	56	16	15	176	904
Salmonella typhi	2010	6	2	23	8	1	9	0	0	8	57
	2011	7	2	14	8	1	9	0	1	14	56
Shigella dysenteriae 1	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
Shigella spp. (Non Sd1)	2010	181	40	520	102	9	36	20	15	325	1248
	2011	173	39	455	124	9	21	29	11	406	1267
Streptococcus pneumoniae, invasive disease, all ages	2010	310	229	1422	330	80	187	79	131	450	3218
	2011	243	171	1201	280	48	150	51	141	432	2717
Streptococcus pneumoniae, invasive disease, < 5 years	2010	54	39	324	85	13	38	32	23	112	720
	2011	34	34	237	42	7	36	15	21	89	515
Vibrio cholerae O1	2010	0	0	1	0	0	0	0	0	0	1
	2011	0	0	0	0	1	0	0	0	0	1
Viral Haemorrhagic Fever (VHF)											
Crimean Congo Haemorrhagic Fever (CCHF)	2010	0	1	0	0	0	0	2	0	0	3
	2011	0	0	0	0	0	0	0	0	0	0
****Other VHF (not CCHF)	2010	17	123	0	0	0	0	76	9	11	236
	2011	17	3	0	0	0	0	2	0	14	36

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

**Rubella cases are diagnosed from specimens submitted for suspected measles cases.

*** Confirmed cases. Excludes pandemic influenza H1N1. See weekly influenza reports on www.nicd.ac.za.

**** All Rift Valley fever . For 2010 the total includes 1 case from an unknown province.

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

U =unavailable, 0 = no cases reported

Table 2: Provisional laboratory indicators for NHLS and NICD, South Africa, corresponding periods 1 January - 30 September 2010/2011*

Programme and Indicator	Cumulative to 30 Sept, 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	2010	38	9	42	49	32	24	2	15	17	228
	2011	51	24	73	69	62	35	5	15	17	351
Laboratory Programme for the Comprehensive Care, Treatment and Management Programme for HIV and AIDS											
CD4 count tests											
Total CD4 count tests submitted	2010	293,479	164,847	575,264	715,141	193,772	223,094	47,622	188,736	177,881	2,579,836
	2011	324,022	166,706	630,105	832,838	225,589	267,508	51,510	202,424	214,642	2,915,344
Tests with CD4 count < 200/µl	2010	92,118	49,369	187,679	168,809	61,507	67,789	13,668	54,716	45,050	740,705
	2011	87,563	43,424	184,463	159,079	65,432	74,861	12,583	51,961	43,428	722,794
Viral load tests											
Total viral load tests submitted	2010	103,042	54,014	262,753	246,723	62,629	68,129	19,886	76,154	79,649	972,979
	2011	113,235	63,517	258,044	365,886	73,482	86,768	20,044	75,390	102,403	1,158,769
Tests with undetectable viral load	2010	64,479	35,829	181,968	181,074	43,967	51,765	12,078	49,910	60,601	681,671
	2011	73,435	50,142	174,210	262,228	50,772	59,555	13,777	49,605	79,168	812,892
Diagnostic HIV-1 PCR tests											
Total diagnostic HIV-1 PCR tests submitted	2010	22,244	10,531	45,348	56,933	16,016	17,202	3,539	13,866	13,077	198,756
	2011	26,087	11,668	49,152	63,437	17,932	19,100	3,854	15,104	13,815	220,149
Diagnostic HIV-1 PCR tests positive for HIV	2010	1,792	938	4,212	4,490	1,570	1,610	307	1,264	784	16,967
	2011	1,522	672	3,031	3,466	1,129	1,083	215	899	570	12,587

Footnotes

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

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

The Communicable Diseases Surveillance Bulletin is published by the National Institute for Communicable Diseases (NICD) of the National Health Laboratory Services (NHLS), Private Bag X4, Sandringham, 2131, Johannesburg, South Africa.

Suggested citation: [Authors' names or National Institute for Communicable Diseases (if no author)]. [Article title]. Communicable Diseases Surveillance Bulletin 2011; 9(4): [page numbers]. Available from http://www.nicd.ac.za/pubs/survbull/2011/CommDisBull August 2011.pdf