NICD

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NATIONAL HEALTH LABORATORY SERVICE

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of the National Health Laboratory Service (NHLS)

Task Force on Immunisation in Africa (TFI) award for outstanding support to the Polio Eradication Programme in Africa awarded to the Polio Diagnostic and Molecular laboratories of the NICD in December 2005

Left to right : Nicksy Gumede (Lab Manager - Polio Molecular), Olivia Letsoane (Polio Molecular), Mr John Robertson (CEO NHLS), Shelina Moonsamy (Lab Manager - Polio Diagnostics), Prof Barry Schoub (Executive Director NICD)

We would like to acknowledge all the staff members who contributed to this award, particularly Portia Ngcobondwana, Doris Lebambo, Elliot Motaung, Areeve Oliver, Megan Vandecar, Cynthia Simelane and Abraham Sehata from Polio Diagnostics and Alfred Mawela, Verushka Singh, Chris Sifile, Mbali Nyuswa, Busisiwe Guliwe, Olivia Lentsoane, Mbavhalelo Denga, Mashudu Rampilo and Thami Sithebe from Polio Molecular

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Provisional listing: number of laboratory-confirmed cases in South Africa of diseases under surveillance reported to the NICD, corresponding periods 1 January - 30 June 2005/2006

	Disease/ Organism	Case Definition	Subgroup	Cumulative to 30 June, year	EC	FS	GA	KZ	LP	MP	NC	NW	WC	South Africa
VIRAL DISEASES	Acute Flaccid Paralysis	Cases < 15 years of age from whom specimens have been received as part of the Polio Eradication Programme		2005	10	14	15	27	16	6	1	18	6	113
				2006	20	10	34	22	33	18	6	8	15	166
	Measles	Measles IgM positive cases from suspected measles cases, all ages		2005	464	0	34	63	1	3	0	1	13	579
				2006	2	0	11	0	0	2	2	3	0	20
	Rubella	Rubella IgM positive cases from suspected measles cases , all ages		2005	54	2	22	29	4	23	1	9	9	153
				2006	63	8	92	27	19	36	22	16	42	325
	VHF	Laboratory-confirmed cases of CCHF (unless otherwise stated), all ages		2005	0	0	0	0	0	0	0	0	0	0
				2006	0	2	2	0	0	0	2	0	0	6
	Rabies	Laboratory-confirmed human cases, all ages		2005	3	1	0	0	0	0	0	0	0	4
				2006	2	0	0	3	16	0	0	0	0	21
BACTERIAL AND FUNGAL DISEASES	*Haemophilus influenzae*	Invasive disease, all ages	All serotypes	2005	6	8	71	8	1	5	0	0	16	115
				2006	5	11	73	23	0	1	5	1	26	145
		Invasive disease, < 5 years	Serotype b	2005	3	1	11	2	0	0	0	0	2	19
				2006	2	3	12	4	0	1	1	0	6	29
			Serotypes a,c,d,e,f	2005	0	0	6	1	0	1	0	0	3	11
				2006	1	1	10	2	0	0	1	0	2	17
			Non-typeable (unencapsulated)	2005	1	1	20	0	0	1	0	0	1	24
				2006	1	2	18	1	0	0	0	0	2	24
			No isolate available for serotyping	2005	0	1	7	2	0	0	0	0	2	12
				2006	0	2	12	3	0	0	0	0	4	21
	Neisseria meningitidis	Invasive disease, all ages		2005	5	8	108	6	2	3	2	1	28	163
				2006	13	11	133	7	0	9	6	8	25	212
	Streptococcus pneumoniae	Invasive disease, all ages	Total cases	2005	106	79	958	207	30	96	14	45	227	1762
				2006	111	95	928	191	40	78	12	49	230	1734
			Penicillin non-susceptible isolates	2005	25	23	318	72	6	22	4	15	66	551
				2006	28	24	286	64	6	21	4	11	57	501
			No isolate available for susceptibility	2005	14	5	118	18	6	11	1	1	23	197
				2006	23	6	123	19	10	12	0	8	21	222
		Invasive disease, < 5 years		2005	42	31	292	80	11	23	4	11	91	585
				2006	35	31	280	64	10	17	3	14	73	527
	Salmonella spp. (not typhi)	Invasive disease, all ages		2005	23	14	269	53	6	19	0	1	49	434
				2006	20	15	314	51	1	17	0	10	38	466
		Confirmed cases, isolate from a non-sterile site, all ages		2005	108	13	124	114	10	30	3	17	115	534
				2006	48	13	76	78	12	22	10	37	73	369
	Salmonella typhi	Confirmed cases, isolate from any specimen, all ages		2005	13	0	7	8	1	14	0	0	7	50
				2006	15	1	5	9	6	5	0	0	9	50
	Shigella dysenteriae 1	Confirmed cases, isolate from any specimen		2005	0	0	0	0	0	0	0	0	4	4
				2006	0	0	0	1	0	0	0	0	1	2
	Shigella spp. (Non Sd1)	Confirmed cases, isolate from any specimen, all ages	All serotypes	2005	91	22	151	96	11	14	2	3	180	570
				2006	67	29	111	98	6	20	17	11	232	591
	Vibrio cholerae O1	Confirmed cases, isolate from any specimen, all ages	All serotypes	2005	0	0	0	0	0	0	0	0	0	0
				2006	0	0	0	0	0	0	0	0	0	0
	Cryptococcus (*Cryptococcus* spp.)	Invasive disease, all ages	Total cases (incl. *C neoformans*)	2005	222	110	767	430	51	146	14	83	130	1953
				2006	193	110	766	624	73	215	38	109	177	2305
			C. gattii	2005	3	1	26	8	9	10	0	7	6	70
				2006	2	2	13	4	8	14	0	5	4	52

Abbreviations: VHF - Viral Haemorrhagic Fever; CCHF - Crimean-Congo Haemorrhagic Fever

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

0 = no cases reported

THE ESTABLISHMENT OF THE NATIONAL INFLUENZA ADMISSIONS SURVEILLANCE SYSTEM

Cheryl Cohen, Jo McAnerney, Lucille Blumberg
Epidemiology Unit, National Institute for Communicable Diseases

The viral watch surveillance system is a sentinel general practitioner network operated by the NICD since 1984. This surveillance system consists of a network of general practitioners who are requested to submit specimens for influenza isolation on patients with clinical features suggestive of influenza. Isolates cultured from specimens are characterized phenotypically and genotypically. This surveillance system specifically aims to fulfill two main objectives:

1. To provide data on influenza strains for the Southern hemisphere vaccine
2. Provide data on the timing of the influenza season in South Africa

The importance of defining the excess morbidity and mortality associated with seasonal influenza is widely recognized. The high excess morbidity and mortality due to influenza has been well described in many developed countries as well as some tropical regions. Very little is known about morbidity and mortality attributable to influenza in Africa.

Due to its sentinel structure and the ad hoc nature of specimen submission the viral watch surveillance system is not able to provide data on the overall burden of disease due to influenza and does not allow comparison of this burden from year to year.
Burden of disease due to influenza is difficult to estimate for a number of reasons:

- Many cases may be mild and will not present to health- care facilities
- The clinical presentation is non-specific
- Most cases are self-limiting and diagnostic specimens are not routinely sent
- Laboratory diagnosis is often not cost-effective
- Facilities for the laboratory diagnosis of influenza are not widely available

For the above reasons indirect methods are generally used to obtain an estimate of morbidity and mortality attributable to influenza.

To address this issue locally the NICD has established a national data-mining surveillance system in collaboration with private-sector health care providers to monitor admissions for key diagnoses potentially associated with the influenza season.

Specific objectives include:

- To describe seasonal and annual trends in hospital admissions for key diagnoses associated with the influenza season
- To estimate the excess morbidity and mortality attributable to the influenza season
- To use data on attributable morbidity/mortality to estimate potential impact of vaccination
- To allow for comparisons between successive years and different geographic areas.

Data on numbers of cases with respiratory and other diagnoses of interest will be abstracted from the automated data collection systems of private health care providers. Data on viral isolation from the viral watch will be used to establish the weeks of influenza activity for that year (influenza season). These data will be used to estimate excess admissions and deaths attributable to the influenza season and numbers of cases potentially preventable by vaccination. This system will allow us to compare excess burden of disease attributable to influenza by year and province.

Medical Technologist Cardia Esterhuyze performing a haemagglutination inhibition test for subtyping of influenza virus

Some limitations of the surveillance system include:

1. This study is limited to the population of individuals accessing private health care thus findings may not be generalisable to other groups. This population is also poorly defined and population denominators will not be available for calculation of rates.
2. Delays in reporting of data and use of aggregate data would mean that this system would be of limited use for early detection of emerging respiratory infections

Additional benefits arising from the project include the establishment of a data mining network from private healthcare providers. This network could in future be extended to include other communicable diseases of public health importance. Ties between the Private Health sector and the NICD are strengthened, this is important as private health care providers are often under-represented in national surveillance networks.

Acknowledgements: We would like to thank the Netcare Hospital Group for their valuable input. We hope to include additional private health care provider groups as partners in this project in the future.

RESPIRATORY VIRUS SURVEILLANCE UPDATE - 2006 INFLUENZA SEASON

Jo McAnerney, Lucille Blumberg, Cheryl Cohen, Amelia Buys, Terry Besselaar
Epidemiology, Respiratory Virus Isolation & Vaccine Preventable Virus Infections Units,
National Institute for Communicable Diseases

To date a total of 524 influenza isolations have been made, of which 512 (97.7%) were from the Viral Watch programme, the remainder being from routine specimens submitted for respiratory virus isolation. The isolates have been further characterised as 491 influenza A, of which A H3N2 (A/Wisconsin/67/05 -like) accounted for the majority, and 33 influenza B, mainly B/Malaysia/2506/04-like (Figure 1).

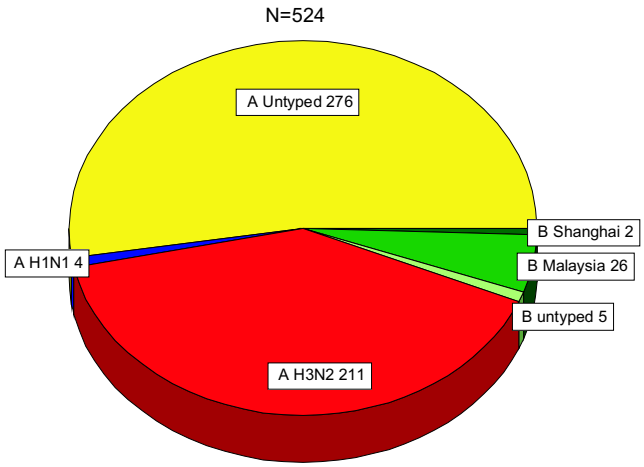

Figure 1 : Characterisation of influenza isolates received by the NICD, 2006

The first influenza isolate of the season was made from a specimen collected on 27 March (week 13) after which sporadic isolates were made (Figure 2). From week 18 (week starting 1 May) isolates were made on a regular basis, with the largest number being made in week 23 (week starting 4 June). The last isolate, to date, has been made from a specimen collected on 28 July (week 30).

This year the Viral Watch was expanded to include centres from the Eastern Cape, KwaZulu/Natal, as well as the Western Cape. As these centres joined when the season had already started it is not possible to say whether the timing of the influenza season differs from Gauteng in these regions. However, it is interesting to note that all the isolates (17) from the Eastern Cape have been identified as influenza A, whereas 2/14 (14%) and 13/26 (50%) of isolates respectively from KwaZulu/Natal and the Western Cape were identified as influenza B virus, compared to 18/455 (5%) in Gauteng.

Molecular characterization has revealed that the 2006 H3N2 strains have drifted from the H3N2 strain in the current vaccine. Representative isolates were sent to one of the WHO Collaborating Centres for Reference and Research on Influenza who confirmed these findings and showed that the H3N2 South African viruses also reacted to low titres with the vaccine antisera. This suggests that the H3N2 strain in the 2006 vaccine may be less protective than in previous years.

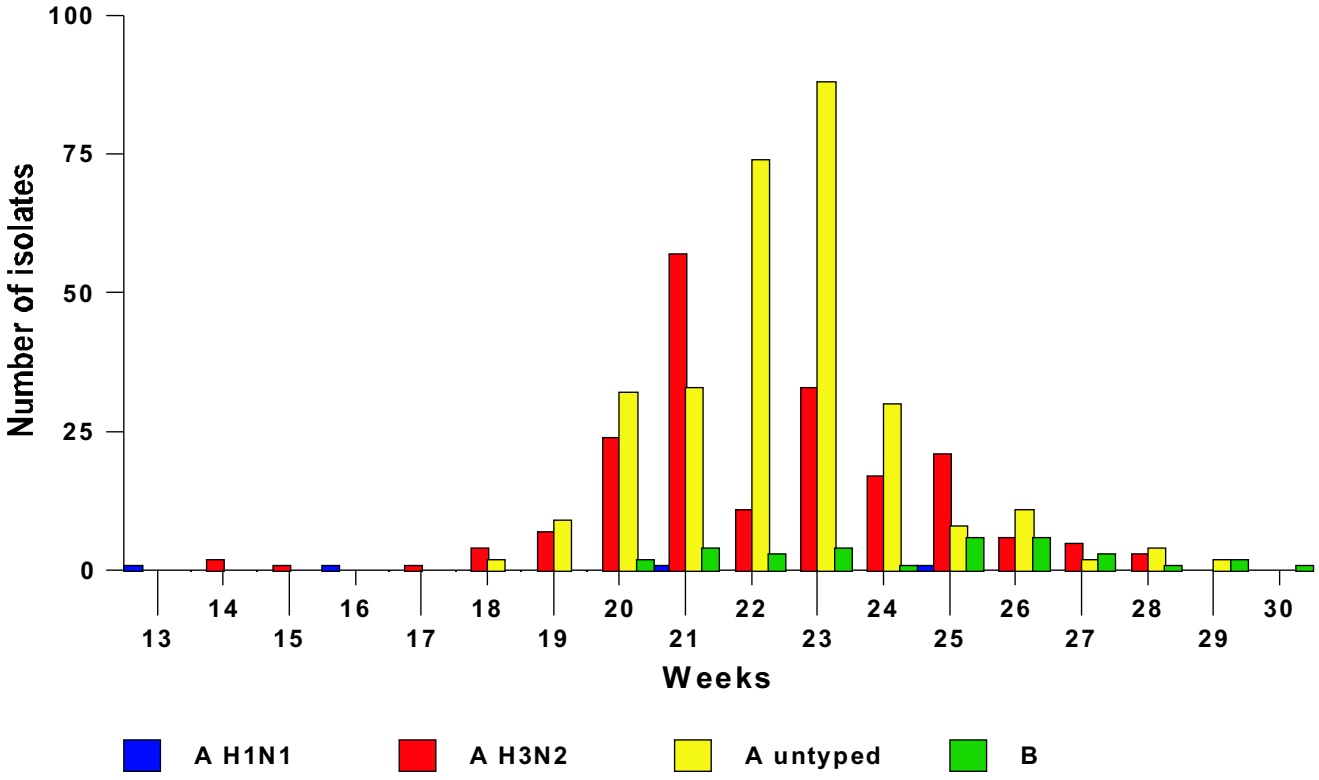

Figure 2 : Number of influenza isolates received at NICD by epidemiologic week and subtype

SOUTH AFRICAN FIELD EPIDEMIOLOGY AND LABORATORY TRAINING PROGRAMME

Bernice N Harris
Epidemiology Unit, National Institute for Communicable Diseases

Although epidemiology can be used simply as an analytical tool for studying diseases and their determinants, it serves a more active role. Epidemiological data steers public health decision making and aids in developing and evaluating interventions to control and prevent health problems. This is the primary function of applied, or field, epidemiology. Field epidemiologists are disease detectives; they study diseases on-site in order to better understand and control them. This "shoe-leather" epidemiology involves helping the investigation team define, find and interview cases, coordinate the collection and analysis of specimens, apply statistical methods to assess factors responsible for illness and recommend control measures.

The South African Field Epidemiology and Laboratory Training Programme (SAFELTP), was established in 2006 at the request of the South African National Department of Health to provide specialised training for health professionals in the practice of applied

Participants, supervisors and facilitators of the first official SA FELTP short course on Outbreak Investigation and Response, May 2006

epidemiology. The primary goal of these training programmes is to develop field-trained epidemiologists who are competent in the practical application of epidemiological methods in a wide range of public health problems in their respective areas. The courses are designed to provide public health officers with the knowledge and skills to conduct surveillance and respond to current diseases as well as the next, yet unknown disease or public health threat and make evidence based decisions. The merging of laboratory, public health and applied epidemiology components makes this a unique programme that will augment South Africa's response to sudden or gradual changes in the patterns of health related conditions e.g. infectious disease outbreaks or annual increases in diabetic out-patient attendees.

The SAFELTP is modelled on the Epidemic Intelligence Service of the Centers for Disease Control and Prevention (CDC) and is the fifth Field Epidemiology Training Programme (FETP) in Africa. There are 34 FETPs world-wide of which two also have an explicit laboratory component, namely Kenya and now South Africa. This alliance is crucial as appropriate intervention often depends on the efficient cooperation of the health departments and the public health laboratory system.

The SAFELTP is designed to train field epidemiology and public health laboratory fellows for leadership positions in the South African national and provincial health services and the National Health Laboratory Services (NHLS). These fellows will receive instruction and mentoring in their respective areas while at the same time providing service to the

National and Provincial Departments of Health and the NHLS. The epidemiology and laboratory tracks will often run in parallel, with several joint sessions and both will contain field projects allowing fellows to transfer learning into the workplace and also provide service to the institution that they represent. The teaching methods include lectures, case studies based on real life experiences and the supervised completion of field surveys from the definition of the study objectives to the analysis and presentation of the results.

Overall, the SAFELTP will consist of both long (residency) and short courses targeting different audiences within the South African public health system and aims to develop skills and competencies that are not easily taught in academic and workplace settings. The short courses are developed according to needs identified by the Department of Health and the NHLS and may range from 3 days to 2 weeks.

Upon graduation from the residency course, graduates will earn a masters degree in public health (MPH) and the recognition, nationally and internationally, that they have undergone Field Epidemiology training. Initially the course will be co-presented by the School of Health Systems and Public Heath (SHSPH) of the University of Pretoria but other universities are being approached so that students may complete most of the class work in their home province. During the 2 years, participants will spend approximately 25% of the time in the classroom and the rest in an appropriate field site e.g. a regional laboratory or provincial health department, doing projects under the supervision and mentorship of a carefully selected supervisor, experienced in epidemiology and laboratory practice or public health.

The programme is initially sponsored by a grant from the CDC but aims to be self sustaining within 3 years. An advisory board consisting of members from the National Department of Health, NHLS, various South African Universities, CDC and individuals who are well respected for their expertise in epidemiology and public health, guides the programme that is managed by the SAFELTP staff. The program is sited on the NICD campus as construction of a training centre with lecture theatre, seminar rooms, training laboratories and a computer laboratory is nearing completion and specialised diagnostic and surveillance laboratories are situated on its campus.

This collaborative training initiative has the potential to significantly add to the existing skill in epidemiology in SA and provides a unique opportunity for acquisition of field epidemiology skills, a scarce resource internationally. The success of the program relies on the ongoing commitment and support of all partners and most importantly the recruitment of dynamic, enthusiastic and dedicated trainees who will ultimately make relevant and skilled contributions to public health for South Africa.

SA-FELTP - ALREADY ON THE MOVE
SHORT COURSE ON OUTBREAK INVESTIGATION AND RESPONSE

Gillian De Jong, Benn Sartorius
Epidemiology Unit, National Institute for Communicable Diseases

The first SA-FELTP short course on "Outbreak Investigation and Response" was conducted in May 2006 and comprised 2 tracks (epidemiology and laboratory) with an additional supervisors and mentors course held simultaneously.

Diagnostic microbiology laboratories traditionally have limited opportunity to actively contribute to public health responses in the field. These limitations are due to many factors some of which can be overcome by a shift in vision, training of key staff in epidemiological principles and in formalizing structures for communication with key public health personnel. Similarly public health personnel may not engage fully with the laboratory due to a lack of recognition of the utility of the laboratory in the public health context and the absence of formalized structures to facilitate such interaction. This can result in significant challenges during outbreak response such as requests for inappropriate diagnostic specimens, misinterpretation of laboratory results and failure to communicate results timeously for effective outbreak activities. In addition, valuable laboratory data may be lost during outbreaks owing to the absence of systems for specific outbreak specimen and data management.

Mr Dick Nemutavhanani processing outbreak specimens

The vision for this course was to attempt to overcome many of the challenges outlined above through the provision of a unique learning environment wherein both key laboratory and public health staff could work together as an outbreak

team, consolidate skills relevant to their respective roles and most importantly, bridge the existing gaps between diagnostic laboratories and public health in the field.

The target audience for the epidemiology track comprised the 9 provincial DOH Communicable Disease Control Coordinators (CDCC's) or equivalent and 1 representative from the national DOH Communicable Disease Directorate who traditionally play a key role in outbreak detection and response in the provinces. Selection of the participants for the laboratory track was more challenging as the position of a laboratory "OutNet (Outbreak Network)" representative did not exist. As such, nominations were requested for one representative from each province who would partner with their respective provincial CDCC for course activities and spearhead the outbreak functions of the laboratory on return to their provinces. Suggested criteria for selection of nominees were provided and included the following:
An individual who is:

- based at a central laboratory within the province which would serve as a natural focal point for coordination of outbreak related laboratory services
- a senior technologist currently occupying a supervisory or equivalent role in microbiology.
- officially permitted to act as the designated microbiology focal point and is available and committed to:
  - Coordinate laboratory outbreak activities for the province with support.
  - Act as the key laboratory contact for the provincial CDCC's during outbreaks.
  - Participate actively as a member of the provincial outbreak team for laboratory liaison
  - Take responsibility for the regular review and reporting of laboratory data trends aimed at early outbreak detection.
- able to work in partnership with existing quality assurance structures and programs to strengthen the microbiological services for the province.

Several methods of instruction were utilized to facilitate adult learning. Group learning was emphasized to optimize the role of the communicable disease coordinators and laboratory staff as members of the outbreak team. Teaching exercises were focused around local scenarios to provide practical application of epidemiological skills in the context of situations in South Africa. Joint sessions with CDCC's and laboratory "OutNet" representatives were used wherever possible to facilitate the formation of an effective network of communication between laboratory personnel and communicable disease coordinators

The specific learning objectives for the epidemiology track included specimen collection and interpretation of laboratory results during an outbreak investigation, collecting and describing epidemiologic data, formulation of hypotheses to identifies the potential source(s) of the outbreak, selecting an appropriate analytic study design to test hypotheses, applying analytic measures to determine frequency and association, describing the key elements required for documenting an outbreak and how to prepare concise reports and recommendations, identifying ways to translate public health recommendations into action.

The content of the laboratory track included material related to several key areas including:

- Steps in outbreak investigation
- Epidemiology for laboratories with emphasis on detection of changes in trends in laboratory data and tools for epidemiological analysis of routine laboratory data.
- Use of a laboratory information system for monitoring of epidemiological data
- The role of the laboratory in outbreak detection and response and as a member of the outbreak team
- Detecting and responding to unusual communicable disease events in the laboratory.
- Recognition of common laboratory errors and their impact on outbreak response

Team work : Ms Noreen Crisp (CDCC Northern Cape), Mr Wayne Ramkrishna (Communicable Disease Control Directorate, National Department of Health) and Eunice Weenink (OutNet laboratory representative Northern Cape)

- Appropriate specimen collection and processing for outbreaks
- Surveillance systems in SA
- The application of all aspects of quality management systems in the outbreak context
- Report writing for outbreaks
- Communication during outbreaks and the importance of information sharing
- Best practice for the diagnosis of epidemic prone diseases

Each of the participants on the course selected or was provided with a supervisor who attended a supervisor's course for 3 days. This course culminated in a planning session in which participants and supervisors discussed potential field projects for completion during the 4-6 months following the course. These projects are aimed at improving systems for outbreak detection and response which may include specific assessment of existing surveillance systems, capacity assessment of laboratories for outbreak response, critical review of current or previous outbreak responses amongst others. Projects will be presented by all participants at a follow up course in October 2006. The outcomes of these field projects will contribute to the post course evaluation and assist with directing future course content.

Evening team building - some light relief!

Future short courses in outbreak investigation and response will be conducted with the ultimate aim of creating a strong laboratory-public health partnership at all levels of the health system and future target audiences will include the district and sub-district level CDCC's with their laboratory counterparts in order to create an integrated laboratory-field epidemiology network for outbreak detection and response nationally. The 2 year residency program of the SAFELTP will complement and drive the fulfillment of this objective and many others.

Graduates Mr Phadish Mamaila (OutNet representative, Limpopo) and Ms Mamokete Mogoswane (Manager, epidemiology services, Limpopo Province) being presented with their certificates by Dr Gillian de Jong and Mr Benn Sartorius.

SAFELTP
FIELD EPIDEMIOLOGY and LABORATORY TRAINING PROGRAMME

For more detail regarding the programme and courses that will be offered, please download a copy of the SAFELTP brochure at: http://www.nicd.ac.za/.

The closing date for applications for the 2 year SAFELTP MPH in Field Epidemiology has been extended to 20 August 2006. Details can be found at: http://www.nicd.ac.za/units/feltp/feltp.htm or http://shsph.up.ac.za/FELTP/index.html.

OUTBREAK OF POLIO IN NAMIBIA, MAY-JULY 2006

Cheryl Cohen, Lucille Blumberg, Jo McAnerney, Shelina Moonsamy & Alfred Mawela
Epidemiology, Polio Diagnostic and Polio Molecular Units, National Institute for Communicable Diseases

Twenty cases of laboratory-confirmed wild poliovirus type 1 have been reported from Namibia as of August 3, 2006. Stool specimens for polio testing have been received from more than 200 clinically suspected cases of acute flaccid paralysis. Prior to this outbreak, the last reported case of polio from Namibia was in 1995.

Laboratory-confirmed cases were reported from Windhoek (14), Mariental (1), Oshakati (2), Okahanja (1), Okahao (1) and Engela (1) (Figure 1). Three of these cases are reported to have died. Eighteen of the 20 confirmed cases were male and ages ranged from 14-51 years (mean 27 years). The index case was a 39 year old man with sudden onset of paralysis on 8 May. An epidemic curve (Figure 2) of suspected and confirmed clinical cases with stool specimens submitted to the NICD for polio testing suggests a propagated epidemic. The large increase in number of specimens submitted in July could be related to increased awareness and reporting of acute flaccid paralysis cases.

A national mass vaccination campaign with monovalent oral polio type 1 vaccine was conducted in Namibia. The campaign consisted of two rounds of vaccination targeting patients of all ages. The first round was from 21- 23 June and the second round was from 18-20 July. A 3rd round of vaccination targeting only children under 5 years of age is planned for 22 August. To date there have been no breakthrough cases (confirmed case more than 10 days after the round of vaccination).

Molecular analysis indicates that the recent isolates are most closely related to strains from the outbreak in Angola in 2005 and are of the SOAS genotype (which is endemic to India). Comparison of genetic sequences suggests that the virus has been circulating in humans for about 2 ½ years.

Due to the close proximity to Namibia South Africa could be at risk for imported cases of polio. The last laboratory-confirmed case of polio in South Africa was reported in 1989. All children in South Africa should receive 5 doses of trivalent oral polio vaccine (TOPV) according to the Expanded Programme on Immunisation. Additional vaccines may also be given as part of mass-vaccination campaigns. The last mass immunisation campaign in South Africa was conducted in 2004.

The South-African response to the outbreak in Namibia has included intensified surveillance for acute flaccid paralysis cases of all ages and an advisory that all travelers to Namibia should receive a booster dose of TOPV 7-10 days prior to travel. An emergency mop-up immunization campaign targeting districts with below 80% TOPV coverage was conducted in June 2006. A national polio campaign targeting all children < 5 years of age is planned for later in 2006.

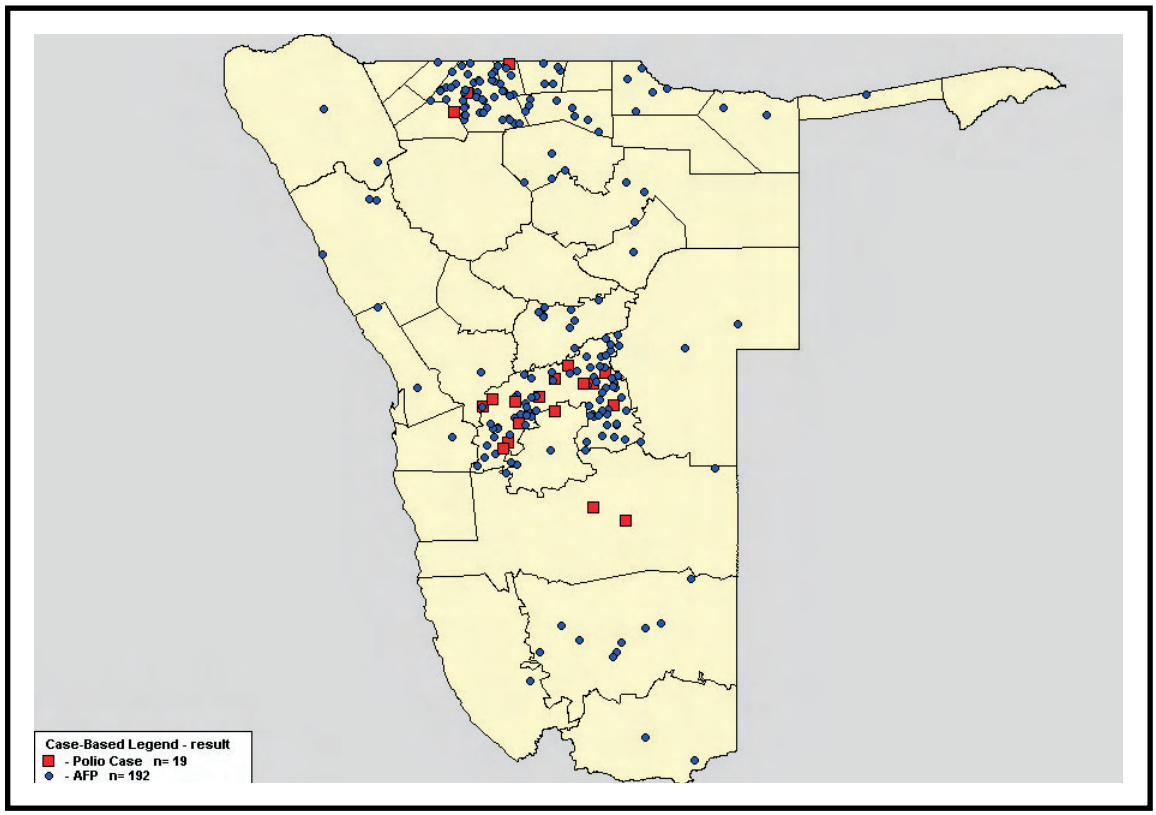

Figure 1 : Map of the distribution of suspected and confirmed polio cases, Namibia, April-July 2006

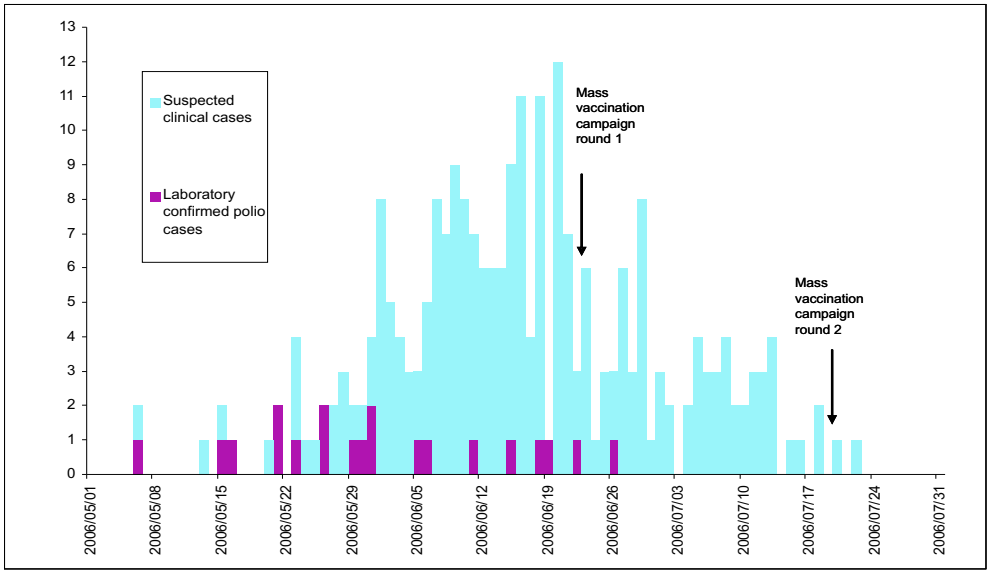

Figure 2 : Epidemic curve of acute flaccid paralysis cases with stools submitted to NICD for polio testing, Namibia, 15 April to 31 July 2006

EXPERT COMMENTARY - NAMIBIA POLIO OUTBREAK

Barry D Schoub
Executive Director, National Institute for Communicable Diseases

The 2006 Namibian polio outbreak is as unexpected as it is unusual. Unexpected and profoundly disappointing as the country had apparently been free of the disease for over a decade. Certainly highly unusual with regard to the age distribution and to some extent the gender distribution. Why the disease was largely confined to young adult males and not children from both sexes remains to be elucidated by careful epidemiological investigation. It could be speculated that the very late start to routine immunization in Namibia could have resulted in a highly unusual accumulation of susceptible adults lacking protective antibodies either from immunization or from infection with wild-type virus. (Namibia only commenced routine immunization after its independence in the early 1990s). However, there could well be other epidemiological explanations for the accumulation of young males mainly clustered in the informal settlements adjacent to Windhoek. The high proportion of severe cases, some still requiring assisted ventilatory support and 3 deaths out of 20 cases is a graphic reflection of the greater severity of poliomyelitis in adult populations.

Molecular analysis of poliovirus isolates has provided epidemiologists with a very powerful tool for understanding the behaviour of the virus in outbreaks. As a routine, the VP1 gene (coding for the main structural protein of the virus) is sequenced (some 906 nucleotides) in all isolates of wild-type virus. By comparing the nucleotide sequences of isolates a phylogenetic tree can be constructed which graphically detects the extent of homology between isolates. This provides epidemiologists with 3 very useful bits of information. Firstly, isolates with close homology can be inferred to be epidemiologically linked. Secondly, gaps between isolates can indicate deficiencies in surveillance. Thirdly, the extent of sequence differences is a measure of the duration the virus has been circulating in a population the so called “molecular clock”. This is based on the fact that the virus mutates at a constant rate during its replication in the human host at 1% change in its nucleotide sequence per annum.

The viruses isolated from the Namibian outbreak belong to a genotype code-named SOAS, which is endemic in India. Sequence analysis of the Namibian isolates reveal a 2.5% difference from parental Indian strains indicating that the virus has been in Africa for at least that period of time. This genotype has also caused smaller outbreaks in Angola (10 cases in 2005) and presently in the Democratic Republic of the Congo (3 cases in 2006). Exactly what route the virus took towards the 3 neighbouring countries is not clear. However, what is apparent is that it was imported into Africa over 2 years ago and has been circulating in human hosts during this period of time making its clinical appearance as outbreaks in clusters of susceptible individuals in Angola, DRC and now in Namibia. Thus there has been a failure of both immunization to achieve adequate coverage and also serious surveillance gaps.

The Namibian outbreak could give rise to despondency and despair that the final goal of polio eradication may not be achievable. However, it is important to recognise that the goal has, in fact, almost been reached already, but that the final steps may now well be the hardest. Milestones of success which have been achieved include the elimination of the virus from most of the world's population: 3 of the 6 WHO regions have already been declared to be polio free Americas (1994), Western Pacific (2000) and European (2002) regions. Type-2 polio virus has probably already been eradicated, the last human case of wild-type 2 poliovirus was reported in India in 1999. Recent use of monovalent type 1 and to a lesser extent monovalent type 3 has been highly successful in countries with difficult to control polio. For example, Egypt has succeeded in eliminating polio in 2005 and India has cut the incidence of polio by more than half from 2005 up to the end of June 2006. Also the number of endemic countries has been reduced from 6 in 2005 to 4 in 2006 and countries with imported polio from 20 in 2005 to 9 in 2006. Unfortunately the world is still living with the legacy of the interruption of polio immunization in Nigeria from 2003 and that country still accounts for 80% of the world's cases of polio.

The clear lesson of the Namibian outbreak is that if the virus is not eradicated from the world, all countries will remain vulnerable to imported polio if immunization coverage levels drop below 90% or if surveillance activities are not sustained.

TOWARDS POLIO ERADICATION : LABORATORY CONTAINMENT OF WILD POLIOVIRUSES IN SOUTH AFRICA

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In 1988 the World Health assembly resolved to eradicate poliomyelitis globally, based on the experience gained during small pox eradication in 1979. The Global Certification Committee (GCC) is responsible for the monitoring and evaluation of this process.

In the eighteen years of the initiative, considerable progress has been achieved with a great reduction in the annual number of new cases from 350,000 to less than 2000 new cases currently. Three WHO regions have already been certified as polio free viz. the Americas (1994), the Western Pacific (2000) and the European Regions (2004). Eradication and certification activities are progressing well in the other three endemic regions viz. the African, Eastern Mediterranean and South East Asia Regions. The requirements for a region to be certified as polio-free include firstly, a show of absence of wild poliovirus from cases of acute flaccid paralysis (AFP), suspect with polio or from healthy individuals or from environmental samples in all WHO regions for a period of at least 3 years in the presence of high quality, certification-standard surveillance. Secondly, containment of all wild poliovirus stocks in laboratories through completion of the requirements of the WHO global action plan for laboratory containment of wild polioviruses [1] .

Senior Technologist Portia Ngcobondwana innoculating vials for culture of poliovirus. Polio Diagnostic Laboratory

The need for Laboratory containment has been necessitated by the small pox experience. Less than a year after smallpox was eradicated two cases occurred in the United Kingdom, both linked to laboratory-associated smallpox. Therefore, the purpose of this exercise is to minimize the risk of reintroducing wild polioviruses from the laboratory to the community. Although, the absolute laboratory containment of any virus cannot be guaranteed, experience indicates that effective containment of wild poliovirus material for global certification is technically and operationally feasible[2]

The laboratory containment exercise is divided into three phases viz. **Phase I**, which begins when Regions are polio-free and involves sending out Survey and Inventory forms to all biomedical/medical laboratories. **Phase II**, which begins when one year has elapsed without isolation of wild poliovirus anywhere in the world. Laboratories are notified to either dispose of all wild poliovirus infectious/potentially infectious materials, or implement appropriate bio-safety requirements and **Phase III** which is a post global certification phase.

South Africa is currently carrying out **Phase 1** activities of this exercise. A data base has been created (not yet complete), including laboratories from the biomedical research institutions, academic institutions, culture collections, environmental agencies, hospitals/clinics, military, producers of vaccines and public health agencies. The laboratories have been categorized into those (a) most likely to possess wild poliovirus (b) may possess wild polio and (c) least likely to possess wild poliovirus material (necessary to quantify risk)[2]

Awareness to generate support was raised through symposiums, posters/talks, website, phone, e-mail and mail. Survey forms designed by WHO and modified have been sent out (pre-tested and piloted) to most of the laboratories identified. The response rate is satisfactory. Follow ups on non-responders are in progress. Laboratories identified with infectious or potentially infectious material have been sent Inventory forms to record all such material from their freezers. A selected number of laboratories will be visited.

All biomedical/medical laboratories in the country are kindly requested to support this initiative. Note should be taken that should South Africa not complete the containment process, it is unnecessarily at increased risk of polio re-introduction from either a research laboratory or a vaccine manufacturing site[3]

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ETHICS AND INFECTIOUS DISEASES

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Broader interactions beyond the pathogen and the disease it causes must be considered in the control of infectious diseases. These include both the host and the environment in which she and the pathogen live. The complexities of these interactions which necessarily demand a 'holistic' outlook mirror the complexities involved when considering the ethical issues raised in this context. As opposed to much bioethical debate where the central tension often lies between the individual and her capacity for choice, ethical consideration regarding infectious diseases moves beyond the individual to consider the society and world in which she finds herself (1 & 2). Debate often includes concerns as to how to balance the individual good with that of society (1 & 2). This short essay will highlight some of these concerns. It will, however, do this in a descriptive fashion and no arguments as to the resolution of these dilemmas will be proposed.

The communicability of infectious diseases (1 & 2), goes straight to the heart of the debate concerning the balancing of the individual and societal good. Utilitarian notions of the good are often sought to justify 'right' public health action. These do not consider individual claims and so many have invoked the discourse of human rights to ensure individual interests (3 & 4). Human rights are those (moral) rights which all people possess in virtue of their biology. They are enshrined in international law and essentially control the relationship between the state and the individual (5), and so are very useful for safeguarding individual interests against those of public health authorities (6). Examples where human rights may be invoked are those where an authority seeks to infringe upon an individual's right to liberty by issuing orders for quarantine, isolation or travel restrictions in the case of an outbreak, such as the SARS outbreak in 2003 (7). Or where the right to privacy is overridden by the public need to know in the case of disease surveillance. Human rights law says that such measures are only justifiable under strict, narrowly definable conditions enshrined in the Siracusa Principles (5). Recently ethical, as opposed to legal, principles to justify the public health responses have been proposed (11). These principles contend that an action is justified if it is intended to protect the community from a greater harm, is carried out in the least coercive manner, is undertaken transparently and ensures the individual is able to fulfill the restrictions imposed on him without incurring any personal loss (11). These principles aim to fill a gap in the ethics of public health which until recently seemed only to be addressed by the rights-based approach.

But rights are only a part of our 'moral armamentarium' and the sole reliance on rights as the only recourse to moral action in such dilemmas has been criticized (8). Moral theory also offers us duties. Simplistically put duties, in general, are obligations we may owe to others or ourselves. Some duties arise as correlatives of rights but others do not. Duties well known in medical ethics include the duties of care owed by healthcare workers (HCW) to their patients. However, in the case of communicable diseases, especially highly contagious ones, their limits have been questioned (7 & 9). Can a HCW refuse or be given the option to care for a patient with SARS, Ebola or MDR-TB? The HCW may not be thinking of their own health in their refusal, but that of transmitting the infection to their loved ones. This raises an interesting notion, put forward by the late Jonathan Mann, that the patient with an infectious disease is both 'victim and vector' (3). This added status of 'vector' may provide justifications for the limiting of patient rights but may also impose additional moral duties on the patient or indeed any exposed person. Perhaps as a vector patients may have a moral duty not to infect other people (9). This could imply not only a justification for the imposition of quarantine, isolation and travel restrictions but may also justify the imposition of mandatory testing, mandatory treatment or mandatory vaccination (9 & 10). This duty may even circumvent the need for ethical principles to guide public health action, as it seems to impose a direct responsibility on the individual for the wellbeing of their community.

Another property of infectious diseases leading to much debate is their relationship to poverty. Much has been written recently about how infectious diseases highlight the important ethical concern for justice especially on a global scale (2 & 12). Given our history over the last few centuries, and especially our more recent economic history, it is no surprise that many preventable and treatable infections still account for most deaths in the developing world (12 & 13). How is this to be redressed? Given the threat infectious diseases pose to global security some have argued that rational self-interest should dictate some redress by wealthy nations (12). Others have argued for the development of 'moral imagination' or a better developed capacity for empathy for everyone in the development of health policy (13).

The above-mentioned comments consider some (by no means all) of the ethical issues raised by infectious diseases. Although a full account of these is beyond my scope and that of this essay, I hope to have put forward some questions for which answers may be found with ongoing debate.

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