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Surveillance and certification of global polio eradication

4.1 Surveillance

Monitoring of sub-national level indicators enables targeted improvements

In the intensified polio eradication effort, surveillance work is focused on optimizing sensitivity in the known and highest-risk infected areas while maintaining the levels necessary for global certification elsewhere. The overall sensitivity and reliability of acute flaccid paralysis (AFP) reporting – the global surveillance system to measure progress towards interrupting polio-virus transmission – remained very high in 2007. All regions maintained AFP surveillance at or above certification quality [3]. In a handful of critical countries, areas for improvement at sub-national level were clearly identified in 2007 and actions initiated to address these weaknesses.

AFP reporting in the polio-endemic WHO regions – the African (AFR), Eastern Mediterranean (EMR) and South-East Asia (SEAR) Regions – remained very sensitive in 2007 (Table 2), with all regions achieving or exceeding international performance indicators. However, surveillance sensitivity in the certified polio-free regions declined slightly compared to 2006. Continued sensitive AFP surveillance in polio-free countries and areas is critical for the detection of, and response to, possible wild poliovirus importations from endemic areas or the emergence of a cVDPV.

Sub-national surveillance gaps key to intensified eradication effort – Chad, Angola and Afghanistan-Pakistan border.

3 A non-polio AFP rate of at least 1 per 100 000 of the under-15 year-old population, with adequate stool specimens taken from at least 80% of AFP cases.

Table 2: Quality of AFP reporting, by WHO region, 2006 and 2007 [4]

WHO region	Reported AFP cases		Non-polio AFP rate		% AFP with adequate specimens	
	2006	2007	2006	2007	2006	2007
African Region	12472	12077	4	4	89	90
Region of the Americas	2151	2151	1.3	1.28	78	78
Eastern Mediterranean Region	8739	9396	3.89	4.19	89	91
European Region	1481	1445	1	0.98	81	82
South-East Asia Region	36665	46133	5.96	7.37	83	84
Western Pacific Region	7011	6231	1.83	1.62	89	90
Global total	68519	77433	3.67	4.19	85	86

A country-by-country analysis of AFP surveillance quality in the endemic regions shows improvements at national and subnational levels in most countries. The majority (89%) of the population of endemic regions now lives in countries with AFP reporting levels of 2 per 100 000 or more: 76% of AFR, 90% in EMR and 96% of the population in SEAR[5]. In endemic and high-risk countries, the entire population lives in countries with this level of AFP reporting or above.

Despite adequate AFP surveillance at the national level, some countries have given cause for further investigation of sub-national surveillance quality, as gaps at this level could allow undetected wild virus circulation for prolonged periods. Following further analysis of genetic sequencing data and surveillance indicators at provincial and sub-provincial levels in key countries in 2007, the focus in 2008 is to rapidly address any gaps with a combination of measures.

In Chad, genetic analysis of wild poliovirus isolates found in 2007 suggested that detection of transmission in that country was delayed by poor sub-national surveillance in the east of the country. The 2007 AFP indicators in Chad exceeded certification quality at the national level, but were sub-optimal in six of 18 provinces, home to over a third of the country's population. Clear geographic delineation of the gaps has enabled the programme to focus its efforts on improvements to surveillance in these areas, though next steps were briefly stalled by security conditions.

The possibility of sub-national surveillance gaps is also acute in Angola: although the most recent case when this report went to press was related to virus detected only six months before, the ongoing transmission may belie apparently adequate indicators. Following an international surveillance review in 2007, new administrative procedures have been recommended to ensure objective quality-control of surveillance reporting. To assist with strengthening the reliability of the surveillance indicators, 24 international consultants have been deployed to the subnational level in 2008.

Another area where surveillance at the sub-national level will be watched more closely in 2008 is the border along Afghanistan and Pakistan, where a spurt of cases in late 2007 confirmed ongoing transmission.

4 Data in WHO/HQ as of 29 April 2008.

5 A small number of countries in each endemic region, most with small populations, did not reach certification-quality AFP surveillance in 2007: Guinea-Bissau in AFR, Bhutan, Timor-Leste and Maldives in SEAR, and Bahrain and Lebanon in EMR. Indicators were marginally below the certification cut-off in a few other countries, which are still considered to have maintained certification-quality AFP surveillance: Algeria, Malawi, Thailand and Zimbabwe.

4.2 Laboratory network

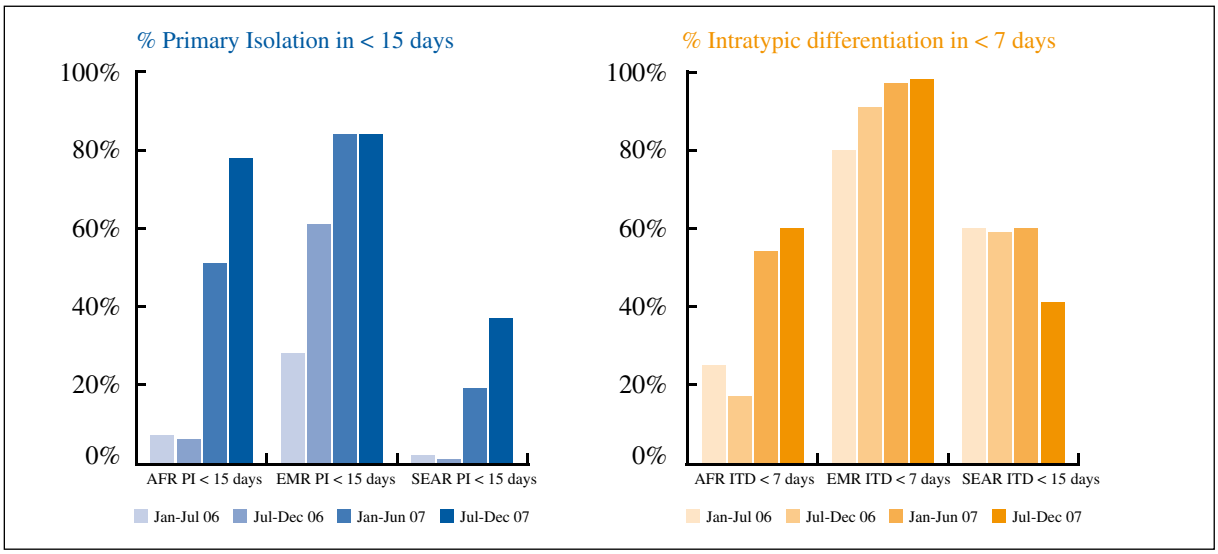
All endemic-region laboratories equipped for virus isolation in cell culture; number of laboratories capable of ITD by ELISA doubles

The Global Polio Laboratory Network (GPLN) comprises 145 [6] laboratories that underpin the GPEI. In 2007, the GPLN tested approximately 167 600 faecal samples, mostly from persons with AFP, a 20 % increase in workload compared to 2006. Wild polioviruses were identified in 1310 AFP cases from 13 countries in 2007: indigenous viruses were detected in four countries and imported viruses in nine [7].

After the 2006 adoption of a new testing strategy to reduce reporting times by 50 % – from 42 days to within 21 days of receipt of samples in laboratories – the GPLN worked during 2007 to strengthen capacity and fill relevant administrative, equipment, technical and data management gaps in priority areas so that all 44 laboratories in the three endemic regions were capable of using the new testing strategy by the end of the year.

The network established a goal of testing at least 75 % of faecal samples from polio-endemic regions

Figure 7: Speed of primary isolation & intratypic differentiation in labs in polio-endemic regions



in laboratories with on-site capacities for both virus isolation in cell culture and intratypic differentiation (ITD) of polioviruses by polymerase chain reaction (PCR) and Enzyme Linked Immunosorbent Assay (ELISA). An additional benefit of increasing the number of ITD-capable laboratories is that fewer isolates need to be shipped, contributing to shorter confirmation times for poliovirus. In 2006, only 14 (32 %) of the laboratories in endemic regions had functioning appropriate ITD capacity. During 2007, the number of such laboratories was doubled to 28 (63 %); by the end of the year, 68 % of samples were being tested in facilities with virus isolation, ELISA and PCR capacities.

This progress was accomplished – against the backdrop of a growing workload for sample processing

6 Laboratories in Guatemala and Papua New Guinea are no longer members of the network and specimens from these countries are now tested in other countries with WHO-accredited laboratories. Cuba and Chile have been added to the network.

7 Indigenous wild poliovirus in Afghanistan, India, Nigeria and Pakistan; viruses of Nigerian origin in Cameroon, Chad, Niger, Somalia and Sudan; viruses of Indian origin in Angola, Democratic Republic of the Congo, Myanmar and Nepal.

Number of laboratories capable of faster testing doubles.

– by several streams of activity. Five laboratories with existing capacity for ELISA and probe hybridization were shifted to ELISA and PCR, with training for their personnel to perform PCR. The Mumbai, India laboratory – damaged in a 2006 fire – was re-equipped and brought back online in the second quarter of 2007, with support from national authorities, WHO, Rotary International and development partners.

Six additional laboratories [8] were upgraded for the first time to on-site capacity for both ELISA and PCR. These six laboratories continue to perform ITD tests in parallel with reference laboratories. Four have already passed key proficiency tests successfully in December 2007.

A WHO-administered accreditation programme requires each laboratory to meet established performance targets for accuracy and timeliness of results. Ninety eight per cent of laboratories were fully accredited by WHO in 2007, and arrangements were made for parallel testing of samples from poorly-performing laboratories in accredited facilities, where necessary. Following proficiency testing, six laboratories were identified with performance weaknesses; solutions were easily achieved in four [9] of these. The network laboratory in Dhaka, Bangladesh received staffing and supervisory assistance; the laboratory in Maiduguri, Nigeria was supported through parallel testing of samples with an accredited reference laboratory and several consultant visits: both facilities attained full accreditation by the end of 2007.

Among the priorities in 2008 will be the process of accreditation of the six newly-upgraded laboratories and the implementation of the new testing strategy in laboratories in the polio-free regions.

4.3 Containment of wild poliovirus

Completion of Phase I in polio-free regions – only three countries left

Minimizing the risk of reintroduction of poliovirus after interruption of wild poliovirus transmission requires countries to coordinate the application of appropriate safeguards and bio-containment conditions for the handling and storage of residual polioviruses (wild, Sabin-strain and vaccine-derived) and poliovirus-infectious materials. After one year has passed without isolation of a naturally occurring wild poliovirus anywhere in the world, containment measures for facility-based wild polioviruses will be required. These measures will include a combination of destruction of unneeded[10] wild polioviruses, replacement of wild polioviruses with Sabin strains where possible and implementation of primary and secondary safeguards in all facilities and countries continuing to retain wild polioviruses.

Over 80% of countries have completed survey and inventory activity for Phase I.

8 Network laboratories upgraded to perform ITD tests are in Cameroon, Kenya, Madagascar, Morocco, Syrian Arab Republic, and Uganda.
9 Kazakhstan, Papua New Guinea, Ukraine and Venezuela.
10 I.e., excepting those required for research, diagnostics, vaccine production (IPV) and vaccine quality assurance and control.

Achievement of effective post eradication wild poliovirus containment starts with identification of facilities with wild poliovirus infectious and potentially infectious materials through implementation of national laboratory surveys in all countries, known as Phase I activities. By the end of 2007, over 80 % of countries had completed the survey and inventory activity. The majority of those not completing the work are located in AFR where the priority remains interrupting wild poliovirus circulation and, furthermore, the risk posed by facility-based polioviruses is low due to limited laboratory infrastructure.

Containment activities for Phase I were a priority in 2007 in three critical countries with more significant laboratory infrastructure – Brazil, China and Japan. All three countries reported significant progress towards completion of this Phase. Japan completed all activities and submitted a report to the Regional Certification Committee (RCC) of the WHO Region of the Western Pacific (WPR) for review and China expanded its national survey to include facilities in all relevant government ministries. Brazil held meetings to finalize the plan for activities that will start in early 2008. All three of these priority countries are now well positioned to complete Phase I in 2008, potentially leading to full regional completion in the WHO Regions of the Americas (AMR), Europe (EUR) and the Western Pacific (WPR).

Progress in Phase I and developments in long-term containment planning continue to be an integral component of the eradication effort and a topic of interest to many stakeholders, including the global bio-safety community: in 2007, keynote presentations were invited and delivered for meetings of both the Asia Pacific Biosafety Association and the Brazilian Biosafety Association.

In 2008, emphasis will be on Regional completion of Phase I in the polio-free regions of AMR and WPR, requiring an intense programme of work in AMR with focus on Brazil. WPR can complete Phase I once China has fully implemented planned activities and the RCC approves the process in Japan following its review, bringing Phase I to completion in all three of the WHO Regions now certified as polio-free.

Long term containment planning in 2008 will feature finalization of the 3rd edition of the *Global Action Plan to minimize post eradication poliovirus facility-associated risk (GAP II)* after a process of public comment and review by the ACPE and continued briefing of stakeholder groups, including delivery of an invited presentation at the meeting of the European Biosafety Association.

4.4 Certification of global polio eradication

Increase in polio-free countries with final certification documentation

To prepare for eventual regional certification of the eradication of wild polioviruses, National Polio Certification Committees (NCCs) and RCCs in endemic regions regularly review national documentation submitted by eligible countries, i.e. those where no wild poliovirus has been found for at least three years in the presence of certification quality surveillance. In 2007, RCCs met in each of the three endemic regions and in two of the polio-free regions.

The number of eligible countries for which RCCs accepted final certification documentation increased from 14 to 21 in AFR (of 46 member states), and from 8 to 9 in SEAR (of 11 member states); it remained at 15 (of 23 member states) in EMR. Overall, the percentage of countries which successfully submitted final

certification documentation increased again, from 80% in 2006 (169 out of 209) to 86% in 2007 (179 out of 209). While short of reaching the milestone[11] of 100% set in the *Global Polio Eradication Initiative Strategic Plan 2004-2008*, this increase occurs in the context of international outbreaks from 2003-2006, when countries which could have presented documentation for certification were re-infected by poliovirus from two of the four endemic countries. Those countries which have stopped their outbreaks in 2007 are now concentrating their resources on protecting themselves from future importations in order to prepare for submission of their documentation once three years have passed with adequate surveillance and no evidence of poliovirus circulation.

Recognizing the increasing restriction of poliovirus transmission in the remaining endemic areas, and the speed with which outbreaks of imported poliovirus have been stopped, the Chairman of the Global Certification Commission (GCC) in November 2007 convened the chairs of all six RCCs for a meeting in Geneva. After examining certification activities in the endemic regions, activities to maintain polio-free status in certified regions and advances towards laboratory containment of wild poliovirus, the group confirmed that consistent progress had been made towards eventual certification of wild poliovirus eradication and outlined relevant priorities to the Director-General of WHO.

The percentage of countries which successfully submitted final certification documentation increased to 86%.

11 See Appendix II.