Paediatric Society CME
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AFP surveillance and the Global Polio Eradication Initiative

The critical role of acute flaccid paralysis surveillance in the Global Polio Eradication Initiative
Tangermann RH, *et al*. Int Health 2017; 9: 156–163

This is a review that describes each of the components of the Global Program Eradication Initiative.

1. **What proportion of polio infections in susceptible people result in paralysis, what is the main differential diagnosis of acute flaccid paralysis, and in AFP surveillance how are they distinguished?**

   Less than 1% of all polio infections result in paralysis. The main differential diagnosis is Guillain Barre syndrome. There are others including hypokalaemia, and tick bites. They are distinguished partly on clinical grounds, but more specifically by stool testing for poliovirus.

2. **What are the components of polio surveillance?**

   - Reporting of all cases of AFP in children less than 15 years (most cases are <5 years, but some cases may occur in older children up to 15 years).
   - Detailed epidemiological investigation of each suspected case
   - Collection of 2 stool specimens within 14 days of paralysis onset (since virus excretion in the stool may be intermittent and virus excretion in stool diminished rapidly after 2 weeks of paralysis).
   - Virus isolation in a WHO-accredited polio laboratory
   - Final classification of the case as “confirmed polio”, “non-polio AFP” or “polio-compatible” if specimens were not collected or collected late
   - In some countries environmental testing and testing of contacts of the index case

3. **What is the difference between passive reporting, zero reporting and active surveillance?**
   Passive reporting is where a health facility reports only the cases of AFP that they see but they have no obligation to report if they have not seen a case. “Zero reporting” is where health facilities are mandated to report each month, even if they have not seen a case (they report “zero cases”). Active surveillance is where there are regular visits by trained public health staff to priority health facilities in an AFP surveillance network. The public health staff enquire about AFP cases and conduct

direct checks of the hospital departments by going through patient admission log books. The visits can be weekly or monthly depending on the size of the health facility. During active surveillance there is also an opportunity to detect cases of other vaccine preventable diseases, such as measles, whooping cough or tetanus.

4. **What is the role of environmental surveillance for polio?**

   Environmental surveillance is looking for polioviruses in sewerage, this is done in highest risk countries and areas. It is used to detect circulating polioviruses (wild, vaccine-derived, and Sabin-like) directly from the environment, in order to identify residual WPW transmission. It is coupled with genetic sequencing of all isolated strains to understand the origin of cases and patterns of transmission. High quality environmental surveillance is needed before the world can be declared polio free.

5. **What are the criteria for certification of polio eradication?**

   All three of:
   - Annual non-polio AFP reporting rate of >1/100,000 under the age of 15
   - Adequate (>80% of AFP cases) stool samples collection within 14 days of the onset of paralysis
   - 3 years of isolating no wild polio virus cases (with the strict reporting and stool testing criteria met above).

6. **What can be learned by genomic sequencing of isolated polioviruses?**

   Genetic sequencing of poliovirus involves comparing the nucleotide sequence of poliovirus isolates. This allows direct links between cases, helps recognise imported cases (as they are more different in nucleotide sequences than cases identified within a country where polio is endemic), and helps track spread of WPV across the world (see the example of WPV1 in 2013-2016. Genetic testing is also needed to identify vaccine-derived poliovirus. With progress to eradication the genetic diversity of the isolated viruses decreases, i.e. they become more similar.

Post-discharge mortality

Post-discharge Mortality Prediction in Sub-Saharan Africa
Madrid L, *et al*. Pediatrics 2019; 143; (1) January 2019:e20180606

This is an important “hot topic”, the recognition that in some countries deaths in children in the first month after hospital discharge may be as common as case fatality rates in hospitals.

This study, one of the largest is an example of the research in this field, there are many others, including from countries in Asia.

1. **How common was post-discharge mortality and how common was in-hospital mortality?**
   Across the entire time period of the study, post-discharge mortality was 3.6%, whereas hospital deaths was 2.5%.

2. **What were the main risk factors the authors found for post-discharge deaths?**
   The main meaningful risk factors identified were (1) young age (neonates and infants under 3 months were particularly at risk; (2) severe malnutrition, (3) HIV, (4) absconding, (5) transferred to a tertiary hospital, (6) blood culture positive.

   * This is a difficult question, as the authors found many risk factors, but they did not look only at risk factors on discharge, which would be more meaningful, they also looked at clinical risk factors at presentation (such as fever, diarrhoea, respiratory distress, which relate to so many children it is hard to know what it means clinically. So just draw out the risk factors that are relevant to the time of discharge.

3. **What are some of the differences between inpatient mortality trends in the African hospitals studied, and those in PNG?**
   See the Figure 2, graph F, which shows the trend in case fatality rate in these hospitals, in 2001 it as similar to what we have in PNG (about 5-7% overall), but since then it has fallen markedly to be reported as <1%. In PNG our CFR has been stable at 5-7% since 2010. In Africa, as hospital CFR fell 2001-2010, the rate of post-discharge mortality rose (Figure 2, graph A), which suggests that patients were being sent home too early. Since 2010 the rate of post-discharge mortality had fallen (to <2%) and the reported CFR also stayed low (<1%). We do not know what the post-discharge mortality is in PNG or the Pacific, as it is not systematically recorded. Another difference between African hospitals and PNG is the much higher rates of HIV in the African setting – up to 40%.

   The authors attributed the fall in both in-hospital mortality and post-discharge mortality partly to reductions in malaria (from bed-nets and other interventions), decreasing rates of malnutrition, full implementation of anti-retroviral therapy for HIV, Hib vaccine, pneumococcal vaccine and rotavirus vaccine.

4. **What could reduce post-discharge mortality in PNG and Pacific countries?**

   - Identifying children at greatest risk (severe malnutrition, young infants, low birth weight babies, children with HIV, blood culture positive).

- Teach health workers about the risks of post-discharge mortality
- Targeted home follow-up of high risk children after discharge – needs a nurse outreach service, plus mobile phone contact where possible.
- Not sending home children too early
- A checklist for safety and readiness for discharge
- Education for mothers on what to look out for, and when to return