Inform'ACTION no 32
ISSN 1029-3396
Information for action / Information pour action

This article is an early release of information from Inform'ACTION No. 32, which will be published very soon.

Moving ahead with influenza surveillance in Pacific Island countries and territories

The following article is an extract from a report prepared by the Public Health Surveillance and Communicable Disease Control Section of SPC and arising from discussions with a broad range of stakeholders in late 2009 and early 2010. The report (see below for information on obtaining a copy) aims to inform agencies and Pacific Island countries and territories (PICTs) on key issues related to influenza testing and surveillance, and to support collaborative approaches to strengthening laboratory and surveillance systems in PICTs.

The implementation of influenza testing and surveillance in PICTs has achieved some success while also facing considerable challenges. Experience with pandemic (H1N1) during 2009 brought many of the issues into sharp focus and provided an opportunity to examine the current situation and consider how influenza testing and surveillance could be improved.

A key issue relates to the limitations of existing overall laboratory and surveillance capacity in PICTS in being able to support laboratory-based influenza surveillance. Further developing LabNet and strengthening laboratories in PICTs are recognised priorities. Similarly, strengthening surveillance capacity in PICTs has been identified as a priority for the Pacific Public Health Surveillance Network. The absence of a strong foundation of laboratory and surveillance infrastructure is a significant impediment to implementing communicable disease surveillance in the Pacific.

Introducing new equipment and techniques into PICT laboratories has proved problematical and the following issues should be considered:

- Appropriateness of the equipment and technique for the specific laboratory.
- Effective initial training that allows technicians to use the equipment and/or technique in their own laboratory setting. This should include supervision and trouble-shooting during a number of routine testing cycles. Other key factors in training include: training several technicians per laboratory to provide back-up, follow-up visits by trainers within six months, and opportunities for further training at reference facilities with PICT colleagues.
- Simultaneous implementation of a proficiency testing and quality assurance programme.
- Ensuring equipment servicing and ongoing technical support for laboratory equipment that is donated, provided under a health programme or project, or purchased by the country. This may, when appropriate, be built into the initial purchase contract or negotiated with partners.
- Routine maintenance of equipment by laboratory staff and/or local biomedical engineer. If possible, biomedical staff should have input into equipment selection and installation.
- Stock management of reagents and consumables, and a sustainable budget for their ongoing provision under a costed procurement scheme.

The following points highlight some issues regarding testing methodologies for influenza in PICT laboratories:

- Rapid Diagnostic Test Kits (RDTs) and Immunofluorescence Assay (IFA) have sensitivities below that of Reverse Transcriptase Polymerase Chain Reaction (RT-PCR). Sensitivity of RDTs has been reported as low as 20% for pandemic (A) H1N1, while for direct IFA, a sensitivity of 47% was reported. Laboratory, clinical and public health staff in PICTs are not always aware of the limitations of RDT and IFA in regard to informing clinical and public health decisions.

- Use of RDT in Wallis and Futuna showed satisfactory results with a sensitivity of 71% and specificity of 87.5% (n=104) when compared with RT-PCR; while French Polynesia had results with a sensitivity of 56% and specificity of 100% (n=67).
- The relatively poor sensitivity of RDTs and IFA is exacerbated by poor quality samples due to inadequate collection, or sample collection too late in the illness, and unsuitable sample transport and storage. Correct application of the case definition is important to ensure that cases with influenza-like illness are chosen for sampling.
- IFA requires a high level of technical competence, and to achieve this, technicians need effective training and technical advice to perform IFA on a regular basis and be supported by a proficiency and quality assurance programme. This methodology can be used for some other diagnostics targets. However, an irregular and inadequate supply of samples and high turnover of laboratory staff with consequent loss of technical expertise in IFA by laboratory technicians, along with microscopes being out of service have been problems with using this methodology in PICT laboratories.
- RT-PCR is the gold standard for influenza testing and this methodology can be used for a wide range of diagnostics targets. It is relatively expensive to establish (estimated AUD 120,000 for equipment), requires strict laboratory techniques and appropriate laboratory infrastructure and is expensive to run, especially when sample throughput is small. While PCR should be a long-term goal for suitable PICT laboratories, the introduction of this technology must be carefully considered and well supported.

Opportunities to improve influenza testing and surveillance in PICTs include the following:

- Further emphasis on the need for well-collected nasopharyngeal samples by trained collectors using a nylon flocked swab (example Copan brand) taken from people meeting the influenza-like illness case definition within 48–72 hours of onset of symptoms.
- Further training of laboratory technicians on influenza testing techniques in association with reference laboratories, including an expanded proficiency testing and quality control programme.
- Improved understanding of the interpretation of tests such as RDT and IFA in guiding clinical and public health decisions.
- Improved system of packing and shipping samples to reference laboratories.
- Trial the use of IFA digital images that are sent from PICT laboratories to reference facilities for checking and training purposes.
- Introduce systems that allow the transport of live virus samples for influenza virus culture and further virus characterisation.

At a regional level, strengthening LabNet, further developing Level-2 laboratories with RT-PCR capability, and consolidating sample referral mechanisms are required.

There is no one recommended influenza laboratory testing methodology and influenza surveillance system appropriate for all PICTs. Rather, it is suggested that each PICT, in consultation with partners, identify:

- What type of influenza test is (or tests are) appropriate for their laboratory (with an understanding of the limitations, cost of the techniques and long-term development of the laboratory).
- The degree of involvement the PICT will have in influenza surveillance. For example, this may involve a number of sentinel sites regularly supplying samples for local testing and sending on to reference laboratories; or, PICTs may chose not to test locally and only collect and send samples; or PICTs may have a staged sampling process at the beginning and end of their influenza seasons and during outbreaks. A small number of PICTs may have the resources and infrastructure to develop PCR capacity.

- How best to support and integrate laboratory-based surveillance within a comprehensive wider disease surveillance system.

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Acknowledgement: The contribution of information by stakeholders, agency representatives, reference laboratories, staff of PICTs and SPC staff to the report is gratefully acknowledged.

For a copy of the full report please use email contact: phs.cdc@spc.int