Global Polio Laboratory Network

Guidance Paper 10

Standardized process for onboarding candidate laboratories to the GPLN Sequencing Network

Document version (date)	Description of substantive revisions
Version 1.0 (February 2025)	

Purpose

This document provides a framework for the Global Polio Laboratory Network (GPLN)'s standardized process for onboarding a new GPLN sequencing laboratory. This guidance clarifies and formalizes the steps to be followed from training to accreditation of a GPLN member laboratory (performing VI and ITD) as a sequencing laboratory that can provide sequencing results to the Global Polio Eradication Initiative (GPEI).

Rationale

The current GPLN-recommended testing algorithm for Polio diagnosis encompasses three different procedures (i) virus isolation using cell culture, (ii) intratypic differentiation (ITD) of poliovirus isolates using rRT-PCR assays, and (iii) sequencing the VP1 region of the poliovirus isolate using Sanger sequencing method with Q8-Y7/Y7R primers . The latter procedure is needed for all polioviruses of programmatic interest (i.e. wild poliovirus and vaccine-derived poliovirus) to be reported to and accepted by the GPEI. Indeed, VP1 sequencing is the confirmatory procedure for poliovirus detection in isolates or poliovirus RNA of human specimens and environmental samples.

Since its inception, the GPLN has built sequencing capacity in reference and specialized laboratories across the network. To date, all sequencing laboratories are participating in the annual quality assurance program, including proficiency testing, to be accredited by WHO as sequencing laboratories, i.e laboratories capable of completing the procedure and tasked by WHO to provide confirmed results to the GPEI. It is noteworthy that it is imperative to obtain a poliovirus sequence (at least the VP1 gene) to confirm the presence of a poliovirus in human specimens (Acute Flaccid Paralysis case or healthy contacts from the household or the community) or sewage samples.

A robust process led by the GPLN's Global Specialized Laboratory (GSL) hosted by the US CDC has been implemented to ensure that sequencing laboratories meet global standards. During the last few years, the GPLN has relied on 28 sequencing laboratories to provide confirmatory testing in the six WHO regions. However, following the launch of the GPEI's Strategic Plan 2022-2026 (https://www.archive.polioeradication.org/gpei-strategy-2022-2026/) , which emphasized improving overall timeliness of surveillance results, including laboratory results, the Global Polio Surveillance Action Plans (GPSAP) 2022-2026 aimed to build additional sequencing capacity, mainly in the laboratories serving endemic and outbreak countries, and/or develop timely and efficient shipping procedures where possible.

With the continued development of new molecular technologies and procedures, it is of utmost importance to establish a fit-for-purpose quality assurance scheme for sequencing procedures for polioviruses, often in a complex environment, based on robust training, mentoring, monitoring and evaluation processes within a fit-for-purpose quality assurance scheme

Objectives of the Guidance Paper 10

The objectives of this document are as follows:

1. To describe the standardized process for onboarding poliovirus sequencing laboratories using GPLN-recommended or accepted methods;
2. To provide guidance and clarify all steps to be undertaken including roles and responsibilities of the different stakeholders.

Applicability

This guidance applies to all regions, countries, and laboratories that are members of the GPLN (144 active laboratories to date) and supports sequencing of poliovirus of programmatic interest across the Network. One of the main strengths of the GPLN relies on the strict application of unique processes and standardized procedures in all laboratories. These processes and procedures are defined by the GPLN's Small Working Group (SWG) composed of subject matter experts in Polio virology, Research and Development of poliovirus diagnostic methods, and implementation of such methods in a wide range of laboratories. Historically onboarding new sequencing laboratories followed a well-defined process initiated on an ad hoc basis depending on the needs expressed by the Program and validated at all levels.

The GPLN SWG remains the GPLN entity which will review, validate, and document any amendment on Guidance Paper 10.

Step-by-step process

The following Ten-Step approach for onboarding a new sequencing laboratory within the GPLN's sequencing laboratory network, describes the necessary and mandatory steps to onboard candidate laboratories. They have been designed to streamline the approach to be undertaken by the GPLN to ensure that high-quality laboratory standards, which are essential for an eradication program like polio, are maintained across the Polio Laboratory Network and over time.

1. Expression of interest (country/Institutional levels)

The onboarding process starts with a formal letter as an expression of interest from the Institution/Country hosting a GPLN National or Regional Polio laboratory that has been accredited by WHO to perform Virus isolation (VI) and Intratypic Differentiation of Poliovirus (VII laboratory). This letter should be addressed to the Regional Polio Laboratory Coordinator (RPLC) with copy to the Global Polio Laboratory Coordinator (GPLC), and clearly outline the reasons why the institution/country would like to be accredited for poliovirus sequencing, the benefits it would bring to the institution/country and the GPLN, and the commitment of the institution/country to support establishing and maintaining competency with the procedure. A RPLC or the GPLC may also raise the possibility of an institution being accredited for poliovirus sequencing to address a perceived need in the GPLN (e.g including the necessity for worldwide data sharing), but the institution/country must convey their commitment to meet the standards required of the GPLN for poliovirus sequencing in the letter of expression of interest.

2. First approval step (regional level)

The RPLC in coordination with the Surveillance Officers at regional level reviews and validates the expression of interest (green-light to positively consider initiating the process), from a VI/ITD laboratory to implement WHO-recommended procedures for sequencing. Initial approval to pursue the process should be granted at that level after discussions and agreement with WHO-HQ and proper dissemination of the information at the three levels of WHO for awareness and further discussions as needed.

3. Tri-partite assessment and validation (global level)

Following the initial approval, laboratory coordination mechanism and activities of the review process at three levels, i.e the candidate sequencing laboratory, the regional office (RPLC), and the global level (WHO-HQ GPLC and GPLN's GSL), an in-depth assessment of all aspects and implications for both the Regional and the Global PLN is conducted and a report is shared with the different stakeholders. At this step, an implementation plan, including details and timelines of all activities will be validated by the implementation team which comprises the RPLC, the GPLC and the Head of the GPLC-designated GSL. The candidate laboratory should lay out the supply chain for equipment, consumables, and reagents by the laboratory.

4. Initiation of the process

- Training is the first step as per GPLN standards and can be a combination of webinars, onsite visits, workshops, and/or visits by laboratory scientists/technicians to a GSL for specific trainings such as bench work, sequencing laboratory management, QA implementation and monitoring in sequencing laboratory, etc….
- Preparedness for readiness: to conduct the activities listed above, a roadmap with milestones is established to monitor laboratory readiness for subsequent steps.

5. Initial (pilot) testing

When the candidate sequencing laboratory is ready, as assessed by the implementation team, pilot testing of sequencing procedures is set up and agreed between the implementation team and the candidate sequencing laboratory. This ad hoc process, which aims to validate the proof of concept, should include number and type of samples/biological materials to be tested, frequency of testing and procedures for comprehensive data sharing and validation. At this step a GSL may want to share a practice panel to ensure that the candidate laboratory can reliably sequence different serotypes and mixtures of poliovirus.

6. Evaluation of results and recommendations

The pilot testing phase will be considered closed after a full positive evaluation by the implementation team and the production of a short report with conclusions/recommendations for the next steps, i.e., starting parallel testing. It is worth noting that the pilot period can be extended if further data are needed to inform the implementation team's decision.

7. Parallel-testing phase

This phase aims to assess in real time the capacity and the capability of the candidate sequencing laboratory through:

- Sharing comprehensive raw data and reports in real-time of poliovirus sequence results arising from the standard GPLN test algorithm, with the implementation team. The candidate laboratory may sequence polioviruses identified by ITD/VDPV rRT-PCR, adhering to poliovirus containment guidelines, while also referring the isolates for sequencing to the GPLN facility they usually do.
- Iterative mentoring, assessment, and feedback by the GSL, to ensure that wet lab sequencing and interpretation of data are compliant with GPLN standards.

○ Candidate laboratory completes a “questionnaire” at the end of the parallel testing phase for the implementation team’s evaluation.

The subsequent step, i.e readiness for proficiency testing, is planned only after approval (that may be given after an onsite visit) is obtained from the implementation team.

8. Proficiency testing (PT) readiness

○ Preparedness for readiness: the implementation team should ensure that all conditions are met and issue a short note for the record which includes instructions to the candidate sequencing laboratory on how the proficiency testing process should be conducted.

○ Assessment and PT panel shipment: This is managed by the GSL providing the PT, as per GPLN standards for sequencing PT.

9. Final mentoring and parallel reporting phase

If the results from the sequencing PT panel are satisfactory then the implementation team will allow the candidate laboratory to start sequencing and continue sharing results with the GSL for at least 6 months, or for a duration set consensually by the implementation team. This includes an assessment of the capability of the sequencing laboratory to use the GPLN database and report results as per Guidance Paper 5.

10. WHO-accreditation as a GPLN sequencing laboratory

The final step to onboard the candidate sequencing laboratory as a new GPLN sequencing laboratory (VIIS laboratory), is to conduct an onsite accreditation exercise, at least after gathering sequencing data/results in the previous 12 months as per WHO/GPLN practices for accreditation. This first exercise must be conducted by the implementation team (RPLC, GPLC, Head of GSL, or their designated representatives). Subsequent accreditation exercises are done as per GPLN’s agreed procedures and practices to accredit GSLs and RRLs.

Completing the ten-step process mentioned above and in Annex-1, results in the laboratory being recognized as a member of the GPLN sequencing network.

Document control:

Validated by the GPLN on 05 February 2025 (unanimous vote).

Version1, effective as of 05 February 2025

Annex-1:

Standardized Ten-Step Process to Onboard Candidate Laboratories into the GPLN Sequencing Network