Ninth Meeting of Vaccine-Preventable Diseases Laboratory Networks in the Western Pacific Region (Measles and Rubella Session)
29 September - 01 October 2021 - Virtual
MEETING REPORT

NINTH MEETING OF VACCINE-PREVENTABLE DISEASES LABORATORY NETWORKS IN THE WESTERN PACIFIC REGION

Convened by:

WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC

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27 September–1 October 2021

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NOTE

The views expressed in this report are those of the participants of the Ninth Meeting of Vaccine-Preventable Diseases Laboratory Networks in the Western Pacific Region and do not necessarily reflect the policies of the conveners.

This report has been prepared by the World Health Organization Regional Office for the Western Pacific for Member States in the Region and for those who participated in the Ninth Meeting of Vaccine-Preventable Diseases Laboratory Networks in the Western Pacific Region, held virtually from 27 September to 1 October 2021.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AFP</td>
<td>acute flaccid paralysis</td>
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<tr>
<td>cVDPV</td>
<td>circulating vaccine-derived poliovirus</td>
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<td>EQA</td>
<td>external quality assessment</td>
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<td>ES</td>
<td>environmental surveillance</td>
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<td>GAPIII</td>
<td>Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use, version III</td>
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<tr>
<td>GMRLN</td>
<td>Global Measles and Rubella Laboratory Network</td>
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<td>GPLN</td>
<td>Global Polio Laboratory Network</td>
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<td>GSL</td>
<td>Global Specialized Laboratory</td>
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<td>IgG</td>
<td>immunoglobulin G</td>
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<td>IgM</td>
<td>immunoglobulin M</td>
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<td>IPV</td>
<td>inactivated poliovirus vaccine</td>
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<td>IRR</td>
<td>International Reagent Resource</td>
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<td>ITD</td>
<td>intratypic differentiation</td>
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<tr>
<td>L20B</td>
<td>a mouse cell line (L-cells), genetically engineered to express the human poliovirus receptor</td>
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<td>MeaNS</td>
<td>Measles Nucleotide Surveillance database</td>
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<td>NIID</td>
<td>National Institute of Infectious Diseases</td>
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<td>NMRL</td>
<td>national measles and rubella laboratory</td>
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<td>nOPV2</td>
<td>novel oral polio vaccine type 2</td>
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<td>NPEV</td>
<td>non-polio enterovirus</td>
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<td>NPL</td>
<td>national polio laboratory</td>
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<td>OPV</td>
<td>oral polio vaccine</td>
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<td>PCR</td>
<td>polymerase chain reaction</td>
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<td>PEF</td>
<td>poliovirus-essential facility</td>
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<td>PIM</td>
<td>potentially infectious material</td>
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<td>PT</td>
<td>proficiency test</td>
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<td>poliovirus</td>
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<td>rapid diagnostic test</td>
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<td>RNA</td>
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<td>RT-PCR</td>
<td>reverse transcriptase polymerase chain reaction</td>
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<td>RITM</td>
<td>Research Institute for Tropical Medicine (Philippines)</td>
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<td>Regional Reference Laboratory</td>
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<td>RubeNS</td>
<td>Rubella Nucleotide Surveillance database</td>
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<td>SL</td>
<td>Sabin-like</td>
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<td>United Nations Children’s Fund</td>
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<td>US CDC</td>
<td>United States Centers for Disease Control and Prevention</td>
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<td>VDPV</td>
<td>vaccine-derived poliovirus</td>
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<td>VIDRL</td>
<td>Victorian Infectious Diseases Reference Laboratory</td>
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<td>VPD</td>
<td>vaccine-preventable disease</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WPV</td>
<td>wild poliovirus</td>
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SUMMARY

The Ninth Meeting of Vaccine-Preventable Diseases Laboratory Networks in the Western Pacific Region was held virtually from 27 September to 1 October 2021 to review the performance and identify the challenges of the poliovirus and measles and rubella network laboratories in the Region.

Meeting participants reviewed ways to further strengthen the performance of network laboratories and also monitor the implementation of recommendations from the previous meeting in March 2019. The meeting provided an opportunity to address the challenges of maintaining surveillance of vaccine-preventable diseases during the coronavirus disease 2019 (COVID-19) pandemic and to discuss strengthening the quality and sensitivity of poliovirus detection, and enhancing poliovirus surveillance through increasing the sequencing capacity of national laboratories, introduction of direct virus detection and environmental surveillance in key countries and the application of the WHO Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use (known as GAPIII) for the containment of poliovirus in the laboratory network. Participants also discussed: ways to improve the quality and timeliness of laboratory-based surveillance through establishing subnational laboratories, the introduction of rapid diagnostic tests for measles and rubella in countries and areas with challenging infrastructure, and the importance of molecular surveillance for support of verification of elimination of measles and rubella.
1. INTRODUCTION

1.1 Meeting organization

The Ninth Meeting of Vaccine-Preventable Diseases Laboratory Networks in the Western Pacific Region was held virtually from 27 September to 1 October 2021. Approximately 90 participants from network laboratories, temporary advisers, observers and WHO staff connected to the meeting over the five days. The list of participants is available in Annex 1. The meeting was organized in two sessions to cover poliomyelitis (polio) (27–28 September) and measles and rubella (29 September–1 October). The meeting programme is available in Annex 2.

1.2 Meeting objectives

The shared objectives of the meeting were:

1) to share information and experiences to ensure high-quality assurance systems for the polio and measles and rubella laboratory networks; and

2) to recognize the important contribution of both laboratory networks in the coronavirus disease 2019 (COVID-19) response and to develop a surge capacity strategy for the laboratories to be better prepared for future pandemics.

The specific objectives were:

Polio Laboratory Network

1) to present and discuss challenges of the polio laboratories in support of polio eradication programmes and how to overcome these; and

2) to present new developments in polio diagnostics:
   • direct detection of poliovirus with molecular methods
   • detection of novel poliovirus vaccine strains after introduction of novel oral poliovirus vaccine type 2, or nOPV2.

Measles and Rubella Laboratory Network

1) to present and discuss challenges of the laboratories in support of measles and rubella elimination programmes and how to overcome these;

2) to identify strategies to obtain continuous genotype data of measles and rubella viruses and further improve the molecular detection capacity and data reporting; and

3) to develop testing strategies using new technologies in difficult-to-reach or unreached areas of the Region.

2. PROCEEDINGS

2.1 Polio Laboratory Network Meeting

2.1.1 Polio endgame strategy and updates on maintaining polio-free status

Progress towards eradication and new Global Polio Eradication Initiative strategy

Huge challenges have faced the Global Polio Eradication Initiative (GPEI) since March 2020 due to the impact of the COVID-19 pandemic on global and national health systems. The pandemic has specifically affected acute flaccid paralysis (AFP) surveillance, environmental surveillance (ES) and polio immunization programmes. Wild poliovirus type 1 (WPV1) remains resistant to final eradication efforts in
Afghanistan and Pakistan, although surveillance indicators are currently reported as good for both countries. As of 27 September 2021, the last WPV1 AFP cases were detected in January 2021, with Afghanistan and Pakistan each reporting one case. A decline in environmental samples positive for WPV1 in both countries since January 2021 has been another encouraging indicator of progress, although renewed social disruption in Afghanistan is very concerning. Also encouraging was the WHO African Region being certified as polio-free in August 2020. There has been a resurgence in the number of circulating vaccine-derived poliovirus type 2 (cVDPV2) detected in multiple countries, but of concern is the spread of this virus in Afghanistan, Pakistan, West and Central Africa, and the Eastern Mediterranean following cessation of routine oral poliovirus vaccine type 2 or OPV2-containing vaccine.

**Global Polio Laboratory Network updates and alignment to the new strategy**

Although challenges continue in eradicating the last vestiges of WPV1, the Global Polio Laboratory Network (GPLN) is achieving good overall performance indicators for timeliness and accuracy of poliovirus detection and characterization in all regions. There is a continuous improvement in GPLN capacity with enhancement of both AFP surveillance and ES sensitivity to meet the GPEI needs. A strategic plan is in place to improve timeliness of reporting by building sequencing capacity in laboratories supporting high-risk countries, improving surge capacity and introducing direct-detection methods. Sustained laboratory staff commitment continues to be a linchpin for the GPEI despite hurdles and uncertainties and providing a critical resource for COVID-19 support.

**Regional polio laboratory network update**

The Western Pacific Region continues to be wild-polio free. An outbreak of cVDPV2 was detected in the Philippines between 19 September 2019 and 20 October 2020, with 13 AFP cases, 2 contacts and 5 healthy children infected with the virus from the same genomic cluster. The main cVDPV2 cluster in the Philippines was subsequently identified in Sabah, Malaysia, in AFP and ES samples from November 2019 to May 2020. Strong immunization campaigns effectively stopped the outbreaks in both countries.

The high level of performance and capacity of the regional polio laboratory network has been highlighted by its effectiveness in dealing with recent vaccine-derived poliovirus (VDPV) outbreaks despite the heavy additional workload in supporting national COVID-19 surveillance. Currently, six countries routinely carry out ES with a total of 5705 samples processed over the 2018–2021 period. ES has been proven invaluable for monitoring the disappearance of OPV2 post-switch. The Lao People’s Democratic Republic and Cambodia are expected to introduce ES and Papua New Guinea to re-establish ES, in the near future.

COVID-19 travel restrictions have led to the suspension of accreditation site visits in the Region, although the external quality assurance programmes (EQAP) have continued. All regional polio laboratories that participated in the EQAP passed the virus isolation, intratypic differentiation and sequencing proficiency tests (PTs), confirming that GPLN continues to operate at high performance levels. The International Reagent Resource (IRR), supported by the United States Centers for Disease Control and Prevention (US CDC), has been highly beneficial for the supply and distribution of reagents and PT panels to the Region’s VPD laboratories.

**2.1.2 Reports from the Global Specialized Laboratory and regional reference laboratories**

**Japan as Global Specialized Laboratory**

The Japan Global Specialized Laboratory (GSL) at the National Institute of Infectious Diseases (NIID) serves as a national polio laboratory for Japan, Cambodia and the Lao People’s Democratic Republic. The COVID-19 pandemic has impacted the shipping of samples from Cambodia, with 80 samples from AFP cases awaiting shipment to the GSL. Sabin-derived inactivated poliovirus vaccine (siPV) is administered
in Japan as a combination with the diphtheria, pertussis, and tetanus (DPT) vaccine. The country has good coverage with DPT/sIPV, and 98.5% of the population are vaccinated by 12 months of age. Serosurveillance using polio pseudovirus indicates good protection (> 95% with neutralizing titre of at least 1:4) for types 1 and 2 up to 44 years of age, but with a lower percentage (60–80%) of protection for type 3. The poliovirus pseudovirus neutralization test has been fully validated and is now automated. Supplementary surveillance using ES occurs across the country utilizing the Public Health Institute (PHI) network of laboratories. AFP surveillance was initiated in Japan in 2018 with stool, throat swab, cerebrospinal fluid and serum samples all recommended for collection. Laboratory diagnosis is reported to be challenging with a division of roles between NIID and the PHI laboratories.

**Australia as regional reference laboratory**

The Victorian Infectious Diseases Reference Laboratory (VIDRL) supports the testing of AFP samples from Brunei Darussalam, Papua New Guinea, and Pacific island countries and areas. A total of 920 AFP cases were tested from these countries between 1 January 2019 and 30 June 2021, and an additional 252 cases were tested from Australia. The cVDPV outbreak in Papua New Guinea boosted workload due to the number of samples from AFP cases and contacts received from that country. Additionally, the cVDPV2 outbreak in Malaysia in 2020 was supported by VIDRL with the provision of VP1 sequencing. ES continues in Melbourne, and a method for detecting the ubiquitous Pepper mild mottle virus (PMMoV) was developed as an indicator of ability to concentrate and detect virus from sewage. Polio ES experience has been helpful in developing SARS-CoV-2 surveillance in Australia. VIDRL has been heavily involved with the COVID-19 response at state and national levels, and Melbourne has experienced six lockdowns lasting more than 250 days, which has impacted the functioning of VIDRL.

**China as regional reference laboratory**

The Chinese Center for Disease Control and Prevention (China CDC) National Laboratory and regional reference laboratory (RRL) received 185 polio isolates from the country’s provincial laboratories from 2019 to August 2021. Sabin-like (SL) type 1 was identified from 88 samples, SL type 3 from 106 samples and cVDPV2 from four samples in 2019. Declining rates of non-polio enterovirus (NPEV), poliovirus (PV) and AFP were reported following COVID-19 travel restrictions being implemented. Sporadic VDPVs are being detected in AFP, contacts and environmental samples, but thorough investigations have not detected significant spread.

The China national and provincial laboratories continue to operate at high quality performance levels, and seven provincial ES labs passed the new ES external quality assurance QA-3 test at the beginning of 2021. Members of the China polio laboratory network have been heavily involved in COVID-19 prevention and control in the country, and poliovirus ES guidelines have been applied the development of SARS-CoV-2 surveillance in the country. The National Laboratory has also contributed to vaccine assessments and screening of potential anti-SARS-CoV-2 drugs.

2.1.3 Reports from the national polio laboratories in the Region

**Hong Kong SAR (China)**

Despite COVID-19, performance of AFP surveillance has been satisfactory, and all indicators above the target value have been achieved from 2019 to August 2021. No PV was detected from any of the 32 AFP cases reported from Hong Kong SAR (China) or the 4 received from Macao SAR (China). A further 738 non-AFP stools were tested over the same period, also with no PV detected. COVID-19 has had a dramatic impact on the reduction of respiratory and faecal samples being received for enterovirus testing.
Malaysia

Malaysia experienced an outbreak of cVDPV1 and cVDPV2, first detected in November 2019, in Sabah and WP Labuan provinces. Both strains had genetic links to strains from an outbreak in the Philippines occurring at the same time. In response to the outbreak, Malaysia implemented enhanced AFP surveillance with additional samples collected from close contacts of AFP cases and a healthy children survey, as well as ES, which had been discontinued in 2018 but restarted in 2019 and enhanced to include 55 sites across the whole country. In 2020, 700 ES samples were collected and 15 VDPVs, 82 Sabin-like PVs and 24 NPEVs detected. In 2021, following the bOPV/mOPV2 campaign in response to the VDPV outbreak, none of the 379 ES samples collected was positive for VDPV. To build capacity, the Public Health Laboratory in Sabah was supported to start virus isolation and ESQAP was established in three laboratories. Malaysia was officially declared cVDPV free by WHO in August 2021.

Mongolia

The AFP detection rate declined since the start of the COVID-19 pandemic as surveillance staff were focused on COVID-19 activities. Mongolia has an expected AFP detection rate of nine cases per year. The number of AFP cases detected was N=5 for 2019, N=1 for 2020 and N=1 for 2021 (to August). The National Polio Laboratory (NPL), in cooperation with the immunization department, has organized online training to intensify AFP surveillance during the pandemic. The NPL has been heavily involved in COVID-19 testing and has performed RT-PCR tests on 248,000 samples since December 2020 and are finding it difficult to perform the laboratory’s normal activities. Cell sensitivity recently dropped, and it is difficult to train new staff. However, ES has started and from 39 samples of sewage collected from wastewater plants in three provinces, 13 NPEVs (33.3%) were detected using the two-phase separation method recommended by GPLN. A serological survey in under 5-year-olds (N=433) in 2019–2020 identified positive neutralization titres to PV1 in 96.8%, to PV3 in 90.3%, and to PV1 and PV3 in 88.6%.

New Zealand

New Zealand has an expected AFP detection of nine cases per year. Eight AFP cases were detected in each year (2019 and 2020), and none was NPEV positive. From 14 non-AFP stools examined, five (36%) had NPEVs detected, and no PVs were detected. AFP surveillance was maintained as one of the priority services during COVID-19 lockdowns. An issue with contamination of L20B with another cell line led to the global isolation PT needing to be repeated after new cell lines from the National Institute for Biological Standards and Control were established. The NPL is considering using samples from COVID-19 wastewater surveillance for poliovirus ES.

Philippines

An outbreak of cVDPV2 was detected in the Philippines between 19 September 2019 and 20 October 2020 with 13 AFP cases, 2 contacts and 5 healthy children infected with virus from the same genomic cluster. Enhanced surveillance in the Philippines (AFP and ES) resulted in the national laboratory at the Research Institute for Tropical Medicine (RITM) also identifying two clusters of cVDPV1, another cluster of cVDPV2, as well as an immunodeficiency VDPV2 and six ambiguous VDPV2s. A total of 40 VDPVs were detected from ES in the Philippines in 2019 (N=33) and 2020 (N=7). The main cVDPV2 cluster in the Philippines was subsequently identified in Sabah, Malaysia, in AFP and ES samples from November 2019 to May 2020. Strong immunization campaigns effectively stopped the outbreaks in both countries, and the outbreak was declared over by WHO in June 2021. ES started in Philippines in 2019 and proved effective at detecting VDPVs. Currently, 45 sites are sampled covering 17 regions. COVID-19 impacted normal operations as the ES laboratory was used for COVID-19 sample processing and NPL staff were tasked to
support COVID-19 testing. Future plans include expanding ES sites by 2022 with additional ES concentration laboratories, pilot testing direct detection in stool samples and using Pepper Mild Mottle virus (PMoV) as an indicator for ES quality control. WHO in the Region is considering establishing RITM as an ES hub for the Western Pacific.

**Republic of Korea**

An AFP surveillance system has been established in 50 paediatric neurology hospitals, and national AFP detection rates showed decline after the onset of COVID-19. ES has been implemented since 2006 with 59 hospitals nationwide participating as the Korea Enterovirus Surveillance System (KESS) and an enterovirus laboratory network consisting of Korea Disease Control and Prevention Agency (KDCA) and 17 regional Institutes of Health and Environment. However, COVID-19 has negatively impacted the detection rate of enteroviruses. A multiplex pan-EV/EV71 real-time RT-PCR kit has been developed and shown to improve sensitivity by up to 34.6%.

**Singapore**

The impact of COVID-19 in Singapore has resulted in the number of AFP surveillance cases being halved for 2020. The supply of some consumables and reagent kits have been delayed but laboratory services were not affected, and some staff have been deployed to another laboratory for COVID-19 testing. Concerns have been raised that clinicians are ordering PCR instead of virus culture which has resulted in enterovirus isolation rates dropping. Introduction of direct detection could improve PV sensitivity.

**Viet Nam**

**Hanoi**

The NPL at the National Institute of Hygiene and Epidemiology is responsible for detecting PVs and NPEVs from specimens collected under AFP and hand, foot and mouth disease or HFMD surveillance programmes for 28 provinces in the north and six provinces in the centre of Viet Nam. Due to the impact on routine surveillance of a large COVID-19 outbreak in early 2021, the overall AFP rate has dropped from 0.49 per 100 000 in 2020 to 0.06 in 2021 (to August). About 25% of samples took more than 7 days to reach the laboratory in 2021, but the NPEV rate was 13.6%. No PVs were detected. Hand, foot and mouth disease and viral encephalitis surveillance detected a range of enteroviruses including Echovirus 4 from encephalitis cases. ES has been implemented in Hanoi and the NPL is enthusiastic to implement direct detection methods but will need further human and financial resources. The NPL had challenges with the virus isolation PT for 2020 but passed it on retesting.

**Ho Chi Minh City**

HCMC Pasteur Institute laboratory personnel were unavailable to present their updates.

### 2.1.4 Laboratory quality assurance system

**Virus isolation proficiency testing, 2020–2021**

The global virus isolation proficiency testing (VI PT) panel provided by RIVM (Netherlands) contained four different samples, one of which contained the novel OPV2 (nOPV2). Overall, laboratories did very well, although five laboratories did not pass the first round, including two in the Western Pacific Region that had cell-line issues. The Western Pacific laboratories established new cell lines, and both passed the retest. Many laboratories were overwhelmed with COVID-19 testing responsibilities and had reporting timeliness issues but were not penalized. All 18 laboratories that received the nOPV2 were able to correctly...
detect and identify it. All laboratories in the Western Pacific Region (N=43) passed the PT, with 32 (74%) achieving a 100% score.

**Environmental surveillance proficiency testing**

RIVM was given the task to develop an environmental surveillance quality assurance programme (ESQA) for GPLN ES laboratories to establish proficiency for enterovirus concentration and virus isolation from environmental samples. Three pilot ESQAs (1, 2 and 3) have now been completed with the conclusions that a PT programme for ES is feasible and that the composition and concentrations of viruses in ESQA-3 are about right. Analysis of ESQA-3 indicated that, overall, results were good and if it had been graded then 27 of 37 laboratories (73%) would have passed, with 21 of 37 (57%) achieving a 100% score. Shipping of the ESQA samples is still a challenge and requires dry ice. An e-reporting scheme is under development. ESQA-4 will be shipped together with VI PT-2021 in October and November 2021.

**Review of ITD/VDPV combined proficiency testing panel (2019, 2020 and 2021)**

The 2019 ITD/VDPV PT introduced a standardized reporting and feedback form with explanations for deductions explained in a PowerPoint presentation. Any laboratory that failed to identify a wild poliovirus, VDPV or PV2 would have 15 points deducted and therefore not reach the 90% passing score. Laboratories in the Western Pacific Region achieved very good results, with just one from 42 participating laboratories not achieving a pass on the first round. This laboratory obtained a pass on the retest.

The 2020 ITD/VDPV PT had additional performance criteria added, including requiring indeterminate results to be identified and only one panel would be graded, with no repeats evaluated other than those required by the algorithm. The International Reagent Resource (IRR) was selected as the exclusive provider for all ITD/VDPV kits and PT panels. Analysis of the results of laboratories in the Western Pacific Region identified 1 of 41 participating laboratories did not pass, and 34 of 41 (81%) achieved a 100% score.

The 2021 ITD/VDPV PT panel will be distributed through IRR as lyophilized RNA samples and not on FTA cards.

**Review of 2019-2020 poliovirus sequencing PT panels**

Seven polio sequencing laboratories in the Western Pacific Region participated in the global sequencing PT for 2019. Five passed the PT, three with 100% and two were required to repeat, one of which achieved 100%. An issue with the consistency of lyophilization of the panel samples was raised as a possible reason for difficulties many laboratories had amplifying the samples’ RNA and their subsequent failure to report complete or correct sequences. For the 2020 panel, all samples were sent on FTA cards. Six laboratories in the Region participated; four achieved 100% and one was required to repeat and scored 98%. The 2021 panel will be distributed by the end of 2021 in an FTA card medium through the IRR mechanism. The laboratory that did not undertake the 2020 PT will undergo virtual training in the near future.

**2.1.5 New diagnostics, development and capacity-building**

**Progress on direct detection demonstration project and implementation plan**

A direct detection (DD) pilot was performed by seven GPLN laboratories using a Zymo manual method. A total of 314 AFP samples were tested and evaluated. Also evaluated was the Kingfisher Duo automated system where 12 samples can be extracted simultaneously, and results obtained an hour after setup. Comparing results of 92 surveillance stools using Duo and Zymo RNA extraction methods, Duo identified 10 more Sabins than Zymo. Zymo has advantages of lower cost and is quick and easy to perform but requires more hands-on time. The cost per sample is approximately US$ 30, probably more costly than virus culture. GPLN plans are to add a sequencing module to the DD demonstration project and trial it in
those laboratories in the African Region serving high-risk and outbreak countries in order to get real-world information about the proportion of samples that must be sequenced. Virtual training will take place in November 2021 and DD kick-started by the end of the year. By the end of first quarter of 2022, there should be sufficient data to evaluate its value to the network.

**Novel OPV2: roll-out and genetic characterization**

The novel OPV2 (nOPV2) vaccine for addressing cVDPV2 outbreaks is a modified version of the type 2 monovalent OPV (mOPV2). Clinical trials have shown comparable protection against poliovirus while being more genetically stable and less likely to be associated with the emergence of cVDPV2 in low immunity settings. The vaccine is the first to have emergency use listing and has been used in seven countries so far, with 100 million doses administered. A new ITD rRT-PCR for L20B-positive isolates includes a panEV/Sabin quadraplex which includes primers for PV2 and nOPV2. Any PV2-positive isolate identified requires complete genome sequencing. A classification scheme has been developed for identifying neurovirulence, and responses will be according to the results of classification outcomes and reviewed in the context of broader campaign data using the campaign risk assessment report.

**Building sequencing capacity to improve timeliness of detection**

The drive to improve timeliness of reporting within 28 days of case detection has led to reviewing the process for countries without polio laboratories or countries with NPLs that do not have sequencing capacity. These countries are required to send AFP samples or isolates to a designated laboratory in the Region. For some countries in the Region, COVID-19 flight restrictions have delayed shipment of AFP stools, or positive isolates, for months. WHO in the Western Pacific Region is considering introducing DD for those countries without NPLs which are at risk of polio transmission, as well as building capacity for poliovirus sequencing in the Philippines and Malaysia. These countries will require training, infrastructure building and staff support, all of which the Regional Office will require partner support and funding to implement.

**Regional overview of the implementation of poliovirus laboratory containment (GAPIII) in the Western Pacific**

Currently, 24 countries plan to retain type 2 poliovirus and/or type 3 wild poliovirus in 69 designated poliovirus-essential facilities (dPEFs). Within the Western Pacific Region, five countries plan to have 17 dPEFs but the Regional Certification Committee (RCC) has concerns over the lack of national commitment in two countries to start the certification process. Recent global updates on containment reference documents and potentially infectious material guidance have been made available, and qualified auditors have been trained for preparing countries for the certification process in alignment with the WHO Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use, known as GAPIII. Following the Global Certification Commission for Polio Eradication unanimously concluding that indigenous type 3 wild poliovirus has been eradicated worldwide, countries must identify facilities with WPV3/VDPV3 infectious and potentially infectious materials (PIMs), which then need these materials to be either destroyed, transferred or retained within a PEF.

**2.1.6 Global Polio Laboratory Network performance tools**

*Global Polio Laboratory Network Management System (GPLNMS) tool: Management of GPLN activities*

Recently, implemented features of GPLNMS include adding PT data for virus isolation, ITD and sequencing, which has helped document the process and for polio laboratories to track progress and review
outcomes. ES PTs are also planned for inclusion. Key GPLN documents (N=35) are available, including some of the specialized protocols currently being used. New accreditation checklists and annual reports are also available on the dashboard, launched in 2020. A survey has helped determine the impact of COVID-19 on GPLN operations. There was a good response to the survey from most laboratories, although one region has yet to respond. Preliminary findings identified that: more than half of responding laboratories had COVID-19 testing being conducted in the same facilities as polio, PCR and sequencing machines were shared with COVID-19, and 75% of polio staff were involved with COVID-19 activities. A quarter of laboratories reported that COVID-19 responses had affected polio activities. A dashboard has been established to monitor laboratory operations associated with COVID-19 activities to identify gaps and to determine and address priority needs. This is reviewed weekly and contingency plans developed as necessary.

**Overview of GPLN Guidance paper number 7**

The rationale of guidance papers is to respond to the new programmatic strategies allowing for the evolving epidemiology, new immunization protocols and new surveillance and response protocols. For the laboratory, there are frequent changes in the diagnostic algorithm and alignment with new containment requirements. Guidance paper no. 7 covers the process for the evaluation and adoption of new polio diagnostic methods and procedures. It bridges a gap by formalizing established GPLN small working group practices and gives clarity and openness to the process for establishing new methods and procedures.

**2.1.7 Key pillars of the Global Polio Surveillance Action Plan (GPSAP) 2022–2023 to meet objectives of new GPEI Strategic Plan 2022–2026**

The GPEI Strategic Plan 2022–2026 was launched July 2021 with goals of: 1) permanently interrupting all poliovirus transmission in endemic countries, and 2) stopping cVDPV transmission and preventing outbreaks in non-endemic countries. One of the key outcomes, related to GPLN, was increasing the speed of detection by reporting final lab results for at least 80% of cases within 35 days of onset (AFP) or collection (ES). Three key pillars were identified to speed the final result: 1) improving field surveillance capacity, 2) faster shipment of samples to lab, and 3) faster turnaround for laboratory results.

WHO’s proposed plan for improving timeliness of detection in the Western Pacific Region focused on prioritization for high-risk (Lao People’s Democratic Republic, Papua New Guinea and Philippines), medium-risk (Cambodia and Viet Nam) and low-risk countries (Fiji). Strategies for the countries that send stools to a reference laboratory are to provide resources to improve supervision and training for surveillance field staff and to speed shipping samples to the appropriate laboratory. Introduction of DD is being considered for countries without NPLs (Cambodia, Lao People’s Democratic Republic, Papua New Guinea and Fiji) and also in logistically challenging countries with NPLs (the Philippines and Viet Nam). It is planned for ES to be strengthened in the Philippines, Papua New Guinea and Viet Nam.

**2.2 Measles and Rubella Laboratory Network Meeting**

**2.2.1 Overview of global and regional measles and rubella elimination**

The COVID-19 pandemic has had a dramatic impact on the Western Pacific Region’s Measles and Rubella Laboratory Network as many of the laboratories and personnel are using their considerable expertise and capability to actively contribute to COVID-19 surveillance and mitigation efforts in their countries. COVID-19 mitigation efforts have also had a big impact on the transmission of measles and rubella, globally and in the Region. Limitations on social mobilization, international travel and the implementation of health measures such as mask wearing have limited the transmission of many respiratory infections. Global vaccination coverage has declined since the COVID-19 pandemic started, and routine immunization
has fallen for first time in a decade. The impact of COVID-19 has also led to a decline in surveillance and decreased laboratory testing, and travel restrictions have impacted the shipment of reagents and samples across borders.

Many countries in the Region reported low numbers of suspected measles cases after the pandemic began and a much-reduced receipt of measles and rubella samples for laboratory testing. Large measles outbreaks during 2019 in Cambodia, Malaysia, the Philippines and Viet Nam all faded in 2020/21. A similar response occurred for rubella outbreaks in China, Japan, Malaysia and the Philippines from 2019. Measles molecular surveillance in the Region identified a reduction of number of genotypes detected in 2020 (N=2) compared with 2017 (N=4). Of particular note is that genotype H1, which has been predominant in China for more than 20 years, was not detected in 2020 or 2021 (to September) in China or elsewhere in the world. China also reported the lowest number of confirmed measles cases in 2020 since measles surveillance began, which equated to a reported rate of 0.7 per million. Reported rubella case numbers have also declined and molecular surveillance identified two genotypes (2B and 1E) in the Region.

The pandemic and limited staff capacity has also impacted the ability of Regional Office staff to provide on-site accreditation reviews for the past several years. However, all regional Measles and Rubella Laboratory Network laboratories continue to meet performance indicators. All passed the global measles and rubella serology proficiency test for 2019 and 2020, and 11 of the 13 molecular laboratories that received the 2020 global molecular EQA panel have passed. Results for two laboratories are still pending.

2.2.2 Reports from the Global Specialized Laboratory and Regional Reference Laboratory reports

Japan as GSL

Japan was verified as having eliminated measles in 2015, but in 2019 a measles outbreak was triggered after a workshop of a group of people averse to vaccinations. The outbreak spread to homes, schools and hospitals with 744 reported cases in 2019, the largest since elimination. In 2020, 12 cases were reported; in 2021 (to September), 4 cases. The predominant strain was genotype D8, belonging to cluster (MVs/Gir Somnath.IND/42.16). Genotype B3 was also detected and made up 28% of the sequences obtained in 2019. A rubella outbreak began in 2017 and peaked in 2019 (N=895). Genotype 1E (L2-5 lineage) predominated with a small proportion of 2Bs also detected. No rubella cases have been confirmed since March 2020.

NIID continues to be involved in strengthening the capacity of the regional and national laboratory network. A national EQA programme has been established since 2019 for assessment proficiency of genotyping in the prefectural public health laboratories (N=68) in Japan. The EQA results identified all laboratories were competent in genotyping, but several had issues with their quality of sequence analysis. Training is planned for later in 2021.

A Vero cell line that is no longer receptive to poliovirus has been developed, yet still supports the growth of measles and rubella viruses. This cell line may be beneficial to GMRLN in the polio containment environment. The cells (VeroΔPVR/hSLAM) will be available to GMRLN by the end of 2021, after a final quality check.

Australia as RRL

Since Australia’s borders closed in early 2020 due to COVID-19, no measles cases have been detected apart from a subacute sclerosing panencephalitis or SSPE case detected in a 37-year-old. The brain biopsy sequence of the SSPE was genotype D4, with a closest BLAST match to 1994 South African and 1999 Russian viruses. In the first few months of 2020, samples for measles testing were received from Samoa, Kiribati, Tonga, Solomon Islands, Papua New Guinea and Brunel Darussalam, but none have been received
since. VIDRL has been using sequencing procedures developed for SARS-CoV-2 for measles. Whole genome sequencing of measles virus was possible using the tiled amplicon strategy, which provides cleaner sequences compared with those obtained from virus isolates.

**China as RRL**

Measles incidence in China has dropped significantly since the resurgence in 2014 and as of August 2021 is at its lowest ever recorded with a reported incidence of 0.3 per million. Further evidence of progress is the reduction in detection of endemic genotype H1. From 2009 when imported virus genotypes were first detected, H1 was still predominant. In 2019, genotypes D8 and B3 were detected in greater numbers than genotype H1, and in 2020 and 2021 (to August), no H1 was detected. Sequence analysis of the D8 and B3 strains indicates multiple importation events rather than prolonged transmission. COVID-19 mitigation efforts could be the reason for the steep decline in measles cases since 2020, and China has made good progress towards elimination since the outbreak of 2013–2016.

**Hong Kong SAR (China) as RRL**

Hong Kong SAR (China) received very few samples for confirmatory testing due to COVID-19 restrictions since the start of 2020. The Public Health Laboratory has been evaluating alternative assays to Siemens and have made a provisional decision on using Serion Virion for measles IgM and Microimmune for rubella IgM. A panel of sera from primary (N=7) and secondary (N=26) infection cases were tested with Euroimmun measles avidity EIA, with good agreement between avidity and vaccination history. Challenges include: defining concordance rate calculation when national measles and rubella laboratories send samples for confirmatory testing which are using different EIA assays to the RRL. WHO reports that the Canadian PHL EIA global assessments have been delayed due to COVID-19 priorities, and a new expression of interest will be initiated to try to include additional assays for evaluation.

### 2.1.5 Country presentations

**Brunei Darussalam**

The Regional Verification Commission for Measles Elimination verified Brunei Darussalam as having achieved measles elimination in March 2015. In 2019, one of 22 specimens tested was a laboratory-confirmed case (genotype B3) and determined to be imported. No measles or rubella cases were reported in 2020 to September 2021 with 19 samples tested in each year.

**Cambodia**

Following measles elimination verification in March 2015, Cambodia experienced a measles outbreak with 676 cases confirmed in 2019 and 378 in 2020. Following outbreak response immunization and COVID-19 strict limitations on population movement, just four measles cases were confirmed in 2021 (to September). Genotypes B3 and D8 were reported in 2019 and 2020. There are plans to improve capacity and introduce molecular testing, but the National Measles Laboratory will require support from WHO and US CDC. The National Measles Laboratory staff are involved in COVID-19 vaccine roll-out and response.

**Republic of Korea**

The National Measles and Rubella Laboratory (NMRL) in the Republic of Korea is within the Division of Viral Diseases, Korea Disease Control and Prevention Agency (KDCA). The NMRL uses IgM, IgG and avidity testing for diagnosis of measles and rubella with complementary virus culture, real-time RT-PCR and sequencing. In 2019, a total of 194 measles cases were reported with all but four classified as imported or import-related. Genotypes B3 and D4 were detected. In 2020, six measles cases were detected, and all were classified as imported. Genotypes B3 and D4 were detected. No measles cases were detected in 2021
(up until September). Rubella cases were confirmed in 2019 (N=8), with seven imported and one unknown, and in 2020, (N=2) with all imported or import-related. Genotype 1E was identified. Diagnostic requests for measles and rubella have decreased sharply due to the COVID-19 pandemic.

The measles outbreak in the Republic of Korea in 2014 was thought to be related to vaccine failure because most patients had a history of vaccination. A total of 365 samples from confirmed cases (N=195) and non-cases (N=170) were analysed by age, vaccination history and collection time and tested with a Siemens measles IgG avidity test. It was found that of the confirmed cases, 76.4% had high avidity index and 8.2% intermediate avidity index, indicating possible waning immunity. Of the uninfected control individuals, 54.7% had high avidity index and 34.1% had intermediate avidity index. The majority of high avidity cases were aged 10–24 years.

**Lao People’s Democratic Republic**

The Lao People’s Democratic Republic stated that very few reports were being received from the provinces due to COVID-19. The National Laboratory was reported to be very busy with COVID-19 surveillance.

**Macao SAR (China)**

Macao SAR (China) performed measles and rubella serosurveys in 2019 and 2020 and identified gaps in rubella seropositivity in most age cohorts but especially in the age groups 20–29 years (84.9%) and > 40 years (84.9%). The country experienced multiple rubella outbreaks in 2019, of which four appeared to originate from casinos (N=3) and one in a hotel. A total of 79 cases was confirmed, with imported (N=39) and endemic (N=39) origins identified. Imported cases had links to mainland China, Cambodia, the Philippines and Viet Nam. Ages of cases ranged from 23 to 54 years. Genotypes identified were 1E (N=31) and 2B (N=1), with N=7 untyped. The first case was detected in week 4 and the last case in week 48 of 2019. All cases recovered without complications, and no congenital rubella syndrome were reported. Almost all cases were confirmed by RT-PCR as the National Laboratory is mostly sent nasopharyngeal aspirates than sera.

**Malaysia**

The National Public Health Laboratory (NPHL) Malaysia is the national laboratory for measles and rubella. Due to its geography, size and large population, Malaysia has established four subnational laboratories (SNLs) in Kota Bharu, Ipoh, Johor Bahru and Sabah. NPHL has set up a national QA programme for the SNLs with confirmatory testing performed twice a year and an annual proficiency test carried out. All four SNLs have performed well over 2019 and 2020. On-site visits were planned for 2020 but postponed until 2022 due to COVID-19 movement restrictions.

**New Zealand**

New Zealand has had measles and rubella elimination status since 2017. During 2019, the country experienced the largest measles outbreak in over a decade with over 2000 confirmed cases and an incidence of 45 per 100 000 population. The last case was detected in January 2020. Of the more than 2000 notified cases, 807 cases belonged to 15 separate outbreaks. Eleven outbreaks followed separate independent importations with a total of five different D8 strains and seven different B3 strains detected. The remaining four outbreaks were not epidemiologically linked to an imported case. Because the two longest outbreaks lasted less than 12 months each, New Zealand has not lost its measles elimination status. The measles, mumps and rubella vaccine or MMR vaccination schedule was changed from first dose at 15 months and second dose at 4 years to first dose at 12 months and second dose at 15 months, starting October 2020.
**Papua New Guinea**

A total of 134 samples were tested for measles and rubella in 2020 with seven measles positive and two rubella positive. In 2021 (to September), five samples were tested, and all were negative. Most of the focus of the NMRL since the start of 2020 has been on the country’s COVID-19 response. No PT panels were received in 2020.

**Philippines**

The Philippines plans to establish subnational laboratories (SNLs) for vaccine-preventable diseases to strengthen laboratory capacity. These laboratories will: enhance the detection and confirmation of measles and rubella, Japanese encephalitis virus (JEV) and rotavirus diseases in the country, identify outbreaks and guide immunization programmes. Seven SNLs have been proposed with locations based on population size and geographic representation, and their ability to refer samples to the National Laboratory at RITM. SNLs will provide serological testing capacity, and RITM will provide training, capacity-building, a quality assurance programme and confirmatory testing, as well as and conduct molecular tests, if appropriate. COVID-19 travel restrictions have required online advocacy meetings with the seven laboratories but on-site laboratory assessments are planned to be carried out by the end of 2021, with training and capacity-building to occur in 2022, in collaboration with WHO, the Department of Health and RITM.

**Singapore**

Singapore confirmed 157 measles cases in 2019 with the highest incidence rate in infants under 12 months and in the age group 25–34 years. A total of 88 confirmed cases of non-endemic sub-genotypes without clear epi links to importation were classified as import related. Outbreaks were detected in two foreign worker dormitories (N=12) and adults in a home for people with intellectual disabilities (N=19). Investigations did not reveal a common source of infection, and the lineage of genotype B3 (strain 7) detected had not been reported in Singapore previously. Due to COVID-19, Singapore closed its border to short-term visitors and foreign workers in March 2020, and no further measles or rubella cases were detected. The MMR schedule was altered in 2020 to have the second dose administered at 15 months rather than 15–18 months.

**Viet Nam**

**Hanoi**

The NMRL at the National Institute of Hygiene and Epidemiology (NIHE), Hanoi, supports the quality assurance needs of two subnational laboratories in Viet Nam: Highland (TIHE) and Central Viet Nam (PI Nha Trang). NIHE provides confirmatory testing for the SNLs, but a PT programme has yet to be established. The IgM kits used by the SNLs are different to that used by NIHE, but discordance of results is low.

**Ho Chi Minh City**

The Pasteur Institute Laboratory in Ho Chi Minh City receives measles and rubella samples from 20 provinces in southern Viet Nam. The D8 measles outbreak in 2019 (N=3969 cases) diminished in 2020 (N=470 cases) and two cases were detected in 2021 (to September). For rubella, cases detected were in 2019 (N=28), 2020 (n=31) and 2021 (N=6). Congenital rubella syndrome surveillance is carried out in two children’s hospitals in Ho Chi Minh City, and positive cases identified in 6 of 347 (1.7%) suspected cases tested in 2019, 10 of 351 (2.8%) in 2020 and 2 of 116 (1.7%) in 2021. Challenges created by COVID-19
are restrictions in the shipment of samples, shortage in the supply of IgM kits and an inability to carry out training workshops in the provinces.

2.1.6 Issues in the Region

International Reagent Resource (IRR)

IRR, with the support of US CDC, has made significant improvements in the operation of GMRLN. Almost all laboratories have now registered and are receiving IgM kits, molecular reagents and PT panels. The shipping of standardized, quality reagents through IRR has led to a marked reduction in the level of input required by the global and regional coordinators, allowing them to focus attention on other important aspects of managing the network. A few teething problems have arisen, but these can be addressed appropriately if communicated to US CDC as they arise. The possibility of including the supply of cell lines for measles and rubella virus culture will be investigated.

2.1.7 MeaNS and RubeNS update

A new version (2) of the measles and rubella nucleotide databases has been developed by the UK Health Security Agency (UKHSA, formerly HPA). The new system will improve data integrity and become more responsive, and internal and external security will be improved to ensure hackers cannot access data. The first version of MeaNS and RubeNS were separate databases; the new version will be one database for both measles and rubella and will be more genome ready and less N450 centric. Users will be limited to accessing data according to their role in GMRLN. A demonstration version is already available.

Measles and rubella rapid diagnosis tests (RDTs)

A measles and rubella IgM RDT has the potential to offer improved surveillance in countries or areas where there are logistical challenges in surveillance and/or shipping samples to the relevant GMRLN. A measles RDT has been developed by HPA and well validated in multiple countries. It has been shown to be easy to use, with good correlation to serum-EIA IgM results. The measles RDT can be used with serum, capillary blood and oral fluid by health facility staff, with minimal training, and results are available in less than 30 minutes. The RDT device can also be sent to the GMRLN for generating sequence information. A batch of measles RDTs will be ready for evaluation in the Western Pacific Region by early 2022. Development and validation of a rubella IgM RDT is progressing, and it is proposed that a combined measles and rubella device will be available.

Fiji and the potential for using measles and rubella RDTs

Fiji has a well-functioning national measles and rubella laboratory (NPHL), which is integrated with GMRLN. However, the measles outbreak in 2019 challenged the laboratory which experienced a shortage of kits and an absence of sufficient well-trained staff to deal with the workload. NPHL addressed the challenges and, with support from VIDRL and WHO, developed molecular testing capacity. A concept for using measles RDTs to provide strong surveillance in Fiji and other Pacific island countries and were was developed to assist in laboratory-based surveillance. RDTs would allow real-time case confirmation outside of central/regional laboratories, thereby facilitating timely public health response. It is proposed to roll out RDTs strategically at divisional and subdivisional laboratories with regular monitoring by NPHL in Suva. VIDRL would be the RRL for confirmatory testing and sequencing.

2.1.8 Laboratory quality assurance systems

Serology IgM EQA

The 2020 global IgM PT panel (02003) was completed by all regions except the Eastern Mediterranean Region. All samples in the panel were checked for temperature stability after 13 days at room temperature.
Several samples showed a drop in OD values, especially with Euroimmun and Siemens kits and confirmed the need for maintaining a cold chain during shipment. A total of 13 commercial IgM kits were used for measles, predominantly Euroimmun (58%) and Virion Serion (21%), and only 2% of laboratories used Siemens. For rubella IgM kits, 60% of laboratories used Euroimmun, 12% Virion Serion, and 2% Siemens. All 55 Western Pacific laboratories passed the measles and rubella PT with 89% achieving 100% for measles and 87% achieving 100% for rubella. A modification of the VIDRL website to include reporting templates and reporting fields specific for Virion Serion and Euroimmun kit users was delayed due to the COVID-19 workload but is now in progress.

**Molecular EQA**

The 2020 mEQA panel was sent to 13 laboratories in the Western Pacific Region using the IRR platform with one panel to Viet Nam (Ho Chi Minh City) still pending shipment issues. Eleven laboratories reported results and passed both the detection and genotyping components for both measles and rubella. Some of the challenges included: the MeaNS and RubeNS mEQA website was down and required submission by email, sequencing and sequence analysis issues, naming of sequences, and correct identification of real-time RT-PCR controls. The panel for 2021 will be available via IRR in the fourth quarter of 2021.

**Global Polio Containment**

GAPIII is currently being revised, and a new version of the Global Action Plan, GAPIV, will likely be released in 2022. The GMRLN laboratories need to seriously consider GAP as they may hold PIMs in faecal or respiratory samples collected at the time of wild poliovirus circulation or at a time of OPV administration. These samples are presumed infectious, unless otherwise demonstrated. However, the risk level is considered low for respiratory tract samples inoculated onto poliovirus-permissive cells such as Vero-hSLAM. For the identification of PIMs in the Region, 33 of 37 Member States have submitted their national inventory reports.

### 3. RECOMMENDATIONS

#### 3.1 Recommendations for Member States

Member States are encouraged to consider the following:

**Polio Laboratory Network**

1) The Korea Disease Control and Prevention Agency and the Mongolia National Polio Laboratory to share a detailed outline of their ES activities and future plans.

2) Laboratories in the Region using Pepper mild mottle virus (PMMoV) as an internal control to assess quality of sewage/wastewater samples, to share protocols and prepare a brief description of its implementation for WHO.

3) The Malaysia Polio National Laboratory (IMR) to provide details on the support required from WHO for the establishment and capacity-building of SNLs, including providing quality assurance and monitoring that they are following GPLN procedures.

4) Member States are encouraged to consolidate IRR orders from multiple laboratories within the same institute/country, such as influenza, measles, polio and rotavirus, to save the request for multiple import permits and to expedite the shipment and customs clearance process, wherever possible.
5) The ITD/VDPV PT panel for 2021 will be available between 20 September and 20 November and should be ordered through IRR as soon as possible. Knowledge of the ITD 5.2 algorithm will be required to perform the PT.

6) The WHO Regional Office for the Western Pacific no longer distributes ITD panels, and it is critical that polio laboratories request PT panels and other reagents available through the IRR mechanism and ensure that they monitor emails. The WHO Regional Office can assist if polio laboratories experience challenges in receiving PT panels.

**Measles and Rubella Laboratory Network**

1) Travel limitations imposed by the COVID-19 pandemic have halted on-site accreditation reviews. However, desk reviews are a valuable monitor of measles and rubella laboratory performance and should be carried out annually using the eWHO accreditation checklist. On-site reviews will be restarted once travel restrictions are relaxed and will focus on priority countries initially.

2) Many countries are currently experiencing very low levels of measles and rubella transmission. For countries that have eliminated measles and/or rubella as well as countries in the pre-elimination phase, it is important to obtain viral genotypes from as many chains of transmission as possible.

3) In response to the COVID-19 pandemic, capacity and capability in collecting clinical specimens (nasopharyngeal or oropharyngeal swabs) and conducting real-time, reverse transcriptase PCR (rRT-PCR) testing have vastly expanded globally and in the GMRLN. As a result, the use of rRT-PCR tests is likely to increase for measles and rubella diagnosis, further increasing the importance of mEQA. Countries that use rRT-PCR for diagnostic tests need to ensure accuracy by always running appropriate controls and participating in the annual WHO mEQA. It is important to closely follow WHO guidance on molecular testing for measles and rubella, particularly pertaining to clinical specimen collection, storage and transportation. WHO and US CDC will continue to support laboratories to achieve the performance levels needed, with close attention on rubella.

4) Rubella molecular surveillance can be improved by using alternative amplification approaches and the use of virus culture, if available, based on extensive experience in China and Japan during the recent outbreaks in those countries.

5) IRR has been a game changer for the timely provision of laboratory reagents to the GMRLN. Based on the outcome of the WHO performance evaluation of measles and rubella serology assays, provision of additional kit manufacturers as well as recommended cell lines should be considered.

6) Member States that use IRR should understand how IRR functions and communicate any concerns or questions to the IRR coordinator at US CDC and include the Regional Laboratory Coordinator. Molecular EQA panels will be distributed through IRR, and laboratories must request shipment of the panels starting 1 November 2021. The serology EQA panels will be distributed by the WHO Regional Office and VIDRL, as previously.

7) To reduce time for import permits and delays with shipment, Member States are requested to consolidate orders from IRR to include, for example, kits, PT panels, controls and reagents, and those countries with subnational laboratory requirements to have all their requests coordinated through the national laboratory.

8) Member States should review their testing algorithms for laboratory testing, including the use of RT-PCR and IgG avidity for case confirmation and identification of breakthrough infections, in consultation with the current WHO Measles and Rubella Laboratory Manual and WHO Surveillance Guidelines.
9) In all countries, the number of measles and rubella cases has decreased dramatically since early 2020. However, this is mainly due to the significant reduction in the number of person-to-person contacts and overseas travellers as a result of COVID-19 measures. The decline in the quality of measles and rubella surveillance is also likely to have been partially responsible due to the focus on COVID-19 surveillance. The surveillance system for measles and rubella needs to be strengthened, at least to the level before the COVID-19 outbreak, and Member States need to be prepared for possible measles and rubella outbreaks when COVID-19 mitigation measures are reduced.

10) Countries planning to develop a subnational network of measles and rubella laboratories should consider strengthening the terms of reference of the national reference laboratory to include its role as a supervisory laboratory with the need to introduce a quality control programme for these additional laboratories. WHO, together with national authorities, will collaborate to ensure the new laboratories meet current GMRLN performance standards.

11) National laboratories are required to ensure timely and complete reporting of genotyping data needed to monitor the progress of elimination in countries and areas. National laboratories need to ensure close collaboration with their National Verification Committee with respect to provision of laboratory-based surveillance data and genotyping data.

12) Vaccine-associated rash illness (VARI) should be differentiated from the wild-type measles cases, especially during/after any vaccination campaign. Rapid confirmation of VARI is also critical for measles surveillance and will help to determine the response measures for measles, especially in measles pre-elimination and elimination settings. Therefore, laboratories are encouraged to have a PCR assay for the detection of the vaccine strain of the measles virus.

13) Nucleic acid detection may be considered for case confirmation when cases present within the first three days after rash onset to complement routine IgM tests. A multiplex rRT-PCR to differentiate wild virus and vaccine strains can be considered for positive measles cases.

14) Member States are encouraged to use the Polio AFP Surveillance and Reporting System or PASRS platform for submitting ES data.

3.2 Recommendations for WHO

WHO is requested to consider the following:

**Polio Laboratory Network**

1) **Integration and transition:** WHO to take the lead on fostering ES data and information sharing and reflect on developing a comprehensive VPD laboratory surveillance programme.

2) **ES reporting:** WHO will develop a guidance document for the standardized reporting of ES results. WHO headquarters will investigate the ES data sharing web-based system developed by other regions as possible templates.

3) GPLN will consider supporting the establishment and optimization of ES in high-risk countries in the Western Pacific Region.

4) After validation of the recently developed poliovirus direct-detection procedure, GPLN to support implementation of this method in priority countries without polio laboratories where feasible, and utilize capacities developed for COVID-19 diagnostics, in collaboration with existing partners.

5) WHO, in collaboration with GSLs and RRLs, to support capacity-building for sequencing in the polio national laboratories in Malaysia and the Philippines.
6) WHO should continue to provide information on polio containment and countries should implement appropriate measures for handling clinical specimens and viral isolates as described in PIM guidance.

**Measles and Rubella Laboratory Network**

1) Despite the impact of COVID-19 on GMRLN activities, WHO will support the completion of the measles and rubella IgM kit evaluation as soon as practicable, because the results from other evaluations that tested a limited number of samples are raising concerns about the performance of the kits currently being used.

2) Use of extended sequencing windows, for example, MF-NCR (non-coding region between M and F genes) and whole genome sequencing (WGS) analysis will become increasingly important as countries move close to measles and rubella elimination. A multiplex real-time RT-PCR to differentiate wild virus and vaccine strains can be considered for positive measles cases.

3) The development of RDTs for measles and rubella is in its final stages of development and can be a game changer for the global programme. WHO is developing a position paper for the introduction of RDTs as alternative methods to further improve surveillance of these diseases. These RDTs can also be used for molecular analysis. Member States interested in introducing RDTs are encouraged to develop a national plan of action involving the national laboratories, surveillance and immunization programme.
ANNEXES

Annex 1. List of participants, temporary advisers, observers, and Secretariat

POLIO SESSION, 27–28 September 2021

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Annex 2. Programme of activities

**WORLD HEALTH ORGANIZATION**

**REGIONAL OFFICE FOR THE WESTERN PACIFIC**

**BUREAU REGIONAL DU PACIFIQUE OCCIDENTAL**

**NINTH MEETING OF VACCINE-PREVENTABLE DISEASES LABORATORY NETWORKS**

**IN THE WESTERN PACIFIC REGION**

Manila, Philippines  
27-28 September 2021

**ENGLISH & CHINESE**

**PROGRAMME OF ACTIVITIES**

**PART I. POLIO LABORATORY NETWORK MEETING**

**27 – 28 September 2021**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity/Agenda Item/Subject of Presentation</th>
<th>Presenter</th>
</tr>
</thead>
</table>
| 8:00 – 8:20| **Opening session**  
- Welcome remarks  
- Opening remarks  
- Self-introduction  
- Election of officers  
- Administrative announcements  
- Group photo                                                                 | Ms Varja Grabovac  
Ms Varja Grabovac  
All  
Ms Varja Grabovac  
Ms Varja Grabovac |
| 8:20 – 8:35| **Session 1: Polio endgame strategy and updates on maintaining polio-free status: Global and Regional updates**  
- a) Progress towards Eradication and New GPEI strategy  
- b) GPLN updates and alignment to the new strategy  
- c) Regional Polio Laboratory Network update  
- Discussion                                                                 | Dr Ousmane Diop  
Dr Ousmane Diop  
Ms Varja Grabovac |
<p>| 8:35 – 8:50|                                                                                                           |                            |
| 8:50 – 9:05|                                                                                                           |                            |
| 9:05 – 9:15|                                                                                                           |                            |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity/Agenda Item/Subject of Presentation</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:15 – 9:30</td>
<td><strong>Session 2: Report from global specialized laboratory (GSL) and regional reference laboratories (RRL)</strong></td>
<td>NIID</td>
</tr>
<tr>
<td>9:30 – 9:45</td>
<td>a) GSL Japan</td>
<td>VIDRL</td>
</tr>
<tr>
<td>9:45 – 10:00</td>
<td>b) RRL Australia</td>
<td>China CDC</td>
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<tr>
<td>10:00 – 10:15</td>
<td>c) RRL China</td>
<td></td>
</tr>
<tr>
<td>10:15 – 10:35</td>
<td><strong>Coffee break</strong></td>
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</tr>
<tr>
<td>10:35 – 10:50</td>
<td><strong>Session 3: Report from the National Polio Laboratories in the Region</strong></td>
<td>PHLC</td>
</tr>
<tr>
<td>10:50 – 11:05</td>
<td>a) Hong Kong SAR (China)</td>
<td>IMR</td>
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<tr>
<td>11:05 – 11:15</td>
<td>b) Malaysia</td>
<td>PHI</td>
</tr>
<tr>
<td>11:15 – 11:30</td>
<td>c) Mongolia</td>
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</tr>
<tr>
<td>11:30 – 11:45</td>
<td><strong>Session 4: Report from the National Polio Laboratories in the Region</strong></td>
<td>ESR</td>
</tr>
<tr>
<td>11:45 – 12:00</td>
<td>a) New Zealand</td>
<td>RITM</td>
</tr>
<tr>
<td>12:00 – 12:15</td>
<td>b) Philippines</td>
<td>KDCA</td>
</tr>
<tr>
<td>12:15 – 12:30</td>
<td>c) Republic of Korea</td>
<td></td>
</tr>
<tr>
<td>12:30 – 13:00</td>
<td><strong>Session 5: Laboratory Quality Assurance System, Part 1</strong></td>
<td>RIVM</td>
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<tr>
<td>13:00 – 13:30</td>
<td>a) Report on 2019, 2020 and upcoming 2021 virus isolation and environmental surveillance proficiency testing</td>
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<td>Discussion</td>
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<td><strong>End of day 1</strong></td>
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**Tuesday, 28 September 2021**

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<tr>
<td>8:00 – 8:30</td>
<td><strong>Session 6: Laboratory Quality Assurance System, Part 2</strong></td>
<td>US CDC</td>
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<tr>
<td>8:30 – 8:45</td>
<td>a) Report on 2019, 2020 and upcoming 2021 ITD PT</td>
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<td>b) Report on 2019, 2020 and upcoming 2021 Sequencing PT</td>
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<td>8:45 – 9:00</td>
<td><strong>Session 7: New diagnostics, development, and capacity building</strong></td>
<td>US CDC</td>
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<td>9:00 – 9:15</td>
<td>a) DD algorithm + pilot-testing of new sequencing procedures</td>
<td>US CDC</td>
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<td>9:15 – 9:30</td>
<td>b) nOPV2: roll out and genetic characterization</td>
<td>Ms Varja Grabovac</td>
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<td>9:30 – 9:45</td>
<td>c) Building capacity to improve timeliness of detection</td>
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<td>Discussion</td>
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<tr>
<td>9:45 – 10:05</td>
<td><strong>Coffee Break</strong></td>
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<tr>
<td>10:05 – 10:20</td>
<td><strong>Session 8: Report from the National Polio Laboratories in the Region</strong></td>
<td>SH, NIHE, PI</td>
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<tr>
<td>10:20 – 10:35</td>
<td>a) Singapore</td>
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<td>10:35 – 10:50</td>
<td>b) Viet Nam NIHE</td>
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<td>10:50 – 11:00</td>
<td>c) Viet Nam PI HCM and SH</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>Session 9: Polio laboratory containment - GAP III</strong></td>
<td>Ms Varja Grabovac</td>
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<tr>
<td>11:10 – 11:15</td>
<td>a) Implementation of GAP III in the Western Pacific Region</td>
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<td>Discussion</td>
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<td>11:15 – 11:30</td>
<td><strong>Session 10: GPLN performance tools</strong></td>
<td>Dr Ousmane Diop</td>
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<tr>
<td>11:30 – 11:45</td>
<td>a) Importance of GPLNMS tool to assess/monitor laboratory performance in COVID times</td>
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<tr>
<td>11:45 – 12:00</td>
<td>b) Review of Guidance Papers: GP 7 evaluation and adoption of diagnostic methods</td>
<td>Dr Ousmane Diop</td>
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<tr>
<td>12:00 – 12:30</td>
<td><strong>Lunch break</strong></td>
<td>Temporary Advisers/WHO/Rapporteur</td>
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<td><strong>Working lunch for TA/Secretariat/Rapporteur</strong></td>
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<td>12:30 – 12:45</td>
<td><strong>Session 11: Key pillars of the Global Polio Surveillance Action Plan (GPSAP) 2022-2023 to meet objectives of new GPEI Strategic Plan</strong></td>
<td>Dr Ousmane Diop/ Ms Varja Grabovac</td>
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<td>12:45 – 13:00</td>
<td>Discussion</td>
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<td>13:00 – 13:30</td>
<td><strong>Session 11: Conclusions and Recommendations</strong></td>
<td>Mr David Featherstone</td>
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<td>13:30</td>
<td><strong>Closing remarks</strong></td>
<td>Ms Varja Grabovac</td>
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| 8:00 – 8:40| **Opening session**  
• Welcome & Opening remarks  
• Aims and Objectives  
• Introductions  
• Election of officers  
• Administrative announcements  
• Group photo                                                | Dr Roger Evans     |
| 8:40 – 8:55| **Session 1: Report from WHO/HQ and Global Specialized Laboratory (GSL) – Japan**                              | Dr Mick Mulders    |
| 8:55 – 9:10| a) The Global Measles and Rubella Laboratories Network and Pandemic Challenges  
Discussion                                                   | Dr Makoto Takeda   |
| 9:10 – 9:25| b) GSL – Japan: Current Measles and Rubella Situation and Laboratory activities in Japan  
Discussion                                                   |                    |
<p>| 9:25 – 9:35|                                                                                                              |                    |</p>
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<td></td>
<td><strong>Session 2: Report from regional reference laboratories (RRL) and national laboratories (NL)</strong></td>
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<td>9:35 – 9:50</td>
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<td>VIDRL</td>
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<td>9:50 – 10:00</td>
<td>a) RRL Australia: Research topic/review of the year Discussion</td>
<td>China CDC</td>
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<td>10:00 – 10:20</td>
<td>b) RRL China: Moving towards elimination: absence of H1 Discussion</td>
<td>CDC</td>
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<td>10:20 – 10:35</td>
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<td>PHLC</td>
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<td>11:00 – 11:10</td>
<td>c) RRL Hong Kong: Research topic/review of the year Discussion</td>
<td>National Virology Ref Lab</td>
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<td>11:25 – 11:35</td>
<td>d) NL Brunei: Molecular development Discussion</td>
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<td><strong>Coffee break</strong></td>
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<td><strong>Session 3: Report from the national laboratories and Regional review from WHO/WPRO</strong></td>
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<td>11:35 – 12:05</td>
<td>a) NL Cambodia: Molecular development Discussion</td>
<td>NIPH</td>
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<td>12:05 – 12:20</td>
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<td>12:20 – 12:30</td>
<td>b) NL Republic of Korea: IgG avidity testing Discussion</td>
<td>KDCA</td>
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<td>12:45 – 12:55</td>
<td>c) Regional review Discussion</td>
<td>Dr Roger Evans</td>
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<td><strong>End of day 1</strong></td>
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**Thursday, 30 September 2021**

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<tr>
<td>8:00 – 8:20</td>
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<tr>
<td>8:20 – 8:35</td>
<td>a) Welcome and review of Day 1 session b) Molecular External Quality Assurance for GMRLN 2020 panel Discussion</td>
<td>Dr Makoto Takeda US CDC</td>
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<td>8:35 – 8:45</td>
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<td>8:45 – 9:00</td>
<td>c) International Reagent Resource (IRR) Discussion</td>
<td>US CDC</td>
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<td><strong>Session 4: Review of Day 1 session &amp; issues in the region mEQA</strong></td>
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<td>9:10 – 9:25</td>
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<td>9:25 – 9:35</td>
<td>a) NL Macao: Reporting rubella Discussion</td>
<td>PHL</td>
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<td>9:50 – 10:00</td>
<td>b) NL Malaysia: Accreditation of SNLs Discussion</td>
<td>NPHL</td>
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<td>11:15 – 11:30</td>
<td>e) NL Philippines: Establishment of VPD Subnational laboratories for serological testing in the Philippines Discussion</td>
<td>RITM</td>
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<td>11:30 – 11:40</td>
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<td>11:40 – 13:00</td>
<td><strong>Lunch break</strong></td>
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<td>13:00 – 13:15</td>
<td><strong>Session 6: MeaNS2/RubeNS2 Update</strong></td>
<td>UKHSA</td>
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<td>13:25 – 13:30</td>
<td>Discussion</td>
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<td>b) Close of second day</td>
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<td><strong>Friday, 01 October 2021</strong></td>
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<tr>
<td>8:00 – 8:20</td>
<td>Session 7: Review of Day 2 session, serology eQA by RRL Australia, Measles IgM Rapid Diagnostic Tests (RDT) update and NL reports</td>
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<tr>
<td>8:20 – 8:35</td>
<td>a) Welcome and review of Day 2 session</td>
<td>Dr Makoto Takeda</td>
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<td>8:35 – 8:45</td>
<td>b) RRL Australia: Measles and Rubella IgM PT Panel Discussion</td>
<td>VIDRL</td>
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<td>8:45 – 9:00</td>
<td>c) NL Singapore: Post - Measles Elimination Status Discussion</td>
<td>NPHL</td>
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<td>9:00 – 9:10</td>
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<td>NIHE</td>
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<td>9:10 – 9:25</td>
<td>d) NL Viet Nam Hanoi: External Quality Assurance Discussion</td>
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<td>9:25 – 9:35</td>
<td>e) NL Viet Nam Ho Chi Minh City: Molecular developments Discussion</td>
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<td>9:35 – 9:50</td>
<td></td>
<td>Mr David Featherstone</td>
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<td>9:50 – 10:00</td>
<td><strong>Coffee break</strong></td>
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<td>10:00 – 10:20</td>
<td>f) Measles IgM RDT update</td>
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<td>Discussion</td>
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<td>Session 8: NL Fiji report, presentation on conclusions and recommendations</td>
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<td>10:45 – 11:00</td>
<td>a) NL Fiji/PICs: AbRDT concept in PICs</td>
<td>Fiji CDC</td>
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<td>11:00 – 11:10</td>
<td>Discussion</td>
<td>Mr David Featherstone</td>
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<td>11:10 – 11:25</td>
<td>Mobility break</td>
<td>Dr Roger Evans</td>
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<td>11:25 – 12:25</td>
<td>b) Presentation of conclusions and recommendations</td>
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<td>12:25 – 12:30</td>
<td>c) Closing speech</td>
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