

WHO train the trainer workshop:
developing national deployment and vaccination plans (NDVP) for
pandemic influenza vaccines

Geneva, Switzerland, 10-12 September 2019



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Acronyms

AEFI	Adverse Event Following Immunization
A(H1N1)	Influenza A virus subtype H1N1 – also abbreviated to H1N1
AMRO	Americas Regional Office (WHO)
cMYP	Comprehensive Multi-Year Plan
CRA	Country Recipient Agreement
DHIS2	District Health Information Software (version 2)
DQA	Data Quality Assessment
EMRO	Eastern Mediterranean Regional Office (WHO)
EOC	Emergency Operations Centre
EPI	Expanded Programme on Immunization
EVM	Effective Vaccine Management
EWARS	Early Warning, Alert and Response System
FAQs	Frequently Asked Questions
GAP	Global Action Plan for Influenza Vaccines
GISRS	Global Influenza Surveillance and Response System
HIS	Health Information System
IHME	Institute of Health Metrics and Evaluation
IHR	International Health Regulations
ISIS	Integrated Surveillance Information System
JRF	Joint Reporting Form
LTA	Long Term Agreement
MDVP	Multi-Dose Vial Policy
MERS	Middle East Respiratory Syndrome
MIS	Management Information System
MoH	Ministry of Health
MR	Measles and Rubella
NDVP	National Deployment and Vaccination Plans
NGO	Non-Governmental Organization
NITAG	National Immunization Technical Advisory Group
NRA	National Regulatory Agency
PAHO	Pan-American Health Organization
PIP	Pandemic Influenza Plan
PISA	Pandemic Influenza Severity Assessment
SAGE	Strategic Advisory Group of Experts
SARS	Severe Acute Respiratory Syndrome
SIA	Supplementary Immunization Activity
SMTA2	Standard Material Transfer Agreements 2
SUMA	Supply Management System
TRS	Technical Report Series
UNICEF	United Nations Children’s Fund
VSSM	Vaccine Supply Stock Management
VVM	Vaccine Vial Monitor
WHE	WHO Health Emergencies Programme
WHO	World Health Organization

Background

A three-day workshop was held by WHO from 10-12 September 2019 in Geneva, Switzerland, to familiarize participants with the key issues surrounding country preparedness for influenza vaccine deployment in the event of an influenza pandemic.

The main objective of the workshop was to create a pool of experts that would be able to support their own, and other, countries to develop national pandemic preparedness plans, and for participants to become educators and spread the word about the need for countries to be prepared for a pandemic.

A further objective was to establish an expert network and share practices in an effort to enrich responses in case of pandemic and to provide a platform for the group to exchange materials and information on pandemic preparedness.

Participants from the following institutions attended the meeting:

- The Ministries of Health of Lebanon, Oman, Sri Lanka and the United Arab Emirates
- The American University of Beirut.
- WHO Africa Regional Office, WHO Eastern Mediterranean Regional Office, Pan-American Health Office (PAHO) and the WHO Western Pacific Regional Office
- WHO Mozambique and Tunisia Country Offices
- An independent consultant from Nepal
- WHO Secretariat, and WHO HQ Subject Matter Experts
- MMGH Consultants

The WHO “Guidance on Development of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines” together with its associated Checklist, were used as reference materials to highlight the key steps for preparedness. Presentations were made by subject matter experts on the ten main topics covered in the WHO document “Guidance on Development of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines” and used to stimulate discussion and clarification on the application of the concepts to individual country contexts.

All presentations, as well as numerous background materials, were made available to the workshop participants through the Dropbox. Following is a summary of the proceedings and key issues that arose during the discussions.

DAY 1

Opening Remarks

Taking a historical perspective on the 2009 H1N1 influenza pandemic, when the pandemic broke, much of the supply of the vaccine was already committed and WHO was unable to secure sufficient vaccine to cover the needs of all countries. For the next pandemic, due to new arrangements put in place, 400 million doses will be available to WHO, which, although being more than during the last pandemic, will still not be enough. Optimizing management of resources – both vaccines and funding – will be key to addressing this shortage, together with close coordination of all parties, and preparedness of countries. At the country level, having a national pandemic preparedness plan ready and updated will go a long way to mitigating the challenges that will undoubtedly occur.

Prior to the 2009 H1N1 pandemic, some countries had a plan and were able to effectively distribute the vaccine to those that needed it. But there were still gaps in the planning. For example, in some settings, not involving General Practitioners in the planning and initial discussions and using an external workforce, posed challenges to risk communication efforts and in some situations manifested through lower uptake than optimal.

This example shows that while securing access to vaccine is part of the job, making sure the people who need the vaccine get it, is equally important and highlights the importance of communication.

Countries should be cognizant of the importance of having a national pandemic preparedness plan ready and updated, and aware that this can be used not only for deployment of influenza vaccine, but also for other vaccines such as MERS (Middle East Respiratory Syndrome), Zika, and SARS (Severe Acute Respiratory Syndrome) in the event of an outbreak due to these viruses.

Workshop participants were encouraged to master the steps that would be covered during the workshop to ensuring adequate country preparedness and to becoming advocates for such preparedness as they supported countries upon conclusion of the workshop.

The first part of the morning consisted of briefing the workshop participants on some of the historic lessons learned from the 2009 A(H1N1) pandemic, on the processes that have been put in place to facilitate speedier response in the event of another pandemic, and on presentations on selected relevant topics.

Pandemic Influenza Preparedness Plans

There are three types of influenza that infect humans:

- Type A causes epidemics and pandemics;
- Type B can cause epidemics but has not yet caused pandemics; and
- Type C causes mild illness in humans and does not cause epidemics or pandemics.

Annual seasonal influenza deaths are higher than previously estimated: the new estimate is between 200,000 – 650,000 deaths per year. This is a figure that can be used to gain the attention of countries as to the severity of influenza.

This session introduced participants to the tools and guidance available to countries to prepare their Pandemic Influenza Plans (PIPs) and each resource was briefly explained. Participants were also informed of the ability to review the status of publicly available PIPs from other countries, which could be useful to countries when preparing their own plans and of other information available on the website.¹

Through an interactive game, the session illustrated the continuum of pandemic phases, i.e.: Alert – Pandemic – Transition, and the different actions to be taken during the different phases.

Current Status of Seasonal Influenza Vaccination

Participants were informed that some of the main challenges to introducing influenza vaccine during an influenza pandemic include: absence of a national influenza immunization policy at country level; regulatory aspects; service delivery issues; insufficient preparation of health workers; and concern about the safety of the vaccine versus perceived risk from the disease during a pandemic. It is assumed that those countries conducting seasonal vaccination for influenza will be able to respond quicker during a pandemic as aspects such as regulatory policies are in place, health workers are prepared, etc.

With this in mind, the global community gathers information on the status of countries' national seasonal influenza policies, vaccination coverage rates in the different risk groups vaccinated, and the types of vaccine used as reported by national immunization programmes to WHO via the WHO/UNICEF Joint Reporting Form (JRF) on Immunization.

Workshop participants were briefed on the key results from the latest JRF submissions. The presentation highlighted the need to encourage lower middle-income countries in particular to start putting in place their pandemic influenza preparedness plans, and to make progress on developing the regulatory processes for when the pandemic strikes. Seasonal influenza vaccination of selected risk groups will contribute to preparedness for a pandemic.

Standard Material Transfer Agreements 2 (SMTA2)

This session provided workshop participants with information on the steps WHO is taking to ensure improved supply of vaccine during the next influenza pandemic.

During an influenza pandemic, one of the main challenges is accessing sufficient vaccine to vaccinate those most in need. Unlike other epidemic- or pandemic-prone vaccine-preventable diseases, the particular strain of the influenza pandemic vaccine is not known in advance therefore it is not possible to stockpile the vaccine. The Global Influenza Surveillance and Response System (GISRS)² network shares information to enable vaccine to be created. The GISRS is a lab network of 115

¹ <https://www.who.int/influenza/pip/en/>

² https://www.who.int/influenza/gisrs_laboratory/updates/gisrs_one_pager/en/

Member States supporting 151 laboratories that has been in existence for 65 years and is used to identify the appropriate strains for the seasonal influenza vaccine. Participants were directed towards the website for more information.³

However, global production capacity will not cover the entire population in all countries at the onset of the pandemic, and the international community needs to ensure the highest risk countries and the highest risk populations have priority access to the vaccine in the event of a pandemic. Through the Pandemic Influenza Preparedness (PIP) Framework (adopted in 2011)⁴, WHO begun to conclude advance agreements for securing real-time access to pandemic supplies such as vaccines, therapeutics and diagnostics. To date, WHO has signed 13 Standard Material Transfer Agreements 2 (SMTA2) with manufacturers whereby they commit 10% of their influenza vaccine production to WHO in return for access to the pandemic vaccine virus strains and information. Currently, this provides WHO with access to approximately 420 million doses of influenza vaccine, in addition to other pandemic related supplies such as syringes, antiviral medicines and diagnostic kits.

Overview of Pandemic Vaccine Deployment

Among the many lessons learned from the 2009 H1N1 pandemic, lack of preparedness at country level, in particular in the areas of regulatory issues, legal agreements and national deployment planning were highlighted as bottlenecks to the rapid deployment of the vaccine.

This session took workshops participants through the various steps of preparing a National Deployment and Vaccine Plan for Pandemic Influenza Vaccines (NDVP) and highlighted the need for countries to develop and test their plans now, to be ready in the event of a pandemic.

Currently, 77 countries have such a plan from the 2009 A(H1N1) outbreak, but these plans have not been updated and may have missing elements. And while it may be possible in the event of a pandemic to use existing infrastructure, there are some key differences between routine and pandemic response vaccination, for example, unpredictability, urgency, novel vaccines, surge capacity in supply chain and for vaccination, and different target populations.

Workshop participants were directed to the WHO “Guidance on Development of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines” together with its associated checklist, as the main documents to support the development of a NDVP through inception, development and implementation. Participants were also informed about the availability of tabletop simulation exercises and the need for periodic testing of the deployment plans in-country and to the WHO Open Course⁵ learning package that consists of 10 modules, video lectures and presentations to help countries develop their National Deployment and Vaccination Plans.

The next part of the meeting was dedicated to presentations that explained the 10 Chapters in the WHO document “Guidance on Development and Implementation of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines”, as well as topics of direct

³ https://www.who.int/influenza/gisrs_laboratory/en/

⁴ <https://www.who.int/influenza/pip/en/>

⁵ <https://openwho.org/courses/ndvp-en>

inability to vaccinate the entirety of its population, this session focused on briefing the workshop participants on *relevance to the workshop participants in their future efforts to support countries in developing their National Pandemic Vaccine Deployment Plans*.

Defining Vaccination Strategies (Chapter 1)

Given the likelihood of a vaccine shortage and a country's the need to identify and prioritize the target groups who should receive the vaccine in the event of a pandemic, the sequence in which they should receive the vaccine in the event that enough doses to cover the whole target population were not available at the onset of the pandemic, and on how to define the vaccination strategy to reach that population.

The vaccination strategy to be selected will depend on the characteristics of the pandemic, including those at the highest risk of infection, severity of the disease in different population groups, and availability of the vaccine.

The workshop participants were briefed on the main planning considerations the national authorities need to be mindful of when considering a vaccination strategy in a pandemic situation.

The WHO "Checklist for the Development and Implementation of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines"⁶ was given as a resource that highlights critical areas for pandemic planning.

➤ Group work

The workshop participants were divided into three groups and assisted to devise a vaccination strategy appropriate for the scenario for their group. The scenarios were based on different attack rates and case fatality rates for the following three target groups: health workers, pregnant women, those with co-morbidities.

The group work was very useful in stimulating the participants to think through how to decide on target groups and develop corresponding vaccination strategies.

Key issues that arose from the discussions included the following:

- As a pandemic policy decision is more sensitive and more complex than a routine vaccine decision, countries will need to ensure that the National Immunization Technical Advisory Group (NITAG) has the right composition to deal with these complexities. Additional representation, e.g. from Civil Society Organizations, ethicists, and individuals with programmatic expertise may be needed and countries could consider identifying such people in advance of a pandemic to supplement the NITAG for making policy decisions on pandemic vaccine use.
- Countries need to be aware that they do not decide in a vacuum and that the global level recommendation will be available to guide their decisions. However, safety issues will need to be monitored during and after vaccination as the information on the safety profile for the novel pandemic vaccines will not be available in advance.

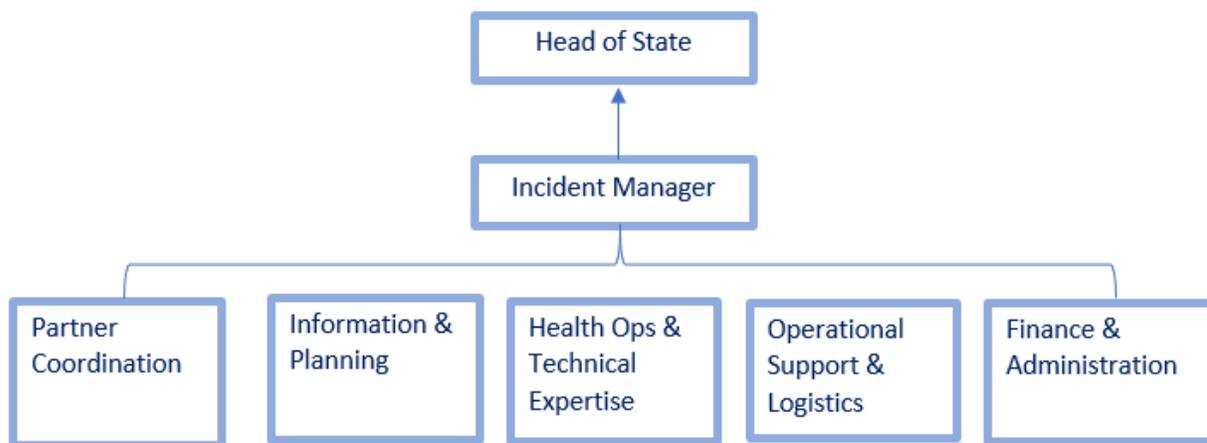
⁶ https://www.who.int/influenza_vaccines_plan/resources/IER_Deployment_Guidance_Checklist_web.pdf?ua=1

- As part of pandemic preparedness, countries should determine the data that will be required for setting policies and identify all potential sources of data in advance. Specifically, participants explored potential sources for data on numbers of health workers, numbers of pregnant women, numbers of people with co-morbidities. Participants were informed that the WHO Global Health Observatory⁷ may be a useful resource in providing some of this information, and that disease burden estimates can be obtained from the Institute of Health Metrics and Evaluation (IHME)⁸.

Management and Organization (Chapter 2)

This session explained to the workshop participants the need to develop effective processes and structures for managing deployment and vaccination operations, including methods for sharing operational information and facilitating cooperation and coordination between Ministry of Health departments, agencies and organizations at all levels.

From the discussions it was apparent that many countries have a form of Emergency Operations Centre (EOC), but these vary in whether they were fully operational or were used more as data collection and information sharing centres. While these EOCs are not always health-related – some are for natural disasters – it was agreed that they should be used for pandemic situations but would need to consist of the following:



However, in many countries funding is dwindling, so it is important at country level to provide support for these structures to continue and be re-formulated to support pandemic situations.

It was suggested that the Guidance Document be updated to consider the structures in place at country level which can be used for influenza and can also be strengthened to deal with other emergencies. The functions presently suggested in the guidance (e.g. Incident Commander, Chief of Logistics and Chief of Vaccinations) may no longer be applicable to many country situations.

⁷ https://www.who.int/gho/health_workforce/en/

⁸ www.healthdata.org

Additionally, consideration is needed on how to develop these EOCs in countries with a devolved (e.g., federal) political system and whether these structures should be replicated at sub-national levels. In Canada for example, the Federal level of Government declares the emergency, procures the vaccine and provides guidance to each province to implement through the provincial system. A final consideration discussed was the interaction with the private sector and whether they are easily convinced to assist in an emergency or whether the political country leadership can instruct and direct them. Examples were given by the participants of strategies to involve the private sector from the beginning to achieve better results.

Information Management of Deployment Activities (Chapter 4)

This session explained to workshop participants the need to ensure that the national Management Information System (MIS) provides the EOC (or Chief of Logistics and the Chief of Vaccinations), managers and staff with the information they need to make effective decisions and manage operations throughout deployment and vaccination operations.

When working with the country to prepare for a pandemic, the communications hardware will need to be checked to ascertain whether it needs be upgraded, or backed up, and arrangements will need to be made for redundant capabilities in case the primary information system fails.

The types of information needed for deployment and vaccination operations are for: human resources management; vaccine inventories, movement and waste disposal; and communication. Generally, this type of information will be available from different stakeholders and at different levels. As much as possible data should be standardized across systems to facilitate compatibility and interoperability of information systems which will allow rapid data exchange.

Support to countries will need to focus on which tools are already available and can readily be adapted for use for pandemic flu deployment and vaccination, which tools will need to be developed specifically for pandemic flu, and whether additional tools and mechanisms are needed to ensure seamless operations within seven days.

Participants were reminded of the option of setting up Long Term Agreements (LTAs) with transport and storage companies and to stock up on fuel to power trucks and warehouses in the event of a pandemic. Countries therefore need to map out where outsourcing possibilities exist and prepare a backup in the event they are not available when needed. A challenge identified in the discussions related to the feasibility of the Ministry of Health (MoH) to allocate budget to preparing for something that is not immediate nor visibly imminent.

A key element is the flow of information through the EOC or similar coordination and management structure. Participants shared the following examples of particular software used for this and some best practices.

One participant mentioned that although one country still uses fax to report epidemiological data, they also use a free Health Information System (HIS) electronic reporting tool which works well and is able to provide updated analytical tables that can be shared with stakeholders. They also use social media platforms, e.g. WhatsApp groups, to share information easily between focal points. However,

anonymity/confidentiality could be an issue, and data used for event-based surveillance has to be verified. Data protection issues need to be further discussed.

Another country uses the Early Warning and Reporting System (EWARS)⁹ for notification of vector, food, water- born and acute respiratory diseases. Each district has to report on a weekly basis, and every day during an outbreak.

Another software and emergency management data is WEB UC Intramedics, which has a strong encrypted system and is currently being used in Australia, Indonesia and Thailand. It can be tailored to the country context and translated into any language. It costs between \$70-120,000, including training.

WHO/PAHO uses the Integrated Surveillance Information System for Vaccine-Preventable Diseases (ISIS)¹⁰ surveillance tool through which countries report on a weekly basis. They are also implementing the VSSM (vaccination supply stock management) tool in countries which provides information on the vaccines, lot numbers, distribution, AEFIs (Adverse Events Following Immunization), etc. During the 2009 A(H1N1) pandemic, the WHO/PAHO Supply Management System (SUMA)¹¹ tool was used in Mexico.

Day 2

Regulatory Preparedness and Planning (Chapter 3)

The main lessons learned from the 2009 A(H1N1) pandemic relating to lack of regulatory preparedness were:

1. It is a lengthy global process to register and approve the use of a new vaccine.
2. There are different licensing processes in different countries.
3. Countries require different amounts of regulatory/licensing documentation for each product.

All of these are difficult to accommodate during an emergency and could inevitably slow down the availability of the vaccine at country level unless emergency procedures are established in advance. Participants were taken through the background to these issues and ongoing steps being taken by WHO to mitigate against these issues for the next pandemic.

Ongoing WHO initiatives for pandemic preparedness are: (1) strengthen national regulatory capacity for pandemic influenza products by working with targeted countries to benchmark the status of their regulatory processes and to provide technical support for the development and implementation of their Institutional Development Plan; and (2) promote the adoption of regulatory pathways that accelerate approval for the use of pandemic influenza products.

⁹ <https://www.who.int/emergencies/kits/ewars/en/>

¹⁰ <http://www.paho.org/immunization/toolkit/resources/surveillance/ISIS-Users-Manual-ENG.pdf?ua=1>

¹¹ https://www.paho.org/disasters/index.php?option=com_content&view=article&id=675:suma&Itemid=924&lang=en

Information on the use of different pre-qualified seasonal influenza vaccines from different manufacturers is available on the WHO website. The public can be provided with this information, e.g. this product has been used in 30 countries for xx years, to help to allay fears and build trust in the product/manufacturer.

As it is important to understand what documentation a country is going to need, and how to obtain it from the manufacturer, it will be necessary to have preparatory discussions with the regulatory experts in the countries in advance of a pandemic.

Through a group exercise, participants learnt about the different regulatory pathways available to countries (recognition, fast track assessment, full assessment, reliance, strain change), and which pathway is appropriate for which pandemic phase (interpandemic, alert, pandemic and transition).

Participants were directed towards Annex 7 “Guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries”¹² of the TRS 1004 where the main guidance can be found, in addition to numerous relevant and useful references.

This was followed by a demonstration of the Immunization Department’s website to show participants where official WHO Policy Recommendations¹³ and Position Papers¹⁴ for the various diseases can be found as well as the page for the Strategic Advisory Group of Experts (SAGE)¹⁵, which will be the body that will advise WHO on the use of vaccines and the potential target groups in the event of pandemic.

Participants were also directed to the Immunization Monitoring and Surveillance¹⁶ pages where it is possible to see what vaccines each country is using, as well as the Vaccine Prequalification¹⁷ pages where it is possible to see the product description for each pre-qualified product which provides details on whether or not the vaccine comes with a vaccine vial monitor (VVM), what the storage requirements are, whether or not it contains a preservative (important for the implementation of the open vial policy). This information can be used to create scenarios on which product a country might receive in the event of a pandemic and plan accordingly.

In the subsequent discussion, participants noted that this was a very useful session as regulatory processes in countries are not common knowledge, and that awareness of the website for information on pre-qualified vaccines was useful, not only for emergency situations.

In response to questions, the participants were instructed that if they were to go to a country to support them in developing their NDVP, to start developing the regulatory part of the plan, they should start by looking at the current status for registration of vaccines and to document what exists in the country.

[Human Resources and Security \(Chapter 5\)](#)

¹² <http://apps.who.int/medicinedocs/en/m/abstract/Js23326en/>

¹³ <https://www.who.int/immunization/policy/en/>

¹⁴ https://www.who.int/immunization/policy/position_papers/en/

¹⁵ <https://www.who.int/immunization/policy/sage/en/>

¹⁶ https://www.who.int/immunization/monitoring_surveillance/en/

¹⁷ https://www.who.int/immunization_standards/vaccine_quality/vq_index/en/

In this session, participants were introduced to the need to understand planning considerations to ensure availability of an adequately skilled and trained workforce during a pandemic, and to develop a security plan to protect staff, equipment, facilities and vaccine throughout the pandemic deployment and vaccination stages.

However, in order to decide what skills are needed, countries will need to have updated job descriptions for each of the respective areas. Participants were directed to the WHO Immunization Department website¹⁸ as a source of information on competencies required to manage immunization programmes. Such information will assist in reviewing the job descriptions at country level to see whether the skills needed are being met. Countries will also need to maintain a database with all contact details of all staff, ensure there is an adequate number of staff, and conduct an ongoing training needs assessment to ensure that all staff are capable of carrying out the duties expected of them in the event of a pandemic. In some countries the MIS (management information system) will have a database of personnel who have been trained and in what areas, from which it should be possible to estimate who needs to be (re-) trained in what areas.

As the pandemic influenza vaccine may be different from the seasonal influenza vaccine, specific training for pandemic vaccination is crucial to avoid programmatic errors. Care should be taken in the selection of participants for training sessions as unfortunately, the perverse incentive of per diem for training sessions can compromise the composition of the audience.

Furthermore, refresher training will be needed to reinforce the key messages and to mitigate the effects of staff turnover. Online resources for refresher training and re-certification could be considered.

It may be necessary to employ surge capacity of personnel should there be a need to conduct mass vaccination campaigns. To estimate this, one useful source is the Measles and Rubella Supplementary Immunization Activity (MR SIA) Planning Guide¹⁹. Officials in the vaccines department of a country who have conducted mass vaccination campaigns (measles – injectable, polio – oral) will have a good estimate of how many people are need for mass vaccination activities. Surge capacity can come from other ministries, or can be outsourced in some areas, especially logistics. However, it is vital that the vaccinators used for surge capacity, as well as volunteers, are well trained in how to administer vaccines safely to avoid programmatic errors.

There will be a need for supervisors to develop performance indicators for health workers and to monitor these during pandemic situation to optimize the quality of service delivery and take corrective actions as necessary.

In the area of security, it should be recognized that pandemics create fear and mistrust. Early engagement of community leaders in discussions and planning preparations is key to mitigating this.

It is also important to think of the welfare of the health workforce and their families in a pandemic situation. Countries need to reduce absenteeism of health workers, which can be due to their own sickness, or concerns about their families' health status. Vaccination should be offered to health

¹⁸ https://www.who.int/immunization/programmes_systems/workforce/standard_competencies_framework/en/

¹⁹ <https://www.who.int/immunization/diseases/measles/SIA-Field-Guide.pdf?ua=1>

workers and their families to reduce their concerns, and also provide an incentive for them to continue working under potentially difficult situations.

During the 2009 A(H1N1) pandemic, per diem, together with fuel, was one of the main budget categories. Budgeting for human resources and security is very important. This will include not only the salaries of the health workers, but also costs for preparation of training materials, training exercises, staff welfare, and security plans. If health workers need to travel to further away sites to vaccinate, they will need per diem and transportation allowances.

During the discussion, participants engaged in thinking about how to overcome the inherent limitations of cascade training, e.g. dilution of key messages or distortion of content. Some suggestions were to ensure that materials are standardized at all levels to overcome personal biases in the trainers, and to be creative in helping countries to make training more interactive, for example by using training videos and the board game. Additionally, during cascade training, to make sure that the provincial trainee supervises each district in training its health workers to ensure accuracy of the information being transmitted.

As the participants cannot expect to be the experts in all topics, they recognized the need to work with officials in the countries to guide them to where the specific resources are available. They understood that training at each level will be different, for example, at national and provincial levels the focus will be more on managerial and regulatory aspects, while at lower levels the focus will be more operational. Participants will need to make sure that the expertise in the trainers at each level is available and that the trainers are carefully selected and appropriate to the level. There was also discussion on the need to limit the size of training sessions and if necessary, to run more sessions – e.g., a session with 200 people is sub-optimal for absorption of the messages.

Participants shared some experiences with training and approaches to filling surge capacity:

- Preparing a handbook for health workers with FAQs (frequently asked questions) on points to remember when vaccinating. The handbook includes the name of the supervisor and focal point to follow up with on other questions. This would be a useful tool to use during a pandemic situation.
- There was a suggestion to pre-test and post-test health workers before and after training to assess whether they have acquired the knowledge expected, and whether the training needs to be repeated or the training methodology needs to be changed.
- Non-governmental organizations (NGOs) send mobile clinics and pharmacy students to volunteer to provide surge capacity.
- During the yellow fever outbreaks, WHO used retired staff who have the basic skills to vaccinate, but who just needed refresher training.
- The option of using semi-qualified staff (e.g., community volunteers) to join qualified personnel is a good one but needs careful management to avoid legal problems in the event of AEFI. Ideally such individuals would be used in supportive roles, such as filling tally sheets, but not vaccinating. The vaccine should only be administered by trained professionals.

Supply Chain Management (Chapter 7)

- Demonstration of EPI logistics tool for demand forecasting and supply chain management.

In this session, participants were reminded that during a pandemic situation, the key strategic questions for planning are: What vaccine? Who to vaccinate? When to vaccinate? Where to vaccinate?

There are four targets for logistics planning: availability (timely, sufficient supply of vaccine and materials); potency (maintaining adequate cold chain); access (implementing adequate vaccination sites); and immunization safety.

In order to achieve these targets, the participants will need to know the national programme, i.e. the status of the supply chain, what the immunization schedule is, what the national vaccine management policies are with regard to using vaccine vial monitors (VVM), applying the multi-dose vial policy (MDVP), what the vaccine wastage rates are, and equipment management policies.

To ascertain the level of knowledge of the participants, a short quiz on basic principles of vaccine management was administered, in which the participants engaged fully.

One of the main challenges during a pandemic will be knowing which pandemic influenza vaccine(s) the country will receive. Given the big differences in cold chain requirements of the different vaccines - ranging from 18.4 cm³/dose (single dose) to 1.34 cm³/dose (17 dose) - countries will need to plan for the one with most storage requirements.

Planning to deploy a pandemic vaccine will need to cover the following areas:

- Estimation of vaccines and injection equipment for the populations to be vaccinated
- Estimation for storage capacity, including dry storage needs
- Estimation for transport capacity
- Coolant pack production capacity
- Estimation of waste generated and disposal options

Experience has shown that budgeting for the correct resources is key to a successful strategy. The WHO Logistics Forecasting Tool²⁰ is a key resource for scenario analysis and micro-planning, using historical expenditure data on unit costs from the 2009 pandemic. This is an Excel-based, multiyear planning tool for vaccines, supplies, storage and distribution, for routine and campaign immunization, including preparing for a pandemic. The results from the tool provide an analysis of trends and gaps in the supply chain system. This will help, in the event of storage shortage, to decide whether to outsource cold chain capacity or whether to split the vaccine shipments so they can be accommodated. Participants should work with the EPI Logistics Officer in the country to input the necessary country data and target population(s) as well as the vaccine characteristics for a range of products, in order to have several estimates of storage and budget requirements. A crucial part of logistics planning is to make sure that the budget for the storage required is available and ring-fenced.

Participants were familiarized with the various worksheets of the EPI Logistics Forecasting Tool with explanations of the different variables that can and should be introduced.

It was noted that a step-by-step demonstration of the tool is not necessarily helpful to this audience but instead to outline the main principles using the slide set that was prepared for the workshop. It

²⁰ https://www.who.int/immunization/programmes_systems/supply_chain/resources/tools/en/index5.html

may be noted that the Expanded Programme on Immunization (EPI) logisticians at the country level in most low- and middle-income countries are familiar with the tool and could be used for planning the logistics of pandemic vaccine deployment in their respective countries.

To conclude, preparations to secure cold chain and transport for the pandemic vaccine need to happen within a short period of time. It is important to estimate in advance whether surge capacity will be needed, as it will need to be called upon at short notice. In many countries, it may be cheaper to outsource surge capacity in cold chain and countries can consider putting in place dormant contracts with suppliers that can be activated at short notice in the event of a pandemic.

➤ Effective Vaccine Management Assessments:

Another useful source of information on the status of the cold chain in a country is the Effective Vaccine Management (EVM) assessment that is conducted periodically in countries. These assess each level of the supply chain, using criteria to assess the different areas of supply chain management.

A large number of countries, especially in Africa and Asia, have done one or more EVM assessments, and the resulting information is available in their EVM assessment reports, which are available to WHO staff from the EVM website²¹. It would be important for consultants to obtain the EVM assessment reports and the resulting Improvement Plans before travelling to the country.

Managing Waste (Chapter 8)

During any immunization activity, sharps waste needs to be handled appropriately to protect the community from infectious materials. Within the urgency of a pandemic situation, this is an area that should not be neglected. An influenza pandemic response will generate a vast amount of medical and sharps waste and countries will need to plan for surge capacity for the safe collection, transport and disposal of this waste

When working with a country, consultants need to familiarize themselves with the national policy for immunization waste disposal, as they vary greatly between countries, and select the best option for the national context.

Usually there are three options:

- Incinerate – which requires incinerators reaching a temperature of 1,000°C;
- Safe burial – which requires a safely fenced pit, ideally with a cement slab;
- Burn and bury – which is the least safe option.

Autoclaving and burial is another option but is seldom available in low-resource settings.

Consultants can also refer to the WHO document “Management of waste from injection activities at district level”²² from 2004 for guidance.

²¹ https://www.who.int/immunization/programmes_systems/supply_chain/evm/en/

²² https://www.who.int/water_sanitation_health/publications/waste-from-injections/en/

The next steps in developing this part of the NDVP plan are to look at the legal provisions in the country for waste disposal, map the collection and disposal sites, agree with national officials on the best possible approach, develop a generic plan for all levels, calculate the volumes to be dealt with, assess available infrastructure and define the transport requirements by level.

Any modifications to existing structures will need to be budgeted for and funding set aside. It may be necessary to work with private sector contractors to provide surge capacity for waste management, including transport of injection waste to disposal sites, and again, dormant agreements may need to be put in place that can be activated at short notice in the event of a pandemic.

Day 3

Public Communications (Chapter 4)

This session focused on the importance of having a communication strategy in place prior to any pandemic, that provides links with communities, e.g. through local leaders or NGOs, that understands the belief systems of the different populations, to be able to start communicating as soon as the pandemic breaks.

National governments need to be prepared to communicate with their public during all phases of a pandemic. Initially it will be about the who, what, why, where and when of the actual vaccination. This will then move to instilling confidence, generating demand and addressing possible rumours. Towards the final stages of the pandemic, communication will move on to vigilance among stakeholders and affected populations, and finish with the importance of seasonal vaccination.

Some of the common characteristics of information needs during an emergency are that people want answers quickly and often the answers do not exist. Governments need to communicate with the public early on in the pandemic to address misinformation and dispel rumours and will therefore need to be able to work with the uncertainty surrounding the issue.

Communicating through the preferred channels that the public uses is important. If the MoH website is not a place that the average individual goes to for their information, publishing updates on the pandemic here will not reach the target audience. Likewise, traditional media such as newspapers, radio, television, are not necessarily the best way to reach people. In today's society, using social media, key influencers and other ways to stimulate community engagement can have considerably more impact. Key for communicators is to know their target audiences and what information sources they trust.

It is important for the government to be first, be fast and be frequent with their communications during a pandemic, and to use well-trained spokespersons. Ideally, there would be a small team of several spokespersons, as well as technical experts, that are trained to speak to the public. Additionally, as it is generally accepted that health workers are the most trusted source of health information, they also need to be trained in communication.

The language used in such communications is also important, as over-simplification of language can result in miscommunication and use of highly technical/scientific language can result in further

confusion and fear. Countries can learn about their target audiences before a pandemic strikes, through the use of health promotion groups or other existing communications experts in the country.

Risk communication is defined as the real-time exchange of information that enables everyone at risk to take informed decisions to mitigate the effects of the threat and uses a mix of communication and engagement strategies and tactics.

There are four main risk communication strategies that relate to the emotional response of the target audience relative to the size of the hazard:

- Outrage management
- Crisis communication
- Health education and stakeholder relations
- Precaution advocacy

A group exercise was conducted to propose which strategy was best suited to scenarios of five different types of audiences: Health workers; Pregnant women; Parents; Religious leaders; Elderly persons.

When working with a country to develop the public communications portion of the NDVP it will be important to work with the press office of the MoH , with the influenza communications team, the health promotion unit and with “other voices”, e.g. the Ministry of the Interior, the Emergency Department or Emergency Operations Centre, and external stakeholders such as UNICEF (United Nations Children’s Fund).

Key elements of the communication plan should be developed to cover the different phases of a pandemic.

There are several sources of information that can be drawn upon before developing the communications plan. These include the national emergency response system, past pandemic influenza plans, recent emergency response After Action Reviews, other key threat communication strategies/plans, and recent news stories on public health threats in the country.

Additionally, WHO’s International Health Regulations (IHR) has a Joint External Evaluation Tool²³ that evaluates countries’ capacity to prevent, detect and respond to public health threats. Section 5 of this tool contains sections on responding through communications. The Health Emergencies Programme also has other guidance for risk communication.

[Monitoring and evaluation – Key concepts for Establishing Surveillance Systems to Detect and Respond to Adverse Events Following Immunization \(AEFI\)](#)

Handouts were provided at the beginning of the session which were useful for the audience.

²³ https://www.who.int/ihr/publications/WHO_HSE_GCR_2016_2/en/

Participants were introduced to the necessity to have a surveillance system in place to detect and respond to any Adverse Events Following Immunization (AEFI) that may take place during pandemic vaccination.

The main objective of post-marketing surveillance is to detect vaccine-related reactions in order to improve knowledge on the safety profile of the vaccine, as well as to detect programmatic errors with its administration in order to be able to prevent these in the future.

The definition of an AEFI is: "...any untoward medical occurrence which follows immunization, and which does not necessarily have a causal relationship with the usage of the vaccine." AEFIs are grouped into the following five categories:

- Vaccine product-related
- Vaccine quality defect-related
- Immunization error-related
- Immunization anxiety-related
- Coincidental event

Most AEFIs are due to programmatic error, not to a faulty vaccine. However, effectiveness and safety of pandemic vaccines can only be obtained after their widespread use. Planning for real-time evaluation is critical and requires assessment of capacities and resources available to collect, manage, and measure a large data set generated over a short period of time.

The AEFI surveillance cycle comprises detection and reporting, investigation, causality assessment and risk/benefit assessment. While many countries have a well-established AEFI monitoring system, it is important to verify this before a pandemic, and to put in place a robust system capable of capturing and analyzing large amounts of data in a short period of time from different populations and age groups.

WHO has an e-learning course on Vaccine Safety Basics, in which Module 3 relates to AEFIs.²⁴ During the discussions the audience were pointed towards the WHO vaccine reaction rates information sheets²⁵ that provide details on the reaction rates of selected vaccines.

Monitoring and evaluation – Coverage

During this session the audience was introduced to the two main reasons to monitor coverage:

- To measure the impact of the vaccination
- To take corrective operational action during the pandemic and to learn lessons for next event/outbreak

The necessary data components for measuring vaccination coverage are:

- Numerator = Doses administered
- Denominator = Target populatio

²⁴ <https://vaccine-safety-training.org/overview-and-outcomes-3.html>

²⁵ https://www.who.int/vaccine_safety/initiative/tools/vaccinfosheets/en/

- Output = Coverage: numerator/denominator (%).
It is also possible to monitor utilization, i.e. number of vaccine doses received/number of doses used = vaccine utilization rate (%).

Numerator and denominator data can come from either administrative data or from surveys. Administrative data allows for real time monitoring which can be used for corrective actions, but this needs accurate estimates of target populations and a robust reporting system. However, administrative data do not provide information on determinants of vaccination uptake. Surveys do not need accurate estimates of target populations but can be used to collect information on determinants of vaccination. However, surveys are usually conducted after termination of deployment and do not allow for real time data collection for operational decisions. Moreover, the data are collected only for a sample of the population and may not be able to detect heterogeneity between different parts of the country or in different communities.

Reporting and data flow for routine immunization is usually done on a weekly or monthly basis. In a pandemic situation this may need to be done on a daily basis. When developing the NDVP, the frequency required for reporting will need to be articulated in the plan, together with how the data will flow, who is responsible for which aspects of data reporting, and what the source of the numerators and denominators will be.

It should be noted that inaccuracies in data reporting can come from a variety of causes, such as incomplete recording, vaccinating outside the target population, failure to account for vaccine wastage, or in the data manipulation which can be deliberate due to rewards for achieving targets. Surveys can be used after the pandemic to estimate coverage and this can be a way of validating the administrative coverage. Thus, coverage monitoring need not be limited to either administrative coverage or surveys alone, but to use both approaches since one can be used to validate the other and each will provide complementary information.

Participants were provided with links to various resources for monitoring coverage^{26,27}, one of which is specifically for measuring seasonal influenza vaccination coverage²⁸ which can be used/adapted for use for pandemic influenza coverage monitoring.

In summary, when supporting a country to draft the vaccination coverage monitoring section of the NDVP, the country needs to decide on the approach it will use for estimating coverage, i.e. administrative versus survey, identify the sources of data for estimating target population size, develop tools and processes for recording and reporting vaccination data and identify institutions with experience in conducting surveys. It is advisable to include data management in the training curriculum of vaccinators, supervisors and data management personnel.

During the discussions several issues related to data collection and reporting as well as potential errors in coverage estimates and misinterpretation of the data were discussed.

²⁶ https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html

²⁷ <http://www.technet-21.org/en/resources/vaccination-coverage-surveys>

²⁸ http://www.euro.who.int/_data/assets/pdf_file/0004/317344/Methods-assessing-influenza-vaccination-coverage-target-groups.pdf

Consultants can review a country's latest Data Quality Assessment (DQA) to see whether there are potential issues with recording and reporting of data that need to be managed when preparing the plan.

The issue of populations not included in the denominator, e.g. those living in remote rural areas or migrant populations, was also discussed. These populations, however, may be picked up through a well-conducted survey, or through a house to house campaign. The Polio programme uses satellite mapping to spot missed populations or houses, usually in remote areas. When supporting a country to develop its NDVP, consultants can review polio or measles post-campaign reports to identify populations that might be missed during a pandemic influenza vaccination response and ensure their inclusion in the plan, if they include target groups for pandemic vaccination, e.g. pregnant women

It will be important to know whether a country is using an electronic system and whether it can be used for the planning of pandemic influenza vaccination activities. The District Health Information Software (version 2) (DHIS2), which provides aggregated data, is being used in many countries at district level. WHO's Health Emergencies Department is working on a software "GoData", to be used for outbreak investigation, which is being piloted for Ebola.

Global Influenza Strategy 2019-2030

The burden of seasonal, pandemic and zoonotic influenza is known, and while a future pandemic is a certainty we do not know when it will hit and how severe it will be. Therefore, planning for a pandemic is very important.

Influenza is on WHO's list of top 10 threats to Global Health in 2019 and WHO has developed the Global Influenza Strategy 2019-2030²⁹ which provides a cross cutting approach to prepare for a pandemic and builds on global assets and successes such as the Global Influenza Surveillance & Response System (GISRS) and the PIP Framework.

The vision of the Global Influenza Strategy is the "Attainment of the highest possible influenza prevention, control and preparedness to safeguard the health of all people". It is structured around four strategic objectives (Research & Innovation; Surveillance, Monitoring and Data Utilization; Seasonal Prevention and Control Policies and Programmes; and Pandemic Preparedness and Response. The two main outcomes of the strategy are driving research for better global tools and facilitating stronger country capacity. The three goals are to reduce the burden of seasonal influenza, minimize zoonotic influenza and mitigate the impact of pandemic influenza.

For the strategy to be effective, there is recognition that countries need to be at the centre of activities and there is a need to strengthen their capacity. Furthermore, the global influenza assets and strategies need to be strengthened and sustained, i.e. the GISRS, the Public Health Research Agenda for Influenza and the Global Action Plan for Influenza Vaccines (GAP) Follow Up Recommendations. Countries, industry and civil society need to continue to support and implement the PIP Framework and relevant partnerships need to be strengthened and expanded.

²⁹ <https://www.who.int/influenza/en/>

Monitoring and Evaluation – Disease Surveillance

This session was intended to explain the link between standard disease surveillance and influenza surveillance and to provide participants with links to where to find information.

Public health surveillance is the ongoing systematic collection, analysis, interpretation and dissemination of health-related data. Surveillance of influenza is integral to its prevention, control and treatment as it enables us to plan for a pandemic using better data.

- Surveillance at country and global levels consists of a bundle of three complementary systems:
- Routine surveillance;
- Special surveillance (outbreak, pandemic, special studies); and
- Forecasting (modelling).

In routine surveillance, there is a need for clear categories of case definitions, as it is important for countries to know what is going on in neighbouring countries and to have a global overview.

There are also global influenza monitoring tools such as FluNet³⁰ (which collects virological data) and fluID³¹ (which collects epidemiological data) that gather data from Member States for real-time monitoring of influenza activity to make informed decisions at national, regional and global levels and allow each country to analyse their data in a global context.³²

In addition to these monitoring tools, there is the Pandemic Influenza Severity Assessment (PISA)³³ tool through which countries can see what kind of influenza season they are in – severe or moderate – and to evaluate their overall pandemic risk. In WHO there is a full team checking media, the worldwide web, etc. to monitor epidemic intelligence.

As was explained earlier (see session on SMTAs), through the PIP Framework, manufacturers give 10% of their vaccine production and cash to access information on influenza strains and other information. Some of this is distributed back to countries and WHO Regional Offices to work on strengthening laboratory and surveillance, burden of disease, regulatory capacity building, planning for deployment and risk communications.

In developing an NDVP, the existing influenza surveillance systems in countries should be examined to determine how they may be leveraged for collecting information during a pandemic, including to evaluate the impact of vaccination.

Background to the Comprehensive Multi-Year Plan (cMYP) Tool

This session focused on briefing the audience on the Comprehensive Multi-Year Plan for Immunization (cMYP)³⁴, which is a long-term strategic plan for all vaccines and immunization

³⁰ https://www.who.int/influenza/gisrs_laboratory/flunet/en/

³¹ https://www.who.int/influenza/surveillance_monitoring/fluid/en/

³² <https://www.who.int/influenza/resources/charts/en/>

³³ https://www.who.int/influenza/surveillance_monitoring/pisa/en/

³⁴ https://www.who.int/immunization/programmes_systems/financing/tools/cmyp/en/

activities that is costed and aligned with the country's health sector planning cycle. The cMYP identifies investments, strategies and activities to solve problems and reach national and global goals.

The cMYP consists of guidelines, a costing and financing tool, a user guide and a video tutorial. The financing tool provides information on costs and needs and identifies financial gaps. The cMYPs of many countries are available on the WHO website.³⁵

The cMYP is an important resource for pandemic deployment as it covers all immunization activities and can be used to secure the budget for immunization activities within the Ministry of Health and also with the Ministry of Finance as a resource mobilization tool for external fundraising.

The cMYP contains information that can be used to populate the NDVP such as demographic data, cost of vaccines, vaccination coverage, and operational costs for Supplementary Immunization Activities (SIAs). It will also contain unit costs such as health worker salaries and per diems, costs of training and meetings, equipment costs, waste management costs, etc.

Demonstration of NDVP Costing Tool

In addition to the cMYP from the Immunization Group in WHO, the Influenza Group is developing a tailored costing tool that accompanies the NDVP Plan. This tool was demonstrated to the participants in a pilot version, which will be further developed.

As a first step in preparing the NDVP during the preparedness phase of a pandemic, much of the information needed to estimate costs and quantities of vaccines and supplies, can be pre-filled. Most countries use a similar tool for outbreak campaign planning response in the event of a cholera or meningitis outbreak, for example, and are able to provide the required information within 24-48 hours. Participants were reassured that they do not need to be experts in understanding the various tools but do need to understand where to get the information from and who, at country level, can populate the tool. Participants were reminded that data such as unit costs for meetings, per diem, transport, etc. are available in the cMYP or other planning tools used at country level such as the EPI Forecasting Tool.

This session concluded with agreement on the need to capture/map all the tools that have been discussed and demonstrated and that are available to support pandemic planning, to indicate who is responsible for filling which tool at country level, and to clarify what information can be obtained from the different tools. Ideally, consultants would work with tools that are already in use in the countries or use these to refine the tools WHO is providing.

Termination of Deployment Activities (Chapter 10)

As a final presentation, participants were reminded of the need to announce officially that the pandemic is over, and that deployment and vaccination operations are terminated in a planned manner.

³⁵ https://www.who.int/immunization/programmes_systems/financing/countries/en/

A key step is to recall excess stocks of vaccines and injection supplies and record them, calculate the supplies remaining against the number of people vaccinated, and certify that the remaining stocks have been returned and stored appropriately. All data should be in the LMIS, and by analyzing numerator data and vaccine usage rates, it may be possible to estimate the vaccination coverage post hoc.

The country will need to determine what to do with unused or expired vaccine. For unused vaccine, the excess stock may be used to vaccinate those target populations that did not receive sufficient vaccine in the beginning. Expired vaccine should be disposed of in line with the national waste disposal policy.

The country will also need to certify that appropriate disposal of waste is completed.

Documenting lessons learned will provide invaluable information to be used either by other countries or for the next pandemic and supervisors need to describe both positive and negative aspects of the deployment. This information could be gathered through a concluding workshop.

Regional Plans

Participants were reminded that the intended outcome of the meeting is for them to constitute a pool of consultants able to support countries to prepare or update their National Vaccine Deployment Plans (NDVPs) and potentially to run a Training of Trainers workshop in the countries. They were asked whether they had received the necessary knowledge to do this and what further support they needed to carry out their mission.

Participants felt that they were definitely more prepared now and knew what questions to ask in order to support a country in developing its NDVP. However, there were doubts that they would be able to run a similar training, as this workshop had many subject matter experts that they would not have available to them. They expressed the need for a complete package of materials.

The Secretariat reassured the participants that they will be provided with all the materials that were presented in this workshop as well as the Guidance Manual which goes into more detail and sets out the approach to be taken in country to develop the NDVP. It was noted, however, that the Guidance Manual does not include all the topics that were presented during this workshop, i.e. coverage monitoring and surveillance, and that some of the concepts needed to be updated with new information.

Participants were reminded that there should be subject matter experts at country level that can also contribute to the workshop in addition to WHO Headquarters and Regional Office staff being available to support.

Another participant stated that her country already has a draft NDVP that is being updated and she is comfortable contacting the WHO Country Office for input on what is missing from the plan and how to improve it. She would feel more comfortable holding a local stakeholder meeting at country level rather than conducting a training of trainers, and it was agreed in the meeting that this was a useful approach.

Another suggestion was that as three days is too short to assimilate all the information, WHO facilitate the creation of a pool of experts that could be invited as co-facilitators to other training activities that WHO HQ may organize.

Participants from the WHO Americas Regional Office (AMRO) will discuss how they will work together to support countries. They will start following up with the countries to see whether they have reviewed the plans they developed 10 years ago and identify what is missing in the plans. They will not commit to holding training workshops but will prioritize which countries are in most need of support to finalize their plans and support them accordingly.

The WHO Secretariat informed the participants that there is no set timeline for countries to update their plans, but it is important for the workshop participants to apply the knowledge they have gained as soon as possible. Participants were urged to identify the people in the country responsible for updating or drafting the NDVP and to initiate the dialogue with them on the need for an updated plan.

The WHO Eastern Mediterranean Regional Office (EMRO) is supporting countries to update their plans. In 2020 they will have a regional workshop to enhance capacity in the region for pandemic vaccine deployment and then evaluate how to move forward. One suggestion was for EMRO to ask countries to indicate the timeframe for developing their plans.

Participants were reminded that once the plan is completed in country, simulation exercises and the tabletop game can be used periodically to test the robustness of the plan and identify what needs to be improved in the plan.

Another approach to updating countries' plans is the peer-review workshop the immunization team in IVB uses with countries to update their cMYPs wherein countries review each other's plans during a one-week workshop. This approach helps countries to recognize gaps in their own plans and results in all plans being strengthened.

Next steps:

The WHO Secretariat confirmed that all the materials and slides will be made available through the Dropbox. They also reminded participants that they would like any additional feedback on the NDVP Costing Tool that was presented earlier in the day.

While the workshop mostly followed the WHO "Guidance on Development of a National Deployment and Vaccination Plan for Pandemic Influenza Vaccines" published in 2012, several of the presentations included new information, for example on newly established Emergency Operations Centers, SMTA2, and public communication, or topics that were not previously included in the guide, e.g. coverage monitoring. It was felt that the deployment guide could be updated to include all the newer materials and also refer to new tools, materials and sources of information that are available on the WHO website and elsewhere and that were referred to during the workshop.

The NDVP Costing Tool also needs further revision and to be pilot tested in a few countries before it is ready for use.

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