GLOBAL ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (GLASS)

Technical Meeting on the Early Implementation Phase

22-23 October 2015
WHO Regional Office for Europe
Copenhagen, Denmark

Meeting Report

World Health Organization

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EXECUTIVE SUMMARY

In May 2015, the Sixty-eighth World Health Assembly adopted the global action plan on antimicrobial resistance (AMR). One of the five strategic objectives of the action plan is to strengthen the AMR evidence base through enhanced global surveillance. To support this objective, the Global Antimicrobial Resistance Surveillance System (GLASS) aims to establish a global standardized approach to the collection, analysis and sharing of data.

On 22 – 23 October 2015, the World Health Organization (WHO) hosted a meeting with WHO Collaborating Centres, partner technical institutions and international AMR surveillance networks on the early implementation of GLASS.

I: Strategic directions for implementation of the Global Action Plan on AMR

- The meeting was told there is a high level of support for the AMR global action plan and the agreed WHO organization-wide budget envelope for AMR for 2016-17 has been increased to US$53.8m.
- WHO's guiding principles for implementation of the global action plan include: realistic and achievable objectives; implementation through work streams; taking account of the different levels of resources and different priorities of Member States; working with the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) to implement the One Health approach; taking an all-inclusive approach and learning from the established AMR activities of other WHO teams such as tuberculosis (TB), malaria and human immunodeficiency virus (HIV); joint ownership between WHO Headquarters (HQ) and the regional offices when possible; and ensuring good coordination and alignment of AMR activities across WHO.

II: GLASS – Global AMR Surveillance System Development

- GLASS will be a global system built on national surveillance systems. These national systems should align with the global surveillance system in order to produce coordinated and consistent data on AMR.
- The objectives of GLASS are to:
    - foster national AMR surveillance systems using harmonized global surveillance standards
    - assess and report on selected indicators of AMR
    - detect emerging resistance
    - inform and assess impact of interventions.
- WHO seeks the collaboration with WHO collaborating centres, existing surveillance networks, partner technical institutions to support countries for GLASS implementation.

III: GLASS Tools

GLASS Manual & Training package

- The GLASS Manual for Early Implementation has been published to guide countries on how to enrol into GLASS. It introduces the aims, surveillance methods, data management for GLASS,

local/national/global dataflow, and provides guidance to those responsible for AMR surveillance, including lists of priority specimens, pathogens, and pathogen-antimicrobial combinations and details of data collection, compilation and reporting.

- The proposed steps for the development of national surveillance systems encourage countries to enrol into GLASS in a stepwise manner.
- A country's three core components of GLASS will be: a National Coordinating Centre; a National Reference Laboratory; and at least one surveillance site with the capacity to collect and merge core patient data with microbiological data, including antimicrobial susceptibility test (AST) results.
- The support package available to GLASS countries will include: a web-based platform for data sharing, management and reporting; implementation tools; surveillance software (WHONET); capacity-building activities; assistance in monitoring and evaluation (M&E) for low-income countries; and training materials.

GLASS IT platform and linkages with existing AMR surveillance networks

- EpiConcept, a company that delivers IT solutions for public health, is developing the IT platform for GLASS. The GLASS architecture uses the data that the country or the surveillance network is already collecting, and will be compatible with a range of input methods and export formats. Every inputted file will pass through the GLASS Aggregator, which will impose structure and consistency on the data, check for errors using inbuilt data validation rules, and provide immediate feedback on any error detection.
- The phased implementation of the IT platform will be completed by July 2016 and will include field tests with pilot sites to collect feedback to help finalize the design.
- A Working Group of meeting participants with IT platform experience will work with WHO and EpiConcept on further defining the plans for the GLASS IT platform.

WHONET modifications

- The WHONET database software is being modified so that it is compatible and easy to use with the GLASS IT platform.
- The two main types of modifications are: i) changes to the software itself, for example: changes to the WHONET analyses to support what GLASS needs to record; creation of GLASS export files: implementation of the GLASS data check and feedback report. Dr Stelling said these are modest changes and will be finished soon; ii) changes in what the WHONET users will have to provide to support GLASS implementation.

Laboratory tools

- A range of quality assurance tools developed by WHO and its partners are freely available to improve the quality of laboratory data to the standard needed for the GLASS surveillance system. Specific resources include: i) assessment tools so that laboratories can review their overall performance and the components of a good quality system; ii) a handbook for quality management training; iii) a stepwise quality implementation tool that indicates the critical features that must be in place.
- WHO is also working to ensure countries and laboratories have access to the latest standards for AST. It is preparing training videos for YouTube on the freely available European Committee on Antimicrobial Susceptibility Testing (EUCAST) standards showing how to carry out each of the components in an AST. All European standards have now converged to EUCAST and it is considered by WHO to offer a sustainable solution. WHO has also entered into an agreement with

the commercially available US-based Clinical and Laboratory Standards Institute CLSI (US) to purchase some sets of the next standards more cheaply to make them available to low income countries that are currently still using CLSI.

- It was suggested by meeting participants that there should be some form of evaluation of a laboratory's quality of work, including site visits, before joining the GLASS system.

IV: Identification of capacity building activities and technical support

- Participants considered the required capacity building activities and materials needed at country level to support three aspects of GLASS implementation: epidemiology, data management and reporting capacity; laboratory capacity, and: development of national surveillance coordination. They also made related commitments on behalf of their organizations.
- The main areas suggested for activity included: advocacy of GLASS to decision makers; assistance for Member States on establishing governance structures and the core necessary organizations, such as the National Reference Laboratory and the National Coordinating Centre; laboratory capacity building activities; identification of surveillance sites; assistance to establish quality assurance mechanisms and appropriate quality checking; ongoing training and continuing education for all the different roles involved in GLASS, including support from a pool of experts; tools to support decision making on when samples should be taken from patients; a peer support mechanism for countries to help each other on national action plans; support for the collection of accurate epidemiological data; assistance on the productive use of data at a local level.
- A range of commitments were made by participants, to be followed up by WHO HQ.

V: Further GLASS developments

- Participants were provided with Concept Notes on issues to be further developed under GLASS: unusual AMR events under surveillance; diagnostic stewardship; and monitoring and evaluation (M&E) framework for GLASS implementation. They were asked to further refine the scope of the work of these three subjects to be addressed by three working groups over next six months. Participants were asked to sign up for the Working Groups.

Unusual AMR events under surveillance

- Important issues for this topic's Working Group included: a clear definition of "unusual" and "event" in the AMR context; clearly defined goals for the reporting unusual events; establishment of systems to verify the initial claim of an unusual event in order to avoid action based on erroneous laboratory results; integration of the reporting of unusual events into the GLASS IT platform, with clear channels of how such information would flow to different local, regional and global levels; and the development of protocols for risk assessment and guidance on how to decide the urgency of an event and to prioritize different types of event.

Diagnostic stewardship

- Many participants suggested that GLASS should find alternative wording to the term "diagnostic stewardship" as it was difficult to understand and awkward to translate into other languages. Cost-effectiveness issues were seen as important as in many countries treatment was cheaper than diagnostic testing; other health system barriers to the appropriate collection of samples should also be identified. Other key issues on diagnostic stewardship should include: how to apply the same directions and guidelines on diagnostic stewardship to the private as well as the public sector; a landscape analysis on current initiatives in this area; and how to reduce the variability across countries in diagnostic procedures.

Monitoring and evaluation (M&E) framework

- Participants suggested the M&E framework should be developed and piloted as soon as possible. The list of indicators should be reviewed at early stages of GLASS implementation. M&E could lead to advice to countries on improving their surveillance system and provide evidence on whether GLASS is generating benefits and impacting on policy. Participants were told that the M&E framework for GLASS will feed into the overall M&E framework for the global action plan as a whole.

VI: Roles and responsibilities

- Participants were asked to consider the expected roles and responsibilities of the different groups involved in the collaborative platform to support GLASS implementation: WHO Collaborating Centres; partner technical institutions; existing surveillance networks; and WHO HQ and the Regional Offices.
- Representatives from WHO Collaborating Centres stressed the importance of a regional approach to roles and responsibilities. Within each WHO region there is a need for capacity to support individual countries to set up their national surveillance systems, including on laboratory methodology, quality control and epidemiological surveillance methodology. The WHO HQ AMR team said it may need to ask Collaborating Centres in some regions to provide support to other regions that lack their own institutions.
- Representatives from technical institutions said it was important that the ground level "champion" institutes tried to implement GLASS and then provided feedback on any problems and gaps in the system. Once they had implemented GLASS in their own environment then they could assist in taking it into neighbouring countries.
- Representatives from existing surveillance networks said there were clear opportunities for collaboration on GLASS with organisations such as Institut Pasteur and Médecins Sans Frontières (MSF), particularly on access to more remote areas. It was suggested that more discussion was needed on the practicalities of connecting the different surveillance initiatives already underway and on how to link them with GLASS.
- Representatives from the WHO Regional Offices said there was a need for better communication between WHO HQ and the regional and country levels, and also across different departments. It was suggested WHO HQ should lead on some aspects of resource mobilization, the development of Terms of Reference for the WHO Collaborating Centres, and that HQ or the WHO Regional Offices could set timelines for what was expected at the national or regional levels on GLASS.

VII: Support needed to make GLASS a success

- The development of GLASS has benefited from much in-kind contribution from partners, and more is needed for its implementation.
- In order to match funds to activities, WHO and countries need to draw up costed work plans to enable constructive discussions with existing and new donors. It is important to seek longer term sustainable funding as the AMR global action plan will span several WHO biennium funding periods.

Next steps and agreed areas for action

- Participants will provide feedback on the guidance and tools being developed to support implementation of the GLASS Manual, for finalization by February 2016.

- A Working Group will assist EpiConcept's development of the GLASS IT platform.
- Three Working Groups will address unusual AMR surveillance events, diagnostic stewardship, and the M&E of GLASS implementation.
- The WHO Secretariat will refine its own GLASS implementation plan for the next biennium period and will inform participants what activities are planned.
- All participants will disseminate information about GLASS as widely as possible.
- A regular AMR newsletter will be distributed by the WHO HQ AMR team to update members of the collaborative platform.

FULL PROCEEDINGS

Organization and process of the meeting

On 22 – 23 October 2015 WHO hosted a meeting with WHO Collaborating Centres, partner technical institutions and international antimicrobial resistance (AMR) surveillance networks on the implementation of the WHO global antimicrobial resistance surveillance system (GLASS).

The list of participants in the meeting is provided in Annex 1.

The agenda is provided in Annex 2.

The meeting was Chaired by Dr Hugo Lopez-Gatell.

Background

Antimicrobial resistance has become a public health priority for countries all over the world. The draft global action plan presented at the 68th World Health Assembly in May 2015 outlined five strategic objectives, one of which was to "strengthen the knowledge and evidence base through surveillance and research".

Throughout 2014, leading technical institutions and WHO Collaborating Centres worked together to establish standards, laboratory requirements and principles of sharing data and to agree on priority syndromes and pathogens for global antibacterial resistance surveillance in humans. These were discussed and accepted at a high-level meeting in Stockholm in December 2014, where participants from 30 Member States requested that the global surveillance programme be implemented from 2015 onwards. Since then, WHO, with help from the Public Health Agency of Sweden has been working towards the launch of GLASS.

Key objectives of the meeting

The key objectives of the 22-23 October 2015 meeting were:

- To define how best to provide technical support to countries to facilitate their participation in the AMR global surveillance programme.
- To define and outline capacity building activities at country level: for example, mentorship, buddying, training, sharing etc.
- To build on and establish linkages with existing and forthcoming networks/surveillance efforts.
- To define strategies for information dissemination.
- To define roles and responsibilities in implementation.

DAY ONE: 22 October, 2015

Opening remarks

Dr Nedret Emiroglu, Deputy Director, Division of Communicable Diseases, WHO Regional Office for Europe, welcomed participants on behalf Zsuzsanna Jakab, WHO Regional Director for WHO/Europe. Dr Emiroglu said AMR had been a priority in the region for some time, including the adoption in 2011 of a European strategic action plan on antibiotic resistance.[1]

The European action plan's strategic priorities are well aligned with the AMR global action plan and include the development of national AMR action plans, multi-sectorial action with a One Health

[1] http://www.euro.who.int/__data/assets/pdf_file/0008/147734/wd14E_AntibioticResistance_111380.pdf?ua=1

approach, and AMR surveillance, said Dr Emiroglu. The WHO Europe region includes 53 diverse states and this requires actions to be adapted and adjusted according to their needs. Surveillance activities in European Union (EU) Member States are coordinated by the European Antimicrobial Resistance Surveillance Network (EARS-Net), led by the European Centre for Disease Control. Since 2011, AMR surveillance has been broadened to non-EU countries through the establishment of the Central Asian and Eastern European Surveillance of Antimicrobial Resistance (CAESAR) network, in partnership with the European Society of Clinical Microbiology and Infectious Diseases and the National Institute for Public Health and the Environment (RIVM) of the Netherlands. Dr Emiroglu said AMR was high on the political agenda but Member States would not be able to create the necessary momentum to address AMR unless the global action plan was implemented using good evidence from surveillance systems.

Dr Marc Sprenger, Director, AMR Secretariat, WHO Headquarters (HQ) said that the launch of GLASS would have an impact because there was currently a lack of good, reliable, comparable global data on AMR. He said the WHO regions, WHO Collaborating Centres and a wide range of individuals with global expertise on AMR were all represented at the meeting – these were the people who would be able to implement a global surveillance system. Only with meeting participants' input, feedback and critical knowledge could GLASS be a joint success.

Dr Danilo Lo Fo Wong, Programme Manager AMR, WHO/Europe, said the meeting would first take an overview of the progress to date and the tools under development; as leaders in their respective fields, participants would then discuss how they could contribute to GLASS implementation. GLASS requires coordinated action from many players and stakeholders.

SESSION I: Strategic directions for implementation of the Global Action Plan on AMR

Dr Sprenger said there was a high level of support for the AMR global action plan and the agreed WHO organization-wide budget envelope for AMR for 2016-17 had been increased to US$53.8m; this funding would flow to the regions in time.

He explained the global action plan has five strategic objectives: improve awareness and understanding; strengthen the knowledge through surveillance and research; reduce the incidence of infection; optimize the use of antimicrobial medicines; and ensure sustainable investment.

Dr Sprenger outlined the AMR Secretariat's seven guiding principles. These included realistic and achievable objectives – for instance not trying to develop a global surveillance system in one year; implementation through work streams; taking account of the different levels of resources and different priorities of Member States; working with the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) in order to implement the One Health approach; taking an all-inclusive approach and learning from the established AMR activities of other WHO teams such as tuberculosis (TB), malaria and human immunodeficiency virus (HIV); establishing joint ownership between WHO HQ and the regional offices when possible; ensuring good coordination and alignment of AMR activities across WHO.

The AMR Secretariat, based at WHO HQ, is small but works across all the clusters at WHO HQ. The roles of the Steering Group, comprising ADGs and Directors of Programme Management (DPMs) from the WHO regions, include budget allocation and resource mobilization. Dr Sprenger listed the nine AMR work streams and their nominated leads at WHO HQ:

- Global awareness campaign (Olivia Lawe-Davies)
- National Action Plans (Carmem Pessoa da Silva)
- Global surveillance of antimicrobial resistance (Carmem Pessoa da Silva)

- Infection prevention and control (Benedetta Allegranzi)
- Optimizing the use of antimicrobials and regulation (Gilles Forte)
- Research and development and new business models (Peter Beyer)
- Innovative diagnostics (Francis Moussy)
- Environmental drivers of AMR (Kate Medlicott)
- United Nations General Assembly (Marc Sprenger).

The reality, however, was that in many countries antibiotics are still freely available over the counter from corner drug stores, with no information on dosage and when they should be used. Similarly, many hospitals have no microbiology laboratories, no guidelines on infection prevention and control, no drug regulations, and patients have no money to see a GP for a proper diagnosis and to obtain appropriate treatment. Dr Sprenger stressed, however, there are many impressive and committed local individuals and WHO country office staff members working on AMR, but they need support.

The AMR global action plan is ambitious and it is a joint responsibility, said Dr Sprenger. The world depends on its implementation or it will not be possible to treat our children with antibiotics.

SESSION II: GLASS – Global AMR Surveillance System Development

Dr Carmem Pessoa-Silva, Coordinator a.i. (acting in charge) AMR, HSE/PED, WHO HQ, said the focus of the meeting would be on the early implementation phase of GLASS.

In 2014, when WHO published a review of the available information, *Antimicrobial Resistance, Global Report on Surveillance* [2], it was clear that AMR surveillance data were scarce and there were no agreed global standards for methodology, data sharing and coordination. In the May 2015 World Health Assembly (WHA) Resolution (A68/7), Member States requested WHO to *"... develop and implement an integrated global programme for surveillance of antimicrobial resistance across all sectors in line with the global action plan"*.

The overarching goal for GLASS is to achieve a monitoring capacity to capture essential information on the global situation of AMR and inform decision making. Dr Pessoa-Silva said she was highlighting this point because the goal for a global system might not be the same as for a national surveillance system. However, a national system should align with the global surveillance system in order to have coordinated and synergized data on AMR.

The objectives of GLASS are to:

- foster national AMR surveillance systems using harmonized global surveillance standards
- assess and report on selected indicators of AMR
- detect emerging resistance
- inform and assess impact of interventions.

The most important point, said Dr Pessoa-Silva, was that GLASS will be a global system built on national surveillance systems so it is WHO's duty and mandate to foster the development of these national systems. Another imperative is to assess the proposed actions: are they effective, what are the benchmarks, what is the baseline, and how does the system develop globally? Without monitoring effectiveness, it would not be possible to guide future actions.

Globally there are already some surveillance systems (for example for TB, HIV and artemisinin-resistant malaria) but these do not cover bacterial resistance in humans. So that will be the initial focus of GLASS, said Dr Pessoa-Silva. However, while bacterial resistance in humans is the starting

[2] http://www.who.int/drugresistance/documents/surveillancereport/en/

point, the future vision for GLASS will be to integrate AMR information from other areas. WHO is therefore already working with colleagues on the animal-human interface, from the WHO Essential Medicines office (on the use and consumption of antimicrobials), and on the development of standards relating to environmental AMR. These links will be strengthened progressively.

The roadmap for GLASS calls for an assessment in 2017 of the initial phases of GLASS; this means it will be possible to make any necessary adjustments to keep the system evolving.

SESSION III: GLASS Tools

GLASS Manual & Training package

Dr Sonja Löfmark, a microbiologist at the Unit for antibiotics and Infection Prevention and Control, Public Health Agency of Sweden, briefed participants on the GLASS Manual, which has been published to guide countries on how to enrol into GLASS. It introduces the aims, surveillance methods, local/national/global dataflow and the data management for GLASS. The intended readership is national public health professionals and national health authorities responsible for the surveillance of antibacterial resistance in humans, the first focus of GLASS activity. Dr Löfmark said it was important to think about how AMR surveillance data is used at the different levels to support local, national and global strategies.

The GLASS Manual provides guidance to those responsible for AMR surveillance, including lists of priority specimens, pathogens, and pathogen-antimicrobial combinations and details of the collection, compilation and reporting of data

Importantly, the proposed steps for the development of national surveillance systems encourage countries to enrol into GLASS in a stepwise manner. The GLASS Manual also gives guidance to countries on how to report the aggregated harmonized national AMR data of assured quality to GLASS.

Dr Löfmark said the aim and focus of GLASS early implementation will be the routine surveillance that is based on local practice and case-finding from routine clinical samples of priority specimen types. Laboratory-based surveillance without linkage to patient information will not be promoted in GLASS, she said.

The GLASS priority specimens have been selected because they are common and represent areas of infection where there is increasing resistance to drugs of last resort. Respiratory tract infections are not included in the first stage of GLASS as the pathogens found here are more difficult to relate to actual infections. Dr Löfmark stressed that countries are encouraged also to report data from their own priority public health issues in their national surveillance systems.

The GLASS Manual outlines what is expected from a country's three core components of GLASS: the National Coordinating Centre; the National Reference Laboratory; and at least one surveillance site with capacity to collect and merge core patient data with AST results.

Dr Löfmark described the support package that will be available to the GLASS countries, including: a web-based platform for data sharing, management and reporting; implementation tools; surveillance software (WHONET); capacity-building activities and assistance in monitoring and evaluation (M&E) for low-income countries. WHO is also establishing a collaborative platform to promote exchange and peer support between GLASS stakeholders in different countries and centres.

Further training materials currently under development to support the GLASS Manual are: a slide set explaining the Manual; a flyer with core components and key messages; an implementation plan for

establishing the core institutions; and workshops and practical training. These will be shared with participants for consultation in the near future and finalization in February 2016.

Questions and comments from participants

Participants stressed the importance of intensive training in the methods of ASTs so that the test data would be accurate.

Participants suggested GLASS should not exclude respiratory infections because they account for a large proportion of patients in any hospital around the world.

Comments from the WHO HQ AMR team

Dr Pessoa-Silva said respiratory infection samples would be included in future phases of GLASS and that methods for flagging inconsistencies in data will be built into the GLASS IT platform.

GLASS IT platform and linkages with existing AMR surveillance networks

Participants were informed that EpiConcept, a company specialising in delivering IT solutions for public health, had been selected by WHO to develop the IT platform for GLASS. Three company representatives briefed the meeting on what was planned: Thomas Czernicow, Head of Software and Services; Dalhia Khnafo, Project Manager; and Dr Camelia Savulescu, Epidemiologist.

The proposed GLASS IT platform will be based on Voozanoo, an EpiConcept-developed framework to meet information system requirements for public health that is already widely used globally. The methodology allows the software to be deployed through staged implementation as the modules can be used independently. The approach is to develop a quick prototype that is then tested in the field and revised after feedback. Voozanoo is open source so there are no intellectual property issues.

Data for the proposed IT platform will be collected through file transfers or direct input through a web-interface; different types of file transfer can be used. The system will define the format of the data that are entered into the system and will have rules to check for data consistency and also for data export. It will also be able to provide configurable analyses and analysis reports on the data.

The GLASS architecture uses the data that the country or the surveillance network is already collecting, even if there is not a complete overlap between the files that are inputted and the proposed GLASS data collection. Every inputted file will pass through the GLASS Aggregator, which can impose structure and consistency on the data, check for errors using inbuilt data validation rules, and provide immediate feedback on any error detection.

The system will be able to provide data aggregated at the national, regional or international level. The platform's GLASS reporting tools will have preconfigured maps, charts and full analytics.

EpiConcept's planned implementation strategy has three phases.

- Phase 1 implementation will include: the initial web-based application; the first data import functionality; testing of the data collection methods; the immediate feedback given to the data provider and the missing data report; the first set of analysis tools (End date: February 2016).
- Phase 2 implementation will include: field tests with a set of pilot sites and collection of feedback; error management and follow-up; and identification of additional/change in functionality (End date: May 2016).
- Phase 3 implementation will include: final delivery and wide deployment of the platform; introduction of new features, for example drag and drop; options for configuring the data import; new import formats; and a full set of analysis tools and maps (End date: July 2016).

Questions and comments from participants

One participant asked if GLASS would have a memorandum of agreement with each country that used the GLASS IT platform.

Participants wanted to know how the platform would integrate with laboratory systems that were already in place in some countries so that currently available data could be transferred to the GLASS system. Participants asked if WHONET would be compatible with the GLASS platform. The EpiConcept representative said the company would be discussing appropriate export formats and would make sure the platform was integrated with different data formats. EpiConcept systems generally make sure that any kind of data can be captured in the surveillance platform.

Participants wanted to know what level of expertise would be needed by data inputters. The issue of training was considered a critical concern by the meeting, with the suggestion that training in inputting data and data management would need to be an ongoing feature and not a one-off occurrence. They said the IT platform's own checking facilities might not pick up all types of erroneous data so the staff doing the inputting needed to be trained in how to look at data. The GLASS platform will give immediate feedback on the quality of the inputted data plus training resources on how to use the software, including tools and videos. Every country will need to define a local or national trainer. The GLASS platform will work with the existing structures as these will not change with the new system.

It was also pointed out that some countries have no current systems and would need additional support. EpiConcept said it was aware of the challenges in low income countries. The company was willing to work with WHO to create specific indicators for different layers of data collection.

One participant pointed out that 22 countries write from right to left and asked if the GLASS IT platform's user interface could accommodate this as many data entry technicians would not know English. The EpiConcept representative said they would review the requirements with WHO HQ.

Given that joining GLASS can be a stepwise process for a country, participants asked if the IT interface would be customized to reflect each country's level of participation or would there be many fields left blank; would the system make a distinction between data that was not yet intended to be provided and missing data? Under the EpiConcept plan, the interface will be based on a standard data collection template; countries would provide data they have which should improve over time.

Other questions included: Would countries have only one point for entering their data into the GLASS platform, or more than one? Would the system automatically produce reports/analysis for a country? The GLASS intention is that countries will directly input their data through a web-interface. The system will come with some predefined reports.

It was suggested that during the Phase 2 pilots it would be important to see how the platform was used in the quality assurance cycles at local, regional and national levels.

EpiConcept was asked if it had visited the European Food Safety Agency (EFSA) which already carries out a well-structured harmonised surveillance of antibiotic resistance, with data collection from national surveillance programmes and integrated quality assurance components. The company said it was aware of EFSA and that a future phase of the GLASS project would include the integration of veterinary and environmental AMR surveillance data into the GLASS platform.

The Chair asked about the informatics standards for health data in regard to the export of data for local and international use. He also wanted to know whether, when exporting data for local use, the GLASS platform only made predefined tools available or whether it would be possible to customize

such tools for local retrieval and analysis of the data. On a technical point, he asked about the IT platform's likely minimum requirements for hardware, software and connectivity speeds. Under the EpiConcept plan, the system would make available standard tools to users as and when they are developed. The IT infrastructure requirements would be addressed in the first phase of the project.

Comments from the WHO HQ AMR team

Dr Pessoa-Silva clarified that an IT needs analysis had first been carried out to inform the project proposal developed by EpiConcept. In addition the company had based its proposal on a system with 15 years' use in the public health field.

On the question of Member States sharing their data with WHO, Dr Pessoa-Silva reminded participants that this transfer of data was in the WHO constitution and has been the basis of all WHO global health reports and the health statistics in the WHO Global Health Observatory. The GLASS platform will also be linked to Observatory so that the AMR surveillance data can also be accessed from there.

Finally Dr Pessoa-Silva asked for volunteers with IT platform experience to form a small group that could work with WHO and EpiConcept on further defining the plans for the GLASS IT platform – including quality assurance rules and integration with other systems – in time for the planned prototype version in February 2016.

WHONET modifications

Dr John Stelling, Co-Director of the WHO Collaborating Centre for Surveillance of Antimicrobial Resistance, based at the Brigham and Women's Hospital in Boston, USA, briefed participants on what modifications would be needed to WHONET to achieve integration with the GLASS IT platform. WHONET is free Windows-based database software initially developed for the management and analysis of microbiology laboratory data with a special focus on the analysis of AST results. It is currently used in an estimated 2,300 laboratories in 110 countries.

Dr Stelling began by clarifying the GLASS IT platform aggregated national statistics. This means that the issue of ensuring good quality data has to happen at an earlier stage, he said. Once the data are aggregated there are only limited approaches for validation (for example, by comparing different resistance totals) and it is no longer possible to identify the types of quality issues that are apparent at isolate level, said Dr Stelling.

On the question of what data collection systems will be compatible with the GLASS IT platform, Dr Stelling drew a parallel with the 30 countries of EARS-Net, 20 of whom use WHONET to collect the data nationally and then export to EARS-Net and 10 use their own systems. Many data providers use WHONET so it will be made as easy as possible for WHONET users to participate in GLASS.

When WHONET was set up, its two aims had been to enhance the use of locally-generated data and to promote national, regional and global collaborations through the use of standard software and standard tools. WHONET avoids the need for double data entry through its use of the BacLink data conversion utility to facilitate the transfer of data from diverse existing laboratory information systems into WHONET. When files are exported using WHONET, BacLink converts them into WHONET structure and codes; this data conversion can take place at the local or national level. A lot of the WHONET standardization of data from different surveillance sites will therefore happen before it reaches the national level and the GLASS IT platform.

There are two primary types of modifications needed to WHONET use to make it compatible with GLASS:

- Changes to the software itself, for example: changes to the WHONET analyses to support what GLASS need to record; creation of GLASS export files: implementation of the GLASS data check and feedback report. Dr Stelling said these are modest changes and will be finished soon.
- Changes in what the WHONET users will have to provide to support GLASS implementation. This will require completing more data fields so these changes are more onerous.

Many of the changes are built around the metrics in the GLASS protocol and relate to how the data are collected. The four metrics, which should be available as overall totals and stratified by age group, gender, and/or infection origin are:

- Metric 1: Frequency of patients sampled per specimen type per population covered.
- Metric 2: Frequency of patients with growth of non-susceptible bacteria per specimen type, species and antibiotic.
- Metric 3: Proportion of sampled patients with positive culture of any (susceptible, intermediate or resistant) pathogenic bacteria per specimen type.
- Metric 4: Proportion of samples with growth of non-susceptible bacteria of the species and antibiotic under surveillance per specimen type.

The data required for the metrics include information that would be new for some users, such as data on patient hospitalization and data on all negative samples and all non-GLASS organisms.

Overall there will be three kinds of files: patient demographic breakdowns for the population covered by the surveillance initiative; organism totals by sample type; AMR statistics.

There will be three levels of data checking: local data validation using the local unit's own tools before submission; checks before submission to the website including for quality, missing data, comparisons with previous years' results etc; then high level checks by WHO staff seeing what looks correct and incorrect. Users would receive a system commentary on the data check after submission.

Laboratory tools

Dr Christopher Oxenford, Technical Officer, IHR National Capacity Development Unit, Health Security, WHO HQ, briefed participants on WHO activities to ensure that the quality of data coming from laboratories and going into surveillance systems was adequate. He said no surveillance system, however good, would be useful if the data from the laboratories were not believable.

Several WHO quality tools are already available. Most of these tools are designed to be used independently by the institutions but WHO is also looking to provide intensive additional support. WHO takes a holistic approach to laboratory quality, focusing on the overall laboratory rather than an individual aspect. Otherwise issues may be missed: for example, a laboratory may be providing poor AST results because the building's electricity supply is unreliable and sample storage conditions are compromised, said Dr Oxenford.

In recent years, WHO has developed some specific resources:

- Assessment tools so that laboratories can review their overall performance and the components of a good quality system. These tools are freely available on the WHO website and can be used by individual laboratories or for a national laboratory system.

- In cooperation with other partners, resources have been produced for quality management training with a handbook in English, Russian and soon French.
- Developed in conjunction with the Royal Tropical Institute in the Netherlands, a stepwise quality implementation tool is available for laboratories to take a generic approach to improving the quality of results. This guides the user through all the steps needed to improve quality, indicating the critical features that must be in place. The ideal end result is that the laboratory can be accredited against an international standard but WHO recognizes that many may never be in that position.

Monitoring quality performance through proficiency testing is also important, said Dr Oxenford. At Regional Office level WHO supports regional proficiently testing, which includes AST, in several countries. This provides follow up and feedback for laboratories. WHO is also in the process of developing a database of proficiency test providers that will be freely available so institutions and countries can find appropriate schemes.

WHO is also working to ensure countries and laboratories have access to the latest standards for antibacterial susceptibility testing. There are two major standard-setting bodies: the US-based Clinical and Laboratory Standards Institute CLSI and the European Committee on Antimicrobial Susceptibility Testing (EUCAST). The latter's materials are free whereas CLSI is a commercial product. Dr Oxenford said this meant that some countries using CLSI may have outdated materials. WHO has entered into an agreement with CLSI to purchase some set of the next set of standards more cheaply to make them available to low income countries. However, this might not be a sustainable approach long-term, as updated tables are issued annually. He pointed out that all European standards had now converged to EUCAST.

WHO is preparing training videos on EUCAST to be posted on YouTube showing how to carry out each of the components in an AST.

Questions and comments from participants

Several participants raised issues connected with the provision to laboratories of quality assured reference strains as laboratories have difficulties accessing these. Dr Oxenford said it would be expensive to provide these strains, although some WHO Regional Offices had looked into the possibility.

Several participants argued strongly that there should be some kind of evaluation of a laboratory's quality of work before joining the GLASS system. Even if the quality assured reference strains were provided to a laboratory, poor storage conditions, for example, could mean they were not maintained properly. It was suggested that a laboratory should be subject to a site visit to check its quality standards before providing data to GLASS. WHO could also suggest some national external quality assurance programmes in which all laboratories participating in the national system could enrol. Dr Oxenford said quality assurance and checking of laboratories would be a country decision. One approach was to refer some isolates to the National Reference Laboratory to confirm if the analysis results were the same.

One participant welcomed the new WHO videos but said many laboratories did not realise that the instructions in a video must be followed exactly so training programmes were still needed.

The WHO Collaboration Centre had conducted proficiency tests for identification and susceptibility testing in up to 200 countries since 2001 to today and as part of this process supplied new laboratories with certain reference strains and the protocols for good maintenance. He also had 18 hours of video available on susceptibility testing, from basic to advanced, plus protocols on testing.

The US Food and Drug Administration (FDA) and Centers for Disease Control and Prevention (CDC) had put together antibiotic resistant isolate banks; these were fairly specialized and were designed for diagnostics manufacturers and companies evaluating new drugs but there was no reason not also to use them for quality assurance.

Comments from the WHO HQ AMR team

Dr Pessoa-Silva clarified that WHO was not promoting EUCAST because it was cost free but because its technical level was equal to CLSI so it was therefore good for sustainability. It also has breakpoints for fungi, which CLSI does not have, she said.

SESSION IV: Identification of capacity building activities and technical support

The meeting's participants were divided into groups defined by WHO regional areas and asked to consider the required capacity building activities and materials needed at country level to support GLASS implementation, and to make related commitments on behalf of their organization. The discussion covered three aspects of GLASS implementation:

- Epidemiology, data management and reporting capacity
- Laboratory capacity
- Development of national surveillance coordination.

Groups were asked to report back to the meeting on their priority activities.

WHO Eastern Mediterranean region

Participants from the WHO Eastern Mediterranean region described their priority areas and related general commitments.

- First activity: advocacy. Participants said this will be an important aspect of persuading decision makers to implement GLASS. Slide sets or flyers are already under development but other materials will be needed to convince governments to take part in GLASS.
- Second activity: governance and capacity building for governance. The group said a clear explanation was needed on how to select a national focal person (for example, defining the appropriate characteristics, background, expertise) and the Terms of Reference for this person. Clarity was also needed on what would be the national coordinating mechanism.
- Third activity: laboratory capacity building activities. Guidance is needed on how to identify a National Reference Laboratory and whether it should be a hospital laboratory or the central public health laboratory. Related issues were where the samples would be available and how samples would be stored and shipped to the National Reference Laboratory from laboratories carrying out the routine surveillance.
- Fourth activity: identifying surveillance sites. Selection criteria are needed for choosing sites, plus tools for the assessment of such sites and what capacities exist.
- Fifth activity: data management. Surveillance sites need guidance on integrating laboratory and epidemiological data so they can send them to the national data coordinating mechanism, which will then submit to the GLASS IT platform.
- Sixth activity: Member states need guidance on the utilization of data at the national level before submitting it to the global level. This will require huge capacity building efforts.

The general commitments were:

- Expansion of the surveillance network that exists in Pakistan.
- Provision of laboratory training on pathogen identification and AST.
- Quality assurance programmes.
- To assist in developing the tools that might be required in certain capacity building activities.
- Training in AMR quality assurance.
- On data management, guidance and capacity building exercises at the different levels of collecting, aggregating and sending the data.

The Chair said it was understandable that participants might need to consult with their organizations before making firm commitments but it would be helpful if they could identify areas in which they would be consulting about supporting GLASS implementation.

WHO Western Pacific region

Participants from the WHO Western Pacific region described priority activities and specific commitments in these areas.

- First activity: A framework on how to develop a National Coordinating Centre for GLASS. There was a need for documents describing the core components and quality criteria. WPRO Regional Office committed to this; Member States would also need to commit.
- Second activity: continuing education. There is a need to educate, not just through videos but with actual educational programme, to enable and persuade people to commit to GLASS and to ensure that methods are precise and accurate. This will require standardized training tools and teaching materials. Both the WPRO Regional Office and the WHO Collaborating Centres made commitments on this.
- Third activity: a peer support mechanism. It is important to bring countries together to support one another to implement GLASS. Both the WPRO Regional Office and the WHO Collaborating Centres made commitments to help Member States in the Western Pacific region to make commitments to help one another.
- Fourth activity: laboratory site visits. The WPRO Regional Office discussed the benefit of identifying and training a group of site visitors (for example, professors) who could encourage and check the level of quality in laboratories. Before such teams could operate there was a need to secure agreement and consensus for their work, including a standardized approach to assessing quality.
- Fifth activity: strong advocacy for GLASS from WHO and key stakeholders. WHO Regional Offices and Member States should be involved in this advocacy.
- Sixth activity: Member States should access a quality assurance programme. It was suggested that some regions could develop and set up such a programme and share it to avoid all countries incurring the expense of developing their own.

WHO African region

Participants from the WHO African region described their priority activities.

- First activity: diagnostics stewardship. The group suggested the creation of tools or an *aide memoire* to define when samples should be collected from patients and how to organize transportation of specimens and receiving in laboratory and what tests should be performed.

- Second activity: continuing education and training materials at all levels and specifically for nurses on taking samples. There are some existing documents in this area.
- Third activity: Laboratory support and strengthening. A standardized list of laboratory materials is needed as many countries have cumbersome procurement system (do not know what to purchase); GLASS could support standardized procurement system in the region. WHO or another organization could take this responsibility.
- Fourth activity: maintenance of materials. There should be online training or an onsite workshop, plus standard operating procedures. It is important to ensure that everyone uses the same standard operating procedures in their surveillance systems.
- Fifth activity: laboratory assessment tools. These are already being provided by WHO HQ (Lyon office).
- Sixth activity: supporting countries to use the data that are fed back by GLASS. There is a need for materials or guidance to support countries to adapt their treatment and infection prevention and control policies in response to the data that comes back from GLASS.
- Seventh activity: accurate epidemiology data. It is important to ensure the correct sampling frame so that the data coming in are meaningful and useful.

Commenting on other groups' suggested additional activities, the African region participants agreed on the need for laboratory site quality assessment visits but asked who would carry these out. They suggested a supra-national reference laboratory or the WHO Collaborating Centre should take the lead, working with other partners.

The Chair asked all meeting participants not only to focus on laboratories when suggested activities.

WHO European Region

Participants from the WHO European Region described priority activities and specific commitments in these areas.

The European Region has already existing international surveillance systems (EARS-net and the CAESAR network) although not all countries are yet reporting AMR surveillance data. WHO Regional Office for Europe provides support to help countries start reporting and to join CAESAR. Its main focus is on countries without any AMR surveillance and/or lacking laboratory capacity.

CAESAR has national AMR focal points that act as champions; it is often difficult to find the right person. While it is usually an individual that takes the lead, the focal point should be a team or institute at the national level that can work on setting up a national AMR surveillance network. It is important for WHO to support the focal point.

- First activity: an operational plan. It is necessary to tailor the GLASS Manual content to a country's individual needs and to define the incremental steps that can be taken to implement GLASS. To start with, there should be a focus on improving the quality of the epidemiological and microbiological analysis data. Commitments on this were made by the WHO collaborating centre, the National Institute for Public Health and the Environment, the Netherlands.
- Second activity: Establishment of a National Reference Laboratory. It is important to have Terms of Reference for the National Reference Laboratory, standard operating procedures for various aspects of laboratory practices, a set of reference strains, country registration of laboratory consumables, standard operating procedures for the sampling practices, and enabling diagnostics.

Commitment in these areas was made by the Technical University of Denmark, a WHO Collaborating Centre.

- Third activity: standard operating procedures. There are already many available and a package of tools is already in progress.
- Fourth activity: education and training. There is a need to build a pool of experts, not only for training and workshops but also so have a stepwise approach to follow-up. Workshops should be based on a clear view of who needs to be training and what that training should include; afterwards there should be follow-up with the support of consultants. In addition, laboratory site visits are a good idea and should use a generic assessment tool that can be tailored to individual countries but has a core thread of what is needed for GLASS.

WHO South-East Asia Region

Thailand is a regional champion for AMR and has already implemented 60% of the AMR global action plan. It has made a commitment to participate in GLASS, specifically at Siriraj Hospital in Bangkok, with 2,300 patient beds. They are the WHO Collaborating Centre for AMR Prevention and Containment (Faculty of Medicine Siriraj Hospital, Mahidol University) and the WHO Collaborating Centre for AMR Surveillance (Department of Medical Sciences, Ministry of Public Health).

The National Antimicrobial Resistance Surveillance Center Thailand (NARST) network operates across 77 provinces with more than 80 laboratories and one or two laboratories may also participate in GLASS. NARST laboratories are also implementing a quality assurance system. For data management, some use WHONET and others have an in-house information management system. For epidemiological data, they are collecting hospital number, age, gender, specimen type, and ward type. Siriraj Hospital would like to do more in terms of measuring the catchment area population.

All the South-East Asia region Member States have a focal point that is a unit not a person.

There was a request for support on infrastructure development, data management, storage of isolates and their shipment from provinces to reference labs for validation of results, laboratory staff training, and equipment and laboratory supplies, including ACTT strains.

It was also suggested that there could be a single software that could address both the epidemiological and the laboratory needs; WHONET might like to include epidemiology so there was no need to use two different softwares.

WHO region of the Americas

Participants from the WHO region of the Americas said they approached the question of activities from a generic standpoint, identified relevant existing materials and reported commitments relating to new materials to be developed.

- First activity: Advocacy, including for a national coordination centre and National Reference Laboratory. A regional customized training package was needed for communication with opinion leaders to secure their support for GLASS. The US CDC communications specialists could assist with this.
- Second activity: a national needs assessment customized and administered at regional level. The group suggested regional needs assessment could use some existing tools.
- Third activity: documentation or guidance on a surveillance strategy, including the selection of surveillance sites, dataflow, validation of the epidemiological data, and stratification of the

reporting. The groups said a tool was needed to support the selection of surveillance sites and development of a surveillance strategy. The US CDC committed to assist this work.

- Fourth activity: laboratory assessment at the primary sites that submit data. The group suggested that forming networks of existing laboratories could help the assessment process, plus the WHO laboratory assessment tools described earlier by Dr Oxenford.

Finally the group suggested that more time should be taken to identify useful materials that are already available.

Questions and comments from participants

One participant stressed that the priority was to help countries to have a well-functioning national surveillance strategy and system for AMR in the general sense. This itself met many purposes, such as establishing facilities that allow the country to check outbreaks of an organism, and a subset of facilities that could look at the burden of disease and/or the response to therapy. This national surveillance system would report to GLASS.

On the issue of a laboratory obtaining samples, the participant said there was a difference between diagnostic stewardship and taking representative samples. Appropriate diagnostics does not require that samples are collected from every patient; for some infections the recommendation may be to treat empirically. Separately, a country can carry out a regular survey on a randomly selected group of patients and use those results to decide treatment guidelines etc.

Comments from the WHO HQ AMR team

Dr Pessoa-Silva thanked participants for their suggested activities and said WHO HQ would follow up on commitments.

Dr Pessoa-Silva reminded participants that the development of an AMR national action plan by May 2017 is an overarching activity for each Member State. The national plan will set country targets that are aligned with the country's resources and also aligned with the global action plan to ensure global synergies in the approaches taken.

The GLASS Manual explains that the national surveillance system should be aligned with the strategies of the national action plan. Member States need to consider how their surveillance systems can support those strategies; they are not being set up just to provide data to GLASS but to orient the national and global efforts on AMR. Dr Pessoa-Silva said tools for national action plans are being developed in parallel with those for GLASS.

Dr Pessoa-Silva agreed on the need to improve the quality of epidemiological data. During the peer review process for the GLASS manual, the suggestion of including information on the size of the catchment area population had been dropped for the GLASS early implementation phase because of the difficulties in obtaining this measurement.

For the first phase of GLASS, WHO has taken a very pragmatic approach based on sample-based surveillance. Few pilot studies will explore how to develop types of surveillance that would provide more information than routine surveillance, such as burden of resistance.

On the suggestions of peer partnership between countries, Dr Pessoa-Silva explained that the development of the AMR global action plan was unusual in terms of being a process led by Member States and involving Member States approaching each other to promote surveillance. More countries are now involved in pairing with other countries, with WHO facilitating the process.

SESSION V: Further GLASS developments

Dr Sergey Eremin, Medical Officer, WHO HQ/AIP AMR, Infection Control and Publications introduced the three topics for discussion: Unusual AMR events under surveillance; diagnostic stewardship; and Monitoring and evaluation (M&E) framework for GLASS implementation. Concept Notes on each topic had earlier been distributed to participants, with a list of questions intended to define the scopes of work for three new Working Groups. Participants were asked not to answer those questions but to discuss whether the Concept Notes needed clarifications or amendments regarding the issues to be addressed by each Working Group over a period of about six months.

Participants were asked to sign up to join one or more of the three Working Groups. Dr Eremin added that all outputs from the Working Groups would be peer reviewed by all participants.

Unusual AMR events under surveillance

Dr Eremin said the GLASS Manual described the standards and methodology for routine AMR surveillance and reporting but there would also be AMR events that needed to be disseminated more urgently and outside the usual annual reporting and publishing cycle. One of the GLASS objectives is to detect emerging AMR mechanisms.

Among the issues for the Working Group to consider were the definition of "unusual" events, the purpose of disseminating information about such events, the proposed reporting procedure and mechanisms, and how to provide guidance to countries on assessing the risks related to the emergence of a new pathogen.

The Concept Note on Unusual AMR events under surveillance is provided in Annex 3.

Questions and comments from participants

Several participants reiterated the need for a clear definition of "unusual" and the importance of defining the goals of reporting these unusual events, for instance to enhance the ability of GLASS to pick up patterns of new resistant bacteria globally.

Participants said that it was necessary to ensure that laboratories have the capacity and methods to be able to detect unusual AMR mechanisms in terms of both the phenotype and genotype.

Several participants said that detection of an apparently unusual event should be verified, for example by sending the sample to a National Reference Laboratory to confirm. It was pointed out that claims of unusual events have often turned out to be erroneous due to laboratory mistakes. This is already recommended in the GLASS manual.

If confirmed as unusual, a reporting system for such events should be established and integrated into the GLASS IT platform for rapid reporting at the local level (where the event was detected), the national level and the global level. The channels for the information flow should be clear. One participant said the Working Group should define who needs to be notified, and in what timeframe, from two perspectives: the importance of the event to public health and the importance of the information for academic purposes. Another said that information was often published in outlets with limited readerships and might not come to the attention of public health authorities; a weekly or quarterly digest with alerts would improve communication. However, it was also pointed out that an email AMR alert system set up in Europe three years ago had been little used.

Any confidentiality issues should be identified beforehand. Similarly, the intellectual property and the right of first publication of new data should be clear when the data are disseminated, including any role for Material Transfer Agreements.

It was suggested GLASS should provide protocols for risk assessment and guidance on how to decide the urgency of an event and to prioritize different types of event.

There was a need for public awareness about the issues involved, and that dissemination of information should be properly handled in order to avoid public panic. In a related suggestion, one participant said that the inclusion of place names in the naming of new pathogens should be avoided to prevent any risk to tourism etc.

Some participants had discussed the possibility of ground level operating and response centres that could organise activities and look at options if an unusual AMR event occurred. National governments would be responsible for this response team and for then reporting to WHO.

On the terminology in the Concept Note, one participant said it was confusing to use the work "event" because of its standard use and meaning in the International Health Regulations (IHR) context.

Given the difficulties for laboratories to decide what counted as an unusual event, one participant asked whether GLASS, with its awareness of the global situation, could inform laboratories on a regular basis what they should look for and report on.

The Chair said that the incentives to report unusual AMR events may need to be connected with the perception that reporting is useful beyond pure scientific knowledge/curiosity. The paradox is that the person who reports something may never be aware of the impact, for example when a single incident is important because it is part of a pattern.

Diagnostic stewardship

Dr Eremin said the concept of diagnostic stewardship needed to be developed further by the Working Group in order to improve the quality of data coming into surveillance systems and the tools available to support good stewardship. Diagnostics should be systematic and trustworthy and needed a system of management and guidance. The surveillance system need to make sure that clinicians send the appropriate samples to the laboratories and that there were the necessary technical resources to respond to the increased demand for diagnostics.

The term "diagnostic stewardship" was also itself problematic as it was a difficult concept and also awkward to translate into other languages, said Dr Eremin.

The Concept Note on Diagnostic Stewardship is provided in Annex 4.

Questions and comments from participants

Many participants suggested that GLASS should find alternative wording and definition to the term "diagnostic stewardship".

It was suggested that most regions have many countries in need of better diagnostic stewardship but it will be difficult to stimulate sampling as part of routine clinical practice and to pay for it. While protocols and standard operating procedures can be introduced as used with sentinel studies, it is challenging to implement these at a local level. However, it was important to address the challenges posed by diagnostic stewardship.

Another participant said the Working Group should look at the cost effectiveness of diagnostic stewardship and whether additional funds will be needed for some countries, such as in Africa. It can often be cheaper to implement a treatment rather than to carry out a diagnostic test. Similarly, which diagnostic tools are applicable, and whether they are available to poorer countries, needs to be considered.

It was suggested that the same directions and guidelines on diagnostic stewardship should apply to the public and private sector as there are many private laboratories in some regions, with private repositories of diagnostic information that is not freely available and which will otherwise be missed.

One participant said the Working Group should carry out a landscape analysis on all initiatives in this field as there were currently many ongoing initiatives.

Participants stressed that a distinction needed to be drawn between AMR diagnostic stewardship in the context of GLASS (which included issues such as which samples to collect for public health and how to store them etc.) and diagnostic stewardship in the context of antibiotic stewardship (which requires easy, cheap diagnostic tools to avoid the improper use of antibiotics and other antimicrobials). A laboratory test result can thus have public health preparedness implications but it also concerns how a clinician can quickly and correctly treat an individual patient.

The focus of the Working Group should be on the diagnostic stewardship needed for GLASS surveillance. This requires the right samples to be taken in the first place and sent to a laboratory. The Group should therefore look at the health system barriers that mean samples are often never taken. In many countries, for instance, the cost of taking a sample is higher than providing a broad spectrum antibiotic. GLASS needs to consider what mechanisms should be in place to ensure the sampling required for surveillance.

The Working Group should also look at how to reduce the variability across countries in diagnostic procedures. It is important for countries to understand how the diagnostic process affects surveillance data and the need to focus on the diagnostic system at the macro level.

The Chair said there was a need to push for high quality data while being aware of any impact on clinicians/patients. Such consequences were likely to be positive, because if cultures are used wisely for public health then they are also likely to lead to wiser treatment practices. However, it was important not to introduce a bias by pushing hard much for that relationship. The issue of cost-effectiveness needed to be tackled to achieve consistency globally as cost calculations at a local level are widely variable.

Monitoring and evaluation (M&E) framework

Dr Eremin said the implementation of GLASS needs to be monitored and evaluated at both the global and national levels. The GLASS Manual includes a list of proposed indicators that could be used for these purposes. They have been based on the more general guidance on public health surveillance programmes but the WHO AMR team believes the Working Group on M&E should further develop the indicators and the M&E framework itself.

The Concept Note on the M&E of GLASS implementation is provided in Annex 5.

Questions and comments from participants

One participant said M&E was integral to AMR surveillance and GLASS; it should be developed from the early stages of GLASS implementation. There should be two levels of M&E: from WHO down to the country level; and an internal M&E element inside the national Ministries of Health so that they monitor what they achieve as part of GLASS.

The Working Group should review and finalize the list of indicators in the GLASS Manual. In addition, indicators to be introduced to validate quality of the data coming into the surveillance system, both from laboratories and from epidemiology.

The goal of M&E should be to provide specific advice to countries about next steps so that they iteratively improve their surveillance systems.

Qualitative issues should also be covered by the M&E indicators, for example are the data biased and are they representative

As with the CAESAR network, countries should be encouraged to join and contribute data to the surveillance system even if the quality of their data is not yet good; at the same time there can be an explicit discussion of the limitations and quality of the data and this process used to improve the data and surveillance in the future.

The proposed M&E framework is stronger on monitoring than on evaluation, one participant said. The latter is important because in order to persuade other countries to adopt GLASS, or to sustain it, there needs to be evidence that it is generating benefits and impacting on policy.

A distinction should be maintained between monitoring the AMR global action plan and monitoring the GLASS surveillance system.

The Chair suggested that the experience of monitoring the IHR implementation process might yield some suggestions for GLASS M&E.

Comments from the WHO HQ AMR team

Dr Pessoa-Silva reiterated that the AMR global action plan includes surveillance. The M&E framework for GLASS will feed into the overall M&E framework for the global action plan as a whole, which will be developed.

The Working Group should start from a blank sheet of paper in order to decide how to frame and customize an M&E framework that is relevant for GLASS, she said.

DAY TWO: 23 October, 2015

SESSION VI: Roles and responsibilities

Dr Pessoa-Silva said that it was important to establish a collaborative platform to support GLASS implementation. It would therefore be useful to have clarity on the expected roles and responsibilities of the different groups: the WHO Collaborating Centres; the partner technical institutions that have been helping to establish GLASS; and existing surveillance networks such as EARS-Net, CAESAR, and ReLAVRA, the Latin American surveillance system; and WHO itself, both at the Regional Office level and HQ. In addition, it would be helpful to understand the potential interaction between GLASS and the international networks of organizations such as the Institut Pasteur and Médecins Sans Frontières (MSF).

Presentation: Institut Pasteur

Dr Arnaud Fontanet, Head of the Epidemiology of Emerging Diseases Unit, Institut Pasteur, suggested it would be useful to discuss the possible contribution of the Institut Pasteur's International Network to the GLASS initiative. Institut Pasteur currently has a network of 33 institutes worldwide, 70% of which are in low income and emerging economies. Half of these institutes are national public institutes and all have a bilateral agreement with the Ministry of Health in their country and are embedded in the national structures.

The institutes have a major role in surveillance of infectious diseases and two of their roles are potentially relevant to GLASS. First, the institutes' income in large part comes from providing laboratory microbiological diagnosis to local health structures, including hospitals. Through receiving

these samples for diagnosis there is an opportunity to connect with the wider surveillance system. Second, many of the institutes serve as national reference centres in their countries.

Looking to the future, Institut Pasteur is investing in Global Genomics Centres for bioinformatics, establishing a global framework for reproducible research with unified bio-banking, data storage, management and analysis. The planned connected platform would allow the analysis of big data from genetic sequence data (GSD) and the Institut Pasteur wants that data to be shared. This may also fit into the GLASS initiative, Dr Fontanet suggested, as sequencing will play a bigger role in the future

Questions and comments from participants

Dr Fontanet was asked about the reporting system for the network – do the network's institutes report directly to the Institut Pasteur and how does this work at the regional and global levels? Dr Fontanet said there were different levels of reporting. The institutes that are national institutes, or which have an agreement with their Ministry of Health, report directly to the Ministry at a local level. If a more global view is wanted, institutes can either be part of a coordinated initiative and can report to a wider network, or there can be institute driven initiatives to aggregate the data.

Does the Institut Pasteur carry out AMR training activities and do these address the various language barriers in Africa? Dr Fontanet said Institut Pasteur, for example, runs a two to three week short course in AMR each year in Cameroon that is very practical. The Institut communicates in languages other than French and most of its courses are in English. The Institut Pasteur would be keen to collaborate with GLASS on training and believes it is important to have more intra-African initiatives that bring together the different language speaking countries.

WHO Collaborating Centre participants on roles and responsibilities under GLASS

Representatives from WHO Collaborating Centres stressed the importance of a regional approach to roles and responsibilities. Within each WHO region there was a need for capacity to support individual countries to set up their national surveillance systems, including on laboratory methodology, quality control and epidemiological surveillance methodology.

Representatives from WHO Collaborating Centres in the WHO European Region said they were willing to share their experiences in capacity building and from setting up CAESAR. Similarly, another participant said that the WHO Collaborating Centre in the Americas region might also be able to serve in a similar capacity, including utilizing tools and its standardized framework.

Comments from the WHO HQ AMR team

Responding to these points, Dr Pessoa-Silva said was requesting support from WHO Collaborating Centres for regions that are currently not well served by such centres. She pointed out that WHO Collaborating Centres were not originally established with a regional remit but for a global purpose. Therefore WHO may need to ask Collaborating Centres in some regions to provide support to other regions that lack their own institutions to provide support.

Technical institution participants on roles and responsibilities under GLASS

Representatives from technical institutions said there were two types of technical bodies: first, the "champion" institutes that worked closely with samples and patients; second, the back-up institutes. The participants suggested it was important that the ground level champion institutes tried to implement GLASS and then provided feedback on any problems and gaps in the system. Once they had implemented GLASS in their own environment then they could assist in taking it into neighbouring countries.

This group also highlighted possible practical issues related to GLASS implementation. For example, some technical institutes might need official paperwork from WHO to confirm they are part of GLASS implementation in order to secure the necessary support and designation in their home country, even if the GLASS system operates through the Ministry of Health. Second, there may be issues to be sorted out regarding IT support and the compatibility between existing systems and WHONET and EpiConcept.

Finally, this group suggested that in regions without WHO Collaborating Centres, a mapping exercise could identify relevant other functioning institutions, such as in the Institut Pasteur network, and academic bodies that could be approached to support GLASS.

Surveillance network participants on roles and responsibilities under GLASS

Participants working for existing surveillance networks said there were clear opportunities for collaboration on GLASS with organizations such as Institut Pasteur and MSF, particularly on access to more remote areas. As the meeting had already heard, the Institut Pasteur has a network of institutes, many of which are already functioning at a national level as reference laboratories.

They agreed that there was a need for WHO Collaborating Centres to work outside their own regions and to collaborate with each other to support the development of laboratory capacity for AMR surveillance in other countries. Examples of this type of existing cooperation were mentioned, including by the UK and the Russian Federation.

It was suggested that more discussion was needed on the practicalities of connecting the different surveillance initiatives already underway, for example by ECDC, and how to link them with GLASS. Participants in this group said there was a willingness to do this and to make sure it happened.

MSF mentioned its development of mini-laboratories in remote areas to support susceptibility testing and promote diagnostic activities. Its representative asked how surveillance data from an area with no existing surveillance system could be fed to the national level in order to be of value to GLASS.

Comments from the WHO HQ AMR team

Responding to the final query, Dr Pessoa-Silva said GLASS was specifically targeting a country's national surveillance system but recognized that there are places without a government surveillance presence but where there are other surveillance activities. It would therefore be important to ensure that the GLASS IT platform could accommodate this type of information, which is also useful.

WHO HQ and Regional Office participants on roles and responsibilities under GLASS

Participants from the WHO Regional Offices said there was a persistent problem of poor communication between WHO HQ and the regional and country levels, and also across different departments.

They suggested that all levels within WHO needed to lead on the advocacy of GLASS but urged WHO HQ to lead on some aspects of the mobilization of resources, although the Regional Offices would also be involved in this.

WHO must ensure that GLASS is integrated with the current system and does not create a parallel system.

Participants said WHO should be responsible for developing Terms of Reference for the WHO Collaborating Centres to reflect the GLASS standards and the level of activity that the Centres would

be contributing to GLASS. WHO should provide the oversight for these networks and laboratories to contribute to GLASS.

Questions and comments from participants

One participant from a WHO Collaborating Centre said that, given the quick timetable for implementation, GLASS should try to "piggy back" on existing ongoing activities. There are many existing AMR networks and initiatives that have resources that can be used for GLASS; this is also a way to avoid repeating past mistakes.

Another WHO Collaborating Centre representative said it would be helpful if WHO HQ or the WHO Regional Offices set timelines for what was expected at the national or regional levels on GLASS. He pointed out that when asking Collaborating Centres to offer support outside their own regions, WHO should recognise that the Centres are themselves bureaucratic and need to plan ahead for the commitment of staff and resources. The centres need a concrete plan from WHO in order efficiently to utilize their knowledge and expertise for GLASS.

One WHO staff member said that the organization generally does not make good use of WHO Collaborating Centres. She described how some WHO Collaborating Centres have been asked to report on their support to the AMR global action plan in their annual reports; as surveillance is central to the action plan this means they must include something on GLASS. Separately, she suggested GLASS needs to be aware of all the resources that are already available so as to avoid duplication of effort.

It was stressed that the WHO Africa region does not have a Collaborating Centre for AMR and will need support from Centres in other regions. Establishing its own Collaborating Centre would require too much effort and resources. One participant asked whether WHO would provide financial support for countries without a Collaborating Centre to obtain external support.

Responding to this query, Dr Pessoa-Silva said the AMR global action plan's fifth strategic objective related to estimating the size of the investment needed to implement a country's national action plan. These national plans, in which surveillance is a key element, are due to be drawn up by May 2017. Based on the estimated costs, there will be several initiatives to support countries in need. However, Member States must first provide plans that are costed. That said, implementation of GLASS is not only about additional resources; it is also about changing processes and this does not necessarily need additional funding. For example, the CAESAR annual report incorporates an update on how countries are moving towards a national surveillance system.

Participants heard that the UK's Fleming Fund government-backed initiative is particularly focused on supporting low income countries to develop surveillance and laboratory capacity relating to AMR and towards joining GLASS. While it is difficult to know the extent to which the really low income countries will be able fully to join GLASS, it is important that countries decide what data they need and the first steps to developing laboratory capacity. The Fleming Fund and many other agencies are available to support these efforts and many see developing capacity for AMR surveillance is a public health good. The most important aspect is that countries are in the driving seat and what is done meets their needs; this avoids donors imposing their own agendas.

One participant pointed out that Collaborating Centres themselves are also under financial constraints and asked if there was scope for the Fleming Fund to add resources to Centres so they had dedicated capacity to commit to GLASS.

One participant suggested that, as some countries will take longer to produce surveillance data due to limited capacities, it would be helpful to create an additional tier of laboratories of supporting centres that could be part of the structure while not being fully-fledged WHO Collaborating Centres.

On the issue of providing costings for a national AMR action plan, it was suggested that this process should be incorporated into drafting of the Member State's five-year national health strategy rather than being addressed in isolation. AMR cannot be delinked from a broader health system approach as it is a consequence of many things that can go wrong in healthcare delivery. Therefore many AMR activities and their costs, such as diagnostics, are embedded in the health system.

Another participant pointed out that with all the surveillance networks that are already in place, there must be good information on the costs of such systems. Could WHO post on the GLASS website information about lessons learned from different networks and a generic cost analysis that could be used by Member States?

Comment from the WHO HQ AMR team

Dr Pessoa-Silva said that the next WHO two-year funding cycle will start in January 2016 and discussions were under way on the GLASS implementation plans for the WHO AMR Secretariat. Once decided, WHO HQ will be transparent with the members of the GLASS collaborative platform and will inform them about the elements of the WHO HQ organizational plan for the implementation of GLASS.

GLASS dissemination

Dr Pessoa-Silva asked all types of participants to explain how they saw their roles for the dissemination of GLASS to individuals and organizations that are involved in surveillance but who are not aware of GLASS.

Comment from participants

Participants suggested they could be involved in a range of inputs to promote GLASS more widely, including presentations, workshops and the provision of materials for use globally. It was also suggested that the emphasis could be on promoting GLASS as the global AMR initiative.

Another participant suggested societal and academic conferences would provide a platform for dissemination, suggesting the Western Pacific Chemotherapy Conference and the Infection Control conference as two venues that had already featured AMR. Now that GLASS was launched there was a clear message that could be given on surveillance.

From a regulatory point of view, it was suggested that as almost all hospitals are involved in an accreditation process, accreditation bodies around the world could incorporate the requirements of GLASS into their accreditation requirements, in much the same way that hand hygiene was now part of many accreditation standards.

Two notes of caution were also sounded by participants. First, it was suggested that it was too soon to commit to specific approaches to the implementation of GLASS and that over the next two years it will become clear what gaps remain and what needs to be modified; the immediate priority should be to understand any challenges to its validity and efficiency before deciding what to do to champion GLASS. Second, the Chair said that there were many competing health initiatives and global agendas, such as One Health and IHR implementation so there was a question of how institutions would make room for a GLASS specific implementation process reconciles any potentially conflicted agenda in a harmonious way.

Comment from the WHO HQ AMR team

In response to the comment on competing health agendas, Dr Pessoa-Silva said that GLASS was a response to a decision taken by WHO Member States to set up a global surveillance system for AMR. What was needed was alignment across the different initiatives. An example was Universal Health Coverage (UHC) and GLASS. One of the challenges for UHC is the weakness of the health system information structures; this presents a link with GLASS where there is an entire group working on health information to enforce health systems. There are other examples of linkages: the WHO HQ Lyon office does not only provide laboratory capacity to define and detect pathogens and do AST, it also enhances laboratory capacity in a generic way. Similarly, other colleagues working on the development of new diagnostics to support GLASS are also improving diagnostics in general. The WHO AMR Secretariat works on the integration of AMR into other programmes and activities. The question to other organizations is how they see the integration of GLASS and the selling of GLASS to other agendas to which they are linked.

Governance and intellectual property concerns

Dr Pessoa-Silva explained that governance of GLASS is vested in WHO, is defined by its governing bodies and follows WHO rules. GLASS will reinforce the WHO Regional Office networks, which will continue to manage the AMR surveillance activities in their regions. Global coordination of GLASS activities is the responsibility of WHO HQ, which will keep GLASS's collaborative and consultative platform as transparent as possible.

All intellectual property, for example documents and publications, based on information produced by GLASS will be vested in WHO.

SESSION VII: Support needed to make GLASS a success

Resources

Dr Tejinder Chowdhary, Technical Officer, WHO HQ/AIP AMR, briefed the meeting on resources for AMR activities. The US$53.8m AMR budget approved for 2016-17 was still mostly unfunded but this was not unusual in WHO funding cycles. Potential donors have been identified, momentum is building behind the AMR global action plan and there is a need to match funds to activities.

The US$53.8m represents the ceiling for all WHO AMR staff and activity costs for AMR at HQ, regional and country office levels, including surveillance activities.

The meeting's discussions will help WHO to finalize its estimates for the planned GLASS work, including for the new IT platform, the WHONET modification, and the provision of guidance documents and tools to help countries implement the GLASS manual, said Dr Chowdhary. The output from the meeting will also help further define the WHO work plan and activities.

Good work plans enable constructive and profitable discussions with existing and new donors. Overall, there is the need for a coordinated approach to funding and to avoid chasing the same donors with similar or multiple requests. Rather than apply for "drip feed" funding, GLASS should have a strategic discussion with donors about how much of the work plan they can fund. As an initiative that will span several biennium funding periods, it is important to seek longer term sustainable funding.

"In-kind" contributions to GLASS had been donated by countries such as Sweden and ongoing funding has been received by Japan, the Netherlands, South Korea, Sweden, UK and the US CDC. The meeting's discussion had included the potential for future "in-kind" contributions to GLASS by

WHO Collaborating Centres but WHO had to take account of the financial constraints of those Centres themselves, said Dr Chowdhary.

Questions and comments from participants

One participant asked for further information on the aims of the Fleming Fund. The bulk of the money – up to £75m a year – will go to countries to support laboratory capacity and surveillance, with the focus on lower and lower middle income countries in Asia and Africa. Low income countries can bid for infrastructure funding and middle income countries for technical assistance; there will also be funding to support networks, for example for quality assurance. The Fund is also keen to support South-South collaboration.

In response, another participant suggested that the Fleming Fund and other donors should bear in mind that there were countries outside Africa and Asia that faced big challenges, and that bids for funding should be judged by the quality of the proposal and the level of need, rather than by the region from which they came. The current donor focus on developing new technologies and new tests could mean that some basic needs were overlooked, such as building laboratory capacity and establishing strong health systems. A dialogue was needed with donors on what is really needed to make a difference, he said.

Comment from the WHO HQ AMR team

Dr Pessoa-Silva mentioned that there was a need to strengthen the structure within WHO to provide support to countries on AMR and to establish dialogues with external partners. In-kind support for GLASS, such as has been received from Sweden, had therefore been crucial in GLASS's progress to date and Dr Pessoa-Silva made a plea for further in-kind contributions from participants and others.

NEXT STEPS

Dr Pessoa-Silva summarized the agreed next steps:

- A report of the meeting will be sent to participants for review.
- Participants will be shown draft versions of all the guidance and tools being developed to support implementation of the GLASS Manual, and asked for feedback. The target is to finalize these materials by February 2016.
- A Working Group will be set up comprising three meeting participants to provide input into EpiConcept's development of the GLASS IT platform. The members are: Dr John Stelling, Dr Liselotte Diaz Högberg and Dr Tjalling Leenstra.
- Many participants have volunteered to join the three other Working Groups (on unusual AMR surveillance events, diagnostic stewardship, and M&A) and the WHO team will finalize membership of the groups so they are not too large. Working Group outputs will be disseminated to all meeting participants.
- The WHO Secretariat will refine its own GLASS implementation plan for the next biennium period and will inform participants what activities are planned.
- Participants should disseminate information about GLASS as widely as possible, which will also help avoid duplicated, uncoordinated initiatives. Coordination of effort is very important.
- To improve clarity on communications, a regular short AMR newsletter will be sent out by the WHO HQ AMR team to members of the collaborative platform. Participants were invited to contribute updates for inclusion in the newsletter.

MEETING SUMMARY AND CLOSING STATEMENTS

The Chair summarized some key achievements of the meeting.

Participants had discussed how to nurture the implementation of GLASS, a global strategy that is central to the success of the global action plan on AMR. He noted that many of the meeting's participants had been at the core of developing GLASS over the past 18 months. Now was the time for theory to become reality.

Participants had reviewed many aspects of GLASS and the specific challenges to its international implementation. These discussions had provided some solutions and there should be no delay for action, even if some areas needed further consideration.

Areas for action include:

- The continuing development of laboratory capacity, including standards and quality assurance.
- Widening the scope of AMR surveillance by basing GLASS's global surveillance model on existing national surveillance systems.
- Establishing the practical components on GLASS, including the core centralized IT platform that will underpin the global reporting system. This requires not only technology but also the concept of an AMR surveillance information system that meets global needs.
- The development of the managerial capacity required by a global strategy and meeting the different perspectives of: WHO Collaborating Centres, technical institutions, existing surveillance networks, WHO structures and other partners.
- The development by the WHO Secretariat of tools to help countries develop solid national AMR action plans.

WHO had updated participants on the relatively limited WHO funding envelope for AMR but as a crucial public health issue it will be central to many other agendas such as Global Health Security, national security, One Health, and IHR. Costed plans for AMR activities will enable requests to donors to be based on solid foundations.

The Chair concluded by asking participants for their active participation to achieve GLASS.

Closing the meeting, Dr Pessoa-Silva thanked the external partners for their contributions and input into the shaping of GLASS and looked forward to their future participation. She thanked all participants for attending the meeting, and WHO Regional Office for Europe for hosting the event.

ANNEX 1

GLOBAL ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (GLASS)

TECHNICAL MEETING ON THE EARLY IMPLEMENTATION PHASE

22-23 OCTOBER 2015, WHO REGIONAL OFFICE FOR EUROPE,

COPENHAGEN, DENMARK

List of participants

WHO COLLABORATING CENTRES	
Dr Scott FRIDKIN	Senior advisor for Antibiotic Resistance in Healthcare WHO Collaborating Centre Division of Healthcare Quality Promotion National Centre for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention Atlanta **USA**
Dr Rene S. HENDRIKSEN	Head WHO Collaborating Centre for Antimicrobial Resistance in Foodborne Pathogens Division of Microbiology and Risk Assessment National Food Institute Technical University of Denmark, Copenhagen **Denmark**
Prof Monica LAHRA	WHO Collaborating Centre for Sexually Transmitted Diseases Department of Microbiology The Prince of Wales Hospital Randwick **Australia**
Dr Tjalling LEENSTRA	Medical Epidemiologist Head, WHO Collaborating Centre for Antimicrobial Resistance Epidemiology and Surveillance Centre for Infectious Disease Control National Institute for Public Health and the Environment **The Netherlands**
Dr Wantana PAVEENKITTIPORN	WHO Collaborating Centre for Antimicrobial Resistance Surveillance and Training Miscellaneous Bacteriology Section National Institute of Health, Department of Medical Sciences Ministry of Public Health, Nonthaburi **Thailand**
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Prof Rumina HASAN	Department of Pathology and Laboratory Medicine Aga Khan University Stadium Road, Karachi **Pakistan**
Prof Roman S. KOZLOV	Director Institute of Antimicrobial Chemotherapy of Smolensk State Medical Academy President, Inter-regional Association for Clinical Microbiology and Antimicrobial Chemotherapy (IACMAC) Smolensk **Russian Federation**

Dr Sonja LÖFMARK	Microbiologist Unit for antibiotics and Infection Prevention and Control The Public Health Agency of Sweden Solna **Sweden**
Dr Hugo LOPEZ-GATELL (Chair)	Director Innovation on Infectious Disease Surveillance and Control Research Center on Infectious Diseases National Institute of Public Health Cuernavaca Morelos **Mexico**
Dr. Avery HINDS	Senior Technical Officer Communicable Diseases and Emergency Response Department Caribbean Public Health Agency Port of Spain **Trinidad and Tobago**
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OBSERVERS

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WPRO	
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Prof Francis MOUSSY	Scientist, Public Health, Innovation and Intellectual Property
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ANNEX 2

GLOBAL ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (GLASS)

TECHNICAL MEETING ON THE EARLY IMPLEMENTATION PHASE

22-23 OCTOBER 2015, WHO REGIONAL OFFICE FOR EUROPE,

COPENHAGEN, DENMARK

Meeting Agenda

DAY ONE: 22 October, 2015		
Time	**Session title or subject**	**Speakers**
08:30	Registration	
09:00	Welcome and introduction	*Marc Sprenger, WHO HQ*
09:05	Meeting format, objectives and desired outcomes	*Danilo Lo Fo Wong, WHO EURO*
09:10	Election of Meeting Chair and Rapporteur	
09:15	**SESSION I: Strategic directions for implementation of the Global Action Plan on AMR**	*Marc Sprenger, WHO HQ*
09:30	**SESSION II: GLASS – Global AMR Surveillance System Development**	*Carmem Pessoa-Silva, WHO HQ*
10:00	Tea/Coffee break	
10:30	**SESSION III: GLASS Tools**	
	a. GLASS Manual & Training package	*Sonja Löfmark, PHA Sweden*
	b. GLASS IT platform & Linkages with existing AMR surveillance networks	*Sergey Eremin, WHO HQ*
	c. WHONET modifications	*John Stelling, WHO CC, Boston*
	d. Laboratory tools	*Christopher Oxenford, WHO Lyon*
12:00	Lunch	

13:00	**SESSION IV: Identification of capacity building activities and technical support** a. Epidemiology, data management and reporting capacity b. Laboratory capacity c. Development of national surveillance coordination	*Nienke van de Sande-Bruinsma, WHO EURO; Peter Ulleryd, WHO HQ*
14:30	Tea/Coffee break	
15:00	**SESSION V: Further GLASS developments** a. Unusual AMR events under surveillance b. Diagnostic stewardship c. M&E framework	*Sergey Eremin, WHO HQ*
17:00	Meeting adjourns	
18:00	**Working Dinner – Restaurant Ofelia, Royal Danish Playhouse**	

DAY TWO: 23 October, 2015		
Time	**Session title or subject**	**Speakers**
08:30	Summary Day One	*Moderators*
08:45	**SESSION V: (Cont.)** **Further GLASS developments**	*Sergey Eremin, WHO HQ*
10:00	Tea/Coffee break	
10:30	**SESSION VI: Roles and responsibilities** a. Roles of WHO and partners b. Governance, IP concerns	*Carmem Pessoa-Silva, WHO HQ*
11:00	**SESSION VII: Support needed to make GLASS a success** a. Resources b. Advocacy	*Tejinder Chowdhary, WHO HQ*
11:30	**Meeting summary and next steps**	*Carmem Pessoa-Silva, WHO HQ*
12:00	**Closing statement**	*Meeting chair*
12:30	Meeting ends	

ANNEX 3

CONCEPT NOTE

SESSION V: "UNUSUAL" AMR EVENTS UNDER SURVEILLANCE

Background

The goal of GLASS is to enable standardized, comparable and validated data on antimicrobial resistance (AMR) to be collected, analysed and shared with countries, in order to inform decision-making, drive local, national and regional action and provide the evidence base for action and advocacy. GLASS should also monitor the emergence of new AMR mechanisms.

The Problem

While standards and methodology for "routine" global AMR surveillance are developed and described in the GLASS manual, the needs for and processes of identifying and reporting "unusual" events[i] such as emerging resistance patterns are not defined. Furthermore, there is currently no global consensus on the definition of "unusual" in this context.

Solution

A system for early detection and reporting that would signal emerging AMR mechanisms and map their global spread.

Next steps

Establish a working group to elaborate on the needs and processes for monitoring and reporting unusual events. The model and accompanying documents will be submitted for peer review.

Participation and input

WHO Collaboration Centres, partner technical institutions and international AMR surveillance networks.

Timeline

The model and necessary tools to be developed by second quarter 2016.

Questions for consideration by the Working Group

1. Phenotypes of concern are not included in the early implementation of GLASS. Should they be included at a later stage?
2. What would be included in the watch-list? "Previously unknown", "international epidemic clones", "high risk clones", genotypes/phenotypes etc.?
3. What confidentiality issues would need to be considered?
4. Should there be different needs for different low/high endemic countries?
5. Should reporting of "unusual" events be included within GLASS? And if so, should this be via a web interface on a WHO dedicated site, or by email, etc.?
6. Should the monitoring and reporting framework include recommendations for national risk assessment?
7. Who should have the responsibility for reporting?
8. What would be the expected time frame for reporting?

ANNEX 4

CONCEPT NOTE

SESSION V: DIAGNOSTIC STEWARDSHIP

Background

The quality of surveillance based on routine data can be improved by diagnostic stewardship, which is an integral part of both clinical management and standardized surveillance. Diagnostic stewardship is described in the GLASS Manual[3] as coordinated guidance and interventions to improve appropriate use of microbiological diagnostics to guide therapeutic decisions. It should promote appropriate, timely diagnostic testing, collection and identification of specimens and accurate, timely reporting of results to guide patient treatment and prevent antimicrobial resistance.

The Problem

GLASS has not yet defined a model for diagnostic stewardship. A model for improving diagnostic practices of infections was suggested in a recent paper4 in which the integration of antimicrobial stewardship, infection prevention stewardship and diagnostic stewardship was described. Another interesting approach to encourage clinicians to utilize actively and properly microbiological labs is developed in the WHO/EURO "Proof of Principle" study. A number of specific tools already exists but they need to be assessed, selected and systematized.

Solution

A GLASS model for diagnostic stewardship is to be developed, including all tools needed for training and implementation in participating countries.

Next steps

A working group will be established to consider the needs and outline the process for diagnostic stewardship. The model and accompanying documents will be submitted for peer review.

Participation and input

WHO Collaboration Centres, partner technical institutions and international antimicrobial resistance (AMR) surveillance networks.

Timeline

The model and necessary tools to be developed by second quarter 2016.

Questions for consideration by the Working Group

1. What are the main elements and who should be responsible for implementing diagnostic stewardship?
2. How can these elements be integrated into GLASS?
3. What support do countries need to be able to improve their diagnostic stewardship?

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[3] WHO, 2015. Global Antimicrobial Resistance Surveillance System Manual for Early Implementation. At http://www.who.int/drugresistance/surveillance/en/.

[4] Dik JH et al. An integrated stewardship model: antimicrobial, infection prevention and diagnostic (AID). Future Microbiol. 2015 Sep 1. [Epub ahead of print].

ANNEX 5

CONCEPT NOTE

SESSION V: MONITORING AND EVALUATION OF GLASS IMPLEMENTATION

Background

Upon enrolling in GLASS, participating countries will be requested to provide information not only on rates of AMR but also on the national surveillance system. Progress in establishing or strengthening national surveillance and in reporting data to GLASS will be monitored and reported. Member States are not obliged to provide data on all the defined priority pathogens but are encouraged to monitor as many as possible and to build the necessary capacity.

The Problem

Although a sample of selected indicators for global monitoring purposes and outline of a monitoring and evaluation (M&E) framework is included in the GLASS manual, a M&E framework to monitor progress in national antimicrobial resistance programmes and inform capacity building strategies has not yet been developed.

Solution

A generic framework to enable i. the monitoring and evaluation of GLASS implementation at the global level and ii. the monitoring and evaluation of implementation of national AMR surveillance programmes.

Next steps

A working group will be established to consider the needs and outline the process for development of the framework. The draft M&E framework will be submitted for peer review.

Participation and input

WHO Collaboration Centres, partner technical institutions and international antimicrobial resistance (AMR) surveillance networks will be invited to provide input to the working group.

Timeline

Model M&E framework and related tools to be developed by April 2016

Questions for consideration by the Working Group

1. How useful are the indicators, currently included in Annex 4 of the GLASS manual, for monitoring and evaluating the implementation of GLASS at the global level?
2. How many of these indicators would be useful to countries when measuring and evaluating the implementation of GLASS by their own national AMR programmes?
3. What more would be needed to develop a generic, comprehensive M&E framework that could be used by countries to monitor and evaluate GLASS implementation at the national level?

[i] According to risk assessment and considering clinical, epidemiological and public health importance