GLOBAL HEALTH SECURITY

EPIDEMIC ALERT & RESPONSE

Implementation Workshop on the WHO Global Strategy for Containment of Antimicrobial Resistance

25-26 November 2002
Geneva, Switzerland

World Health Organization

DEPARTMENT OF COMMUNICABLE DISEASE SURVEILLANCE AND RESPONSE

WHO/CDS/CSR/RMD/2003.7

Implementation Workshop on the WHO Global Strategy for Containment of Antimicrobial Resistance

25-26 November 2002
Geneva, Switzerland

World Health Organization
DEPARTMENT OF COMMUNICABLE DISEASE
SURVEILLANCE AND RESPONSE

© World Health Organization 2003

All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The World Health Organization does not warrant that the information contained in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

TABLE OF CONTENTS

ABBREVIATIONS....0
1. SUMMARY....1
1.1 Major gaps in implementation....1
1.2 Major obstacles to implementation....1
1.3 Needs for implementation....2
1.4 Recommendations....2
2. BACKGROUND....3
3. INTRODUCTION....4
4. MEETING STRUCTURE....4
5. DAY 1: ANALYSIS AND DISCUSSIONS REGARDING IMPLEMENTATION OF THE GLOBAL STRATEGY....4
5.1 Gaps in the implementation of the Global Strategy....5
5.2 Obstacles to implementation of the Global Strategy....7
5.3 Achievements in reaching Global Strategy objectives....7
5.4 Needs for implementation of the Global Strategy....8
5.5 Day 1 summary....8
6. DAY 2: THE WAY FORWARD....9
6.1 The integrated WHO approach....9
6.2 Role of WHO....9
6.3 Priorities and projects....10
6.4 Other discussions....11
7. CONCLUSIONS....12
7.1 Major gaps in implementation....12
7.3 Needs for implementation....12
8. RECOMMENDATIONS....14
Appendix 1....15
Agenda....15
Appendix 2....16
Summaries of HQ and Regional presentations on progress gaps and obstacles in the implementation of the Global Strategy....16
1. WHO Headquarters....16
2. Regional Office Reports....17
2.1 AFRO....17
2.2 PAHO/AMRO....17
2.3 EMRO....19
2.4 EURO....19
2.5 SEARO....20
2.6 WPRO....21
Appendix 3....23
Summaries of background documents as provided by speakers....23
Appendix 4....28
An Integrated Framework for Continuing Implementation of the WHO Global Strategy for Antimicrobial Resistance....28
Appendix 5....29
Participants in the Implementation Workshop on the WHO Global Strategy for Containment of Antimicrobial Resistance....29

ABBREVIATIONS

AMR	antimicrobial resistance
ARCH	Applied Research on Child Health
BU	Boston University
CAH	Department of Child and Adolescent Health and Development
CO	Country Office (WHO)
CSR	Department of Communicable Disease Surveillance and Response
EDL	Essential Drugs List
EDM	Department of Essential Drugs and Medicines Policy
EQAS	external quality assurance system
EU	European Union
HQ	Headquarters (WHO)
IMCI	Integrated Management of Childhood Illness
MCE	multi-country evaluation
MOH	Ministry of Health
MSM	Management Sciences for Health
OTC	over the counter
QA	quality assurance
QC	quality control
RA	Regional Adviser (WHO)
RO	Regional Office (WHO)
RPMPlus	Rational Pharmaceutical Management Programme Plus
STG	Standard Treatment Guidelines

1. SUMMARY

In recognition of the threat of antimicrobial resistance (AMR) to health and well-being, the World Health Organization responded to World Health Assembly resolutions in 1998 and 2001 by preparing a comprehensive strategy for antimicrobial resistance surveillance and containment. This was issued in September 2001 as the WHO Global Strategy for the Containment of Antimicrobial Resistance. The implementation strategy was devised as a set of 67 recommendations for interventions, predominantly at national level. Fourteen priority interventions were identified from these recommendations.

This Workshop was convened to determine the status of implementation of the Global Strategy and to identify both the obstacles to implementation and the means to better overcome them through integration of WHO activities at Country Office (CO), Regional Office (RO) and Headquarter (HQ) level.

An analysis of implementation gaps and obstacles to implementation was based on reports and discussions from the WHO departments primarily involved (CSR, EDM and CAH) at HQ and the ROs. An Integrated Framework structure, which will provide a means for WHO to encourage progress and track implementation of the Global Strategy, formed the basis of subsequent discussions. Additional background information and experience was provided by invited experts in the field of AMR containment.

The outcomes of the discussions included agreement on the roles for the various levels of WHO (HQ, RO, CO) and the value of the Integrated Framework document. Other conclusions are listed below.

1.1 Major gaps in implementation

The extent of implementation of the Global Strategy was very variable, both across and within Regions. Where priority interventions were in place, in many instances these were nominal only, since compliance was not enforced. National Task Forces for country implementation had, in general, not yet been established, and there was a need to improve liaison between and within HQ and ROs.

1.2 Major obstacles to implementation

Sustained approaches to advocacy and educational interventions were difficult to mount in the absence of materials and tools based on valid data and information. Resource limitations affected the ability to implement the Global Strategy, and underdeveloped health infrastructures were unable to provide a platform for the Strategy. There was a lack of data on the costs of AMR and the benefits of containment of AMR as an advocacy tool, as well as a lack of clear data on antimicrobial use. Other obstacles include the predominance of the non-public sector in AM use, where misuse of antimicrobials is rife, the often unregulated use of antimicrobials in food-producing animals, financial incentives to prescribers for providing antimicrobials, poor quality drugs, and lack of inclination to enforce existing regulations.

1.3 Needs for implementation

There is a need for linkages between AMR surveillance data and policy and standard treatment guidelines. There is also a need to establish country AMR Task Forces by combining advocacy to government from external (e.g., WHO) and internal (e.g., informed access groups) sources, resource mobilization, and to produce convincing economic arguments for Ministries of Health based on the short, medium and long term benefits of AMR containment. A coordinated approach for the roles of HQ, RO and CO as defined at the Workshop is necessary.

Since existing WHO structures have been unable to facilitate substantial progress on implementation, a more vertical approach using an intersectoral team was proposed. AMR activities needed to be appropriately resourced and funded at both HQ and RO levels. A full-time Task Force leader was required for interaction with donors and stakeholders. Furthermore, there is a need for coordination of different disciplines, for translation of surveillance data into policy, for monitoring and evaluation, and for a revised implementation strategy to be developed by HQ for application at all WHO levels.

1.4 Recommendations

It was recommended that:

1. the Integrated Framework for the Implementation of the WHO Global Strategy for Containment of Antimicrobial Resistance (Appendix 1) be adopted;

2. the complementary roles of HQ, RO and CO, as set out in this Report (section 6.2), be adopted;

3. an independent Intersectoral Task Force/coordinating Unit be established at HQ and ROs, with full and appropriate resources and funding;

4. an Action Plan for continuing implementation of the Global Strategy be prepared and circulated; this should include proposals for funding, including that of the Task Force coordinators.

2. BACKGROUND

The ability to treat infectious diseases with antimicrobials is regarded as an essential component of medical management. Antimicrobials provide life-saving benefits in individual cases and additionally limit morbidity attributable to infection. In addition to benefits for the individual, antimicrobials have a public health benefit by reducing the burden of a number of important diseases. This is achieved by interrupting transmission chains and by removing reservoirs of infection. For maximum benefit, antimicrobials should be accessible, safe and efficacious.

The appearance and spread of infective agents resistant to commonly used antimicrobials has long been recognized and continues to increase in a number of key areas. It is also known that overuse and misuse of antimicrobials contributes to the emergence of resistance and its amplification. WHO has recognized this threat and, in formulating resolutions of the World Health Assembly (WHA51.17 and WHA54.19) in 1998 and 2001, Member States agreed to address the problem.

In September 2001 WHO released a comprehensive strategy for antimicrobial resistance surveillance and containment for application at country and international levels (WHO Global Strategy for Containment of Antimicrobial Resistance). This strategy is based on the following principles:

- Reduction of disease burden and the spread of infection
- Improved access to appropriate antimicrobials
- Improved use of antimicrobials
- Appropriate regulation and legislation
- Surveillance of antimicrobial resistance
- Focussed research

The implementation strategy was devised as set of 67 recommendations for interventions, predominantly at national level.

For TB, HIV and malaria, programmes are in place or else are being developed as increased antimicrobial access is provided under the auspices of the Global Fund. Other syndromes identified by WHO as having a major and global impact on morbidity and mortality include respiratory tract infections, diarrhoeal diseases, sexually transmitted diseases and hospital-acquired infections. In these conditions, resistance to antimicrobials seriously threatens efforts to manage individual patients and implement disease control strategies.

The Global Strategy includes a plan for implementation at a national level by establishing priorities derived from factors identified in the following areas: patients and the general community; prescribers and dispensers; hospitals; national governments and health systems; drug and vaccine development; and pharmaceutical promotion.
Within these areas, a defined set of essential and high priority interventions for use in national programmes was developed and ranked from the list of 67 recommended interventions. This prioritization was based on available evidence (summarized in Part B of the Global Strategy document) or else based on a consensus of a group of experts convened for this purpose. The outcome of these processes is contained in the suggested model framework for implementation of the core interventions within the Global Strategy.

This Workshop was convened with the objectives of determining the status of implementation of the Global Strategy, of identifying both obstacles to implementation and the means to overcome them through integration of WHO activity at Country, Regional Office and Headquarter level. Delegates from WHO/HQ working on AMR in the departments of CSR, EDM and CAH were joined by colleagues in equivalent positions in the Regional Offices and distinguished experts in the field of AMR containment.

3. INTRODUCTION

The meeting was opened by adoption of the draft agenda and appointment of Prof R. Wise as Chair for Day 1 and Dr T. Sorensen as Chair for day 2.

Delegates were jointly welcomed by Dr G. Rodier (Director, CSR) and Dr J. Quick (Director, EDM). Both emphasized the complexity of the task involved in AMR containment, its long-term nature and the need for a multidisciplinary approach. This in turn required a common vision and collaboration at all levels of WHO so that synergies could be developed that would have their greatest effects at critical points of impact at country level.

Dr P. Jenkins described the aims and objectives of the Workshop as a review of the current status of the implementation of the Global Strategy and current AMR containment activities, thereby identifying the important measures still to be implemented and major obstacles to their implementation. Additionally, an objective of the Workshop was to define the WHO roles of HQ, Regional and Country offices in continuing implementation of the Global Strategy and propose how this could best be organized.

4. MEETING STRUCTURE

The first day was used for a review and discussion of the current implementation status and an analysis of implementation gaps and obstacles to implementation. These were based on reports from the WHO departments primarily involved (CSR, EDM and CAH) at HQ and the Regional Offices.

The second day was used to consider a proposed Integrated Framework structure for WHO and plan a way forward for implementation of the Global Strategy on the basis of discussions in Regional groupings followed by Plenary discussions. In additional, background information and experience was provided by invited speakers and presented at various stages throughout the Workshop (see Appendix 3).

5. DAY 1: ANALYSIS AND DISCUSSIONS REGARDING IMPLEMENTATION OF THE GLOBAL STRATEGY

These discussions were based on presentations from each RO and HQ (either as a combined presentation or else as a series of separate presentations) followed by plenary discussions.

Summaries of these presentations are given in Appendix 2.

The general conclusion was that progress in implementation of the Global Strategy was slow and very variable both across and within regions. The plenary discussions identified common themes under the headings of gaps, obstacles, achievements and needs.

5.1 Gaps in the implementation of the Global Strategy

Regional Offices supplied a qualitative general assessment of progress on implementation of the two Fundamental and 14 First Line implementation priorities in the Global Strategy. This was used to construct a rough guide to progress of implementation by scoring progress on a 1 (low) to 5 (high) scale (Figure 1). It should be noted that this relatively crude assessment was used merely as a summary tool for the purposes of the Workshop.

Of the Fundamental and First Priority Interventions, only one (5.9*, Establish Recommended Drug Lists)* had been widely implemented. This implementation, however, was in many instances only token in that use and compliance with Essential Drugs Lists (EDLs) was patchy in the public sector and virtually non-existent in the private sector.

Interventions where, in general, few advances had been made were:

- 5.1 advocacy, national task forces and resource mobilization
- 1.2 patient education on prevention of infection
- 1.3 patient education on infection control
- 2.1 prescriber education on AMR and AM usage
- 2.2 presciber education on infection control
- 2.3 prescriber education on diagnosis and treatment
- 3.1 hospital infection control
- 3.6 QA of microbiology services
- 5.11 educational support of STG/EDL

Some activity in the remaining areas prioritized for intervention was identified. However, much of it predated the release of the Global Strategy and frequently was not enforced, e.g., *5.3 Regulations on availability of antimicrobials*. These areas included:

- 5.13 reference laboratories; AMR surveillance
- 2.8 guidelines for antimicrobial use
- 3.5 access to microbiology laboratory services
- 5.3 regulations on availability of antimicrobials
- 5.5 quality safety and efficacy of antimicrobials
- 5.8 Standard Treatment Guidelines

Figure 1. Regional status on implementation of the WHO Global Strategy for AMR Containment[1]

Intervention Recommendations	Priority	AFRO	AMRO	EMRO	EURO	SEARO	WPRO
5.1	Fundamental	1	3	2	3	2	2
5.13	Fundamental	2	4	3	4	2	3
1.2	First	1	2	1	2	1	1
1.3	First	1	2	1	2	1	1
2.1	First	3	2	1	2	1	3
2.2	First	1	2	2	2	1	1
2.3	First	1	2	2	4	1	1
2.8	First	2 (TB)	3	2	3	2	3
3.1	First	1	3	1	3	2	1
3.5	First	2	4	4	4	2	2
3.6	First	2	3	1	3	2	1
5.3	First	1	2	4	4	4	1
5.5	First	2	4	3	4	3	1
5.8	First	2 (TB)	4	1	4	2	3
5.9	First	5	4	4	4	5	4
5.11	First	2	3	1	3	1	3

[1] The Regional Offices assessed implementation of Global Strategy recommendations within their Region on a scale from 1 (low) to 5 (high).

5.2 Obstacles to implementation of the Global Strategy

It was observed that there was a lack of *sustained* approaches to advocacy and education. This in turn was due to a lack of tools for these functions, e.g., insufficient valid surveillance data (both of AMR and of antimicrobial use patterns), and lack of development of the concept of costs of AMR.

Regarding AMR surveillance data, laboratory strengthening and refinement of the different types of surveillance needed was required. The various types of AMR surveillance include surveillance for advocacy, surveillance for policy such as treatment regimen modification, and surveillance for monitoring outcomes of interventions.

Concerning data on antimicrobial use patterns, the predominance of non-public sector use of antimicrobials was highlighted, as was a widespread lack of inclination to enforce existing regulations on antimicrobial use and the monetary gain accruing to prescribers for providing antimicrobials. The latter was seen as a strong disincentive to change. The impact of substandard drug products also needed to be addressed.

Data on the costs of AMR, in terms of costs of treatment failure, costs of ineffective drugs and the high costs of second-line drugs, needed to be strengthened in order to show the benefits of AMR containment.

Resource limitations, which affected both the ability to implement the Global Strategy and the capacity of a health system to include the Strategy in its health budget, needed to be addressed.

5.3 Achievements in reaching Global Strategy objectives

A number of significant achievements were highlighted.

- data on cost studies nearing completion in AMRO/PAHO
- the use in eastern Africa of AMR data in *Shigella dysenteriae* to introduce appropriate treatment (i.e. substitution of ciprofloxacin for naladixic acid)
- the successful introduction in Oman (EMRO) of WHONET
- patient demand for antibiotics in Iceland had been reduced by pricing policies (EURO)
- islands of excellence in SEARO where laboratory/clinician collaboration had led to sustained decreases in AMR in a number of centres
- improved drug resistance surveillance in a number of areas in AMRO, including that for malaria in six additional countries
- the introduction of public health laboratory surveillance in parts of AFRO
- IMCI programmes in Africa
- The ‘vertical programmes’ (for TB, malaria and HIV) were examples of success which could serve as models. They had funding (Global Fund) and Ministry of Health access because of their high profile, and strong linkages between programmes.
- Laboratory strengthening programmes through the CSR/LAB (Lyon) programme
- Global Salm-Surv (Global Salmonella surveillance and laboratory support project)

5.4 Needs for implementation of the Global Strategy

There is a need for linkages between AMR surveillance and standard treatment regimens, specifically the setting of action thresholds for treatment change and policy linked to AMR resistance levels. Even if these are not evidence-based (as were some existing strategies), if consensus approaches could be introduced and continually monitored, AMR surveillance data would be better focused and more relevant.

It is necessary to combine advocacy efforts that could be considered "top down", i.e. outside body (e.g., WHO) influence, with those that are 'bottom up', i.e. support for country-based individuals or groups interested in approaches to sensitization/mobilization of government agencies at country level.

During advocacy on AMR issues, it is important to convince governments that this is a cost issue as well as a health issue. In this context the cost of failure of treatment due to AMR has to be balanced against the increased cost of second-line drugs.

Containment of AMR is a long-term programme and there is no 'quick fix' A paradox is that targeted efforts producing immediate results are generally needed for donors, and there is thus a need to 'educate' those responsible for AMR containment and donors in this context.

Lastly, the importance of laboratory strengthening, especially in relation to quality issues, must be emphasized.

5.5 Day 1 summary

The Chairman summarized the first day's discussions by stating there was need for an integrated programme within WHO that:

- defined the problem clearly;
- promoted cooperation between the government and the health/professionals at country level;
- established targets that were achievable;
- educated both antimicrobial providers and users;
- provided surveillance data on AMR and antimicrobial use.

6. DAY 2: THE WAY FORWARD

On the basis of discussions in Regional groupings followed by plenary discussions, participants considered a way forward for WHO efforts in containment of AMR. It should be noted that there was little discussion on issues related to antimicrobial resistance in food-producing animals, as the HQ experts in this area were unable to attend the Workshop.

6.1 The integrated WHO approach

Dr G. Simonsen expanded on the document "An Integrated Framework for Continuing Implementation of the WHO Global Strategy for Containment for Antimicrobial Resistance" (see Appendix 4). A central concept was that the Global Strategy was developed for implementation at country level, where activity should be focused. The integrated structure within WHO was a means to provide resources and technical assistance for this process.

One essential feature was the Resource Mapping, an information repository accessible to all, providing details and country-derived information in the key areas of antimicrobial use, AMR surveillance, infection control and administrative matters. Difficulties existing in any of these areas (such as those identified at this Workshop) would lead to the remedial actions of Gap Filling and Obstacle Removal. Additionally a progressive status report on the implementation strategy would be maintained by the collaborative efforts of the ROs and HQ.

The Framework document was agreed as a means for WHO to fulfil the roles for implementation of the Global Strategy (see section 6.2), having an information resource capacity at HQ as its focus.

6.2 Role of WHO

There was general agreement on the roles for the various levels for WHO. These roles were seen to be as follows:

a) Headquarters

- to provide overall policy guidelines and coordination and distribute these guidelines
- to provide advocacy and promotion of the Global Strategy
- to provide global monitoring using information from RO monitoring efforts
- to prepare and maintain an information and resource repository for information sharing, e.g., indicators for successful interventions; guidelines for implementation, preparation of templates (tools) for advocacy to be used by RO and CO; resource persons for specific functions
- to undertake resource mobilization

b) Regional Office

- to adapt general policies and guidelines to regional needs
- to analyse needs and priorities at regional and country level

- to provide technical support through development of materials for local use, quality assurance and reference materials
- to monitor country efforts and interventions on a continous basis
- to provide regional meetings/consultations for countries
- to provide feedback on interventions
- to liaise with supra-national bodies within the region (e.g., EU networks)
- to establish relevant Collaborating Centres

c) Country office

- to provide advocacy for MOH using HQ/RO materials
- to coordinate at MOH level, e.g., identification of technical resource groups, advice on Intersectoral Task Forces
- to liaise with access groups
- to provide local funding
- to promote involvement in international EQAS systems
- to translate guideline
- to promote guidelines

6.3 Priorities and projects

Regional groupings were also asked to identify priorities and projects which were most conducive to advancing implementation of the Global Strategy

6.3.1 Priorities to overcoming obstacles

The following priorities were identified:

- advocacy tools and quality data are required to convince policy-makers; this requires laboratory strengthening, especially QA for AMR surveillance, cost studies on drug utilization, and use of surveillance data in policy and guideline development;
- production of generic advocacy, training, and public education materials for modification at local level;
- ongoing surveillance data on distribution and sales of antimicrobials and the costs of misuse;
- readily available guidance on how to set up National Task Forces;
- a WHO AMR Task Force (coordination of effort in WHO across departments and tiers) at both HQ and RO levels; since existing WHO structures have been unable to facilitate substantial progress on implementation, a more vertical approach using a properly resourced intersectoral team was proposed;
- a WHO-wide information resource and strategy (networking)
- sustained advocacy at country level

6.3.2 Projects to fulfil these priorities

The following projects were identified:

- QA workshops to strengthen laboratory surveillance (to include bio-safety, data management and proficiency testing);
- studies of the cost to society of inappropriate drug use, including non-compliance of prescribers with treatment guidelines and non-compliance of patients with treatment prescribed;

- an investigation of the cost of AMR in specific diseases, e.g., shigellosis and gonorrhoea;
- evaluation of the applications of drug use and AMR surveillance data in policy development and formulary structure;
- an analysis of the impact of antimicrobial use in animals on human health.

6.4 Other discussions

It was agreed that WHO, having made AMR containment a priority and issued WHA Resolutions on this issue, should allocate adequate internal resources and put in place the necessary organizational structures.

The meeting consistently identified fragmentation of effort between the various levels of WHO and within the various levels of WHO as a major barrier to the implementation of the Global Strategy. Considerable discussion therefore focused on the need for co-ordination of WHO effort at and between all levels.

There was a need for coordination of WHO efforts at and between all levels. Similarly, it was regarded as essential that AMR activities be appropriately funded and resourced both at HQ and RO levels.

The view of the meeting was that a properly resourced intersectoral team be established at HQ and ROs. (It was noted that such a specific Task Force had been established at HQ but had not operated for some years.) It was felt that any such Task Force required a full-time appointee to lead it, also appropriately resourced, who could interact with donors and stakeholders, lead projects, coordinate input from different disciplines and translate data into policy, while maintaining monitoring and evaluation functions.

7. CONCLUSIONS

7.1 Major gaps in implementation

a) Implementation of the Global Strategy was variable, both across and within Regions.

b) Where priority interventions are in place, these were often tokenistic since compliance was not being enforced.

c) AMR Task Forces for country implementation had in general not yet been established.

d) Liaison between and within HQ and RO needed improving.

7.2 Major obstacles to implementation

a) Sustained approaches to advocacy and educational interventions were difficult to mount in the absence of materials and tools based on valid data and information.

b) Resource limitations affected the ability to implement the Strategy, and underdeveloped health infrastructures were unable to provide a platform for the Strategy.

c) There was a lack of data on the costs of AMR and the benefits of AMR containment as an advocacy tool.

d) There was a lack of clear data on antimicrobial use.

e) Other obstacles include the predominance of the non-public sector in antimicrobial use, where misuse of antimicrobials is rife, the often unregulated use of antimicrobial in food-producing animals, financial incentives to prescribers for providing antimicrobials, and poor quality drugs.

f) There was lack of inclination to enforce existing regulations.

7.3 Needs for implementation

The following are needed:

a) Linkages between AMR surveillance data and policy and standard treatment guidelines.

b) The establishment of AMR country task forces by combining advocacy to government from external (e.g., WHO) and internal (e.g., informed access groups) sources, as well as resource mobilization.

c) The establishment of convincing economic arguments for MOH based on the short, medium and long term benefits of AMR containment.

d) A coordinated approach for the roles of HQ, RO and CO, as defined at the Workshop.

e) A WHO AMR Task Force (coordination of effort in WHO across departments and tiers) at both HQ and RO levels. Since existing WHO structures have been unable to facilitate substantial progress on implementation, a more vertical approach using a properly resourced intersectoral team was proposed. AMR activities needed to be appropriately resourced and funded at both HQ and RO levels.

f) A full-time Task Force leader for interaction with donors and stakeholders, for coordination of different disciplines, for translating surveillance data into policy, and for monitoring and evaluation.

g) An Action Plan to be developed by WHO/HQ for application across all WHO levels. This needs to cover the following issues:

- Advocacy
- Control of drug use in the private sector
- Detailed plans for the establishment of national AMR task forces
- Separate AMR surveillance needs for a) advocacy, b) thresholds for action, c) monitoring implementation and outcomes of interventions
- Ongoing surveillance of antimicrobial usage and misuse
- Continuing and reinforced education of the public, patients and prescribers
- Regulation, especially of non-public sector use and misuse of antimicrobials, and enforcement of regulations
- Drug quality (especially potency) enforcement
- Cost of resistance (costs of infection and costs of treatment failure, costs of incorrect treatment, extra costs of second line antibiotic, etc.)

8. RECOMMENDATIONS

It was recommended that:

1. the Integrated Framework for the Implementation of the WHO Global Strategy for the Containment of Antimicrobial Resistance (Appendix 4) be adopted;

2. the complementary roles of HQ, RO and CO, as set out in this Report (section 6.2), be adopted;

3. an independent Intersectoral AMR Task Force be established at HQ and ROs with full and appropriate resources and funding;

4. an Action Plan for continuing implementation of the Global Strategy be prepared and circulated; this should include proposals for funding, including that of the Task Force coordinators.

Appendix 1

WHO GLOBAL STRATEGY IMPLEMENTATION WORKSHOP

25 - 26 November 2002

Agenda

Monday 25 November

9:00 - 9:10	Introduction and Welcome
9:10 - 9.20	Aims and objectives of Workshop
9:20 - 9:45	Implementation of the Global Strategy - HQ
9:45 - 10:15	Implementation of the Global Strategy in the AMRO Region
10:15 - 10:45	Implementation of the Global Strategy in the EMRO Region
10:45 - 11:15	Coffee
11:15 - 11:30	Discussion
11:30 - 11:45	R.Wise: Confronting the problems - national strategies
11:45 - 12:00	J. Chalker: Country situational analysis (MSH/ARCH/AED)
12:00 - 12:15	E. Gouws: Improving antimicrobial use (IMCI)
12:15 - 12:30	Discussion
12:30 - 13:30	Lunch
13:30 - 14:00	Implementation of the Global Strategy in the EURO Region
14:00 - 14.30	Implementation of the Global Strategy in the SEARO Region
14.30 - 15:00	Implementation of the Global Strategy in the WPRO Region
15:00 - 15:30	Implementation of the Global Strategy in the AFRO Region
15:30 - 16:00	Tea
16:00 - 17:30	Plenary discussion of past and present achievements and obstacles in implementation of the Global Strategy
17:30	Chairman's summary

Tuesday, 26 November

9:00 - 9:15	O. Cars: Combatting AMR in Scandinavia
9:15 - 9:30	J. Stelling: Surveillance and quality assurance
9:30 - 9:45	P. Dubois: Reference laboratories and laboratory strengthening
9:45 - 10:00	F. Bager: Containment of AMR in food animals
10:00 - 10:15	T. Sorensen: AMR containment at Country level
10:15 - 10:30	K. Holloway: Country surveillance pilot projects
10:30 - 10:45	G. Simonsen: Integrated WHO Framework
10:45 - 11:15	Coffee
11:15 - 11:30	Integrated Framework (continued)
11:30 - 12:30	Group discussions on future directions in AMR containment
12:30 - 13:30	Lunch
13.30 - 14:30	Group discussions on future directions in AMR containment
14:30 - 15:45	Plenary discussion of conclusions from regional groups
15:45 - 16:15	Tea
16:15 - 17:30	The way forward - Conclusions and recommendations

Appendix 2

Summaries of HQ and Regional presentations on progress gaps and obstacles in the implementation of the Global Strategy

1. WHO Headquarters

A combined overview of current CSR, EDM and CAH activities was presented.
Of particular note for CSR were those for AMR surveillance and surveillance networks, especially for TB, malaria and HIV. In addition, a series of technical assistance documents had been completed, and ongoing activities in relation to advocacy on AMR and recent initiatives in country-based AMR Task Force establishment were described.

Details of EDM activities for promoting the rational use of antimicrobials were provided. Operational research to identify interventions to promote rational use of antimicrobials through joint initiatives between EDM/WHO, MSM/RPMPlus and BU/ARCH in several countries continued, as did pilot projects in India and Africa to develop new community-level surveillance methods through local capacity building. International training courses promoting the rational use of drugs and the establishment of Drug and Therapeutics Committees had been held.

The CAH activities highlighted were in the area of development and evaluation of clinical approaches to diagnostic algorithms for pharyngitis and non-severe pneumonia with wheezing, and of simplified treatments for pneumonia, meningitis and dysentery.

Additionally, HQ is involved in containment of antimicrobial resistance in animals and spread to humans through activities in antibiotic production and sales, prudent use and its monitoring, surveillance and food hygiene.

Amplification of this general overview was provided by the following presentations (some of which are amplified in Appendix 3):

P. Dubois: Reference laboratories and laboratory strengthening (Lyon/CSR)
J. Stelling: Surveillance and quality assurance (WHO Collaborating Centre for Surveillance of Antimicrobial Resistance, Boston, USA)
E. Gouws: Improving antimicrobial use (IMCI /CAH)
F. Bager: Containment of AMR in food animals (Danish Zoonosis Centre, The Danish Veterinary Institute)
T.L. Sørensen: AMR containment at Country level (Statens Serum Institut, Copenhagen, Denmark)
K. Holloway: Country surveillance pilot projects (EDM)

2. Regional Office Reports

2.1 AFRO

From a few studies undertaken in certain African countries, we know that AMR has increased dramatically in the last decade, affecting the control of many important diseases such as dysentery, gonorrhea and malaria. In the eastern epidemiological block, for example, *Shigella dysenteriae* has become resistant to all antibiotics except fluoroquinolones and third generation cephalosporins.

Among the most pressing needs is more thorough documentation of AMR in Africa. Relatively few studies (160 publications from 25 countries) have been conducted since 1978. A further problem is the absence of standardization regarding AMR test methods.

Lack of a medicines' policy in another important issue in containing AMR in African countries, as is the lack of educational policies. Indeed, antimicrobial distribution practices are an important contributing factor to the spread of antimicrobial resistance.

In order to implement AMR containment in WHO/AFRO Region, it is necessary:

- to sensitize MOH; the first important step is to get AMR on governmental agendas by organizing meetings of those responsible in the MOH;
- to sensitize prescribers and dispensers by visits and discussions;
- to ensure equitable access to affordable essential medicines;
- to achieve more organization and coordination among programmes (malaria, TB, HIV/AIDS, STD, LAB/CSR) at WHO/AFRO level regarding AMR issues; sharing data and using similar strategies to put in place a global programme for AMR containment;
- to help countries develop standard treatments.

In conclusion, AMR is becoming more and more a public health problem in the WHO/AFRO Region especially with respect to pathogens such as *Neisseria gonorrhoea, Shigella dysenteriae* and *Plasmodium falciparum*. There is, therefore, an increasing necessity to put in place and coordinate a WHO/AFRO policy on AMR issues.

2.2 PAHO/AMRO

PAHO has several partners that contribute to these activities: 20 Latin American countries; USAID; the Government of Canada; the Centers for Disease Control and Prevention, USA; and the American Society of Microbiology. The most critical are the countries, since it is at the national level that most activities and the investment is taking place.

The mandates for these activities come from the Ministers of Health from the Americas, Resolution, CD38. R12/1995, and from the World Health Assembly, Resolution WHA51.17,1998 and WHA54.14, 2001. Both mandates indicate what is expected from countries in regards to AMR.

The mandates indicate that advocacy must be an essential part of the activities to combat the spread of AMR. To this end, health supplements of major newspapers from Latin America one or more times per year discuss AMR. The same is true for PAHO publications as shown by "Antimicrobial resistance in the Americas: magnitude and containment of the problem" (PAHO/HCP/HCT/163/2000), which showed the state of the art on the subject in different

countries up to 1999 and the recent publication PAHO Perspectives (Sept. 2002). A video on this topic has been produced in Spanish to be shown by TV networks and independent stations in Latin America, and topics on AMR are also included as central subjects in the meetings of the Southern Cone and Amazon networks for surveillance of emerging diseases.
To convince policy-makers and the population that AMR is a problem, it is necessary to provide evidence of the existence of such a threat. Therefore, countries have implemented surveillance of AMR, with quality assurance as an integral part of the surveillance system, and, as a routine, organized country activity.

Each country is required to have a coordinating laboratory, usually the National Reference Laboratory, and several sentinel laboratories. The Reference Laboratory does the supervision, so that norms and regulations are followed, and conducts periodic performance evaluations of the sentinel laboratories. The sentinel laboratories identify species, do antimicrobial susceptibility testing, and spread information locally. Promotion of surveillance was initiated with Salmonella, Shigella, and *Vibrio cholerae* late in 1996. Three workshops were conducted for standardization of techniques on identification, antimicrobial susceptibility testing, quality assurance, and performance evaluation from 1996 to 1999 so that all national reference laboratories "spoke the same language". Eight countries participated, starting in 1996 (Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Venezuela), five more in 1997 (Bahamas, Barbados, Jamaica, St. Lucia and Trinidad & Tobago), and another seven in 1999 (Bolivia, Cuba, Ecuador, El Salvador, Guatemala, Nicaragua, and Paraguay). Information on the spread of antimicrobial resistance in Salmonella, Shigella and *Vibrio cholera* was available from all the above-mentioned countries by the year 2000.

In addition to *Salmonella, Shigella* and *Vibrio cholerae,* six countries expanded over the period 1999-2000, the number of species under surveillance to the following species found in a) the community: *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Neisseria menigitidis*, and *Escherichia coli* (outpatient); and b) in hospital settings: *Enterococcus faecalis and E. faecium, Staphilococcus aureus, Acinetobacter, Pseudomonas, Enterobacter and Klebsiella*.

From 2000 to 2002, six national workshops were conducted for standardization of techniques on bacteria identification, antimicrobial susceptibility testing, quality assurance, and performance evaluation for these additional species. Three regional courses were also conducted on biosafety, two for WHONET, and three for shipping of strains according to IATA regulations. Overall, 12 countries had surveillance of other species in 2002.

In the year 2000, the number of participating network laboratories in the 14 Latin American countries was 426; 167 of those laboratories did surveillance of enteric pathogens only. Evaluations on how the countries performed have been conducted, at the country's request, in Argentina, Brazil, Costa Rica, Paraguay, Peru, and Venezuela. In order to facilitate the process, guidelines for the evaluation of the Surveillance System for Emerging Diseases, including AMR, have been developed.
In order to convince policy-makers of the importance of AMR, a protocol was developed and implemented to determine the cost of hospital infections. Infections from that setting are caused by multiresistant strains. The results of studies from 12 hospitals in 8 countries are about to be published.
A practical intervention measure that can decrease the spread of resistance, limiting the use of antibiotics, and that at the same time can provide some help in controlling costs, is the development and application of a model clinical guide and formulary adapted to the Region of the Americas. This may also be adapted to the needs of each country. This guide will stimulate discussions on AMR at the level of health services, improving patient care and promoting surveillance in hospitals, since empirical treatment requires knowledge of local resistance profiles.

Adaptation in each country will require collaboration from professors of infectious diseases, internal medicine, surgery, obstetrics, etc, who are the real opinion-makers for the use of antibiotics. These allies will be essential in promoting better use of antibiotics among health personnel. Bolivia has already adapted the model guide to its national needs.

2.3 EMRO

EMRO established a Regional Taskforce on Antimicrobial Resistance in 2000.
A Regional Consultative Committee met in 2002 and produced conclusions and recommendations relating to the Global Strategy.

The gaps in the implementation of the Global Strategy in the EMRO Region are huge. This is mainly the result of resource problems and a general lack of knowledge of AMR. The following gaps and obstacles have been identified:

- high rates of infectious diseases with high levels of AMR in key diseases;
- expansion of hospital care but without therapeutic committees and infection control programmes;
- patient education on prevention of infection and infection control is poor and there is little knowledge about effects of non-human use of antimicrobials;
- use of antimicrobials as growth promoters in food production is probably high but details are unknown;
- lack of intersectoral activities on AMR at country level (no national task forces established or resources allocated);
- fragmented surveillance of AMR;
- all countries have reference laboratories except Iran; AMR surveillance is integrated in Egypt, Oman and Morocco; however, there are inadequate laboratory facilities in terms of training of laboratory personnel and QA;
- prescriber education on AMR and antimicrobial usage is limited and there is none on infection control;
- inappropriate prescribing and OTC sales exist despite regulations;
- access to antimicrobials is irregular for most of the population;
- regulation of quality of medicines is variably enforced; EDLs exist for public sector procurement in most countries and for undergraduate education in some countries;

Educational support for STG/EDL is just beginning.

The 49th Regional Committee prepared a series of recommendations in October 2002 in keeping with the proposals for implementation of the Global Strategy. Of particular relevance is to have available a means of advocacy for AMR. This means that surveillance capacity and the quality of this surveillance needs strengthening. Resources need to be available for this process.

2.4 EURO

In western Europe, AMR rates, as illustrated by altered penicillin susceptibility in pneumococci, increase significantly from North to South. Resistance data from eastern Europe are however very sparse.

Antibiotic use data shows a similar variation in quality; data from western European countries are available but often exclude hospital use data. Data on antibiotic consumption in central and eastern Europe and the NIS are very difficult to get and are not complete or reliable.

Enormous problems exist with prescribing practices, especially in eastern Europe. Policies on rational use of antibiotics are often included within overall policies on rational drug use, but implementation is frequently weak

There is a need to translate documents, especially into the Russian language, and a need to work closely with the EU on this issue

The following are recommended for the European Region:

- Promote at country level the already existing EU-funded networks on monitoring of AMR, including the European Antimicrobial Resistance Surveillance System (EARSS), the European Surveillance System for Sexually Transmitted Infections (ESSTI), and the European Surveillance of Antibiotic Consumption (ESAC).
- Develop partnerships, for instance at the Interagency Coordinating Committee, in order to assist in country assessments, collection of baseline data and development of a regional strategy on implementation of country programmes.
- Develop a regional collaborating centre for additional training, supervision and quality assurance (and with material in Russian).
- Promote the integrated strategy at the Task Force for Baltic Sea States. Especially important is to make better use of the expertise on surveillance of drug use and on antimicrobial resistance.
- Build and share a list of country focal points in each of the areas involved (QPA, CAH and CSR).
- Make a joint assessment in one or two countries, using a specific data collection tool, on the status of AMR. In addition, there is a need to assess which drugs and which diseases could be selected for a targeted approach. One or two countries could be piloted for the initial assessment and could then move into a phase of implementation of the integrated approach.
- For the countries currently in training for laboratory capacities and epidemiological surveillance, a follow-up will be organised during the second workshop in March 2003. EARRS has been contacted and is willing to contribute to a 1-2 day workshop to fully update the participating countries on the terms of reference, etc. The countries include Russia, Belarus, Moldova, Ukraine, Bulgaria, Romania, Turkey and Georgia. These countries have already been trained in a number of laboratory techniques, as well as with surveillance software such as WHONET.
- Explore the possibilities of engaging the CCEE in the ESAC project on monitoring of antimicrobial consumption, funded through the EU.
- Promote at country level the development of treatment guidelines for antimicrobials, under the current training programmes, and regulatory interventions on improving the use of medicines.

2.5 SEARO

The South-East Asia Region generally has low scores in the Implementation Matrix (Figure 1), despite the fact that AMR in almost all the organisms of public health importance is a growing problem.

The following gaps were identified:

- there were no national AMR task forces;
- advocacy in general was weak;
- access to microbiology laboratories was restricted to big towns and cities;
- quality assurance of microbiology services was grossly inadequate;
- reference laboratories were available in 4/11 countries;
- AMR surveillance was consequently limited; however, 575 microbiologists had been trained in antimicrobial susceptibility testing through WHO in the past five years, 59 labs were using WHONET5 and 395 staff had been trained in its use;
- prescriber education on AMR, antimicrobial use and infection control was scanty and isolated;
- hospital infection control programmes were 'primitive' although awareness was growing;
- patient education was on the whole poor with NGO efforts the main source of activity;
- regulatory arrangements for antimicrobial use/prescribing were in place in 8/11 countries but poorly implemented; misuse of antibiotics was a major problem (even in hospitals 50% of use was for colds, influenza and viral pneumonia); counterfeit drugs; inappropriate use; topical use. Self-medication (via OTC purchases) was widespread; drugs from OTC sales were of low cost and easily available;
- Standard Treatment Guidelines existed in most countries but were applied only in the public sector (about 20% of use);
- Essential Drug Lists existed but again had no impact on the private sector;
- a few Drugs and Therapeutics Committee Training courses had been held;
- resources available for Implementation of the Global Strategy were negligible.

SEAR thus experienced most of the problems common to other Regions but, particularly, easy availability of antibiotics and a private sector that is essentially uncontrolled are a major source of AMR containment problems.

However islands of excellence in SEARO existed where laboratory and clinician collaboration had led to sustained decreases in AMR.

2.6 WPRO

The Regional Committee, at its meeting in September 2002 and by means of Resolution RC53.R5, recognised the importance of AMR in the Western Pacific Region and the role of the Global Strategy. It urged Member States to implement relevant parts of the Strategy.

The problems of AMR in the Region involve antimicrobials used for treatment of TB, malaria, pneumonia, diarrhoeal disease, gonorrhoea and nosocomial infections.

Common factors contributing to AMR in the Region include:

- uncontrolled distribution and sales of AM;
- irrational and inappropriate use by providers and consumers, leading to indiscriminate overuse and under-dosage;
- substandard products (genuine and counterfeit);
- non-medical use (e.g., growth promotion in animals).

Achievements in containing AMR in the Region include:

- Surveillance of AMR was established in 1991 in 14 focal points but was currently being modified to include a revised list of organisms, better denominator information, improved quality assurance and laboratory methods, better sample quality and national laboratory systems. A Regional Workshop focusing on the above aspects was planned for early 2003.
- An interdisciplinary group had been established within the Region to address the issue of AMR containment.
- Advocacy and learning materials for multiple audiences were being developed.
- Periodic regional workshops for Hospital Drug Therapeutics Committees had been held with networking of information on rational drug use.
- Periodic consultations of drug regulatory authorities and national drug policy programmes had been conducted.
- Development and field-testing of interventions to reduce the overuse and to improve the proper use of antimicrobials had been undertaken (MTP strategy in Laos and Cambodia).

The major gaps/obstacles to implementing the Global Strategy include:

- inadequate surveillance of drug use;
- lack of appropriate operational research to demonstrate the impact on AMR of effective interventions;
- AMR resistance containment was handled by different programmes (inadequate intersectoral collaboration)
- lack of manpower and resources to implement the Global Strategy.

Appendix 3

Summaries of background documents as provided by speakers

Improving the correct use of antimicrobials through IMCI case management training

Eleanor Gouws[1], Jennifer Bryce[1], Shams El Arifeen[2], George Pariyo[3], and Joanna Schellenberg[4]

Background

Over 10 million children under the age of five years die each year from diseases that are preventable or can be treated effectively with affordable interventions. Integrated Management of Childhood Illness (IMCI) is a strategy developed by WHO and UNICEF to provide these effective and affordable interventions in order to reduce child mortality and improve child health and development. IMCI includes both preventive and curative interventions, and is designed to improve the case-management skills of health workers, to strengthen health system supports for child health service delivery, and to improve family and community practices related to child health.

The Multi-Country Evaluation of IMCI effectiveness, Cost and Impact (MCE) is a global evaluation designed to evaluate the impact of IMCI on child health and its cost-effectiveness. MCE studies are under way in Bangladesh, Brazil, Peru, Tanzania and Uganda.

This presentation draws on selected results from MCE health facility surveys in Bangladesh, Tanzania and Uganda. The aim is to demonstrate that significant numbers of children are receiving antibiotics through health providers, and that training in IMCI case management can significantly improve both health worker practices and caregivers' knowledge about how to continue the treatment at home.

Methods

MCE study designs vary from site to site, depending on the stage of IMCI implementation and the opportunities available for use of existing data. All sites measure a standard set of indicators using compatible survey tools. Data for the MCE are collected at various levels: data on mortality indicators are collected at district level through demographic surveillance systems or vital statistics; data on family behaviours, socio-economic status, access and utilization of health services are collected through population-based household surveys; and data on the quality of case management, health systems support for IMCI and caretaker

---

[1]*Department of Child and Adolescent Health and Development, World Health Organization,Geneva*
[2] *ICDDR,B, Bangladesh*
[3]*Institute for Child Health, Makerere University, Uganda*
[4]*Ifakara Health Research and Development Center, Ifakara, Tanzania and the London School of Hygiene and Tropical Medicine*

knowledge are collected through observation-based surveys at health facilities. Cost data are collected at household, health facility, district/municipality and national levels.

This presentation draws on surveys carried out in random samples of outpatient health facilities in three sites. Sick children presenting to a health facility for the first time during an illness episode were followed by a trained observer throughout their visit. Surveyors recorded the care received and conducted a "gold standard" assessment of the child's health. The caregiver accompanying each child was interviewed as she left the facility. Full details on study designs, indicators and methods are available on the MCE website (*http://www.who.int/imci-mce*).

The survey in Tanzania was carried out in 1999 in samples of health facilities in two IMCI intervention and two comparison districts; the survey in Uganda was carried out in 2000 and was the first round of a programme of continuous monitoring in 10 districts where IMCI is being introduced at various speeds; and the survey in Bangladesh was carried out in 2000 in all outpatient health facilities in the MCE study area, prior to randomization and the introduction of IMCI. Data on antibiotic needs and treatment patterns are available for all three sites; data on the effects of IMCI are available only for Tanzania and Uganda.

Results

According to the "gold standard" assessment, more than one-third of all children under five presenting for care at outpatient facilities in the study areas were found to have an illness that required treatment with a course of antibiotics (Bangladesh: 38%; Tanzania: 32%; Uganda: 32%).

In both Tanzania and Uganda, high proportions of children who needed antibiotics received them, but in a large number of cases the drugs were incorrectly prescribed. Children needing antibiotics or antimalarials were significantly more likely to be prescribed the correct dose, frequency and formulation in facilities where IMCI had been introduced than in non-IMCI facilities. The training of health workers in IMCI case management also significantly reduced unnecessary treatment with antibiotics in both countries.

Communication of essential information about how to administer antimicrobials at home was also significantly better in IMCI facilities than in facilities where health workers had not yet been trained in IMCI. Caregivers who took their sick children to non-IMCI facilities received little or no information about how to administer antibiotics (e.g., the importance of completing the full course), and were significantly less likely than those who took their child to an IMCI facility to be able to report correctly as they left the facility how and when the drugs should be given to the child.

Finally, significantly more children received the first dose of the needed antibiotic or antimalarial in IMCI than in non-IMCI facilities. This is important not only because the treatment begins immediately, but also because it provides an opportunity for the health care worker to demonstrate correct administration of the drug to the caregiver.

Conclusions

Antimicrobial use by health care workers who treat sick children under the age of five at health facilities in developing countries is significantly improved by training in IMCI case management. IMCI-trained health care workers are more likely than their colleagues without IMCI training to prescribe antibiotics and antimalarials correctly, to communicate effectively to caregivers about how these drugs should be administered after leaving the facility, and to provide the first dose of a drug to children at the health facility. IMCI is also associated with the rational use of these drugs, reducing the distribution of antibiotics to children who do not need them.

Ministries of Health and their technical assistance partners, including WHO, should support IMCI case management training as an effective intervention to reduce the inappropriate use of antimicrobials.

Acknowledgements

The authors would like to thank those responsible for the MCE evaluations and IMCI implementation in Bangladesh, Tanzania and Uganda. Full lists of investigators are available on the MCE website.

The IMCI-MCE is arranged, coordinated and funded by the Department of Child and Adolescent Health and Development of the World Health Organization with the financial support of the Bill and Melinda Gates Foundation and the US Agency for International Development. The MCE is carried out in partnership with the child health staff of the Ministry of Health in each site. In Tanzania, IMCI is implemented in the intervention districts in collaboration with the Tanzania Essential Health Interventions Project, which is co-funded by the Tanzania Ministry of Health and the International Development Research Centre, Canada.

Containment of antimicrobial resistance in food animals

Flemming Bager & Henrik C Wegener, WHO Collaborating Centre for Antimicrobial Resistance in Foodborne Pathogens, Danish Veterinary Institute, Copenhagen

Man and food animals constitute overlapping reservoirs of antimicrobial resistance determinants. Resistance may be transferred from food animals to humans either in the form of resistant bacteria – notably food-borne zoonotic agents – or by transfer of resistance genes themselves.

In this light, it is therefore a particular concern that the incidence of food-borne campylobacteriosis keeps increasing in many countries in the western world. Also, food-borne infections with zoonotic Salmonella continue at a high level. Resistance is now emerging in these pathogens to antimicrobials such as fluoroquinolones and third generation cephalosporins, commonly used for empiric treatment of acute gastro-intestinal tract infections. Studies have shown that antimicrobial resistance in Salmonella will triple the risk that individuals undergoing antimicrobial therapy for unrelated reasons become infected with the pathogen. A recent register-based study in Denmark has shown that infection with antimicrobial resistant *Salmonella typhimurium* is associated with a significantly increased mortality.

Usage of antimicrobials in food animal production varies considerably between countries and over time. For example, Sweden and Denmark used 1-3 grams of antimicrobials to produce one slaughter pig, while the USA used 47 grams. In Denmark, usage has varied from 90 tonnes in 1994 to 48 tonnes in 1994, increasing to 94 tonnes in 2001. There are no apparent changes in the health of the national herd of food animals to fully explain these changes.

While the need to treat diseased animals with antimicrobials should not be disputed, it is nevertheless a fact that a number of common husbandry practices predispose for or directly cause disease. For example, use of high starch diets in feedlot beef production is a direct cause of ruminal acidosis with resulting increased risk of hepatic abscesses. This problem is controlled through the use of antimicrobials. Excess levels of protein in the diet of weaner pigs strongly contribute to diarrhoea problems, which are controlled either through use of therapeutic antimicrobials or antimicrobial growth promoters.

The WHO Global Principles have, among other things, called for all antimicrobial therapeutics to become prescription-only medicines, for the establishment of national programmes to monitor antimicrobial resistance and usage of antimicrobials, the rapid phasing-out of the use of antimicrobial growth promoters, and the issue of prudent use guidelines for veterinarians.

Denmark has come some way towards meeting these recommendations. For example, the use of growth promoters has been discontinued and the dispensing by veterinarians of antibiotics has been severely reduced. Furthermore, Denmark has established monitoring of both resistance and antimicrobials usage, providing a high degree of transparency to an otherwise rather impenetrable field. VetStat, which has recently been implemented, is a prescription-based register containing information about all sales of antimicrobials to food animal herds. The register may be accessed by farmers, veterinary practitioners and authorities via secure connections on the Internet. The opportunity for interactive generation of reports has been provided to allow comparison of the usage patterns of individual farmers or veterinarians with national and regional means. It is expected that this will provide an incentive to avoid overuse of antimicrobials in food animals.

AMR Containment at Country Level

Thomas Lund Sørensen, MD, Antimicrobial Resistance Surveillance and Infection Control, Statens Serum Institut, Denmark.

The WHO Global Strategy for Containment of Antimicrobial Resistance prioritizes the recommended interventions. The first priority is to make the containment of antimicrobial resistance a national priority and the second is to designate or develop reference microbiology laboratory facilities to coordinate effective epidemiologically sound surveillance of antimicrobial resistance among common pathogens in the community, hospitals, and other health care facilities. During visits in a number of high and in particular low resource countries, these basic interventions were not accomplished. There seem to be a number of reasons for this, one being the lack of sufficient and reliable data on antimicrobial resistance and use of antibiotics. If data on antimicrobial resistance exists, there are a number of difficulties when it comes to comparing data generated in various institutions or geographical areas. In addition, there are major problems in getting relevant denominators and a data set suitable for comparing the public health impact of antimicrobial resistance and monitoring interventions.

Appendix 4

An Integrated Framework for Continuing Implementation of the WHO Global Strategy for Antimicrobial Resistance.

STATUS REPORT ON WHO GLOBAL ANTIMICROBIAL RESISTANCE IMPLEMENTATION STRATEGY

- Trend data on antimicrobial resistance and use provided in a standardized fashion by local/national data sources e.g. indicator organism data for principal clinical syndromes: STDs and HIV, Respiratory Tract Infections, Diarrhoeal Diseases and Hospital-Acquired Infections, TB, Malaria.
- Compliance with standard treatment guidelines; antibiotic use data.
- Collation of data by WHO Regional Offices/Collaborating Centres.
- Global (bi)annual report by WHO including analysis of deficiencies and obstacles in the implementation of the Global Strategy and evaluation of outcomes in terms of AMR containment.

RESOURCE MAPPING AND COUNTRY PROFILING

- Country-based information centre containing current status of high-priority containment interventions according to the Global Strategy.
- Web-based and accessible to all interested parties.
- Maintained by CSR in collaboration with EDM and CAH as well as regional and country offices.
- The construction and maintenance effort should be actively used for advocacy for implementation of the Global Strategy.
- The information resource should be used for generating the WHO antimicrobial resistance containment reports and to formulate country-based projects.

GAP FILLING AND OBSTACLE REMOVAL

- Country-based time-limited projects to fill gaps and remove obstacles concerning implementation of the Global Strategy.
- Relevant projects identified by countries, Regional Offices or by use of the resource mapping/country profiling tool.
- Collaborative projects with outside agencies, NGOs, industry and other interested parties.

Antibiotic use and misuse

- Overview of regulations and practices, not specific consumption data
- To include valid indicators of compliance with regulations and stated practices

AR surveillance networks

- Overview of surveillance activities, not specific resistance dataTo include valid indicators of performance, quality and data generating capacity of AR surveillance networks

Administrative compliance

- Overview of administrative commitment and efforts
- To include assessment of infrastructure available and resources committed to implementation of the Global Strategy

Infection control

- Overview of regulation and organisation of infection control efforts
- To include valid indicators of quality and performance of infection control

Appendix 5

Participants in the Implementation Workshop on the WHO Global Strategy for Containment of Antimicrobial Resistance

Dr Flemming **Bager,** Danish Zoonosis Centre, The Danish Veterinary Institute, 27 Bülowsvej, DK - 1790 Copenhagen V, Denmark

Dr David **Bell**, Assistant to the Director for Antimicrobial Resistance National Center for Infectious Diseased, Centers for Disease Control and Prevention ; 1600 Clifton Road NE (Mail Code C-12) Atlanta GA 30333, USA

Dr Anthony **Boni,** Coordinator**,** Office of Health, Infectious Diseases, Room 3.07-073, 3rd Floor, RRB Washington, DC 20253-3700, USA

Professor Otto **Cars**, Swedish Institute for Infectious Disease Control S-171 82, Solna, Sweden

Dr Philippe **Dubois**:, WHO/CSR Office , 58 avenue Debourg, 69007 Lyon, France

Dr John **Stelling**: WHO Collaborating Centre for Surveillance of Antimicrobial Resistance, Department of Microbiology, Brigham and Women's Hospital, 75 Francis St., Boston MA 02115, USA.

Dr Thomas **Sorensen** *(Chairman)*: Department of Microbiological Research and Development, Statens Serum Institut, Artillerivej 5 DK-2300, Copenhagen S, Denmark

Dr Richard **Wise** *(Chairman)*: Department of Medical Microbiology, City Hospital, Dudley Road, Birmingham B18 7QH

Dr John **Chalker:** Rational Pharmaceutical Management Plus, Management Sciences for Health, 4301 North Fairfax Drive, Suite 400 ; Arlington VA 22203-1627, USA

WHO Regions
CSR Regional Advisers

AFRO: Dr Jean Bosco **Ndihokubwayo**, Regional Adviser for Bacteriology, Harare.

AMRO: Dr Gabriel **Schmunis**, Pan-American Health Organization, Communicable Diseases Program, 525 23 Red Street, N.W, Washington, DC 20037, USA.

EMRO: Dr Nabila **Metwalli**, Regional Adviser, Blood Safety Laboratory,
P.O Box 7608, Nasr City 11371 Cairo.

EURO: Dr Bernardus **Ganter**, Regional Adviser in Communicable Diseases, Regional Office for Europe, 8, Scherfigsvej, DK-2100 Copenhagen.

SEARO: Dr Rajesh **Bhatia**, STP-BCT, Blood Safety and Clinical Technology,
IP Estate, Ring Road, New Dehli 110 002.

WPRO: Dr Hitoshi **Oshitani**, Regional Adviser in Communicable Disease, Regional Office for the Western Pacific, P. O. Box 2932, 1099 Manila, Philippines.

CAH Regional Advisers

EMRO: Dr Suzanne **Farhoud**, Regional Adviser, IMCI, P.O Box 7608, Nasr City 11371 Cairo.

EURO: Dr Mikael Meyer **Ostergren**, Acting Regional Adviser, CAH, Regional Office

for Europe, 8, Scherfigsvej, DK-2100 Copenhagen.

SEARO: Dr Neena **Raina**, Technical Officer, IMCI, Regional Office for South-East Asia, World Health House, Indraprastha Estate, Mahatma Gandhi Road, New Delhi 110002, India.

EDM Regional Advisers

AFRO: Dr Jean-Marie **Trapsida**, Regional Adviser for Essential Drugs and Vaccines,
B.P. 6, Brazzaville, Republic of Congo.

EMRO: Mr Peter **Graaff,** Regional Adviser for Essential Drugs and Biologicals, P.O Box 7608, Nasr City 11371 Cairo.

AMRO: Dr Rosario **d'Alessio**, Regional Adviser for Pharmaceuticals, Pan-American Health Organization, Communicable Diseases Program, 525 23 Red Street, N.W,
Washington, DC 20037, USA.

WPRO: Dr Budiono **Santoso**, Regional Adviser for Pharmaceuticals, Regional Office for the Western Pacific, P. O. Box 2932, 1099 Manila, Philippines.

EURO: Mr Kees **de Joncheere**, Regional Adviser for Pharmaceuticals, Regional Office
for Europe, 8, Scherfigsvej, DK-2100 Copenhagen.

SEARO: Dr Kris **Weerasuriya**, Regional Adviser, Essential Drugs and Medicines Policy, Regional Office for South-East Asia, World Health House, Indraprastha Estate, Mahatma Gandhi Road, New Delhi 110002, India.

WHO/HQ Secretariat

Dr A. Estrela, CSR
Dr O. Fontaine, CAH
Dr P. Jenkins, CSR
DR K. Holloway, EDM
Dr S. Lazzari, CSR
Dr J. Quick, EDM
Dr G. Rodier, CSR
Dr G. Simonsen, CSR
Dr J. Tapsall, CSR (Rapporteur)