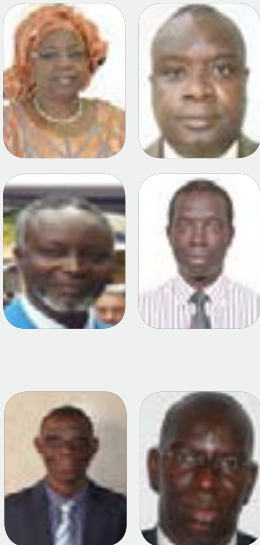


GOVERNANCE AGAINST ANTIMICROBIAL RESISTANCE IN AFRICA: CONFRONTING AMR WHEN RESOURCES ARE LIMITED – THE EXAMPLE OF SENEGAL

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The Global Action Plan on AMR (GAPAMR), voted by the World Health Assembly in 2015, recommended establishing national plans of action – a difficult undertaking on the African continent – and the World Health Organization’s (WHO) intermediary report in May 2016 deplored the delays.

However, Senegal shows real progress in comparison with the vast majority of African countries, and, in addition to campaigns promoting the rational use of antimicrobials for animals and humans, Senegal is fast moving forward thanks to two structures:

- The National Program for the Control of Nosocomial Infections (PRONALIN), launched in 2004, which has been effective in reducing infections and the transmission of multidrug-resistant bacteria associated with hospital care.
- The Directorate of Laboratories which set up a national system for monitoring antibiotic resistance through laboratories.

Senegal has thus grasped the complexity of AMR control and has been at the forefront on the two leading recommendations of the GAPAMR: first, to strengthen infection control and prevention to ensure that health systems do not spread AMR infections, as mentioned at the past G20 meeting, and second, to increase capacities for surveillance and monitoring.

Hence, even though improvements are still necessary, notably in the monitoring and coordination of the various multisectoral interventions, Senegal is a model for achieving rapid progress at a regional level and is further aligning its operational drives with the new framework of the One Health policy, as well as the many new recommendations and technical tools developed by WHO following the lessons learned from the recent major Ebola epidemic.

Senegal has been very much involved in mobilizing other African nations on AMR and has held regional training seminars in collaboration with WHO. This article presents our national and international leadership on this issue.

Antimicrobial resistance occurs when a microorganism (bacteria, virus, fungus or parasite) becomes resistant to an antimicrobial drug against which it was previously sensitive (1). This antimicrobial resistance (AMR) concerns a wide range of infectious agents, and many sectors (human and animal health, agro-industry, livestock and the environment) (1). It is a growing threat to public health and no country is

spared. It is particularly alarming to note the rapid worldwide spread of multi-resistant bacteria causing common infections that are not sensitive to the usual antibiotic treatments, and that of infections (especially hospital-acquired infections) resistant to last-resort antibiotic treatments (2, 3). The problem currently arises in terms of sustainable development: it goes far beyond the framework of human health and is of concern to the

entire world.

World reaction

In May 2015, the sixty-eighth World Health Assembly adopted a Global Action Plan to combat AMR, GAP AMR, demonstrating a global consensus on the serious threat posed by AMR (4). Member states were invited to develop and implement national action plans tailored to their local realities. In September 2016, at the United Nations General Assembly in New York, leaders around the world drew attention to the need to curb the spread of antimicrobial-resistant infections.

Many technical tools and guidelines were made available and technical and financial partners were sensitized to bring support, particularly in resource-limited settings. The principle was that each member state should present its plan of action at the 2017 World Assembly.

In high-income countries, concrete measures are already being implemented to deal with AMR, and this component is already fully integrated into quality management systems for healthcare provision, but the situation is quite different in developing countries in general (4). In May 2016, following the global progress assessment, a delay in project implementation was generally noted, particularly in the African region (4).

The situation in sub-Saharan Africa

Low-resource countries, and those from sub-Saharan Africa in particular, have significant gaps in most of the technical domains of the International Health Regulations (IHR). Due to weak health systems, and in the absence of a real institutionalization of health security, the issues of AMR and infection prevention and control are not yet fully taken into account everywhere.

The WHO Regional Office for Africa has carried out many activities in recent years to strengthen the capacity of laboratories in Africa and currently many laboratories are engaged in the accreditation process, in several countries.

WHO's new Health Emergencies Programme has undertaken a concerted approach with states for the progressive development of all the capacities required for the implementation of the IHR and the acquisition of resilience. Thus, internal capacity assessment has started in many countries while external assessment has already been carried out in five countries.

First results confirm the importance of gaps in health security, and in particular the virtual absence of structured AMR programmes in African health systems. Hence, the need arises for building up capacities over the long run, based on a multidisciplinary and multisectoral approach as well as a continuous improvement of the learning outcomes.

It was in this context that a first seminar was held in Dakar in October 2016, bringing together the administrative staff of

the ministries of health of the 11 francophone and lusophone countries of West Africa, with the main objective of health security institutionalizing. At the end of the seminar, the representatives of the countries left with a concrete roadmap to adapt to their local realities, in order to set up national programmes. Similar seminars are taking place in 2017, as well as training workshops for technical staff to lead future AMR and infection prevention and control (IPC) programmes in African countries.

AMR governance in sub-Saharan Africa: The specific case of Senegal

At the sub-Saharan African level, within the framework of AMR governance, Senegal has set up two structures: PRONALIN and the Laboratories Directorate.

1) PRONALIN:

The National Program Against Nosocomial Infections (PRONALIN) was set up in 2004 and a strategic action plan 2005–2015 was drawn up. The primary goal is to reduce healthcare-associated infections (HAI), but also to avoid catching or transmitting multi-resistant bacteria in the healthcare setting. The objectives of the plan were carried out according to the available funding. But it is the antibiotic resistance component that was the neglected part of the plan, although some activities could be carried out.

Twelve years after the establishment of PRONALIN, the achievements are very concrete:

- ➔ The existence of Nosocomial Infections Control Committees (NICC) and of Committees on Health, Safety and Working Conditions (HSWCC) in all hospitals and health centres. Numerous training courses were carried out, technical tools and a roadmap were put at their disposal for the implementation of the main processes for basic hygiene and the prevention of infections. The context of the Ebola epidemic certainly facilitated rapid mobilization. The country was resilient with only one imported case which did not give rise to any secondary cases.
- ➔ The existence of national associations of communicators and patients (ACAQS-SENEGAL and ANASEP-SENEGAL) for the improvement of quality and safety of care in Africa, section Senegal, which were able to play a decisive role in information and awareness, the latter being components of the first objective of the WHO Global Action Plan on Antimicrobial Resistance (5, 6).
- ➔ The existence of a national committee for the proper use of antibiotics for the prevention of antibiotic resistance has been officially set up, despite the lack of resources.
- ➔ The existence of national guidelines, developed with

the technical support of the *Société Française d'Hygiène Hospitalière* (SF2H), bearing on national policy, treatment of community-acquired infections, treatment of healthcare-associated infections and antibiophylaxis (7, 8).

2) The Laboratories Directorate

The setting up of the Laboratories Directorate in 2012, which established a national system for antibiotic resistance surveillance through laboratories, did improve the situation considerably. Indeed, in 2013, a national survey on the prevalence and the resistance profile of bacteria was organized in 29 public and private laboratories carrying out the antibiogram (ABG) in 11 regions of Senegal. The results of this survey made it possible to select the bacterial agents to be monitored (Table 1) and to produce a comprehensive update on the practice of the sensitivity tests.

At the end of this update on AMR, several activities were carried out:

- ➔ Organization of refresher training sessions for laboratory staff (Figure 1);
- ➔ Development and provision of monthly ABG data collection sheets;
- ➔ Integration of collection tools into the DHIS-2 platform;
- ➔ Monthly data reporting;
- ➔ Supervision of laboratories; and
- ➔ Multisectoral coordination meeting of the National Network of Laboratories, bringing together the actors of the health sector (Laboratories Directorate, TB, HIV and malaria), livestock and trade sector with the support of WHO, to share AMR surveillance activities and lay the foundation for a national plan of action to combat these resistances.

With the technical support of WHO and the main partners, the country has already carried out the internal evaluation of its capacities for the IHR, and Senegal was the first francophone country in sub-Saharan Africa to achieve the joint external evaluation. Relevant recommendations have been made and their application should improve the country's performance in the technical areas of the IHR, including AMR.

Senegal has adopted the international standard ISO 15189 and since 2013, the Laboratories Directorate has set up a system to support the quality approach. This system is based on the organization of quality audits with the SLIPTA checklist (in 2013 and 2016) and on coaching consisting of training sessions and supervision.

3) Other governance measures against AMR

In addition to PRONALIN and the Laboratories Directorate, other governance measures are being undertaken by Senegal:

- ➔ **Promoting the rational use of medicines including**

antimicrobials. The regulations require a prescription for the use of all antibiotics. Activities to promote the rational use of medicines are carried out by the Directorate of Pharmacy and Medicines (DPM). Campaigns to inform or fight against the dangers associated with the use of over-the-counter street drugs are also carried out by the DPM in collaboration with the partners. Awareness-raising on the rational use of antimicrobials in animals is carried out by the *Ordre des Docteurs Vétérinaires* (the National Order of Veterinary Doctors) as well as by representatives of veterinary firms. Again, regulations require a prescription for the use of all antibiotics. There are, however, difficulties in complying with the various regulations.

- ➔ **Food safety and animal health.** Guidelines for risk analysis of foodborne AMR are available (CAC/GL 77-2011). Foodborne pathogens are also investigated and counted at the National Laboratory for Analysis and Control of the Ministry of Commerce (LANAC). However, the antibiogram is not realized due to a lack of strains, materials and reagents. Thus, the systematic realization of the antibiogram is problematic.

On the other hand, there is no surveillance plan for animal health. The antibiogram is performed during the routine diagnosis but also on request by private veterinarians and the results are returned directly to the latter without notification.

Development opportunities for AMR governance in Senegal

The joint external evaluation of Senegal's technical capacity for IHR, conducted in November 2016 by WHO, resulted in the formulation of four priority activities in the technical field of AMR:

- ➔ Development of a national multisectoral plan to combat AMR;
- ➔ Strengthening multisectoral surveillance of AMR;
- ➔ Strengthening the coordination of the various multisectoral interventions on AMR and the connection between laboratories in different sectors; and
- ➔ Strengthening the capacities of the various stakeholders in AMR.

Senegal is currently preparing a workshop to draft the multisectoral national action plan to combat AMR with the support of WHO. This will be followed by a validation workshop by all stakeholders.

In practice, in the area of AMR, these priority recommendations could be regrouped into two strategic areas: the conception of the national multisectoral plan and the human resources development plan. This will enable the development of a budgeted operational action plan for implementation. Thus, Senegal will rely on three documents to better manage AMR in the country.

Table 1: List of bacteria to be monitored in relation to antibiotics in Senegal

DEP bacteria <ul style="list-style-type: none"> • <i>Neisseria meningitidis</i> • <i>Vibrio cholerae</i> • <i>Shigella spp</i> 	Important bacteria in public health <ul style="list-style-type: none"> • <i>Pseudomonas aeruginosa</i> • <i>Salmonella spp</i> • <i>Streptococcus pneumoniae</i> • <i>Haemophilus influenzae</i> • <i>Acinetobacter spp</i>
Predominant bacteria <ul style="list-style-type: none"> • <i>Escherichia coli</i> • <i>Staphylococcus aureus</i> • <i>Klebsiella spp</i> • <i>Enterobacter spp</i> 	

1) Multisectoral National AMR Action Plan

It will be necessary to have an action plan in each of the sectors concerned, with good coordination of activities under the aegis of the health sector serving as a driver, within a multisectoral structure placed under the supervision of the highest authorities of the country. Important institutionalization work will have to be done at each sector level, going beyond the concept of the focal point, with administrative and organizational measures to define roles and responsibilities precisely. This work has already begun in all ministries, but it must be completed.

In the human health sector, especially, the Laboratories Directorate has recently been designated as the national AMR focal point and has greatly strengthened the capacity of the laboratories, with the support of WHO. There is still a need to clarify the roles of each of these institutions in the fight against AMR because, in the context of the current international recommendations, a strong institutionalization of AMR will be required at all levels of the health pyramid, with structures and well-defined roles and responsibilities for individuals who will be well-trained and resourced to carry out these new tasks.

Coordination of all activities that are very cross-cutting, but essentially clinical, epidemiological, therapeutic and preventive activities should play a central role.

Therefore, the capitalization of all the country's AMR assets, making them operational to facilitate the development and implementation of the national plan of action, will require:

- ➔ Reinforcing the NICC and HSWCC set up at the level of hospitals and health centres;
- ➔ Reinforcing the communicators' and patients' associations, which have even started to set up regional and local branches;
- ➔ Reinforcing the national committee or working group for the use of antibiotics in the human health sector and set up working groups within each hospital, integrating them into the pre-existing organization and charging them to manage the quality and safety of care; and
- ➔ Strengthening laboratory capacity in all regions of the country. The availability of new rapid diagnostic technologies requiring no expensive equipment is increasing and allows for greater decentralization of laboratory diagnostics.

Figure 1: Session of theoretical and practical training of the personnel of laboratories of Senegal on the ABG

2) Human Resources Development Plan

The challenge of having human resources available is one of the first challenges faced by African countries in dealing with AMR, and Senegal is no exception. Because of this important need, training offers have recently been made available in Dakar for francophone countries with the support of technical partners such as the WHO and the *Société Française d'Hygiène Hospitalière*. IPC training curricula specially designed for resource-limited countries are being developed by the WHO under the aegis of the IPC Global Unit and in partnership with many institutions working in this field in Africa. The CESAG in Dakar was targeted as a pilot site for the training of personnel from French-speaking countries.

3) Operational Action Plan

The activities of the Operational Action Plan will be based on the lines of work selected in the context of the capitalization of achievements, as well as the objectives adopted within the framework of the global plan proposed by WHO.

After the improvement of the institutional framework, the activities of strengthening prior learning will be to organize workshops to reinvigorate NICC and HSWCC in the regions or zones of the country. The objective of these workshops is to outline once again the administrative and organizational measures to undertake at the level of each structure – taking into account the new national and international context – to make the committees functional. A concrete roadmap will then be proposed, along with the monitoring and evaluation strategy by PRONALIN. These workshops should also allow the integration of measures to be taken within the framework of the fight against the AMR at the level of each institution.

It should be noted that a first workshop has already been organized for the regions of the central zone of the country and that this remains to be done in the other regions of Senegal.

The other activities of the Operational Action Plan will be based on the objectives of the Global Plan. A phased approach will be required by setting realistic and feasible intermediate targets, taking into account the local context as well as the new requirements of the One Health strategy.

Conclusion

The fight against AMR has become a global necessity calling on all countries. The countries of sub-Saharan Africa generally have a significant backwardness or even an absence of a policy of care.

Senegal currently has a certain lead, compared to the vast majority of African countries, although the road ahead is still long. It can serve as a valid model and enable rapid progress to be made at the regional level, provided that its acquisitions are operational and aligned with the new context of One Health policy endorsement, as well as the many new recommendations and technical tools developed by WHO following lessons learned from the recent major Ebola epidemic. ■

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Professor Coll-Seck previously served as Executive Director of the Roll Back Malaria Partnership for eight years and successively as Director of the Department of Policy, Strategy and Research and the Department of Country and Regional Support of UNAIDS from 1996 to 2001. She is the author of more than 150 scientific publications and during her career, she has received several awards and distinctions.

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