

AFRICAN COUNTRIES FACING AMR: THE INPUT OF E-HEALTH AND DIGITAL HIGH TECHNOLOGY

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Antimicrobial resistance (AMR), endangers health systems capacity to treat bacterial, viral, fungal or parasitic infections, as the latter have become resistant to drugs, according to the World Health Organization (WHO).

The WHO Global Plan of Action on AMR, voted by Member States at the World Health Assembly in May 2015, requires each individual country to elaborate a national plan.

The WHO's new AMR secretariat has set up a section specifically to assist countries. Yet, considering the difficulties involved even in OECD countries, the task is not easy for low-income countries. These countries face added obstacles such as lack of financial resources, lack of trained staff and appropriate, infrastructures, all of which might be eased with the use of new technologies, permitting them to leapfrog into better healthcare systems.

Internet communication technologies could facilitate the switch to a more efficient, patient-centred healthcare system. Civil society will be an indispensable element in this endeavour. The Grand-Bassam, Ivory Coast seminar held on 6–8 October 2015 on "Digital technology in Africa: A major tool for healthcare quality improvement and patient safety" (1), was a stepping stone in answering the question: how do digital technologies improve care in the face of major challenges such as the Ebola outbreaks and antibiotic resistance?

Reflecting on African values in the digital age

Within a sociological approach befitting African values and the environment, the major contribution of e-connected health care will be to bring modern care delivery to communities through a patient-centred approach. The principle involved is to avoid, as much as possible, the practice of bringing patients into large hospitals or centralized structures as these will be the amplifiers of antimicrobial resistance (G7 declaration (2), AMR WHO Plan (3)), unless very strict hygiene and infection prevention and control (IPC) systems are in place.

Three West African countries have recently lived through a combined health and economic catastrophe: the Ebola virus epidemic. Experts agree, that negligence in terms of protecting healthcare personnel and patients through IPC systems was the enhancing factor and the "weak link" in the EBOV transmission chain in these countries (4).

The overarching goal of e-connected healthcare is to be able to carry out medical procedures with basic, reliable and safe products which decrease the risk to health workers and patients alike, improve the technical level and work situation

Box 1: Declaration of the G7 Health Ministers, 8–9 October 2015 in Berlin: The Berlin Declaration on AMR

“We emphasize that combating AMR requires a three-fold approach: first, by improving infection prevention and control; second, by conserving the effectiveness of existing and future antimicrobials; and third, by engaging in research to optimize such approaches and to develop new antimicrobials, vaccines, treatment alternatives and rapid diagnostic tools.” (...) “Infection prevention is a crucial element when tackling AMR as it reduces the need for antimicrobials. We will support initiatives that strengthen infection prevention within our countries. We will make information on national approaches to infection prevention and its favourable effect on combating AMR publicly accessible and support other countries in developing and implementing national measures.”

of the health labour force while starting from the needs of the individual patient. Furthermore, in many ways IT digital technologies open the way towards much more individualized, more precise and more recipient friendly medicine. It will enable a higher standard of medicine in the follow up of the patient on discharge from hospital, as well as a better decision-making tree before hospitalization.

There is a constant stream of innovation in healthcare IT products which, in fact, allows for a thoroughly avantgarde concept of healthcare delivery. The later could be first assembled and deployed in low-income African countries.

Information and communication technology (ICT) contributions to combating AMR include increased capacities for surveillance, diagnostics at the point-of-care and mobile-ambulatory care, while improving IPC within existing structures and practices.

Why repeat all the steps Europe went through in the creation of mammoth hospitals (when the wealthy fly to Europe or the United States for treatment), while in Europe itself the trend today is to deploy ambulatory surgical care and diagnostics at the point-of-care; in short, to go towards highly individualized medicine?

The lack of heavy infrastructure, today seen as a problem, could be turned into an advantage from the perspective of an IT-based mobile and ambulatory healthcare delivery system de novo (5). Either way, both the public and the private sector have been looking at the possibilities for the past few years (6).

In fact, the large array of IT technologies might not only capture the imagination of people involved in promoting healthcare for all in Africa, it could well be the only way for the lesser developed countries and poorer communities on the planet to face antimicrobial resistance.

Health workforce in the digital age

The basic problem for the poorer countries of Africa is a lack of manpower, exacerbated by Ebola, where it was demonstrated how dangerous it was to bring, suspected cases into ordinary structures. This was highlighted in a United Nations WHA seminar by Dr Brima Kargbo, Chief Medical Officer of Sierra Leone, at the satellite seminar, “From Ebola to AMR, the urgent need for infection control”, organized by the World Alliance Against Antibiotic Resistance with the Missions to the UN

of South Africa and the United States. Dr Kargbo explained to the audience that the majority of the health workers who contracted and died of Ebola were not working in the specialized Ebola treatment units, but in ordinary healthcare structures and working without even basics in IPC protection, such as gloves (7).

The need is to make rural medicine more attractive to young doctors and nurses, and the use of mobility in health with ambulatory surgery, remote diagnostics and a combination of internet outpost and hand-held tools on the spot, has the potential to revolutionize healthcare in Africa, as was reported at the the Ghana World Summit on e-Health (8).

Digital technologies can enable the development of interested primary healthcare and community health workers, simplified nurses’ rounds in rural settings, and make the role of the physician either a professional carer at a distance, or a carer in a modern ambulatory setting.

Clearly, it makes health care jobs a lot more rewarding and interesting, compared to the terrible situation of overwork in overcrowded, often dangerous hospital wards where patients are little above cattle and caring health workers are burned out by disorganized, heavy work loads and vicious settings.

Universal access to drug susceptibility diagnostic tools was voted by the WHA (9) as a companion to universal access to appropriate drugs and universal access to health services.

The patient in the digital age

It is equally interesting to examine the situation from the standpoint of the parturient: during the Benin Ministerial Level Conference on quality and safety in healthcare in Africa, CIMSEF, (December 2011, Cotonou), field studies were presented from several West and Central African countries, indicating that 25% and above of maternal mortality and morbidity were directly the outcome of hospital-acquired infections: “Nosocomial infections are the leading cause of postoperative mortality, the second leading cause of neonatal mortality (MDG4) and the third cause of infant mortality (MDG5) (11).

A doctor from Guinea testified how she herself nearly died from septicemia after giving birth and was saved only because she understood what her sickness was.

The story shows the need for training, where, again, the

presence of the internet and smart phones can make the difference. Today, there is the possibility of remote ultrasound scans to watch the fetus, which have already been initiated by the French CNES a few years ago (12).

In Europe, people who are not from The Netherlands are always amazed to hear that 80% of women of all social groups give birth at home. Clearly, if they can do so, it means that the midwives, whatever their level of training, have a network handy for prevention and are able to swiftly summon a surgeon if there are difficulties. All these women giving birth at home in safe situations will not be put at risk of nosocomial infections!

High tech and noncommunicable diseases (NCDs)

The objective is to make the patient comfortable, cared for within their own community, to impact as little as possible on the rural setting, on the local production process, while at the same time, imparting the education and a link to world of IT technologies (IT Summits have amply demonstrated the love of poorest peasants and fishermen for internet use for weather forecasting, for knowledge of quantities and prices on this or that market).

A tool such as the BewellConnect™ ecosystem (13) (presented in the Bassam regional workshop) can allow a diabetic or high blood pressure patient to monitor their situation directly, to correct it, and to connect with health providers giving the appropriate information. At the same time a set of medical devices gathered in a small suitcase (Myhealthbox) can be used to register patients' data by telemedicine workers in Africa's rural settings, either through a dedicated hub or with a tablet, or smartphone.

In the Ivory Coast, the Francophone World Digital University (Université Numérique Francophone Mondiale) deploys tools for diabetes monitoring (14) in a study conducted within the National Institute for Public Health of the Ivory Coast, with a BewellConnect glucometer, an infrared thermometer, a scale and a blood pressure monitor (BPM) connected via low energy Bluetooth, as a first step to evaluate the deployment of digital technologies in a dozen diabetes centres through the automated collection of data, to be followed by e-learning and a medical follow up.

The monitoring targets glycemia, weight, arterial blood pressure and temperature for type I and II diabetes patients. The Global Business Coalition nominated the e-Diabetes which was also presented at the Grand-Bassam's seminar (10).

Digital technologies can also be used profitably in African countries to engage in the follow up of patients after renal transplants as happens in France very successfully (15), thereby facilitating hospital care and reducing overall costs to

hospital management and risks to the patient.

Universal access to diagnostics

The WHO AMR team has initiated a point-of-care diagnostic platform (an initiative headed by M Francis Moussy (16)), since the need is growing fast for surveillance, for identifying, and monitoring drug resistance and treating cases while taking into consideration the susceptibility (or lack thereof) of bacteria to this or that antibiotic.

Today, a child with diarrhea for example is brought into a hospital (Benin study (17)) where they are given haphazardly a shot of antibiotics and the parent is sent away with an antibiotic prescription, in a situation where viral and parasitic diarrhea are common, and where pharmacies are too expensive for the poor and too few in numbers, sending poor parents on to the black market (18).

There might be campaigns about the poor quality of medicines on the markets but the biggest problems to solve are upstream and not downstream.

The 2015 Regional Africa E-Health Workshop in Grand-Bassam, Ivory Coast

This e-health event is of course not unique but it was an important stepping stone in a situation where digital (and space) technology is developing much faster than strategies and policies to make use of them! The gap between the potential and the actual situation was brought to the fore as a matter of urgency.

The seminar on the development of digital technology in the health sector in Africa, was put together by the International Network for the Planning and Improving Quality and Security in Health Systems in Africa (INPIQS/RIPAQS), and brought together governmental representatives, public and private health sector suppliers, innovators, and policy-makers, and was very innovative in its format and participatory organization.

The seminar was presided by the Ivory Coast Minister of Health and sponsored by the ICT Minister, the seminar included, besides the Ivory Coast, participants from Benin (the former long time Health Minister of Benin, Dr Dorothee Kinde Gazard, always a leader when it came to patient safety), Benin, Burkina Faso, Mali, Ghana, Liberia, Morocco, Guinea-Conakry, Gabon, Mauritania and France.

The Digital Tech for Health in Africa participants were bold in their report. At the institutional level, they noted a weak or even non-existent awareness of ICT tools in health structures and a lack awareness of policy-makers, regarding e-health strategies, the absence of national strategies for innovation in the ECOWAS region, and the concomitant absence of a regulatory framework for the deployment of ICT in healthcare

and the protection of personal data.

As regards strategy, they noted the absence of ICT tools and equipment registry system, the lack of successful experiments, the problem being, in some instances, the high costs of digital tools for healthcare. At the technical level, the absence of medical personnel training, of competent technical staff, and at the financial level: the absence of budget planning to introduce ICT into hospitals and health structures in general. The participants were also harsh critics of the lack of cooperation between ICT and health sector personnel!

In their deliberations they emphasized the importance of developing regional ECOWAS (19) and national policy to rapidly and massively introduce the health sector to the digital age, with specific goals such as the setting up a technically competent agency to support the deployment of ICT in the health sector, and the training of health personnel on the benefits to be gained from ICT use.

The need to immediately develop a system for the registration of ICT tools and equipment which could be deployed in healthcare. They resolved to engage in advocacy to reduce the gap in use of ICT in health, and transform the health sector into a modern digital age sector.

Strategy documents on how to achieve this were projected to speed up engagement at all levels. They proposed budgetary lines in hospital accounting to include the urgency of ICT modernization, as well as national development funds for the development of ICT in healthcare. An ongoing framework for collaboration between ICT operators and health professionals, the organization of regular consultations and a partnership framework between the OOAS/WAHO (the West African Health Organization) and the telephone operators.

Last but not least, the seminar concluded with the recommendation to organize with ECOWAS a Regional Conference of Health and Telecommunication Ministers on the development of ICT in healthcare as a strategy to improve the response to outbreaks such as EBOV and safety in care for the ECOWAS region, tentatively programmed for December 2016 in the Ivory Coast (20).

The major impacts of digital medicine

- ➔ Hand-held tools for monitoring health parameters reduce distances between patients and specialized doctors as they can now connect both ways in a fashion never possible before, and they allow for the emergence of a new primary healthcare in the age of IT.
- ➔ Sophisticated monitoring allows for detection of risks in a patient before the illness itself (heart beat, tension, etc.) to identify the pathogen and its drug susceptibility at a distance (or with a simple deployable cartridge



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(GeneExpert), meaning faster and more appropriate care, or to identify pregnancy problems before they develop into an emergency.

- ➔ IT medicine allows for the deployment of highly specialized experts who receive the information necessary for decision-making from the community PHC workers or the patients directly, and the triage of information received can be automated to a high degree.
- ➔ In some cases, to give but one example, field PHC can perform colonoscopy, endoscopy, etc with the simple pillcam videocapsule tool (21) (thereby removing nosocomial risk, not a minor consideration when we follow the US CDC alert on the poor cleaning of endoscopes (22), in a situation where only a portion of the problems are reported. In this case, the expert gastroenterologist can be comfortably seated hundreds of miles from the patient and the PHC worker.
- ➔ The developing of ICT for ambulatory care allows the patient to stay within his home, family or community, again with great economic and life gains, while when needed, the decision-making tree to bring someone into a hospital structure.
- ➔ The collection of information in a viable and secured way (instead of scribbling on pieces of paper and errors on names, errors on patients, errors on products, errors in diagnostics) constantly and in quantity provides for a much better understanding of health issues, or the deployment of epidemics, or the emergence of new ones.
- ➔ E-health medicine brings tremendous economic advantages and possibilities while bypassing heavy infrastructure and providing an open field for innovators (23).

By reducing stays “at risk” in health centres and hospitals, ICT significantly reduces the problems identified by the WHO and the G20 in 2015 that these places become, increasingly,

the amplifiers' of AMR.

It is today, in the post-antibiotic era, that ambulatory and mobile medicine, which is patient-centred is highly stimulating for the public as well as the private sector. The range of technological tools is extremely large, at the forefront of innovation, and of major interest for health services in sub-Saharan Africa, in particular in the era of AMR. ■

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For Najeeb Al Shorbaji's presentation on E-Health and the WHO Resolution see: http://www.paho.org/ict4health/index.php?option=com_content&view=article&id=32:ehealth-and-health-informatics-who-hq-by-najeeb-al-shorbaji-director-of-the-department-of-knowledge-management-and-sharing-world-health-organization-who-&Itemid=16&lang=en