

AFRICAN CONFERENCE ON ANTIBIOTIC USE AND RESISTANCE REPORT



Theme:

**WHO IS WINNING THE ANTIBIOTIC RESISTANCE WAR:
BACTERIA OR MAN?**

Date:

18-20. MARCH, 2015

Venue:

GIMPA CONFERENCE CENTER, ACCRA, GHANA



TABLE OF CONTENTS

TABLE OF CONTENTS	1
THANK YOU TO OUR SPONSORS	2
CONFERENCE OVERVIEW	3
CONFERENCE STRUCTURE	5
OPENING CEREMONY	6
CONFERENCE PRESENTATIONS	17
CLOSING CEREMONY	24
CONCLUSIONS AND RECOMMENDATIONS	26
ANNEXES	29
LIST OF PARTICIPANTS	29
PRESENTATION SLIDES AND DISCUSSIONS	34
PHOTO GALLERY	162

THANK YOU TO OUR SPONSORS

This conference was organised by ADMER (a Danida-sponsored research project in Ghana) and the University of Ghana School of Medicine and Dentistry in collaboration with the Ministry of Health in Ghana, the Microbiology Association of Ghana and the European Society of Clinical Microbiology and Infectious Diseases (ESCMID)



Danida

AstraZeneca



ESCMID



MSD

Be well

CONFERENCE OVERVIEW

Diseases of bacterial origin are a major cause of morbidity and mortality in low-income countries, like Ghana. Many of these conditions can be prevented with improved personal hygiene, immunization, and environmental sanitation, but antibacterial drugs are still the main therapy for many of them. This key role of antibiotics has led to high levels of antibiotic consumption and spending. In Ghana, antibiotics are available to the public from a variety of sources. They are commonly purchased without a prescription, even when this practice is illegal. This widespread availability of antibiotics to the public has led to inappropriate use by patients and health care providers, and a steady increase in drug resistance. **The increase in resistance is costing money, livelihoods, and lives and threatens to undermine the effectiveness of the country's health delivery programs.** The magnitude and determinants of the impact of resistance on human health is however unknown.

The African Conference on Antibiotic use was organized by the Antibiotic Drug use, Monitoring and Evaluation of Resistance (ADMER) project; a Danida sponsored research project in collaboration with the Ministry of Health in Ghana, the Microbiology Association of Ghana and the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) under the theme, *“Who Is Winning The Antibiotic Resistance War: Bacteria Or Man?”*

With an overall aim of Prudent use of antibiotics for improved human health in Ghana, ADMER uses multi-disciplinary approach to build the needed research capacity in partner institutions to enable them address and propose solutions on how to prevent and control antibiotic resistance. The conference was organized principally to offer the opportunity to the trained personnel to disseminate their research findings to the general public, interact with policy makers and influence policy decisions based on the research outcomes.

The three day conference which was held from 18th to 20th March, 2015 in Accra was attended by 183 participants from Ghana, Nigeria, Uganda, Sweden and Denmark. These comprise seasoned researchers, medical practitioners, veterinarians, graduate students, civil society organisations and policy makers.

Presentations and discussions at the conference were in the following areas;

- *Ecosystem view of antimicrobial resistance*
- *Surveillance of antimicrobial resistance*
- *Global action plan on antimicrobial resistance*
- *Antibiotic resistance issues in Enterobacteriaceae*
- *Quality of Antibiotics*
- *Antibiotic resistance in Gram-Positive Organisms*
- *Antibiotic resistance in other Gram-Negative Organisms*
- *Antibiotic use*
- *Antibiotic policy*
- *Antibiotic policy issues in line with the Global Action plan*

At the end of the conference it was realized that there is generally a high AMR and it is a real problem in our countries and that Antibiotic-use should not be addressed in isolation, but in the context of general misuse of medicine. The conference recommended the following;

- There is the need for urgent, active surveillance and continuous monitoring of AMR to provide adequate data which will be used in the selection of antibiotics
- Policymakers should regulate and promote appropriate use of medicines
- Policymakers should foster innovation and research and development of new tools towards antibiotic use and resistance
- There is the need for broad policy framework ; Antimicrobial resistance verses Antibiotic resistance, Community education and Sociocultural change interventions
- Establish and enforce quality control checks for all veterinary inputs imported or made in Ghana.
- Seek ways to provide more effective and better quality diagnostic facilities
- Access to antimicrobials should be strictly regulated
- Promoting the one health approach to curb ABR, One Health Approach to AMR issues should be adopted.
- There is an urgent need to develop and sustain a formal platform from which rational prescription, use and antibiotic resistance information can be disseminated for improved services delivery, regarding the management of microbial infections.
- Engage and train CSOs to be involved in AMR education and advocacy activities at all levels especially at the community level
- Seek ways to strengthen the review and control of prescribing practices overall and of antibiotics specifically
- More Research and development is needed in the area of AMRs. For instance research is needed in Antimicrobial use practices to identify barriers hindering appropriate use of antimicrobials.

CONFERENCE STRUCTURE

The three-day conference started with the first scientific session (Scientific Session One) followed by the official opening ceremony. The other scientific sessions continued after the opening ceremony.

Overall, there were eight (8) Scientific Sessions with an average of four (4) presentations per session after which opportunity was given for questions, contributions and discussions. The conference presentations ended with a panel discussion on the last day on antibiotic policy issues and an official closing ceremony.

There were two snack breaks (morning and afternoon) and lunch for all participants. A conference banquet was also organized on the first day of the conference.

Poster presentations and viewing was done during the breaks.

OPENING CEREMONY

The very short but impressive opening ceremony was attended by the Chairman of the Parliamentary select committee on Health, the Danish Ambassador, the WHO Country Representative, the Acting Provost of the College of Health Sciences, University of Ghana, a representative of the Minister of Aquaculture and Fisheries, Representatives from the Ministry of Health, Researchers, Students, CSO representatives among others was chaired by Prof. Alexander Doodoo from the School of Medicine and Dentistry, University of Ghana.

The report here provides a transcription of the speeches made by various speakers at the opening ceremony of the conference.

Welcome Address by Prof. Mercy Newman, ADMER President (Ghana)

I will like to acknowledge the very important people gathered here starting with the Hon. Yieleh Chireh MP, representative for the Minister for Aquaculture and Fisheries, Dr. Peter Ziddah, your Excellency Danish Ambassador, WHO Representative to Ghana, the Dean of the School of Public health, the Registrar of the College of Health Sciences, Members of the Diplomatic Corps. I also acknowledge the members of the organizing committee without whom we would not be here and distinguished ladies and gentlemen.



Prof. Mercy Newman delivering her welcome address

It is a privilege to welcome all of you to this conference and it is also a joy to see all of you here as we meet to discuss issues related to antimicrobial resistance. For several decades we have assumed that we could continue to have a variety of drugs for treating infections. We therefore believe that at the stroke of the pen we could write a prescription and all our problems will go away. Sadly, development of resistance had occurred in several different microorganisms. Although we will concentrate mainly on bacteria, we should not forget resistance to malaria, resistance to HIV and other viruses and last but not the least, we have very serious resistance in relation to mycobacterial species and these are organisms which have been reported worldwide so it is an international issue. Let us remember that the selective pressure of antibiotic use is the engine which is driving this process of increasing resistance in microorganisms. We have already heard about what is happening in the environment. These microorganisms are also causing diseases in humans and also in animals. Most of the time we concentrate on the human issues so we have some rough estimates as to how much antimicrobial agents are being used in treating

humans. On the other hand it's important to note that in many third-world countries we do not know the quality and quantity of antimicrobial agents which are used in animals either for growth promotion or for treatment. You have already been told this morning that resistance is costly. It results in treatment failure and sometimes it can lead to death and we should not pretend that we are not part of the problem because some of our actions lead to resistance. For example, poor diagnosis, indiscriminate and excessive use of antimicrobial agents in both humans and livestock, wrong or substandard prescribing, lack of infection control in health care facilities, inadequate surveillance data and limited quality assurance and control protocols. We know that these factors lead to increased resistance and on the other hand it is important to determine as professionals the extent of the problem not only in Ghana but also in other African countries.

We hope the outcome of this conference could provide some information on what is happening. Francis Bacon once said that knowledge is power. I agree that is power but this knowledge is not going to be powerful if it is left on the shelf. For our evidence to make an impact, we must engage not only political leaders and policy makers but also the general public. As scientists, we strive to expand human knowledge, develop solutions to problems and produce evidence that lead to sound public policy in our area of specialization. Therefore, this conference I hope will provide the requisite interaction of scientists, teachers, students, industry from Ghana and abroad to exchange ideas on how to overcome the challenges we face in relation to antimicrobial resistance.

As most of you are aware we were supposed to have this conference last year November 2014 but due to the Ebola problem, this date was selected and finally we can meet and talk about AMR. With the help of the Danish Government ADMER project led to the training of high caliber Scientists. We had trained PhD, MPhil and other Masters students both from Ghana and also from Denmark. We are holding this conference so that we will present the results of their scientific works. Most of the time at the end of the PhD, the papers are written up, sometimes published in peer reviewed journals, they end up in libraries and people's offices and hardly will anybody get any information unless you actually go digging for it. We decided to do the opposite. We decided to hold this conference so that you don't have to go digging for the information. We are bringing you the information and we hope that by the end of the day you would get something out of it and you will use it.

I wish to express my deepest appreciation to the College of Health Sciences conference planning committee. Without them I don't think we can be here because they did most of the hard work. So my colleagues on the organizing committee including especially our hard working secretarial and ancillary staff who have given us extraordinary support in the planning of this conference, thank you for all the work you have done. I must mention especially Prof. Andrew Adjei. He has been the tower and the very strong person in the committee getting everybody including me to do what we are told.

I would like to welcome all of you to Accra especially the foreign participants and we hope that as we undertake this onerous assignment you would find time to enjoy Ghana especially our Ghanaian hospitality. So I welcome all of you here and I hope this will be a useful time in your

life and you would not go away from this place without having added something to your scientific knowledge, Thank you.

✚ Chairman's Opening remarks – Prof. Alex Dodoo

Looking at the room I am impressed with the demography. There are young people, they are vibrant people and they appear to be enthusiastic and hungry for success. I say this passionately because quite often it is we the balding ones who have been attending such meetings and you wonder that with so much knowledge put into people who are close to the next world where would hope come from? But when I see young people discussing science, I see young people talking about progress.



Prof. Alex Dodoo

Antibiotic resistance is real and if anyone thinks it's not real just look at one figure from the US. Between 1974 and 2004, the number of staphylococcus cases which were due to MRSA (Methicillin-resistant Staphylococcus Aureus (MRSA) increased from 2% to 50%. If this can happen in the United States of America with all its human and financial resources, it can happen anywhere. The cost of treating one case of extremely drug resistant tuberculosis is equivalent to treating 200 cases of susceptible tuberculosis. So the message I want to put across is this; drug resistance kills; it kills millions and we have a responsibility to do something about it. This is a moral ethical and professional obligation. I hope that will engage us and I will come back with my closing remarks. I hope I have scared you enough for you to wake up and do something about resistance.

✚ Statement by the Danish Ambassador, H.E. Margit Thomsen

Good morning distinguished ladies and gentlemen and thank you very much for inviting me to this important conference. I really wanted to come because I know you have come to the cross roads after several years of hard work on this research programme between Ghanaian researchers and Danish researchers. I am very happy to be here today.



H.E. Margit Thomsen

I think this research programme that we are witnessing today is really a very good testimony of the close relationships that exist between our two countries. This describes itself in a very, quite extensive research programme in all that Denmark and Danida has. Not only in Ghana but also in several other countries and it's always such a joy to see how it brings together the best brains from this country of Ghana or other countries and our own country. I would like to echo the words of Prof. Mercy Newman that hopefully these important results that we are seeing from this research programme for the last 4 or 5 years will not just end up on the shelves. We will make a big appeal to the politicians who are here and we will also do it outside this room to do what we can to make sure that it really will be put into implementation. Often the problem is that we have so much knowledge, we have so much research but then the big challenge is how to put it into action.

Let me just say a few words about our relationship and about our collaboration; Denmark and Ghana collaboration. I think many of you know that we've had a long standing relationship. I will not go several hundred years but our recent history started together with the recent new independent Ghana in 1957 and we have been working in so many areas with Ghana throughout many years in water and sanitation, in roads, agriculture, trade, education, electricity etc. etc. Right now, we are also working with the Ministry of Health and have been working with the Ministry of Health (MOH) for the past many years. We are right now in the last phase of collaboration with the MOH and we are working at having our activities out into the countryside to the rural areas and to getting health services out there in the rural areas.

We see Ghana in transit; I know some of you would say that we are not having economic growth. All signs are good in the medium term. We should just stay focused. It's very interesting because in the way that Ghana is transiting into a new phase of its life, the Ghana-Danish relationship is also transiting into a new phase. We see nowadays that not only the development corporation has been characterizing our relationships but now we see also more and more commercial activities between our two countries without any development aids. We see more and more interest in Danish companies coming down to Ghana to explore more business possibilities and we just had two business delegations from Denmark to Ghana which are purely commercial. I just wanted to mention it because I think it is actually interesting to be in a country where we can see that our relationship is really extending and is also transiting and therefore to the embassy, it is transiting into a broader collaboration between Ghana and Denmark. With these words I just want to thank you very much once again and really, please let's do together whatever we can so that the results of this research programme can be implemented.

Thank you very much.

✚ Statement by the WHO Representative to Ghana, Dr. Magda Robalo

Mr. Chairman, the Chair of the Parliamentary select committee on health, the Danish Ambassador, the Dean of School of Public Health, University of Ghana, Prof. Mercy Newman, Organizing Committee, Ladies and Gentlemen; good morning.

I know that I run the risk of telling you things that you know because if you are sitting in this room, it's because you are concerned and I shouldn't be preaching to the converted but I think if I don't say the things that am going to say, you would wonder whether WHO is having it out so am going to say some of the things that you know.



Dr. Magda Robalo

I want you to know that like the chairman said, we are scared. The continued emergence, development and spread of pathogenic organisms that are resistant to antimicrobials are the cause of increasing global concern and it constitutes a global health security threat. WHO is honored to be invited to this conference which seeks to deliberate on this topical issue; “Antibiotic use and Resistance”. Drug resistant microorganisms can circulate in humans and animal populations through food, water and environment. Transmission of resistant pathogens is influenced by trade, travel, human and animal. The resistant pathogens can be found in food, animal and food products that we consume daily. In 2015, the world economic forum identified antimicrobial resistance as a global risk beyond the capacity of any organization or nation to manage or mitigate it alone. Last year WHO reviewed the global report on the surveillance of antimicrobial resistance focusing on antibiotic resistance. This was the first attempt to define the magnitude of the problem. A clear conclusion from the report is that antibacterial resistance has reached alarming levels in many parts of the world. The report revealed very high rates of resistance in all 6 WHO regions in bacteria that cause common infections such as urinary tract infection, pneumonia and blood stream infections. The report also revealed that most countries lack national structures to provide an overview of the situation, they have limited capacity for capturing information and many gaps exist in surveillance of pathogens of major public health importance. There is poor coordination of surveillance efforts and lack of standards in methodology. The high proportion of resistance to some drugs imply the prescriber would have to resort to more expensive alternatives that may not be available in resource constraint countries like Ghana and are likely to further accelerate development of resistance. The emergence and spread of antimicrobial resistance is threatening our ability to treat infection increasing the risk of worse clinical outcomes and consumes more resources which would otherwise be dedicated to

other areas. Antimicrobial resistance undermines standard treatment schemes, infection become harder or even impossible to control with an added social and economic cost. Available data suggests that 10%-17% of patients without prior ART in Australia, Japan, Europe and US are infected with virus resistant to at least one (1) anti-retroviral drug. Globally it is estimated that 3.6% of new TB cases and 20.2% of previously treated cases have multidrug resistant TB. Some cases of TB are now resistant to antibiotics of last resort.

Mr. Chairman, the pipeline of new medicine is running dry and the incentives to develop new antimicrobials to address the global trend of drug resistance are becoming very weak. No major new class of antibiotics has been discovered since 1987, almost 3 decades ago. Too few antibacterial agents are in development to meet the challenge of multidrug resistance. More research and development is needed to discover innovative medicines and other tools to fight antimicrobial resistance.

Ladies and gentlemen, WHO will be presenting a global action plan on antimicrobial resistance at the upcoming world health assembly in May this year. The goal of the global action plan is to ensure for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines of quality assured used in a responsible way and accessible to all who need them.

To conclude, I would like to say that we are at risk if we continue with business as usual and do nothing about the growing trend of antimicrobial resistance. If we do not take action now there will be no cure tomorrow. Health care workers have a vital role in preserving the power of antimicrobial medicines. I am convinced that this conference will raise awareness on what drives antimicrobial resistance and build commitment for effective policies and practices and their implementation to combat this security threat. We need the whole of society's engagement because antimicrobial resistance affects sectors beyond human health. Its impact is far reaching to areas such as animal health, agriculture, food security and economic development. I would like to commend the organizers for putting together a conference for such an important topic and we wish you all fruitful deliberations. Thank you.

 **Statement by Dean of School of Public Health and Acting Provost, College of Health Sciences, Prof. Richard Adanu**

Mr. Chairman, chairman of the select parliamentary committee on health, the WHO representative to Ghana, Prof. Mercy Newman, other representatives of the GHS, MOH and our partners in research from Denmark. I bring you warm greetings from the Provost of the College of Health sciences who is currently out of town. He was informed of this conference some time ago and as soon as he heard it he knew that he wasn't going to be around so he kept telling me to ensure that I am present. So that shows that he would have greatly liked to share in this with you. It's always a pleasure for us in the College of Health Sciences to partake in an exercise of sharing and gaining knowledge obtained through research. More often than not, as have been said earlier, research findings are not disseminated well enough to cause policy change. They are usually left to gather dust on shelves and that's why we believe that conferences such as these should be encouraged and I will seize this opportunity to congratulate the planning committee for the excellent organization of this conference.

Since this conference is being held in Accra, there is a sense in which it's hosted by the College of Health Sciences, University of Ghana since most of our faculty members have been part of the ADMER project. So the planning committee has served as very able ambassadors of the College



Prof. Richard Adanu

of Health Sciences (CHS). Since the establishment of the CHS in 2000, it has contributed immensely to the development of this country not only in the area of producing qualified health professionals but also in the provision of platforms such as this to discuss and find solutions to problems that we are facing in the country.

Mr. Chairman, our health sector is facing new and emerging problems. The age old problems of the lack of adequate facilities and the alarming patient-health professional ratio, the issue of quality of drugs, the lack of emergency response facilities, all these still persists. As the nation is grappling and finding solutions to these age old problems, we have a new and emerging health concern, “Antibiotic Resistance” creeping in. The theme of this conference *“who is winning the antibiotic resistance war; bacteria or man?”* has been a topic for discussion at an informal level for many years now. Health professionals usually deliberate on this issue and I am very delighted that it is being discussed at such a formal and international level. In Ghana and indeed in other low income countries in Africa, diseases of bacterial origin are a major cause of death. The sad thing is that many of these conditions can be prevented with simple actions such as personal hygiene, immunization and environmental sanitation. However, these seemingly free actions are usually replaced with the expensive alternative which is medication. It has become evident from research as you would realize in this 3-day conference that the use of antibiotic drugs is the most preferred by both patients and doctors. In a country where antibiotics are readily available everywhere, this raises a cause for concern. Antibiotics in this country are available over the counter, in cars, in market places and even by the side walk. If you look hard enough you will get some antibiotics. The issue that arises out of the inappropriate use of antibiotics is that it leads to drug resistance so when someone is in dire need of the drug it will not work. The other worrying aspect of this issue is the abuse of antibiotics by doctors. Patients may take these drugs without prescription and that’s not good but sometimes some health professionals are too quick to prescribe these drugs to the patient. This means that the problems need to be tackled on two levels; at the level of the clients that we have and at the level of the physicians who prescribe the antibiotics. Doctors need to painstakingly research into the cases presented by the patient and make a proper diagnosis before prescribing antibiotics and the patients must also not self-medicate.

Ladies and gentlemen, I believe this problem is serious enough to warrant a strict policy of only selling antibiotics when there is a prescription. We must move from a position of simply talking

and expressing concern for such issues and actually take steps to tackle them. Finally, I would like to say that it is my hope that the discussions that would emerge out of this conference will be translated into action. Let us address the issue of antibiotic resistance head-on. Let us all join forces to help march and win the antibiotic resistance war. Mr. Chairman, I wish all participants a successful conference and I pray that you will enjoy every good thing that comes out of it. Thank You.

✚ Address by Ministry of Fisheries and Aquaculture by Dr. Peter Ziddah

Mr. Chairman, the ministry has seen this conference as a collaborating factor. Most of the works that have been done on antibiotic resistance have been on the human side neglecting the animal side. The ministry is therefore trying to collaborate with our counterparts in the medical field so that we have the veterinarians also contributing towards this antibiotic resistance. We would have to include veterinarian, especially the animal production aspect of it, to help fight this looming trend of antibiotic resistance.

Aquaculture has developed in Ghana for the past 8 to 10 years from a production rate of 2000 metric tons, we now have a production of over 40,000 MT and there is a looming use of antibiotics. We fear that problem and it has always been our warning that we drink from the Volta lake and the Volta lake happens to be the bulk of the production of these fish that we eat and with the input of antibiotics into the lake, you might not only eat the Tilapia, you might drink the water. In 2010 we had the case of pesticides killing fishes in cages. You would be surprised that the fishes that were killed were 50 grams and above. We can all remember the death of the whales in Ghana recently where some people were blaming the oil companies but there are other attributes to that. The ministry will like us all to collaborate, do monitoring, do surveillance, also in animal not only in humans.

Thank you.

✚ Address and Launch of Conference by Hon. Yieleh Chireh, Chairman of Parliamentary select committee on health

Professor Chair, Representative of WHO in Ghana, Prof. Ag. Provost, Prof. Mercy Newman, Representative of the Fisheries ministry and all the important people present (directors, scientists and all delegates/participants to this conference). I am going to present a statement that would have been made by the minister on behalf of the Vice President, since they could not be present.



Hon. Yieleh Chireh addressing the conference

Distinguished participants, it is a pleasure for me to be here today as we discuss a topic of critical importance to our health and survival as a people especially in sub-Saharan Africa. The theme for this conference "who is winning the Antibiotic Resistance War: Bacteria or Man?" is one that should be of grave concern to everybody. A few decades ago, practitioners in the field of medicine had in their hands a very powerful tool against many infectious diseases. We made unprecedented strides in averting deaths especially among children. Today we all recognize that these massive gains have added threats from the emergence and spread of microbes resistant to the array of medicines. Reports from different parts of Nigeria have observed temporal trends in the prevalence of resistance among enteric organisms such as E. coli. Studies in other parts of the world have revealed that routine use of these drugs is often associated with a rapid increase in the proportion of resistance strains.

Mr. Chairman, the problem of resistance did not start yesterday. Not long after he discovered penicillin, Alexander Fleming identified staphylococci that were resistant to the first drug. He correctly predicted that imprudent use of antibiotics might lead to clinical failures of these drugs in the future and since his warning, the lifespan of almost every antibiotic has been diminished by the acquisition of resistance by the bacteria. Mr. Chairman, if we do not do anything now we may lose the battle against the bacteria especially those of us in low income countries where diseases caused by bacteria are major causes of death and self-medication is the norm. Prudent use of antimicrobials and prevention of infection must be a health sector concern and priority. In Ghana, almost everyone is a "Doctor". When you have a headache you would self-medicate, where perhaps all you may need will be a good night sleep. When you feel feverish, you immediately conclude it is malaria and you take antimalarial drug. Sadly this quick resort to medication is not only done by patients but by doctors as well.

Mr. Chairman, the focus of this conference is an emerging medical concern which needs all of our attention. Research has shown that many of the lives lost as a result of diseases of bacterial origin would have been saved if simple measures such as personal hygiene, immunization and environmental sanitation were practiced. We need a holistic approach to the issues of AMR. We need to create a platform for constant engagement with all relevant sectors responsible for human and animal health, agriculture, environment and research. It is clear that effective surveillance must be established to monitor the use of antimicrobials and the occurrence of resistant bacteria in human, animals and throughout the food chain. The prudent use of antimicrobials seems to be the best strategy for now and so we must develop mechanisms for this to be actively encouraged and pursued. We must develop policies on the sale of both human and veterinary antimicrobials and start aggressive regulation of these commodities.

Mr. Chairman, transnational research on antimicrobial resistance should be a priority among African countries and so we must encourage our various governments to consider investing in the area. Your meeting here today is a reflection that AMR is a problem and we in Africa must begin to develop an African response based on our peculiar challenges. Resistance can spread between humans, animals, in the environment or through the food and so our strategies must consider our local conditions in developing such responses. We must begin to change long standing practices and attitudes of our people and work with the scientific community in developing our response. Mr. Chairman, the fight against AMR will not succeed without the effort and commitment of our Governments. I hope that by the end of this conference we would

send a message out very clearly. For us in Ghana, I wish to emphasize our firm commitment towards engaging with other African countries, stakeholders and non-health partners to ensure optimum implementation of recommendations of this conference. On this note, I wish to also add a warm welcome to all of you; participants and delegates and also have the pleasure to declare that the 1st African Conference on Antibiotic Use and Resistance is duly open. Thank you.

✚ Chairman's closing remarks by Prof. Alex Dodoo

It has been a very good morning, a very engaging and enjoyable morning but we are talking about very serious issues. Am sure all of you have heard that there have been demonstrations that some artemisinins are now resistant in the Cambodia-Thai border and those of us who are beyond a certain age, you remember what happened when chloroquine become resistant in Ghana. Currently, most of us cannot remember the last time we had malaria because the number of circulating parasites is few. If artesunate goes the way it is threatening to go, malaria will be back and this time it may not come back with a smile. So we have a lot to do as the Danish ambassador said, the world economic forum said antibacterial resistance is a global threat, the WHO country representative has told us clearly that at the world health assembly this year, antibiotic resistance is going to be an issue. We have heard from our own ministers, the threats of antibiotic resistance to human health as well as fishes and the ecosystem as a whole. We therefore have to act now.



How do we go forward? I think first and foremost, we must engage the public. I know Daily Graphic and Ghanaian Times are here. More engagement is needed from the media to champion issues concerning antibiotic resistance. Their demands are usually understandable but not acceptable. But that demand also comes back to all of us that what do you tell a mother whose baby has a fever? It may or may not be pneumonia. If there are no health facilities would you blame this woman for taking whatever is being sold and giving it to the child? We have a job to do and we can either be very academic and say that it is wrong or can be practical and say that people need treatment and if we do not provide effective treatment at affordable rates, they would do what it takes. It's not good, it's not acceptable but what are the options for them? I think it's a shared responsibility. We have been told antibiotics resistance are a global threat but we also know that antibiotics are a global good and very soon we would be held accountable if we misuse these global goods. Governments everywhere are setting up committees to look at it and I am hoping that the African Union will come out very soon with its own statement on the threat of antimicrobial resistance.

Prof. Mercy Newman said that “let us share and gain knowledge”. I am looking at you the young and not so young to help move this forward. We talk about the time for African renaissance. The whole point of ADMER is to build capacity but that capacity should be people who are assertive, who don’t just want the papers; you need them of course but beyond the papers you also must try and influence society. I teach in the University and I don’t like universities or academics who don’t want to make a difference. It’s painful, you will be criticized, you will have all sorts of problems but that is your job. You are in a privileged class. The pains which come with it is because of the privilege which comes along with it. We need more research and more researchers and we have seen the beginning. Please let not ADMIR die because the funding died. That will be catastrophic. I am begging you. If it dies, then it means we did not believe in it in the first place. Let it not die. We need better surveillance and better surveillance for antibiotic resistance is going to be better surveillance for health care. We need better health systems. We have come a long way and I can see from this room that we are building the needed capacity. Let us not fail. Let us win the war. Thank you.



Dignitaries and Participants at the opening ceremony

CONFERENCE PRESENTATIONS

The presentations at the conference were on the topics outlined below. Details of the presentations and discussions have been annexed to this report.

SCIENTIFIC SESSION 1

Chairs: Martha Gyansa-Lutterodt and Prof. K. Obiri-Danso

1. “Antibiotic Resistance and Human impact – a global threat” by Prof. Neils Frimodt-Moller, Denmark
2. “Ecosystem View of Antimicrobial Resistance” by Prof. Denis Byarugaba, Uganda
3. Laboratory-based AMR surveillance in Ghana – Preliminary results by Dr. Japheth A. Opintan, Ghana

SCIENTIFIC SESSION 2

ANTIBIOTIC RESISTANCE ISSUES IN ENTEROBACTERIACEAE

Chairs: Dr. Japheth Opintan and Prof. Niels Frimodt-Moller

1. “Extended Spectrum Beta-lactamases (ESBL) in E.coli – from feecal carriage to infection” by Professor Karen Krogfelt
2. “AmpCs, ESBLs and Carbapenemases in Ghana – From feecal carriage to infections” by Noah Obeng-Nkrumah, PhD (ADMER Project)
3. “Antimicrobial resistance of *Salmonella* spp. Associated with Humans and Poultry in Ghana” by Linda Andor, PhD (ADMER Project)
4. Presentation by MSD Pharmaceuticals by Pharm. John Chun, West Africa Brand and Customer Manager
5. ReAct’s activities in Africa by Dr. Murfin Mpundu, Executive Director, EPNA/Africa Coordinator, ReAct.

SCIENTIFIC SESSION 3

QUALITY OF ANTIBIOTICS

Chairs: Prof. R. Adosraku and Prof. Alex Dodoo

1. “Antibiotics in Ghana – Direct and indirect exposure” by Prof. Bjarne Styris have
2. “Quality of antibiotics sold by hospitals, pharmacies and vendors in Ghana” by Samuel Bekoe, PhD (ADMER Project)
3. “Detection of Mutations by MAMA PCR of Quinolone-Resistant Isolates of *Escherichia coli* from Kumasi” by Philip El-Duah

SCIENTIFIC SESSION 4

ANTIBIOTIC RESISTANCE IN GRAM-POSITIVE ORGANISMS

Chair: Prof. Obiri-Danso

1. “Pneumococcal Antibiotic resistance in Africa” by Dr. Eric S-Donkor
2. “Nasopharyngeal carriage, serotype distribution and multi-drug resistant pneumococci among Ghanaian children under six years of age” by Nicholas Dayie, PhD (ADMER Project)
3. “Nasal Carriage, Antimicrobial Resistance and Population Structure of *Staphylococcus aureus* in Ghana” by Beverly Egyir, PhD (ADMER Project)

SCIENTIFIC SESSION 5

1. Phytochemical and antibacterial evaluation of roots extracts of *Alchornea cordifolia* with particular reference to MRSA by George Pesewu
2. Occurrence of antimicrobial resistant *Escherichia coli* and enterococci in pigs, poultry and humans in Kumasi, Ghana by Karin Malmros
3. Symposium by AstraZeneca

SCIENTIFIC SESSION 6

ANTIBIOTIC USE

Chairs: Prof. R. Adosraku and Prof. Denis Byarugaba

1. “Antibiotic use in animal health practice in Ghana and implications for human health” by Paa Kobina Turkson
2. Antibiotic use in animal health practice in Ghana and implications for human health by Paa Kobina Turkson
3. Antibiotic Stewardship Program by Dr. Philip Ikeme
4. Evaluation of Inhibitory Potentials of Single and Combined Antifungal Agents on Human Clinical Candida Species by Yetunde A. Ekanola

SCIENTIFIC SESSION 7

ANTIBIOTIC RESISTANCE IN OTHER GRAM-NEGATIVE ORGANISMS

Chairs: Prof. Anders Dalsgaard and Prof. Mercy Newman

1. “Antibiotic Resistance in Meningococcus – treatment implications” by Dr. Juventus Ziem
2. “Salmonella blood infections in a tertiary care setting” by Dr. Appiah Korang Labi
3. Antibacterial use and appropriateness at the accident and emergency department of a teaching hospital in Ghana by Daniel Appiah

SCIENTIFIC SESSION 8

ANTIBIOTIC POLICY

Chairs: Dr. Mirfin Mpundu and Dr. Kwame Buabeng

1. “Water quality assessment of swimming pools and risk of spreading antibiotic resistance” by Dr. Courage K.S. Saba
2. ”Anthropological study of antibiotic prescriptions and use in Ghana” by Gifty Sunkwa-Mills, (MD, MA International Health)
3. “The Knowledge, Perceptions And Practices Of Prescribers On Antibiotic Use And Resistance In The Brong Ahafo Region Of Ghana” by Ellen Abrafi Boamah
4. “Antibiotic policy in Ghana: The way forward – how do we go from here?” by Martha Gyansa-Lutterodt, (Ministry of Health, Ghana)

PANEL DISCUSSION

ANTIBIOTIC POLICY ISSUES IN LINE WITH THE GLOBAL ACTION PLAN

Chairs: Dr. T. K. Adiku and Prof. Denis Byarungaba

Statements were made by Dr. Kwame Buabeng, Dr. Mirfin Mpundu, Mrs. Martha Gyansa – Lutterodt and Mrs. Edith Annan after which there was a general discussion. The statements and discussions have been transcribed below.

- **Dr. Kwame Buabeng**

“I think most of the issues have already been addressed. The good thing is that we all acknowledge that we have a very serious issue on hand. The problem of antimicrobial resistance is a serious health security risk. Lots of scientific work to really highlight the problem, has been done. We have to move on and try to look at what we can implement and implement it very well, what we don’t understand, we try to find some more information to try and understand and move on. I think we are not doing badly. We just have to take some actions now to be able to deal with the issues.”

- **Dr. Mirfin Mpundu**

“I think I will join Denis to say that there is a lot that the rest of Africa can learn from Ghana and we are looking forward to Ghana’s success. I was in a meeting over the weekend and the director of health services in South Africa said they came to Ghana to learn about hand washing. So you are doing very well if South Africa thought they could come and learn something from you but unfortunately, just a few minutes after he had said that a colleague from here said wow we are going down on that. So we are looking up to you to succeed and I think there are a couple of things that I wanted to mention. One is that whenever we are looking at these things we have to look at it also in the context of the globe that we live in. We are not just Ghana. We are part of the larger world and what was said earlier was in context of the global action plan. One of my recommendations is that when we look at the global action plan it belongs to the world and we have to make resolutions to WHO to be able to mandate organizations that would ensure that the action plans are put into practice or are implemented. If Ghana implements, Gambia doesn’t, Liberia doesn’t, Zambia doesn’t, Cameroon doesn’t, then all the work of Ghana is going to flop so we have to find ways of making these resolutions that we can support at the world health assembly. Secondly, the issue of stringent measures; we have to be very very careful because that has been tried. In India they tried to ban the sale of all these antibiotics and they got the pharmacists to register what medications that they sold and it never worked. They learnt a hard lesson. One of the other things that I want to mention is the lesson that I learnt from South Africa. They wanted to focus on the basic hygiene and that’s washing of hands. They said if we can just manage this it would be good. It’s a problem. They thought that they should engage industry so they called all the organizations that produce all the detergents and had a meeting with them. We have to engage industry and find a way in which they can possibly help.”

- **Mrs. Martha Gyansa - Lutterodt**

“I must say that since 2007, at the world health assembly, we have been mandating the secretariat of the WHO to do some specific things and in 2014 we categorically requested the WHO to work with countries to come out with the global action plan. So the global action plan is every country's action plan and therefore it is important for us to get a good buy in. In moving forward I would suggest that there are key strategies within the global action plan that involves countries that also involves the global community. One of them has to do with surveillance. Surveillance is the only way we can know what is working well and what is not working well. The diagnostics are not available and I recall that when the ADMER team was training our staff they had to use their own diagnostics to be able to give knowledge to these our staff but how do

we get these diagnostics? That is where I will agree with my colleague Mirfin that it is important to engage industry. Is it possible for us to come out with a diagnostics that can be easily accessed, affordable and accessible to countries? That is also the first step because if for instance we keep on treating without diagnosing what we are doing, that is also a recipe for disaster. I think that the area of surveillance is very strategic for everybody and every country. Nobody can set that system up for us, we have to try. People will come and help us so I will still say that that is an area that I think the universities can play a major role. They should not shun away from it. They will help us and help our facilities to do a good surveillance programming. Issues about quality of medicines on our markets are also of concern to us. It's true that we are in West Africa and we have free movement of goods and services across our borders and therefore if for instance Ghana takes all the measures, we would not be able to achieve that target unless every country within the sub region begins to do something about the quality of the products and I believe that this is another area that the global action we can have a concerted effort to ensure that we improve the quality of the products. We would not get to zero but we should be able to improve as we measure from year to year to see how we are doing regarding the quality of the product. We know that we have 40% of quality issues within Ghana but how do we know we are improving unless we continue to measure and see whether we are improving in the area of quality of medications. I agree that with the global action plan it's very important that we have a concerted effort, what is that concerted effort going to do? All the big players, the industry, financial institutions, just have to come together to ensure that just like the way we started with the MDGs, people are putting money into it and making sure that we are meeting the goals, this is also a health security threat that we need the same enthusiasm and the same collaboration to ensure that we are coming up with new products, management arrangements, correct partnerships to ensuring that we are getting value for money. That is why everybody is important to move forward the global action plan.”

- **Mrs. Edith Annan**

“I would also want to continue with the global action plan. I think the ministers of health of the countries signed to implement the resolutions that are made at the WHO headquarters and so when they come back they are supposed to share those resolutions and it is up to our CSOs to take up those resolutions and ask government to implement them and to support the government to implement them. We cannot always depend on WHO to come down and ask us to implement resolutions that we have signed to implement. So we all need to enforce the implementation of these resolutions that we take up there when we come back. I want to talk about promotion. Most of the studies you have done have not looked at promotion. Promotion of antibiotics by industry and the incentives that they give us to prescribe. Those are also helping to increase the level of resistance in countries. People are given incentives and so when they have to prescribe, they prescribe 3rd generation antibiotics when we haven't even tried our 2nd generation and 1st generation. I also want to talk about data. Nationally, we have to get a national repository when we are undertaking surveillance. There should be a place where we can post the data and share globally. We haven't looked at that yet and I think that that is something that we have to consider if we want to reduce AMR.”

Comments and Discussions

- *“I want to talk about the infection prevention and controls; where to start from and who to implement it. It seems so big and so wide it’s almost impossible to even think of how to go about it but I was privileged to work in a district hospital which is in the western region for about three years and I realised we did something which I think should be shared so that other people can also do. When the Ebola crisis broke out, where we worked is a hospital that has a lot of doctors and it has a lot of things that we do and so people from everywhere including Cote d’Ivoire and Burkina Faso would travel miles to come to our hospital and so we knew that if Ebola would come into Ghana through the western border we would be the first to get it and so there and then, we ourselves, the doctors and the health professionals there just did our own training in-house. We went on line, we researched and did everything. We made sure that every single member of the hospital whether you are a cleaner or a nurse or a doctor, you had to do the hand washing and it was practical and at the end of the day we told them that it’s something that they had to continue. Another thing that we had in our hospital was that there were peer reviews so every year we have hospitals in the western region from the regional hospital to the district hospital, we would all come to one hospital and grade it. They grade your environment, they grade your infection prevention control, your theatre etc. and at the end of the day they tell you your results and if at the end of the day every hospital gets their results, they rank you in a league table and this was taken very serious. We have to start using peer reviews in almost all the hospitals. It would push people to do the right thing and push people to do the infection prevention control and not only just timely peer reviews but impromptu. We also have to use quality improvement methods whereby each hospital should be trained to look at their system. Why is it that you are not doing X and how can we improve without buying anything? How can we improve the system? “*
- *What you said is happening in most of our regions. So far 8 regions do it regularly. Late last year, the tools were reviewed and would be disseminated very soon. It is part of the health sector outputs for all regions. There is a national lab policy so we need to look at it and see how we can also add it to what we are doing.” Dr. Cynthia Bannerman; in charge of quality assurance and co-chair of the monitoring task force.*
- *It is very clear Ghana has come a long way. In your policy programme, how are the other ministries, for example the new Ministry of Aquaculture and Fisheries and other important sectors really on board and how do you take them on board?*
- **Answer:** *“We are already engaging the veterinary, we are engaging them. They are members of the technical task team and they have told us what their needs are and these are all in the framework document. We have also been lucky because the Minister for Fisheries used to be the Minister for Health and she is still committed to dealing with the antimicrobials. People from the environment have been part of our platform. We recognize the need to engage all these sectors that is why the platform is not just for the policy. We intend to continue with this platform work. We are working together with them and we are learning from other countries that have gone through this before.*
- *“I stand on behalf of civil society to thank Ministry of Health for getting the CSOs on board. It’s really an eye opener to many of us. It’s so interesting that working with the traditional leaders (queen mothers), they have come up with a surveillance group in their communities. In the region where this programme is taking place, we have a very high*

number of quack doctors who are always on bicycles selling antibiotics and different drugs to villagers. After training these queen mothers, what they are doing now is that when they see you selling those drugs, they bring you to the chief's house and they ask you to open the drugs and if they see antibiotics in the drugs that you are selling, they take it from you and throw it away and they warn you not to come into their communities to sell these things again. I just want to let you know that involving civil society in the fight against antimicrobial resistance is very important and its one of the success stories of the ReAct project in Ghana. I think the awareness is quite high in Ghana and we are happy as civil society that we are also contributing our quota to the fight against AMR.” Mrs. Cecilia Senoo, Hope for Future Generations.

- *As it is now, we don't have a database for a lot of the studies that are going on in the country but from this conference you can see that there is a lot of things going on with regards to AMR in this country and to drive policy, we should think about developing a repository. Somebody should actively be looking out for studies that have been published from this country and put it there so we can access it so we use it to inform policy while we work on building a database for the country.*
- *We need to educate our political leaders to become strong advocates at all levels. We should consider bringing these political leaders to educate them so that they can take it up from there.*
- *It's unfortunate that we are all talking about AMR in developing countries but we don't put the antimicrobial development attached to it. We don't need to be end users of antimicrobials from other countries we can also do something about antimicrobial development.*
- *I think before we think of more rules, we should make sure that we are keeping up with the ones already there.*
- *Resistance is being caused by substandard drugs, irresponsible prescribing and the like but I think that most health workers also think that the issue or the problem that is really driving this resistance is the ease with which our lay people get access to the antibiotics. As part of the policy, what have you developed or what policy recommendations have you made to control the easy access to antibiotics. In Uganda, there is a law that restricts access to antibiotics but unfortunately, you can still access antibiotics from anywhere. That's why we should consider the implementation or enforcing the laws already in place.*
- **Responses:** *Enforcement of legislation is the problem in this country. There is a law that you cannot give antibiotics without prescription and it is flouted. The laws are there but how can we enforce them? We are the people flouting the law and we turn round and say the laws are not being enforced. People go to the pharmacy and if they are not given they lose business. So how can we help with enforcement of the law? You can develop standard treatment guidelines, essential medicines list and if health workers are not applying them what was the use of doing that? Incentives; in this country we have been monitoring rational use of antibiotics for a long time but are those who are adhering to the rules being rewarded and so is there that will to even continue? Reward systems and sanction systems are not working and we need to do something about that.*
- *It's interesting that one of the reasons we are here is our interest in the subject. I want to throw a challenge to you. In order for some of these things to work, in your facility you can be an AMR champion. You must be the champion, championing that cause. Each one*

of us can make a difference. If people realize that they are being monitored and they will do the right thing. You need to be that sort of a champion wherever you are. What we need to do as small steps, wherever we are, we can make small gains and all of us can contribute to that.

- *Who is going to do the enforcement? Sometimes because duties are duplicated nothing ends up being done. The NHIA should be involved. Before every new doctor is inducted, they conduct a three day ethics session and if you are absent there is no way you would be sworn in and you would not get your license to practice so if we could try and insert some antimicrobial policy/ regulation in that three day session, I think it would make a lot of impact in the new crop of practitioners.*
- *How much are we involving the media? Are we bringing the information through the media? The issue is how do we interest the media in these issues we are talking about?*
- *We are hearing a lot of things. Even the microbiology labs we have do not have the simple items but how can be gather data if we are not able to work and get the data? It seems most of the time the clinical laboratory is put aside. We need to equip the labs to do a better surveillance and data collection.*
- *There should be surveillance of drug stores and chemical shops.*

CLOSING CEREMONY

To officially close the conference, a very short ceremony was held and chaired by Prof. J. A. A. Mingle, Medical Microbiology, School of Biomedical and Allied Health Sciences. The statements made by the various speakers have been transcribed and presented below.

Opening Statement by the Chairman, Prof. Mingle

I am sorry I could not be here throughout the period but it would interest you to know that I was at another forum where they are discussing resistance to anti-retroviral drugs yesterday and the whole thing boils down to the fact that we are talking about the microbes; bacteria and the viruses. How do they get resistance to the drugs that we are using? It seems they are maneuvering to survive therefore the bottom line for us to also overcome them and to win the war is to maneuver so we can also survive otherwise they will eliminate us.

I have heard so many presentations and from the panel that just finished, I have learnt a lot and going through the programme I realized you have covered a lot of grounds. I hope you would take these messages with you and if you implement these things am sure we would win the war. There was a comment about hand washing and I want to share just small information with you. Those of you who know about the “Apollo” eye infection, when it happened in the early 1970s there were outbreaks all over the place. It may interest you to know that none of the workers in the ophthalmology unit came down with the eye infection. How did it happen? I was happy to hear one of the panelists today that, you need to have a champion in that field. The champion made sure that all the nurses washed their hands before they entered the clinic, they washed their hands before they leave and this was documented in the Lancet. None of the workers in the clinic came down with “Apollo”. So that tells us that if we have a champion who would lead us in what we want to achieve, am sure we would overcome the viruses or the bacteria and we need the champions and I can see the champions in all of you here.

Statement by the President of the Organising Committee, Prof. Mercy Newman

Good afternoon distinguished ladies and gentlemen. Mr. Chairman one of the main objectives of the ADMER project was to train researchers so that we are going to have people in the field. I know you would agree with me when I say that for that particular objective, we did it. We have fulfilled that objective and this conference shows that we have got the researchers we need. Young brilliant ladies and gentlemen and we have been able to so far as we can disseminate the findings of our research to as wide a group of the stakeholders as possible both in Ghana and abroad. We hope that you would go back to your hospitals, your labs, where you are teaching, whichever area you are in to spread the AMR message to whichever corner you are coming from and that in addition to spreading the message, you let people know that we need to change our work practices and also our attitude to drugs; not only antimicrobial agents but other drugs which we have in the health system. We have heard about agriculture and fisheries throughout the period we have been here and we all agree that we need to do some more research in this area so that our work would be complete. We can't talk about global village without the fishes and the animals so we have to bring them in. We need a lot more veterinary people to be part of this group. We also need interdisciplinary research urgently so that we would supplement each other and our research findings would be used by other researchers so that we would be able to analyze what is happening better.

Last but not the least, I think we have talked about antimicrobial stewardship several times during these few days and I wish all the healthcare workers here would take that as a major item which health care facilities need to attend to. We've ended by discussing policy; several issues have been raised. I would suggest that whatever policy we determine, we make sure that implementation starts immediately because we have policies which have been determined for years. They are in the books and as I said, if you have the knowledge and you are not putting it into practice then it doesn't add anything at all to our work.

I would like to end here by saying that all this work could not have been done without the financial support of Danida and they need a clap for that. We also need to clap and thank our supervisors, all the people who supervised the PhD and MPhil students. They have all put in a lot of work. It's not very easy supervising people under these conditions and everybody has done very well that is why we have such good quality results. Last but not the least, Ministry of Health, without them, we couldn't have done any research in facilities in this country so we thank you very much. We hope that the cooperation we have from you would continue because research is a never ending piece of work. So thank you all very much for helping us to train our students who have actually started getting their PhDs already. Thank you all very much.

🚩 Remarks by the Head of Department of Medical Microbiology, Dr. T. K Adiku

Mr. Chairman, Ladies and gentlemen. I think we have all taken a lot from this conference. Definitely, we are all resolved that the microorganisms will not win the war against us. We are going to win the war so we are all resolved that from now onwards we would take all the things that we have learnt from this conference, put them into practice and then definitely the victory will be ours. Thank you very much.

🚩 Closing Remarks by the Chairman, Prof. J. A. A. Mingle

Am sure we have all resolved to win the war. Do we agree on that? So the war is already won and I am sure with our collective knowledge we would overcome the collective knowledge of the microbes because that is what gives them the resistance. They try to come out of what we are doing to suppress them and through that they are able to survive. Definitely, we have what it takes for our survival. So many things that we have learnt from here, let us in our own way implement some of these and am sure we would come on top of everything.

Ladies and gentlemen, am sure we have had fruitful interactions during these past few days. Let us remember that we need to overcome these microbes and I wish each and every one of you safe journey back to your stations, your countries and let's continue the war. Thank you.

CONCLUSIONS AND RECOMMENDATIONS

General Conclusions

- The problem of antimicrobial resistance is a serious health security risk.
- There is generally a high AMR across Ghana.
- Antibiotic resistant strains in animal isolates and antibiotic residues in food animal products exist in Ghana.
- A third of all antibacterial prescriptions are considered inappropriate.
- Antibiotic-use should not be addressed in isolation, but in the context of general misuse of medicine
- There is the need to continue multi-stakeholder platform work; continue working with academia and research institutions in surveillance, drug development and continuous research to improve antimicrobial use etc.
- Appropriate Infection control strategies in hospitals and Communities plays a critical role in the fight against AMRs.
- Simple practices such as hand washing and personal hygiene are the best ways of reducing AMRs.
- Periodic reminders to all stakeholders in the hospital on the issue of antimicrobial resistance and the importance of appropriate prescribing.
- Pharmaceutical companies are giving prescribers incentives and so when they have to prescribe, they prescribe 3rd generation antibiotics when we haven't even tried our 2nd generation and 1st generation.
- There is inadequate infrastructure and capabilities for diagnostics. Our laboratories must be equipped to do better surveillance and data collection. Countries need to seek ways to provide more effective and better quality of diagnostic facilities

Recommendations

Surveillance

1. Active surveillance & continuous monitoring of AMR is urgently needed to provide adequate data.
2. There is the need for an expanded monitoring framework
3. Set up systems for monitoring, evaluation and surveillance of drug resistance and residues in food from animal origin.
4. Meningitis surveillance should be strengthened in countries within the meningitis belt in detecting epidemics
5. Set up a surveillance system to monitor pneumococcal serotype distribution, antimicrobial susceptibility patterns as well as emergence and spread of resistant clones.
6. There is the need for adequate infrastructures for effective MRSA surveillance and patient management in Ghana and other African countries.
7. We need to institute routine screening for ESBLs in hospitals to save patient lives and to conserve economic resources

8. We have to get a national repository. There should be a place where we can post data and share globally.

Policy and enforcement of regulations

1. Policymakers should regulate and promote appropriate use of medicines
2. Access to antimicrobials should be strictly regulated
3. Seek ways to provide more effective and better quality of diagnostic facilities
4. Policymakers should strengthen resistance tracking and laboratory capacity
5. Policymakers should promote cooperation and timely sharing of information among all stakeholders
6. Standard operating procedures should be revised to meet international standards
7. Policy makers should link surveillance data with the selection of antibiotics
8. One Health Approach to AMR issues should be adopted.
9. Treatment guidelines for Animal use should be developed
10. Establish and enforce quality control checks for all veterinary inputs imported or made in Ghana.
11. Align and contextualize within existing policies on medicines; Infection control policy, National Medicines Policy, Essential Medicines List
12. Antibacterial use policy for health care professionals, involving all stake holders should be developed and must be implementable.
13. Policymakers should foster innovation and research and development of new tools towards antibiotic use and resistance.
14. Strengthen school health programmes by providing primary and secondary school pupils with focus on disease etiology, medicines and antibiotics
15. A nation-wide systems of mobile phone messaging for providing information to patients should be established
16. The government agency responsible for ensuring the sanity of swimming pools must organise regular training for caretakers of swimming pools and invite experts to talk to them about AMR.
17. There is the need for broad policy framework ; Antimicrobial resistance versus Antibiotic access, Community education and Sociocultural change interventions

Advocacy, Dissemination and Collaborations

1. There is an urgent need to develop and sustain a formal platform from which rational prescription, use and antibiotic resistance information can be disseminated for improved services delivery, regarding the management of microbial infections.
2. There is the need for more collaboration at national, regional and global levels. We have to improve collaboration and partnerships with other countries and Institutions as outlined in the Global Action Plan
3. We need to increase advocacy on AMR issues.
4. Engage and train CSOs to be involved in AMR education and advocacy activities at all levels especially at the community level

5. Poor knowledge, negative perceptions and low level of practice of withdrawal period by farmers need to be tackled through extension education
6. Promoting the one health approach to curb ABR.
7. We need to engage industry and find a way in which they can help.

Prescription and Health Care workers

1. Prescribers should prescribe and dispense antibiotics only when they are needed
2. Prescribers should prescribe and dispense the right antibiotic(s) to treat illnesses.
3. Prescribers should confirm diagnosis before treating
4. Seek ways to strengthen the review and control of prescribing practices overall and of antibiotics specifically
5. Prioritise the dialogue with patients: consultations are windows of opportunity to share important information with patients.
6. Clinical activities in Ghana's three northern regions should be coordinated for optimum output perhaps with the help of post graduate project
7. Continuous professional development must be regular
8. There is the need to train more prescribers

Research and Development

1. More Research and development is needed in the area of AMRs. For instance research is needed in Antimicrobial use practices to identify barriers hindering appropriate use of antimicrobials.
2. Regular evaluation of antibacterial consumption data to better understand our antibacterial consumption trend over time among various sections of the health care facilities.

ANNEXES

LIST OF PARTICIPANTS

1. PROF. ANDREW ANTHONY ADJEI
2. FREEMAN KAFUI FIANOO-VIDZA
3. DR.SAMPSON ABOAGYE
4. DR.KWAKU BAMFO BANDOHO
5. DR.JOSEPHINE SACKEYFIO
6. DR.ENID OWUSU
7. DR.ELIZABETH AGYARE
8. GLADYS KABA
9. DR.ADENIKE A.O. OGUNSHE
10. DR.THELMA OHENE-AGYEI
11. PROF.KWASI OBIRI-DANSO
12. MICHAEL OLU-TAIWO
13. COMFORT HAMMOND
14. DR.SOLOMON OCQUAYE
15. DR.FREDERICK ANKAMAH
16. PRINCE ZOWONU HORLORTU
17. JUDITH ESINAM YABANI
18. EMMANUEL FRIMPONG ADJEI
19. DR.J OLIVER-COMMEY
20. PROF. NIELS FRIMODT-MOLLER
21. DR. JAPHETH A. OPINTAN
22. DR. MARK TETTEY
23. REV.DR. THOMAS A. NDANU
24. ANNE METTE LERBECH
25. ANDERS DALSGAARD
26. KAREN KROGFELT
27. MARIANNE NOER HJORTH
28. JOHN NUSEDONU YAW
29. DR. CALLISTUS B. KUUBIERE
30. FRANCIS KWAME MORGAN TETTEH
31. GIDEON OBENG
32. THOMAS KWESI DANKWAH
33. BRONWEN HOLLOWAY
34. DR. KWAME OHENE BUABENG
35. ISABELLE E. ASHLEY-AGBEDOR
36. FARRID BOADU
37. NANA E. ADADE
38. DR.URSULA N. MAIER
39. GEORGINA AWUAH-MENSAH
40. HARRIET ABBEY
41. DR. JOSEPHINE IVY MENSAH

42. DANIEL APPIAH
43. ELIZABETH YAA TETTEY
44. PHILIP EL-DUAH
45. MIRIAM BADU
46. BENEDICT K. AWADZI
47. NICHOLAS T.K.D. DAYIE
48. MICHAEL GYASI APPIAH
49. GEORGE KHUMALOR KUMA
50. BRITT P. TERSBOEL
51. LINDA A. ANDOH
52. BEVERLY EGYIR
53. DENIS K. BYARUGABA
54. MIRFIN M. MPUNDU
55. DR. KWAME YEBOAH
56. DR BJARNE STYRISHAVE
57. RUFFINA AKWABOAH BOATENG
58. MAURICE LOMO
59. MAXWELL ADDO
60. DIANA ABA QUANSAH
61. EMELIA O. ARYEETEY
62. EVELYN A. OMANE
63. KODUAH ANANE YAW
64. MARY A. FRIMONG
65. EMMANUEL KUSI APPIAH
66. KELVIN EFFAH-ADJEI
67. AUGUSTUS KINGSLEY APPO
68. STANLEY M. AMANKWA
69. CATHERINE BONNEY
70. DR. ROBERT M. FOLI
71. ALHAJI MODU BUKAR
72. PAA KOBINA TURKSON
73. NAA ASHILEY VANDERPUYE
74. MARY-MAGDALENE OSEI
75. PASCAL HODOGBE
76. ELLEN SAM
77. DR FREDERICKA SEY
78. UCHECHI EMEKA
79. FESTUS NII BOYE BOYE
80. DR. CHRIS AKWESI ADOMAKOH
81. DR. EMILY BOAKYE-YIADOM
82. DR F.E. ABUDE
83. GIFTY SUNKWA-MILLS
84. GRACE AKWA
85. DR. APPIAH-KORANG LABI
86. RICHMOND OWUSU AMPOFO
87. HEIKE DRECHSEL-ATTA

88. ISRAEL MENSAH-ATTIPOE
89. ALHASSAN SA-EED
90. EDMOND ADJEI BOADU
91. SAMUEL E.K ACQUAH
92. WILLIAMS WALANA
93. ONYINYECHI C. WEREKO-DANKWA
94. EBEN ANKRAH
95. CAITLIN SELASSIE TETTEH
96. DR. STELLA GYAMFI
97. DR. HARRY OWUSU BOATENG
98. IRENE AMOAKOH OWUSU
99. ASAFO-ADJEI KARIKARI
100. EDITH APPIAH LAWSON
101. GLADYS OFOSU DADZIE
102. MARTHA GYANSA-LUTTERODT
103. MARTHA EKUA AMPONG
104. DORCAS COFFIE
105. NANCY NARTEY
106. SAMUEL O. BEKOE
107. PROF. PATRICK F. AYEK-KUMI
108. DR. SANDRA OSEI-SARFO
109. DR GABRIEL ATTIPOE-DJAGMAH
110. AKOSUA OPOKU
111. DR. GEORGE A. PESEWU
112. VIDA ANGMORKIE TETTEH
113. ISAAC SARSAH
114. DR. CHRISTINE MENSAH
115. ELYSEE A.B KARIKARI-AGYEMAN
116. REUBEN ESSEL ARHIN
117. GEORGE HEDIDOR
118. DR PHILIP IKEME
119. JOHN CHUN
120. DAVID BOAMAH ACHEAMPONG
121. GEORGE APPIAH
122. VICAR EZEKIEL KOFI
123. MARY ANITA QUIST
124. CYNTHIA FONTA
125. EDITH ANDREWS ANNAN
126. PROF. RICHARD ADANU
127. DR. ABDOULIE BADJAN
128. DR. TANI MAHAMA
129. SAVIOUR K. YEVUTSEY
130. AMMA K. KWAA
131. DR. BASHIRU BOI KIKIMOTO
132. DR. MAGDA ROBALO
133. DR.LENUSIA AFUA AHLIJAH

134. DR ALEX OWUSU-OFORI
135. YETUNDE EKANOLA
136. SABINA KWOFIE
137. ABDUL RAHIM MOHAMMED
138. PETERKIN YAKANU
139. RUTH ANGELA YALLEY
140. RITA FOSUAH ADU
141. ABDUL RAHIM MOHAMMED
142. DR PETER ZIDDAH
143. AUGUSTINE SOWAH
144. DR JOSEPH YARQUAH
145. DR RITA OLADELE
146. DR C. BANNERMAN
147. DR. NAA O. ADDISON
148. CECILIA SENOO
149. EDITH GAVOR
150. CHINWE OMOWORARE
151. TEBOGO SHABANGU
152. ABIGAIL AMAKYE-ANSAH
153. KOBBY BLAY
154. AKOSUA BONSU KARIKARI
155. EMELIA OPPONG BEKOE
156. PROF ADOSRAKU REIMMEL K.
157. PROF. MERCY J. NEWMAN
158. ANGELA A. ACKON
159. NOAH OBENG-NKRUMAH
160. DR. ERIC SAMPANE-DONKOR
161. DR. AUGUSTINE K. KWASHIE
162. DR. SAMUEL A. AKAMAH
163. ELLEN ABRAFI BOAMAH
164. MARTHA ALI ABDULAI
165. PRINCE J. PAPP OE-ASHONG
166. RAYMOND D. FATCHU
167. BRABLAN BARNETT
168. DR. ADWOA AGYEMANG BENNEH
169. EMMANUEL ESHUN
170. PROF. JUVENTUS B. ZIEM
171. ANGELA A. ACKON
172. SYLVIA MAWUENA ARKU
173. DR. ELIZABETH S. BANNERMAN
174. EMMANUEL ESHUN
175. FESTUS KORANG
176. MARJORIE NTIWAA QUARCHIE
177. FIDELIS ANUMU
178. MAXWELL AKONDE
179. HANNAH ABA HAYFORD

180. DR. COURAGE KOSI SETSOAFIA SABA
181. SAMUEL DARKWAH