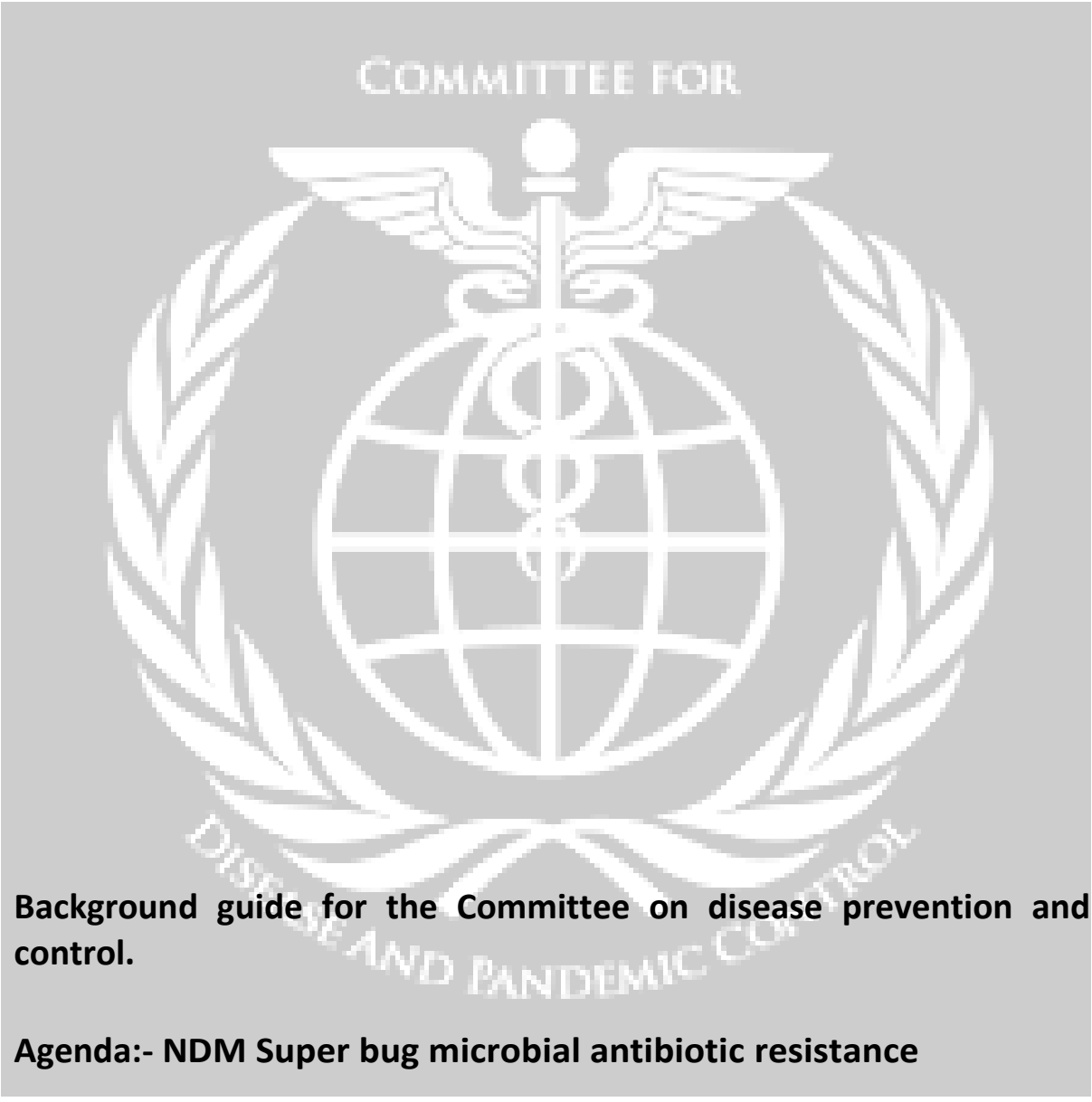
VIT TECHNICAL UNITED CONFERENCE 2017



Background guide for the Committee on disease prevention and control.

Agenda:- NDM Super bug microbial antibiotic resistance

Distinguished Delegates,

Welcome to the Committee of disease prevention and control at VIT Technical United Conference, Vellore. It is our honor and privilege to serve as your Executive Board for the duration of the conference.

Keeping in mind your busy schedules, we have compiled this study guide to help you with your research for council. Bear in mind that the study guide is in no way exhaustive and is only to provide you with enough background information to establish a platform for you to begin your research. We would highly recommend that you do a good amount of research beyond what is covered in the study guide. The agenda that we will be discussing during the conference is "NDM Super bug microbial antibiotic resistance". We have chosen this agenda bearing in mind how pertinent it is in today's global scenario and how it offers much scope for fierce and passionate debate. However, do remember that when you step into the shoes of a delegate, you must leave behind your personal opinions and represent your country to the fullest.

Delegates, for your convenience this study guide will be in form of major questions that beg the attention of readers to interpret and consider the gravity of the situation. This study guide is prepared with an aim of providing you with a basic knowledge of the expectations that we at the executive board have for the debate in the following days. We would be grateful if the preliminary part of our debate is mainly but not entirely based on the topics given in this study guide.

First timers and experienced delegates alike, please go through standard UNA USA Rules of Procedure before coming to council. We will spend significant amount of time explaining the same to you, but it's always better to have a fair idea of how council will function before you step in on Day One. We will be following IIMUN Rules of Procedure in council.

In case you have any doubts or queries, please feel free to contact any EB member and we will get back to you as soon as possible. We look forward to two days of cutthroat diplomacy, solid debate and great fun.

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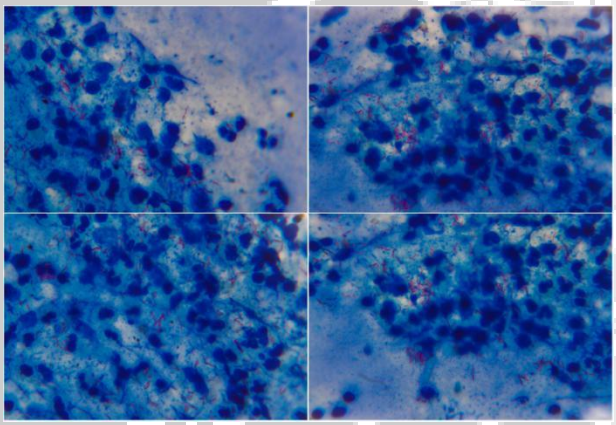
What is NDM-1?

NDM-1 refers to a gene that is carried by some bacteria. A bacterial strain that carries the NDM-1 gene will be resistant to even some of the strongest antibiotics. There are no current antibiotics to combat bacteria that have the NDM-1 gene, and this makes it potentially very dangerous.

NDM-1 stands for New Delhi metallo-ß-lactamase-1. It was first isolated in a Swedish patient of Indian origin who travelled to India in 2008. What led to the emergence of NDM-1 in India is not clear.

It has been found to be widespread in India, and by 2015, it had been detected in more than 70 countries worldwide. NDM-1 itself does not cause disease, but it has the potential to change the characteristics of bacteria. It makes them resistant to antibiotics. In this way, it can lead to a range of conditions, from a urinary tract or bloodstream infection to a wound infection, or pneumonia.



Bacteria that express NDM-1 cannot be defeated using antibiotics.

Carbapenems are the most powerful antibiotics. They are used as a last resort for many bacterial infections, such as E. coli and Klebsiella pneumoniae carbapenemase (KPC).The NDM-1 gene causes the bacterium to produce an enzyme that neutralizes the activity of these antibiotics. The Centers for Disease Control and Prevention (CDC) have classified NDM-1 and KPC as emerging issues in the field of infectious diseases. A bacterium carrying the NDM-1 gene is the most powerful superbug in existence.NDM-1 is different from MRSA, another superbug, because MRSA is Gram-positive, while the infections that carry NDM-1 are Gram negative. They are different strains.

Why is NDM-1 dangerous?

The World Health Organization (WHO) is concerned that NDM-1 could be ushering in "the doomsday scenario of a world without antibiotics." Before the discovery of antibiotics in 1928, many people died of infections that are now avoidable.NDM-1 raises fears that diseases in the future will not respond to antibiotics. If NDM-1 crosses over into other bacteria, secondary diseases will emerge. As they spread around the world, it could lead to a health crisis.

The WHO says that a pregnant woman, for example, could develop a kidney infection that spills over into the bloodstream with a strain containing NDM-1. In this case, there would be no treatment options.

The NDM-1 gene causes bacteria to produce an enzyme called a carbapenemase. Carbapenemase makes nearly every antibiotic ineffective, including carbepenem.Carbepenem antibiotics are extremely powerful drugs that are used to fight highly resistant bacteria when other antibiotics have not worked. Even carbepenem is ineffective in cases of NDM-1.A bacterium with the NDM-1 DNA code has the potential to be resistant to all our current antibiotics, as well as new antibiotics that could become available in the near future. Research is currently under way to find a solution to NDM-1.

How does NDM-1 spread?

The DNA code for NDM-1 can jump from one bacteria strain to another through a process known as horizontal gene transfer (HGT).If NDM-1 jumps to a bacterium that is already antibiotic-resistant, some dangerous infections could emerge, which would spread rapidly between people. These infections might be untreatable.In 2010, scientists were aware that some strains of bacteria, such as E. coli and Klebsiella pneumoniae (KPC), carry the NDM-1 gene. It has since been found that horizontal gene transfer (HGT) is possible between KPC and NDM-1.

Has NDM-1 already spread?

The NDM-1 gene was named after New Delhi, the Indian capital. The gene is widespread in India and Pakistan, especially in hospitals. It initially occurred mainly in India and Pakistan, and specifically in New Delhi, where the climate encourages its persistence year round. It has been found in drinking water and the holy rivers of India, such as the Ganges.NDM-1 has surfaced in countries around the world, including the United States, Japan, Australia, and the United Kingdom, in patients who spent time or travelled in India or have family members there. Some patients carried the disease home after traveling to India or Pakistan for cosmetic surgery, because this type of treatment is cheaper in Asia. However, the ability of NDM-1 to spread to other kinds of bacteria means that scientists are expecting to see numerous secondary cases in other countries that are not related to time spent in India.

What are the causes for resistance?

Antibiotics are medicines that kill bacteria (not viruses or fungi). There are different groups of antibiotics, based on how they work to kill bacteria. Beta-lactam antibiotics (or beta-lactams) are the largest group of antibiotics used against common infections. Carbapenems are another class of antibiotics typically used as a last resort when beta-lactams no longer work.

When bacteria are no longer killed by an antibiotic, they are called resistant to that antibiotic. Some bacteria are resistant to so many antibiotics there are few or no treatments left. These are often called "superbugs."

The beta-lactam group includes penicillins and cephalosporins. There are many types of beta-lactamases. Bacteria can become resistant by producing substances that destroy beta-lactams; these are beta-lactamases. The carbapenem antibiotics are destroyed by carbapenemases. Few bacteria have resistance to carbapenems. Carbapenems are often the last resort antibiotic for resistant bacteria that beta-lactams can no longer kill.

NDM-1 stands for the carbapenemase New Delhi metallo-beta-lactamase-1. It is produced by bacteria containing the resistance gene blaNDM-1. There are many types of carbapenemases that destroy penicillins, cephalosporins, and the last resort carbapenems, mostly produced by a large group of bacteria called Enterobacteriaceae. These carbapenemase-producers are also called carbapenem-resistant Enterobacteriaceae or CRE bacteria. NDM-1 bacteria are only one of the many CRE that threaten health today.

The blaNDM-1 gene has been found on bacterial chromosomes and plasmids. Plasmids are small segments of genetic material. Plasmids and other mobile genes can pass from one bacterial strain to another and even between completely different kinds.

Bacteria may develop gene mutations causing resistance spontaneously or on mobile genes. When a group of bacteria are exposed to an antibiotic, the ones that are resistant survive to multiply more of that bacteria. The more antibiotics are given, the more resistant bacteria are produced. This is called "antibiotic pressure" toward resistance. Reducing unnecessary antibiotic exposure allows populations of bacteria to revert to more susceptible strains.

Here's a little more to know about NDM1

1. **Symptoms:**

Bacteria from the Enterobacteriaceae family are the most common cause of urinary infections. They can also cause bloodstream infections (sepsis), pneumonia, or wound infections. Symptoms and signs depend on the location of the infection. Most people will have fever and fatigue and sometimes confusion. If bacteria enter the bloodstream, patients may go into shock. Symptoms do not differ between bacteria that express NDM-1 and those that do not. However, patients who have bacteria producing NDM-1 will not respond to most conventional antibiotics and are at high risk for complications or death.

2. **Detection:**

Laboratories routinely test bacteria for susceptibility to antibiotics. Strains that produce NDM-1 will show resistance to penicillins, cephalosporins, and carbapenems. Because carbapenem resistance is still uncommon, resistance to these agents raises suspicion of an NDM-1 or CRE strain, although not all will be NDM-1. If the patient has recently been to an area where NDM-1 is common, like India or Pakistan, this increases the probability that the strain is producing NDM-1.

Specific testing for NDM-1 is not routinely available in most laboratories. Fortunately, most NDM-1 or CRE are susceptible to colistin and other drugs. If a carbapenem-resistant isolate is recovered from a patient who has received medical care in India or Pakistan, it is sent to a state public-health laboratory. The state lab forwards it to the Centers for Disease Control and Prevention for specific testing for NDM-1, and the movement of these strains can be closely tracked.

NDM-1 infections can be successfully treated if they are recognized early and if colistin or other appropriate agents are used promptly. If a CRE infection is severe or the bacteria is aggressive, death is very possible. Death rate from KPC infections, for example, may be as high as 40%.

3. **Prevention:**

Several major guidelines have been published about preventing resistant bacteria, and hospital accrediting organizations cannot accredit facilities that do not adhere to them. Hospital Infection Control programs monitor for resistant bacteria and use methods of blocking the spread of disease. Barriers between contaminated surfaces and health-care workers prevent transfer of bacteria from an infected patient to another patient or worker. Barriers for NDM-1 must be extremely strict to contain it. Patients with NDM-1 strains are placed in private rooms. Health-care workers must put on a gown and gloves when entering the room and carefully dispose of them in the room before leaving. The number of people caring for the patient, entering and leaving the room, and the patient's movements out of the room are minimized.

Antimicrobial Stewardship Programs are also critical to controlling resistant bacteria. Such programs help to ensure that antibiotics are used for the right reason, at the right dose, and for the minimum time necessary to treat bacterial infections. This may involve an infectious-disease doctor and pharmacist reviewing antibiotic use and providing personalized feedback to patients' doctors. Carbapenem antibiotics are only given intravenously and should only be used when bacteria are resistant to other drugs.

In the community, it is important that primary-care doctors and other health professionals prescribe antibiotics just as carefully. People should become informed about the pros and cons of antibiotics. Antibiotics do not kill viruses that cause most colds, ear and sinus infections, and bronchitis. They do kill friendly flora though, which can result in worse infections and antibiotic resistance. In addition, antibiotic allergies can be life-threatening; if you develop allergies to antibiotics because of overuse, it can reduce your options for treating serious infections even more than having an antibiotic-resistant bacterial infection.

Treatment of infection caused by NDM-1 harboring Enterobacteriaceae

Infections caused by such bacteria are associated with high morbidity and mortality. Even though specific data on NDM-1 positive organisms is not available, there is indirect evidence to suggest that carbapenemase producing Enterobacteriaceae infection is associated with high crude and attributable mortality. In a study by Bores A et al, it was observed that crude mortality and attributable mortality in the patients of carbapenemase producing Kliebsella pneumoniae bacteremia was 71.9% and 50% respectively .In a similar study by Patel G et al, it was noted that mortality among the cases with carbapenemase resistant Klebsiella pneumoniae was significantly more as compared to control (40% Vs 20%). Timely administration of in vitro sensitive antibiotics was not associated with survival . Two classes of antibiotics i.e., polymyxins (colistin) and glycylcyclines (tigecyclines), have shown in vitro activity against NDM-1 harboring Enterobacteriaceae. On the basis of in vitro sensitivity analysis of 37 British isolates, 50% and 90% MIC for colistin was 0.5 mg/ L and 8 mg/L respectively ,and for tigecycline, it was 1 mg/L and 4 mg/L . In the Kumarasamy study, it was observed that 89% of UK isolates were susceptible to colistin and 64% to tigecycline. Out of all Indian isolates, more than 50% were sensitive to tigecycline and all were sensitive to colistin . but the chances of resistance are also high. In the Kumarasamy et al study one isolate (from Chennai) was highly resistant to all known antibiotics. A similar finding was also observed in studies done in Greece and New York . Resistance to colistin and tigecycline should be a reason for worry, as it indicates a return to the pre antibiotic era . Along with resistance, one more limitation of drug therapy in such infections is toxicity. Colistin group was practically abandoned 30

years ago due to its nephrotoxicity. In a study by Souli et al, it was observed that, attributable mortality by colistin containing regimen in patient infected by carbapenemase producing Klebsiella pneumoniae was around 19% .

Tigecycline is a relatively new antibiotic. In a small number of studies, it was observed that Tigecycline has favorable outcomes in 70% of the patients infected with carbapenem and multidrug resistant organisms. But, a recent US Food and Drug administration update warned about the increase in mortality among patients taking tigecycline as compared to other antibiotics . A combination of tigecycline and colistin has been explored in some studies done for carbapenemase producing Enterobacteriaceae.

Cobo J et al , observed that colistin and tigecycline combination is synergistic .Pournaras et al, on the basis of time kill assay, studied the effect of tigecycline alone, and its combination with meropenam and colistin, on carbapenemase producing Klebsiella pneumoniae strain. It was observed that as a single agent, none of the three antibiotics (tigecycline, meropenam and colistin) showed bactericidal concentration. Tigecycline and colistin, when given together produced bactericidal effect. Some studies also reported the successful treatment of pan resistant Enterobacteriaceae with combination therapy of colistin and tigecycline .Combinations using aztreonam or any other monobactum which are resistant to hydrolysis by metallolactamases are recommended by some studies. Here it is important to understand that NDM-1 containing bacterial strain may also have other carbapenemase like ampC or ESBLs which may hydrolyze the aztreonam. So inhibitors of these enzyme (like NXL104) should be the part of such combination therapy. Fosfomycine is also suggested for use in carbapenemase producing pan resistant Enterobacteriaceae.

The stake holder analysis :

The major stake holders in from the debate point of view are the governments of the various nations, the regulatory authoritites that are trying to prevent and control the disease and also in a larger sense the people suffering.

We have attempted to break it down into further simpler structure to cover the basics required for the debate. We are going to provide you with a starting point at the research for every stake holder we believe is involved in order to give you a fair idea of how the debate can go about in the committee.

1. WHO :

The Antimicrobial resistance is not a new problem. In 1998, the World Health Assembly adopted a resolution urging Member States to take action against it. In 2001 WHO published the WHO global strategy on containment of antimicrobial resistance along with a series of recommendations aimed at enabling countries to define and implement national policies in response to antimicrobial resistance.3 In 2005 another World Health Assembly resolution on antimicrobial resistance

cautioned about the slow progress and called for the rational use of antimicrobial agents by providers and consumers. Thus, the essential strategic interventions to control antimicrobial resistance have been known for some time. So far, however, national and global responses have been inadequate. In fact, few of the recommended policy changes have been pursued.

Lack of commitment and data

Though actions to combat antimicrobial resistance are taken forward by individual programmes and institutions, the effort is often fragmented and not comprehensive. Attention focuses on sensational individual events, such as the reports in 2010 about the new type of carbapenem resistance linked to the description of a new β-lactamase enzyme, NDM-1,4 in different parts of the world, but little emphasis is given to the wider threat of antimicrobial resistance and the need for sustained containment efforts. The issue has not been prioritized by national governments. A paucity of surveillance data on antimicrobial resistance contributes to a poor understanding of the scale of the problem and hampers an effective response to it. It also makes it difficult to regularly update diagnostic and treatment guidelines based on strong scientific evidence and to implement effective measures to prevent and control infections.

Unassured drug quality and irrational use

Fragmented health services and lack of access to quality-assured medicines at an affordable price often lead patients to take incomplete courses of treatment or to resort to sub-standard medicines, which create ideal conditions for the selection of resistant organisms. While poor provider knowledge and a lack of standard treatment guidelines are key contributors to improper antimicrobial prescription practices, the problem stems from a complex interplay of factors. Insufficient training and supervision of health personnel, lack of access to rapid diagnostic facilities to support treatment decisions, perverse economic incentives such as profits from both prescribing and dispensing, and inappropriate marketing of pharmaceuticals can all lead to improper prescribing.5 The absence of legislation regulating the quality and use of antimicrobials and poor enforcement efforts foster the unauthorized dispensing of antimicrobials by poorly trained persons and contribute to indiscriminate use.6

Poor prevention and control of infections

Weak infection prevention and control practices lead to the increased transmission of resistant microorganisms.7 This is particularly challenging in resource-limited settings with poor health

infrastructures and a shortage of health-care staff. Inadequate laboratory capacity limits the ability to rapidly detect resistant microorganisms for prompt treatment and control measures.

Research languishing

While antimicrobial resistance is rapidly spreading, research and development for new antimicrobial agents, diagnostics and vaccines are languishing. Very few pharmaceutical companies are still developing antibiotics. By 2008, eight of the 15 major pharmaceutical companies that at one time had antibiotic discovery programmes had abandoned them and two others had reduced them.8 A study in 2004 showed that of 506 drugs in development by 15 large pharmaceutical companies and seven major biotechnology companies, only six were antibiotics. Approval of new antibacterial agents by the United States Food and Drug Administration decreased by 56% between 1998 and 2002.9 In 2008, a study of antibiotic development involving small firms as well as large pharmaceutical companies revealed that only 15 of 167 antibiotics under development had a new mechanism of action.10 If the current trend continues, before long there may not be effective antimicrobials with which to treat patients with serious infections.

WHO's policy package

Increasing numbers of bacteria are becoming resistant to antimicrobials and there is a need to take urgent action. On World Health Day, WHO introduced a policy package to combat antimicrobial resistance .This package reframes the critical actions to be taken by governments to stimulate change by all stakeholders.

. ***The World Health Organization's policy package to combat antimicrobial resistance***

Commit to a comprehensive, financed national plan with accountability and civil society engagement. Strengthen surveillance and laboratory capacity. Ensure uninterrupted access to essential medicines of assured quality. Regulate and promote rational use of medicines, including in animal husbandry, and ensure proper patient care. Enhance infection prevention and control
Foster innovations and research and development for new tools.

The first overarching component is for governments to commit to a comprehensive national plan against antimicrobial resistance that brings together all the required recommended measures. A national inter-sectoral steering committee should be established to guide actions by several stakeholders under the overall stewardship of the government. Adequate resources should be earmarked and an accountability framework should be set up, with measurable indicators to be reported annually. A well informed public is a catalyst to health actions; thus, building strong public awareness is vital. Civil society representatives should be involved in the development of antimicrobial resistance policies, their implementation and the monitoring activities.

A second component is strengthening surveillance and laboratory capacity. The surveillance of antimicrobial resistant organisms and the tracking of the use of antimicrobials are both essential.

There is also an urgent need to build laboratory capacity to ensure reliable and rapid test results on which to base prescribing decisions and measures for the prevention and control of infections. Standard protocols are needed to assess antimicrobial resistance trends consistently over time and across geographical areas. Surveillance data should be regularly reported and shared at the regional and global levels. Antimicrobial resistance surveillance systems must be expanded to veterinary services and supported by food safety authorities to help assess the impact on human health of the use of antimicrobials in animals for human consumption.

Third, governments must guarantee uninterrupted access to essential medicines of assured quality. An effective national body is necessary to develop the essential medicines list based on standard treatment guidelines. Sufficient public financing for essential medicines, including recommended antimicrobials, should be provided. Efficient systems for managing drug procurement and distribution should be put in place to avoid interruptions in supply or wastage. Issues with drug quality need to be tackled through comprehensive drug regulations. A national drug regulatory authority that is responsible and accountable for all aspects of drug regulation should be structured as an independent coordinating body in the ministry of health, separate from drug supply and management. Regulatory tools should be developed and personnel appropriately trained to ensure consistency and transparency in regulatory functions.

Fourth, the rational use of antimicrobials is essential for containing antimicrobial resistance. The promotion of national standard treatment guidelines calls for proper training and supervision of health personnel and for mechanisms to make diagnostic support available.11 To reduce their irrational use, antimicrobials should only be sold with a prescription and this should be strictly enforced in all pharmacies. Local incentive structures must be examined to identify factors influencing prescription practices. Methods of payment and reimbursement should be in line with standard treatment guidelines to discourage irrational use. Independent and unbiased information on antimicrobial use should be provided to health personnel and consumers. Promotional activities by pharmaceutical companies should be regulated and monitored to prevent industry from misinforming patients and from offering financial incentives to providers. The overuse and misuse of antimicrobials in animals for human consumption must be addressed through surveillance of antimicrobial use in animals destined for food, training of veterinarians and farmers and, most critically, through legislative and regulatory measures.

Fifth, policies and practices for the prevention and control of infections are indispensable in fighting antimicrobial resistance. A proper organizational structure for developing and managing such policies and practices, combined with environmental designs for their application, need to be adopted in health facilities. These practices are also necessary in congregate settings and communities.

Finally, operational research and research and development to make new tools available are crucial in combating antimicrobial resistance. This includes improving current diagnostic tests and antimicrobials and designing incentives to engage industry in the development of new tools. Regulatory bottle-necks need to be eliminated and resources must be mobilized for rapid access to new tools.

The drivers of antimicrobial resistance are interlinked, and so are the solutions. Single, isolated interventions have little impact. Strong leadership and political will are required to bring about bold changes in policies, organize health systems and legislative structures as required, and translate knowledge and recommendations into practice. With new multidrug-resistant microorganisms being disseminated in tandem with well known older pathogens, the window of opportunity is rapidly closing: no action today, no cure tomorrow.

2. CDC

A few of the guidelines that are mentioned by the CDC for the protection of civilians, detection and prevention of the bacteria is as follows:

Facility-Level CRE Prevention

Surveillance Healthcare facilities should be aware of whether or not CRE have been isolated from patients admitted to their facility. In addition, facilities should know whether or not their laboratories have the capacity to perform carbapenemase testing and CRE screening tests. If these tests are not available, facilities should identify outside laboratories that can perform this testing when needed. Facilities should consider performing ongoing evaluations to quantify the incidence of CRE organisms from clinical specimens, such as reviewing archived laboratory results to determine the number and/or proportion of Enterobacteriaceae that are CRE over a pre-specified time period (e.g., 6 to 12 months).

In addition, facilities should consider collecting information on the basic epidemiology of patients colonized or infected with these organisms in order to understand common characteristics of these individuals. This might include patient demographics, dates of admission, outcomes, medications, and common exposures (e.g., wards, surgery, procedures, transfer from other healthcare facilities, etc.)

Facility-Level Prevention Strategies

The following briefly summarizes interventions recommended to prevent CRE transmission in healthcare settings. The listed interventions might be applied differently by facilities based on the underlying epidemiology of CRE in the region including the regional prevalence, the underlying CRE resistance mechanisms found in the area, and the type of healthcare facility involved. In general, standard interventions designed to prevent the transmission of multi drug resistant organisms (MDROs) (e.g., hand hygiene, Contact Precautions) should be implemented for most CRE (CP-CRE and non-CP-CRE).

However, facilities might choose to apply a wider range of interventions for CRE they judge to be epidemiologically important, including all CP-CRE. Some non-CP-CRE might also be targeted for more extensive interventions particularly during an outbreak or if the underlying prevalence of the organism is high or increasing despite the application of baseline prevention measures. The situations where each intervention might be most useful are specified more completely in the next section.

For more in-depth review of MDRO prevention, please refer to the CDC HICPAC guidelines “Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006” (http://www.cdc.gov/hicpac/mdro/mdro_toc.html). If carbapenemase testing is not available, facilities should consider the possibility that any CRE that meets the phenotypic surveillance definition is a CP-CRE and apply the interventions, as described below, accordingly. However, facilities that have information on the epidemiology of CRE in their region might choose to tailor the 8 range of interventions they apply based on these data. For all MDRO control efforts, facilities should work together and with state and local health departments in order to maximize the effect of the interventions regionally.

1. Hand Hygiene

Hand hygiene is a primary part of preventing MDRO transmission. Facilities should ensure that healthcare personnel are familiar with proper hand hygiene technique as well as its rationale. Efforts should be made to promote staff ownership of hand hygiene using techniques like developing local (e.g., unit) hand hygiene champions. Further, having policies that require hand hygiene is not enough; hand hygiene adherence should be monitored and adherence rates communicated directly to front line staff. Immediate feedback should be provided to staff who miss opportunities for hand hygiene. In addition, facilities should ensure access to adequate hand hygiene stations (i.e., clean sinks and/or alcohol-based hand rubs) and ensure they are well stocked with supplies (e.g., towels, soap) and clear of clutter. Further information on hand hygiene is available at www.cdc.gov/handhygiene/. This intervention is a fundamental part of infection prevention practice and should be applied for all CRE.

2. Contact Precautions

The following two sub-sections describe the use of Contact Precautions by healthcare setting type based on the type of care provided. The third section outlines general guidance for any facility using Contact Precautions. a. Acute Care Hospitals and High Acuity Post-Acute Care Settings Acute care hospitals, long-term acute care hospitals, and ventilator units of skilled nursing facilities should generally place patients who are colonized or infected with CRE on Contact Precautions. Some facilities might choose to not place some non CP-CRE that remains susceptible to other antimicrobials on Contact Precautions. All patients with CP-CRE should be placed on Contact Precautions.

3. *Healthcare Personnel Education*

HCP in all settings who care for patients with MDROs, including CRE, should be educated about preventing transmission of 11 these organisms. At a minimum this should education and training on the proper use of Contact Precaution. This intervention is a fundamental part of infection prevention practice and should be applied for all CRE.

4. Use of Devices

Use of devices (e.g., central venous catheters, endotracheal tubes, and urinary catheters) puts patients at risk for device-associated infections and minimizing device use is an important part of the effort to decrease the incidence of these infections. Additionally, device use has been associated with the presence of CRE. Therefore, minimizing device use in all healthcare settings should be part of the effort to decrease the prevalence of all MDROs, including CRE. In acute and long-term care settings, device use should be reviewed regularly to ensure they are still required and devices should be discontinued promptly when no longer needed. For more information on preventing device-associated infection including appropriate use of devices please see http://www.cdc.gov/hicpac/BSI/BSIguidelines-2011.html and http://www.cdc.gov/hicpac/cauti/002_cauti_toc.html. This intervention is a fundamental part of infection prevention practice and should be applied for all CRE.

5. Laboratory Notification

Laboratories should have protocols in place that facilitate the timely notification (i.e., within 4 to 6 hours) of appropriate clinical and infection prevention staff whenever CRE are identified from clinical and surveillance specimens to ensure timely implementation of control measures. This is true for

both facilities with on-site laboratories and those sending cultures offsite and is applicable primarily to all CPCRE and any non-CP-CRE that are deemed epidemiologically important by the facility.

6. Inter-facility Communication/ Identification of CRE Patients at Admission

The presence of CRE infection or colonization alone should not preclude transfer of a patient from one facility to another (e.g., acute care to long-term care). However, facilities that are transferring patients colonized or infected with CRE must notify the receiving facility of the patient's CRE status so that appropriate infection prevention measures can be promptly implemented upon the patient's arrival. Additional information that might be communicated during patient transfers include the type and plan for any invasive devices that the patient has and the duration of any ongoing antimicrobial therapy. An example of an inter-facility transfer form developed by the Utah Department of Health is available at: http://health.utah. gov/epi/diseases/HAI/resources/IC_transfer_ form.pdf In addition, facilities should have a mechanism to identify patients previously identified as colonized or infected with CRE at re-admission so that appropriate infection control precautions can be instituted. 12 This intervention is a fundamental part of infection prevention practice and should be applied for all CRE.

7. Antimicrobial Stewardship

Antimicrobial stewardship is another primary part of MDRO control and is applicable to both acute and long-term care settings. Although the role of this activity specifically for CRE has not been well-studied, multiple antimicrobial classes have been shown to be a risk for CRE colonization and/or infection. As part of an antimicrobial stewardship program, facilities should work to ensure that antimicrobials are used for appropriate indications and duration and that the narrowest spectrum antimicrobial that is appropriate for the specific clinical scenario is used. To assist facilities in this effort, CDC has identified core elements that are included in successful hospital antimicrobial stewardship programs, including commitment from facility leadership to support antimicrobial stewardship activities, designation of appropriate personnel to lead the program and provide drug expertise, implementation of polices and interventions to support optimal antimicrobial use, tracking and reporting of antimicrobial use and resistance rates, and education on optimal antimicrobial prescribing practices.

Detailed description of these core elements is available at http://www.cdc.gov/getsmart/ healthcare/pdfs/core-elements.pdf. An accompanying checklist that hospitals can use to assess whether key policies and actions to improve antibiotic use are in place can be found at http://www.cdc.gov/ getsmart/healthcare/pdfs/checklist.pdf. Both these documents and additional information on antimicrobial stewardship in healthcare settings are available at http://www.cdc.gov/ getsmart/healthcare. A similar set of resources for antibiotic stewardship implementation in nursing homes can be found at http://www.cdc. gov/longtermcare/prevention/antibiotic -stewardship.html.

8. *Environmental Cleaning*

While, the role of the environment in CRE transmission is not completely clear, evidence from CRE outbreaks suggests that the environment can serve as a source for transmission. In order to decrease the risk of transmission, facilities should perform daily cleaning that include areas in close proximity to the patient (e.g., bed rails, patient tray) to decrease the burden of organisms. In addition, CRE have been found in sink drains in patient rooms, raising the possibility that equipment and patient supplies could become contaminated if stored within the zone where splash or aerosolization from sinks could occur. Surfaces around sinks should be cleaned and disinfected

regularly and medical equipment should not be stored in close proximity to sinks. Once CRE patients are discharged, terminal cleaning of CRE patient rooms should be performed. Consideration should be given 13 to monitoring the cleaning process to ensure all surfaces are adequately cleaned and disinfected. This intervention is a fundamental part of infection prevention practice and should be applied for all CRE.

9. Patient and Staff Cohorting

When available, patients colonized or infected with any CP-CRE or any nonCP-CRE judged to be epidemiologically important should be housed in single patient rooms. In addition, consideration should be given to cohorting patients with CRE in specific areas (e.g., units or wards), even if in single patient rooms, and to using dedicated staff (i.e., without responsibility for care of non-CRE patients) to care for them. At a minimum, dedicated staff should include the providers that provide the bulk of the patient's care (e.g., nurses, nursing assistants) but could be expanded to include other staff (e.g., respiratory therapists) particularly if there are a larger number of CRE patients or during an outbreak. The specific staff that are dedicated may vary depending on the healthcare setting. If there are an insufficient number of single rooms, preference should be given to patients at highest risk for transmission such as patients with incontinence, medical devices, or wounds with uncontrolled drainage. This recommendation is not meant to imply that one-to-one nursing is required for all CRE patients and therefore is generally not applicable to facilities with a single CRE colonized or infected patient. This recommendation might be most applicable to CP-CRE, higher prevalence areas, and during CRE outbreaks.

10. Screening Contacts of CRE Patients

Screening is used to identify unrecognized CRE colonization as clinical cultures alone will identify only a fraction of all patients with CRE. Generally, this testing has involved stool, rectal, or peri-rectal cultures and sometimes cultures of skin sites, wounds or urine (if a urinary catheter is present). A laboratory protocol for evaluating rectal or peri-rectal swabs for CP-CRE is available at (http://www.cdc.gov/HAI/ pdfs/labSettings/Klebsiella_or_Ecoli.pdf).

Additional non-culture-based tests are also becoming available for use in the United States that can detect the most common carbapenemases. CRE screening includes screening epidemiologically-linked contacts of newly identified CRE patients and active surveillance cultures. The former is described in this section while the latter is discussed in the following section. If previously unrecognized carriers of epidemiologically important CRE, including CP-CRE, are identified, screening of patient contacts should be considered to identify transmission. This intervention would be most important for CP-CRE. Those patients considered contacts may vary from setting to setting; however, they usually include roommates of the previously unrecognized CRE patient. Some facilities may also choose to screen patients who might have 14 shared HCP or who were present on the ward at the same time. Point prevalence surveys might be an effective way for facilities to rapidly evaluate the prevalence of CRE in particular wards/ units and is usually conducted by screening all patients present on the unit.

This approach could be useful in situations where a review of clinical cultures using laboratory records identifies previously unrecognized CRE patients have been housed on certain wards/units or to rapidly evaluate for additional transmission during an outbreak. Point prevalence surveys might be done only once if few or no additional CRE colonized patients are identified or might be done serially if ongoing transmission is documented. Experience to date suggests that point prevalence surveys have generally been less likely to identify additional CRE patients when performed in response to identification of a single CRE patient without documented transmission. In these

situations, due to the time it takes for the culture results on the initial CRE patient to be finalized and for the survey to be arranged, most or all of the patients who were present on the ward at the same time as the index CRE patient have often been discharged. In these situations, screening contacts at highest risk for transmission (e.g., roommates), even if those patients have been discharged or moved to another ward, is often of higher yield. If CRE transmission is identified through initial contact screening, facilities should consider expanding screening (e.g., point prevalence survey) to determine the extent of transmission and consider conducting additional ongoing surveys to document that transmission has ceased.

11. Active Surveillance Testing

This process involves performing CRE screening of patients who might not be epidemiologically linked to known CRE patients but who meet certain pre-specified criteria. This could include everyone admitted to the facility, pre-specified highrisk patients (e.g., those admitted from long-term acute-care facilities, patients who received medical care in endemic regions), and/or patients admitted to high-risk settings (e.g., intensive care units [ICUs]). This intervention might be more useful in areas with higher CP-CRE prevalence and during CRE outbreaks.

It could also be used for non-CP-CRE judged epidemiologically important by the facility. Active surveillance testing has been used in control efforts for several MDROs including CRE; however, in these studies, the exact contribution of this practice to subsequent decreases in CRE is not known. As described above, active surveillance testing is based on the finding that clinical cultures will identify only a minority of those patients colonized with CRE; unrecognized colonized patients might not be on Contact Precautions and are a potential source for CRE transmission. Surveillance testing strategies can vary depending on facility and regional CRE 15 epidemiology. One approach is to focus on patients admitted with CRE risk factors including overnight stays in healthcare facilities in the last six to twelve months. Alternatively, testing could target patients admitted to high risk settings (e.g., intensive care units). This testing is generally done at admission but can also be done periodically during admission (e.g., weekly).

Point prevalence surveys could also be used to perform periodic surveillance. Patients identified as positive by this surveillance testing should be treated as colonized (e.g., placed on Contact Precautions, etc.). In some situations (e.g., patients admitted from high-risk settings) patients might be placed in empiric Contact Precautions until surveillance testing is found to be negative. Regardless of whether a larger active surveillance program is undertaken, facilities should consider performing surveillance cultures to rule out CP-CRE in patients admitted following an overnight stay within the last 6 to 12 months in a healthcare facility outside the United States or in an area within the Unites States known to have a higher prevalence of CP-CRE.

If a CRE is identified from surveillance or clinical cultures from a patient with a history of an overnight hospital stay outside the United States, the isolate should be sent for mechanism testing to evaluate for the presence of carbapenemases that are not regularly found in the United States. At a minimum this should include evaluation that would detect KPC, NDM, and OXA 48-type carbapenemases. This approach can help identify patients that harbor CRE with novel mechanisms of resistance so that further spread of the organism can be prevented.

12. Chlorhexidine Bathing

Chlorhexidine (CHG) bathing has been used successfully to prevent certain types of healthcare-associated infections (e.g., bloodstream infections) and to decrease colonization with certain MDROs, primarily in ICUs. For CRE, it has been used as part of a multifaceted intervention to reduce

the prevalence of CRE during an outbreak in a long-term acute care facility. Chlorhexidine bathing with 2% liquid chlorhexidine or 2% chlorhexidineimpregnated wipes has been used to bathe patients (usually daily) while in high-risk settings (e.g., ICUs).

The chlorhexidine is usually not used above the jaw line or on open wounds. When chlorhexidine bathing is used for a particular patient population or in a particular setting, it is usually applied to all patients regardless of CRE colonization status. Some studies suggest that CHG bathing might not always be done correctly resulting in suboptimal levels of chlorhexidine on the skin. If used, facilities should ensure that it is done correctly to ensure maximal effect. In long-term care settings this type of an intervention might be used on targeted high-risk residents (e.g., residents that are totally dependent upon healthcare personnel for activities of daily living, are ventilatordependent, are incontinent of stool, or have wounds whose drainage is difficult to control) or high-risk settings (e.g., ventilator unit). 16 This intervention is likely most important as part of a plan to control CP-CRE in areas of higher prevalence including during outbreaks. It could be used for non-CPCRE judged epidemiologically important by the facility.

Questions A Resolution Must Answer

1. What is the amount of damage to state caused because of the disease .
2. Can there be a potential outbreak of the said disease leading to rise in mass contamination.
3. Is there a possibility for a biological warfare
4. How does the disease effect the medical tourism of a country and in turn its' economy.

References

1. https://www.cdc.gov/nhsn/
2. https://www.cdc.gov/hai/pdfs/cre/cre-guidance-508.pdf
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7. https://www.coursehero.com/file/17802221/WHO-Strategy-for-Antimicrobial-Resistencepdf/
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9. http://apps.who.int/iris/bitstream/10665/67426/1/WHO_CDS_CSR_DRS_2001.5.pdf
10. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4149102/

Apart from the above mentioned links please go through more web resources to make sure you are well researched. The link in the reference 6 provides enough space to learn about the case studies of different people who have suffered with the disease and how they have fought the disease . Link number 6 also includes journal and research papers which have helped us much in understanding about the disease. We suggest heart fully that delegates go through the study guide and the given links to prepare themselves aptly.

Validity of Reports:

Delegates are requested to bear in mind, the validity of reports, while researching as we would be following the below structure very strictly in committee.

Valid and Binding:	**Not Valid but can be used for reference purposes:**	**Valid but not binding, in the order of precedence:**	**Not accepted under any condition:**
1. All reports published by the United Nations and its agencies. 2. Reports by Governments and its agencies. (With respect to their country only.)	1. Any report published by a recognized news agency or NGO.	1. Reuters 2. Al Jazeera 3. Amnesty International 4. Human Rights Watch 5. Reporters without borders	1. Wikipedia 2. WikiLeaks 3. Blog Articles 4. The Background Guide itself

Reports presented in committee shall be examined by the Executive Board, if deemed necessary. The Decision of the Executive Board on the validity of the report shall be final and non-debatable.

Please make sure you send a copy of your position papers to the afore mentioned mail id [1] [2] in a valid format. Please contact the executive board members at all times if any assistance is required.

COMMITTEE FOR
DISEASE AND PANDEMIC CONTROL