MEDECINS SANS FRONTIERES

أطبّاء بلا حدود

Conference in Amman

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Al - Quds International Hotel

ANTIBIOTIC RESISTANCE IN THE MIDDLE EAST

Lessons Learned in the Prevention and Treatment of Multidrug-resistant Infections

"Antibiotic Resistance in the Middle East: Lessons Learned in the Prevention and Treatment of Multidrug-resistant Infections"

Médecins Sans Frontières
Amman, Jordan
21 September 2014

Outcome of the conference

MSF Conference in Jordan: Experts Recommend a Series of Steps to Tackle the Issue of Antibiotic Resistance

Over 80 regional and international health experts, hospital medical staff, academics and other experts from several Middle Eastern countries participated in a conference on antibiotic resistance held in Amman last week, where they agreed that antibiotic resistant infections constitute a serious threat to public health in the region. There was also concensus that, to counter this challenge, decision makers and practitioners in all sectors should make greater efforts to find and implement solutions.

The conference provided a forum for academics and public health officials from Jordan, Iraq and Lebanon, who presented data suggesting that antibiotic resistance rates in the region are alarmingly high, antibiotic overuse (in both formal and informal health sectors) is rife, infection control activities have not been adequately supported, and national surveillance systems are weak. Meanwhile, movements of populations uprooted by violence may be increasing the pace at which extremely drug-resistant bacteria are spreading. Since there are few new antibiotics under development, efforts n*ow* to conserve existing antibiotics and to reduce health-care acquired infections are critical. Data presented at the conference by MSF, based on its experience treating victims of violence and refugees in the Middle East, point to the same conclusion.

Key next steps to address antibiotic resistance in the region include:

- Implementing greater restrictions on over-the-counter antibiotic sales.
- Launching public campaigns to reduce patient demand for antibiotics.
- Improving professional training to avoid prescribing of antibiotics for non-bacterial illnesses (such as bronchitis and the common cold).
- Developing antibiotic stewardship programs in hospitals.
- Supporting publicly-financed surveillance networks to track resistant bacteria.

"We need to establish a network of experts to fight against antibiotic resistance. Networks like this currently don't exist in the region," said Professor Timothy Walsh, professor of medical Microbiology and Antibiotic Resistance Park Hospital, Wales.

Dr. Jean Carlet, President of the World Alliance Against Antibiotic Resistance, based in France, also stressed the importance of such a network. ôIt will be very important to extend the discussion started at the conference to include the use of antibiotics outside hospitalsï another key part of the problem,ö he said.

Conference participants also highlighted the need to raise awareness around appropriate antibiotic prescribing, and the importance of clear guidelines. ôThere is a general misuse of antibiotic prescriptions, and therefore an important priority is to push for public awareness campaigns supported by experts from different health sectors,ö said Mohammad Basel, an Infection Control Nurse at MSFôs surgery project in Amman.ö

ôThis conference represented a start for the establishment of a network of experts in the region, which we hope will lead to practical steps towards meeting the challenge of antibiotic resistance in this part of the world,ö said Marc Schakal, MSF Head of Mission for Jordan and Iraq. ôHowever, the need for a follow-up platform is essential to ensure that these discussions continue. MSF remains committed to taking action on this problem and engaging with partners in the region.

**MSF is an independent international medical and humanitarian organization, which delivers emergency aid to people affected by armed conflict, epidemics, healthcare exclusion and natural or man-made disasters all over the world. MSF offers assistance to people based only on need and irrespective of race, religion or political affiliation. Today, MSF is a worldwide movement with 19 national offices and an international headquarters in Geneva, Switzerland. MSF was awarded the Nobel Peace Prize in 1999 and the King Hussein Foundation Humanitarian Leadership Prize in 2004*

Agenda

8:00 ï 8:45	**Conference Welcome**	
8:00 ï 8:30	Registration	
8:30 - 9:30	- Opening of the Conference - Welcome Speech and introduction to the conference - Reception	Marc Schakal , MSF Head of Mission
9:30 ï 11:45	**Session 1: Antibiotic resistance in the Middle East : Overview of the problem**	Chair: Dr Alireza Mafi, EMRO
9:30 ï 9:55	Keynote: How does antibiotic resistance threaten patient safety and what are the costs to health care systems?	Dr Jean Carlet, President of the World Alliance Against ABR, France
9:55 ï 10:15	Antibiotic resistance surveillance in low-middle income countries: why, how and what does it mean?	Dr Timothy Walsh, Professor of Medical Microbiology and Antibiotic Resistance Heath Park Hospital, Wales
10:15 ï 11:00	Panel Discussion: National statistics on antibiotic-resistant infections in the Middle East	*Jordan:* Dr Najwa Jarour, Head of Infection control ï MOH ï Jordan. *Iraq:* --- *Lebanon:* Dr Ghassan M. Matar, Professor of Microbiology & Immunology, Faculty of Medicine,American University of Beirut, Lebanon *MSF* on antibiotic resistance in war-injured Iraqi and Syrian patients: Dr Richard A. Murphy, Infectious disease advisor, MSF-USA
11:00 ï 11:20	Q&A/Discussion	
11:20 ï 11:40	**Refreshments**	
11:40 ï 13:30	**Session 2: Maintaining the effectiveness of current antibiotics**	Chair Jean Carlet, President of the World Alliance Against ABR, France
11:40 ï 12:00	Public health action: Reducing sales of over-the-counter antibiotics: Indiaôs Chennai declaration	Dr Kulakkattil Abdul-Ghafur , Coordinator ócChennai Declarationôof Medical Societies, Apollo Hospitals, India
12:00 ï 12:15	Use and misuse of antibiotics in Lebanon: Results from community and hospital based studies	Dr Sanaa Awada, Professor of Clinical Pharmacology, Lebanese University, Lebanon
12:15 ï 12:30	Introducing antibiotic stewardship in hospitals: What are the key components and challenges? How should success be measured?	Dr Sara Cosgrove, Johns Hopkins University, USA
12:30 ï 12:45	How can microbiology labs take an active role in improving antibiotic use? MSF Experience in Iraq	Jean-Baptiste Ronat, Microbiologist, Laboratory advisor, MSF, France
12:45 ï 13:00	Access to antibiotics, not excess: The need for conservation and creation	Dr Arlene Chua, MSF Access Campaign, Switzerland
13:00 ï 13:30	Q&A/Discussion: What are the barriers to improving antibiotic prescribing in the Middle East?	

13:30 ï 15:00	**Lunch by profession** **(Microbiologists, Public health, Physicians, Pharmacists, Infection prevention specialists)**	
15:00 ï 17:00	**Session 3: Reducing drug-resistant infections: Starting in the hospital**	Chair: **Dr. Mohammed Al-Abdulat**, Head of Jordanian Infection Control Association, Jordan
15:00 ï 15:20	Implementing proven infection prevention interventions in inpatient settings	Dr Sara Cosgrove, Johns Hopkins University, USA
15:20 ï 15:40	Key principles for health professionals new to infection prevention: How to train health care personnel?	Dr Omar Al Rawajfah, Faculty of Nursing, Mafraq, Jordan
15:40 ï 16:00	Infection prevention in hospital: Basic principles	Mohamed Basel, Infection Control Nurse, MSF Amman project, Jordan
16:00 ï 16:20	Overview of MSF inputs in addressing medical issues, with some success stories	Dr Khalid A Ahmed, Medical Referent for Yemen, Jordan and Iraq - (MSF).
16:20 ï 17:00	Q&A/Discussion: Prevention of healthcare facility-based infections	

Abstract

How does antibiotic resistance threaten patient safety, and what are the costs to health care systems?

Jean Carlet MD, President of the World Alliance Against Antibiotic Resistance (WAAAR)

The increased prevalence of antibiotic resistant bacteria poses a major healthcare threat. Faced with an almost complete absence of new antimicrobial drugs under development (1), antibiotic resistance (ABR) has become one of the main public health problems of our time. Margaret Chan, general director of the World Health Organization (WHO), warned recently that: “a post-antibiotic era is almost upon us.” UK prime minister David Cameron recently called for “global action to tackle the growing threat of resistance to antibiotics.” The cost of antibiotic resistance is tremendous, whether measured as the personal and societal burden of illness, as death rates, or as healthcare costs. At a minimum, an estimated 25,000 patients in Europe and 23,000 in the USA die each year from infections caused by resistant bacteria (CDC, ECDC); these numbers are expected to rise as resistance becomes more widespread.

Antibiotics are a crucial class of medications not only for treating individual patients but because of their potential societal impact: improper use of an antibiotic in a single patient can select for ABR resistance that may spread to other people, animals, and the environment, making an antibacterial used in one patient ineffective for many others. Moreover, bacterial resistance can evolve rapidly. As bacteria acquire resistance, the altered genetic material encoding resistance mechanisms can be transmitted readily among bacteria, broadening the reach and extent of resistance. Treatment failures due to multidrug resistant (MDR) bacteria—once rare, notable, and limited to hospitals—now occur very commonly in hospitals, especially in the ICU and increasingly also in the community.

Among these increasingly common ABR infections, methicillin-resistant *Staphylococcus aureus* (MRSA) infections, in particular due to community-acquired MRSA (2), have become extremely prevalent in many countries, including the USA and countries in Europe (3), South America and Asia. (In a rare positive and promising development, prevalence in many European countries has decreased in the last few years.) Vancomycin-resistant enterococci (VRE) are also very frequent, although with large differences between countries: a European point prevalence study found that VRE prevalence among the countries surveyed ranged from 1% to more than 50% (4). Another growing threat worldwide is *Escherichia coli* and *Klebsiella pneumoniae* that harbor extended-spectrum beta lactamases (ESBL) (5), with prevalence reaching 50-70% for *Escherichia coli* in some European and Asian countries (3,5). In the European point prevalence study, prevalence of *Klebsiella pneumoniae* with carbapenemases ranged from 1% to more than 50% (4,6). Most alarmingly, some infections involve bacteria that are resistant to all antibiotics (pan-resistance). Treating these infections requires complex, high-dose combinations of old and new antibiotics, and mortality is very high.

Antibiotic resistance is directly related to the growing volume of antibiotics used, both in health care and agriculture, and to the discharge of these active drugs into the environment (7). To turn the tide, we must change how antibiotics are used and we must adopt proactive strategies, as is being done to save endangered species (8). Preserving the effectiveness of antibiotics and stabilizing antibiotic-susceptible bacterial ecosystems should be global goals, and will require concerted efforts by patients and prescribers.

The primary goal of the World Alliance Against Antibiotic Resistance (WAAAR) is to raise awareness about the urgency and magnitude of the ABR threat and to promote an international dialogue on effective responses. WAAAR is a group of 700 individuals from 55 different countries and represents all the key stakeholders—physicians, veterinarians, microbiologists, surgeons, pharmacists, nurses, evolutionary biologists, ecologists, environmentalists, and patient advocacy groups. The Alliance receives support from more than 145 learned societies and professional groups throughout the world (but none from the pharmaceutical industry) and operates as a nonprofit organization open to professionals and consumers worldwide. Its activities, in particular a recent declaration outlining 10 proposed actions, focus on lobbying for antibiotic preservation and raising awareness among antibiotic prescribers, politicians and policy-makers, patient safety and advocacy groups, pharmaceutical industry, international health organizations, and the general population. Individual actions, no matter how well-intended, are doomed to failure unless there is an international dialogue, a common sense of purpose, and broad consensus on how best to proceed (9).

Antibiotic Resistance in low-middle income countries: Why, how and what does it mean?

Dr Timothy Walsh, Professor of Medical Microbiology and Antibiotic Resistance Heath Park Hospital, Wales

The impact of antibiotic resistance on patient populations can only be assessed accurately if it is appropriately measured. In 2014, few developing countries are measuring antibiotic insusceptibility to an appropriate level. Differences in sampling, storage, inoculum, media, reading and interpretation are all essential to the results but can vary significantly. Methods for MIC or SIR testing also vary significantly, and range from disk to automated methods; however, interpretation of automated results can be suboptimal. The role of internal and external quality control programs is critical to ensure experimental veracity.

Screening of patients entering into a health sector is an ongoing debate, as the country in question may not have the facilities for isolation. Additionally, such screening is based on the assumption that detecting resistance in faeces is automatically associated with a pathogen and not with a commensal bacteria. The screening media used to identify resistance and the swab for sampling are also important. The issue of screening in wards and in animals that may impact on carriage and patient well-being is also undefined.

What do you screen and are there regional differences that can bias this screening/surveillance? In North Africa and the GCC, MSRA levels are not extensively studied but there is an increasing occurrence of ESBL and carbapenem-resistant Enterobacteriaceae and Acinetobacter.

These issues on surveillance and screening will be elaborated during my lecture.

The foreseen decline in antibiotic effectiveness explains the need for data to inform the global public health agenda about the magnitude and evolution of antibiotic resistance as a serious threat to human health and development. Opportunistic bacterial pathogens are the cause of the majority of community- and hospital-acquired infections worldwide. We provide an inventory of pre-existing regional surveillance programs in the six WHO regions, which should form the underpinning for consolidating a global network infrastructure. We also outline the structural components, such as an international network of reference laboratories, that need to be put in place to address the void of these crucial data. In addition we suggest making use of existing Health and Demographic Surveillance Sites (HDSS) to obtain crucial information from communities in resource-limited settings at household level in low- and middle income countries in Asia and Africa. For optimising the use of surveillance data for public health action (i.e., priority setting for new drug development), comparative quantification of antibiotic effectiveness at local, national, regional and global levels, and identification of the action gaps, can be helpful.

Antimicrobial Resistance Profile of Pathogens Isolated in sentinel hospitals MOH in Jordan

Dr. Najwa Jarour, Head Infection Control Department, MOH –Jordan

Background

In 2009, Jordan's Ministry of Health (MoH) established surveillance for healthcare-associated infections (HAIs) and antimicrobial resistance in several hospitals. These efforts have been supported by the infection control unit of the US Naval Medical Research Unit No3 (NAMRU3).

Methods

Currently, the surveillance includes four hospitals (Albashir, Jarash, Totanji, and Prince Hamzah) and focuses on intensive care unit (ICU) and surgical site infections for select surgeries during the time period from December 2009 to March 2014. Infections are defined as CDC standard National Healthcare Safety Network (NHSN) case definitions for pneumonia, bloodstream infections, and urinary tract infections. Isolated pathogens are sent regularly to NAMRU-3 laboratories to be retested (for quality control purposes) and to perform antimicrobial sensitivity testing.

Results

A total of 1069 isolates were tested at NAMRU3 laboratories. Gram-negative organisms represented the majority of pathogens, accounting for 66.6% (712/1069) of samples, with Gram-positive organisms and budding yeast accounting for 20.4% (218/1069) and 13.0% (139/1069), respectively.

In general, the isolated pathogens showed high rates of antimicrobial resistance to the majority of antibiotics tested, as summarized below.

Acinetobacter spp accounted for 23.3% of the isolates and showed high resistance to all antibiotics tested, ranging from 90.8% gentamycin resistance to 98.4% resistance against 3rd generation cephalosporins (ceftrixone). *Enterobacteriaceae* as *Klebsiella* spp and *E.coli* expressed moderate to high resistance to 3rd generation cephalosporins, ciprofloxacin, and gentamycin, drugs which are commonly used as the first-line empirical therapy against *Enterobacteriaceae* in Jordanian hospitals. Another alarming result was the emergence of *Enterobacteriaceae* isolates resistant to imipenem (19.7% of *Klebsiella* spp and 19.5% of *E. coli* isolates), and which are considered as potential indicators of carbapenem resistance associated with treatment failures and high patient mortality. A total of 24% of *Pseudomonas* spp showed resistance to imipenem and variable resistance profiles to 3rd generation cephalosporins(78.4% to ceftriaxone and 32.8% to ceftazidime), and lower rates of resistance to ciprofloxacin (21.6%), gentamycin (15.2%), and amikacin (13.6%).

The resistance profile of gram-positive organisms showed that 91.6% of coagulase-negative *Staphylococcus* (CoNS) isolates and 60.6% of *Staphylococcus aureus* isolates were resistant to cifoxitin and/or oxacillin (an indicator of methicillin resistance). These isolates showed variability in their resistance profile to ciprofloxacin and gentamycin: CoNS had moderate resistance rates to these antibiotics (61.4% and 68.7%, respectively), whereas *Staphylococcus aureus* had much lower rates (25.8% and 13.6%, respectively). None of the *Staphylococci* isolates was resistant to vancomycin, whereas 46.4% of *Enterococci* were resistant. *Enterococci* also showed moderately high rates of resistance to ciprofloxacin (72.5%) and gentamycin (62.3%).

Conclusion

The high rates of antimicrobial resistance reported here reflect extreme abuse of antibiotics in these settings. Establishing a national steering committee and a road map for addressing antimicrobial resistance is essential.

Nosocomial infection and resistant bacteria in Bagdad hospital

Zuhair I. Jassim : Consultant medical Bacteriologist BSc MSc Ministry of Heath ï Public Health Directorate Central Public Health Lab (CPHL)(

Introduction: In last 2 years the extremely antibiotics resistant like *Escherichia coli*, and *Klebsiella pneumonia* has been emerged as an important nosocomial pathogens.
The infection with strains resistant to 3rd cephalosporin is associated with an increased proportion of death compare with susceptible strain.
Aim of this study: To evaluate the incidence of susceptibility of Escherichia coli, and Klebsiella pneumonia which had resistant to 3rd cephalosporin to other
antibiotics, in two years, among patients of Bagdad hospital.
Material and method: A total 239 strains of Escherichia coli and 78 strains of Klebsiella pneumonia, was studied for susceptibility pattern form January 2013 to the end June 2014.
The number of strains at 2013 for Escherichia coli(139)and for Klebsiella pneumonia (62).At 2014 for Escherichia coli (100) and for Klebsiella pneumonia (16).All antibiotics agent according to(CLSI- 2013)
Result: The incidence of susceptibility to Escherichia coli strains at years 2013 (139 strains) as following cefotaxime 1%;gentamicin 38%;amikacin 94%;imipenem 99% (1 strain resistant) ;chloramphenicol 91 %;and ciprofloxacin 21 %.At years 2014 the susceptibility to the same antibiotics (100 strains E.coli) were cefotaxime 2%;gentamicin 32%;amikacin 94%;imipenem 100% ;chloramphenicol 80 %;and ciprofloxacin 11% .
As regarded to strains of Klebsiella pneumonia at 2013 (62 strains) for the same antibiotics were cefotaxime 6%; gentamicin 32%;amikacin 66%;imipenem 87% (8 strains resistant) ;chloramphenicol 42 %;and ciprofloxacin 34%
At the years 2014 the susceptibility pattern of Klebsiella pneumonia (16 strains)) for the same antibiotics were cefotaxime 0%; gentamicin 7%;amikacin 66%;imipenem 100 ;chloramphenicol 44 %;and ciprofloxacin 22%.
Discussion: The treatment option for the resistant bacteria to 3rd cephalosporine was the carababenem and others non B-lactam antibiotics (aminoglycosides,chloramphenicol,ciprofloxacin é etc).For E coli shown less incidence of susceptibility at 2014 to chloramphenicol ,and ciprofloxacin. while Klebsiella pneumonia also shown less incidence of susceptibility to ciprofloxacin & gentamicin .
Conclusions: Infection caused by resistant bacteria to antibiotics result in significant morbidity and mortality; and contributes to escalating health care costs.
Appropriate surveillance and infection control measures are therefore urgently need. We believe that is also essential to apply strict antimicrobial stewardship policies to reduce the selective pressure, so that these antibiotics remains therapeutically useful.

Antibiotic drug-resistant bacteria isolated from Syrian and Iraqi war-injured patients managed in a medical humanitarian surgical program

Richard Murphy, Infectious diseases specialist, MSF

Background: Efforts to describe the epidemiology of war infections are complicated by difficult access to patients, limited availability of microbiology support and widespread empirical use of antibiotics. The proximity of an existing Médecins Sans Frontières (MSF) surgical project in Jordan provided an unusual opportunity to describe the microbiology of war injury in Iraqi and Syrian trauma patients.

Methods: The MSF project in Amman was originally developed for war-injured Iraqis needing surgical orthopedic reconstruction or management of chronic osteomyelitis. Infection management is based on specific organism-targeted antimicrobial agents and wide surgical resection of involved tissue. In this analysis we reviewed the demographics and initial deep surgical culture results obtained from two groups of patients, one from Iraq and one from Syria. Pathogen identification was performed using conventional methods and the API system (bio-Mérieux, Durham, USA). Data analysis was carried out using Stata 12 (StataCorp, College Station, USA).

Results:

Syrian patients

During the period August 1, 2011—March 31, 2013, 1,586 Syrian patients were evaluated, representing 35% of arrivals to the surgical program in both the inpatient and outpatient departments. Patients with suspected osteomyelitis were admitted and evaluated in the operating theatre (OT). At initial OT evaluation, infection was suspected in 61 (18%). Patients had a median age of 26 years (interquartile range 22–34); 98% were male. The median time from injury to admission was 5 months (IQR 1.2–8.1), but for 27 (44%) patients, this time period was >6 months. The 2 most common injuries were gunshot wounds (32 patients [52%]) and wounds from explosions (20 patients [33%]).

For the 61 patients, a total of 67 bacterial isolates were identified from cultures of surgical specimens. Overall, 45 (74%) patients had at least 1 positive culture, and 6 (13%) patients had polymicrobial results. Gram-negative organisms represented 24 (56%) of 43 isolates; 10 (23%) were *Pseudomonas aeruginosa*, 8 (19%) were *Escherichia coli*, and 6 (14%) were *Acinetobacter baumannii*. Gram-positive bacteria, including methicillin-resistant *Staphylococcus aureus* (MRSA), represented 19 (44%) of 43 isolates (Table 1). Overall, 31 (69%) of 45 patients with confirmed infection were positive for MDR organisms. Within this group, MRSA represented 8 (42%) of 19 staphylococcal isolates.

Iraqi patients

During the period October 1, 2006—June 30, 2009, 137 patients (90% male; median age, 35 years [IQR, 28–46] were admitted with suspected chronic osteomyelitis in the setting of war-related injury. The median time from initial injury to program admission was 19 months (IQR, 10–35). Patients had previously undergone a median of 4 (IQR, 2–6) prior procedures in Iraq.

Overall, 107 patients had a positive intraoperative culture. Gram-negative organisms represented 63% of isolates, most commonly *E. coli* (20%), *P. aeruginosa* (18%), *K. pneumonia* (12%), *Proteus* spp (9%), *Enterobacter* spp (9%), and *A. baumannii* (4%). *S. aureus* was the most common individual organism, representing 21% of isolates. Fifty-nine (55%) of 107 patients with confirmed osteomyelitis had an MDR organism isolated at admission—most commonly, cefepime-resistant *Enterobacteriaceae* (n=40), MRSA (n=16), and MDR *A. baumannii* (n=3) (Table 2). For Iraqis, an association of borderline significance existed between a history of more than 2 prior surgical procedures in Iraq and an MDR isolate at program entry (multivariate: odds ratio, 5.3; 95% confidence interval, 0.9–30.6; p=0.064).

Conclusions:

Patients from Iraq and Syria with war-related osteomyelitis often experienced delayed definitive management and were frequently infected with an MDR organism, notably highly-resistant gram-negative pathogens and MRSA. For a humanitarian surgical project, patients infected with MDR organisms lead to formidable diagnostic, treatment, and control challenges. Treatment of MDR infections requires ongoing access to high-quality clinical microbiology support, late-generation antimicrobial parenteral drugs (typically given for 6 weeks), trained personnel, and sufficient hospital space to isolate patients with resistant strains. Our findings support the previously reported linkage between war-associated injuries and infection with antimicrobial drug-resistant organisms—extending this finding to civilians with neglected war injury, with important implications for patient management.

Antimicrobial drug	No. MDR resistant isolates/no. total (%)			
	Staphylococcus aureus, N = 19	*Pseudomonas aeruginosa*, N = 10	*Escherichia coli*, N = 8	*Acinetobacter baumannii*, N = 6
Amikacin		1/ 11 (9)	1/7 (14)	6/6 (100)
Ampicillin			5/5 (100)	
Amoxicillin/clavulanic acid			6/6 (100)	
Cefotaxime			6/8 (75)	
Ceftriaxone			5/8 (62)	
Ceftazidime		3/9 (33)	5/8 (62)	4/4 (100)
Cefepime			5/8 (62)	5/5 (100)
Cefixime			5/8 (62)	5/5 (100)
Ciprofloxacin	7/17 (41)	5/8 (62)	2/7 (28)	5/5 (100)
Colistin		NA	NA	0/5
Trimethoprim/sulfamethoxazole	3/14 (21)		3/5 (60)	
Gentamicin	10/18 (55)	4/9 (44)	4/8 (50)	6/6 (100)
Piperacillin/tazobactam		2/9 (22)	3/7 (42)	NA
Imipenem		0/9	1/7 (14)	4/5 (80)
Penicillin	9/10 (90)			
Oxacillin	7/17 (41)			
Clindamycin	9/17 (52)			
Rifampin	6/15 (40)			
Fusidic acid	10/15 (66)			

Table 1 taken from: Teicher CL, Ronat JB, Fakhri RM, Basel M, et al. Antimicrobial drug-resistant bacteria isolated from Syrian War–injured patients, August 2011–March 2013. Emerg Infect Dis. 2014

TABLE 2. Antimicrobial Susceptibility of Frequently Isolated Pathogens Among Iraqi Patients With War-Related Chronic Osteomyelitis

	Staphylococcus aureus		Coagulase-Negative *Staphylococcus*		*Escherichia coli*		*Klebsiella pneumoniae*		*Pseudomonas aeruginosa*		*Acinetobacter baumannii*	
Organism	**N = 33**	**Resistant (%)**	**N = 22**	**Resistant (%)**	**N = 30**	**Resistant (%)**	**N = 15**	**Resistant (%)**	**N = 27**	**Resistant (%)**	**N = 6**	**Resistant (%)**
Amikacin					29	17	15	20	25	0	6	17
Ampicillin					28	96	15	100	8	N/A	4	N/A
Amoxicillin-clavulanate					21	100	13	100	7	N/A	2	100
Cefotaxime					28	93	15	87	13	N/A	3	100
Ceftriaxone					28	93	15	87	23	N/A	6	100
Cefepime					28	93	15	93	12	67	4	75
Cefixime					26	100					2	100
Ciprofloxacin					21	29	11	36	16	38	4	75
TMP/SMX					15	60	11	82	16	100	4	75
Gentamicin					19	74	7	86	17	77	6	67
Piperacillin/tazobactam					21	10	13	39	22	14	5	60
Imipenem					29	0	15	0	25	0	6	50
Penicillin	25	96	13	92								
Oxacillin	25	84	13	31								
Clindamycin	22	32	11	18								
Gentamicin	22	50	13	54								
Rifampin	14	43	N/A	N/A								
Fusidic acid	10	0	5	60								
TMP SMX	8	38	8	50								
Ciprofloxacin	22	23	12	0								
Vancomycin	27	0	17	0								

Table 2 taken from: Murphy RA, Ronat JB, Herard P, Blackwell N, Abgrall S, Anderson DJ. "Multidrug-resistant chronic osteomyelitis complicating war injury in Iraqi civilians." The Journal of Trauma. 2011

Over-the-counter Rules on Antibiotics Sales in India

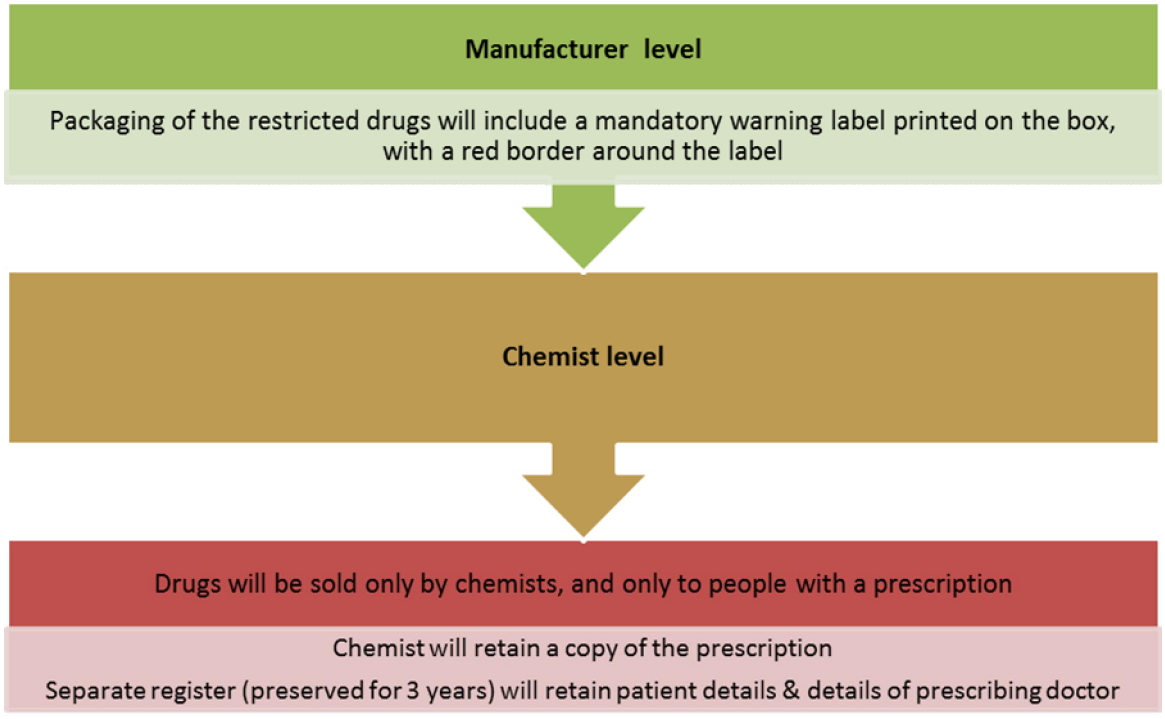
Dr Abdul Ghafur (Coordinator, Chennai declaration), India

Widespread domestic and global concern over growing antibiotic resistance led the Indian Government in September, 2013 to announce a new provision (known as Schedule H1) curbing the indiscriminate over-the-counter (OTC) sale of antibiotics.

Introducing restricted sale of antibiotics was one of the main recommendations of the Chennai Declaration. The Chennai Declaration initiative played a significant role in speeding up the notification of the modified H1 rule (see flow chart below). Implementation of the rule started on March 1, 2014.

46 drugs, comprising mainly third and fourth generation antibiotics and anti-TB drugs, have been placed under these restrictions. Enforcement falls under the jurisdication of the Central Drugs Standard Control Organisation (CDSCO).

How the H1 Rules work:



Introducing Antimicrobial Stewardship in Hospitals

Sara Cosgrove, Johns Hopkins Medical Institutions, Baltimore, MD, USA

Although antibiotics have saved countless lives, their use is not benign or risk-neutral. Antibiotic resistance is occurring in populations and in individual patients. Also at least 5% of hospitalized patients experience an adverse reaction, including rash, nephrotoxicity, and antibiotic-associated diarrhea. Overall, 30-50% of antibiotics used in hospitals are incorrect or unnecessary. We are running out of antibiotics, and very few new antibiotics are being developed.

Antimicrobial stewardship programs (ASPs) seek to ensure that patients receive optimized antimicrobial therapy. This means ensuring that every patient gets: (1) An antibiotic only when one is needed; (2) the right agent (3) at the right dose (4) at the right time; and (5) for the right duration. When implemented robustly, such programs should decrease antibiotics costs and ultimately improve resistance patterns within an institution. ASPs should have clearly delineated leadership by a physician and a pharmacist, and collaborations should be developed with all relevant stakeholders. Numerous options exist for stewardship interventions; the decision about which approaches to employ should be based on the needs of the individual institution. Interventions should be planned in advance using implementation science approaches to facilitate institutional change. ASPs should measure and provide feedback regarding results.

How can microbiology labs take an active role in improving antibiotic use? MSF Experience in Iraq

Jean-Baptiste Ronat, Microbiologist, Laboratory advisor, MSF, France

Faced with high (and increasing) rates of antibiotic resistance and few point-of-care tools for diagnosing bacterial infections, and with few new antibiotics in the drug development pipeline, the expansion of microbiological diagnostic capacity using current tools is considered an essential step in promoting more rational use of antibiotics, according to the WHO 2014 global action plan on antibiotic resistance.

Microbiology laboratories are central to tracking and responding to bacterial resistance, in several respects:

- *Diagnosis of individual patients*. For patients with a suspected infection, clinicians must make a diagnosis to guide treatment selection. When diagnosis is uncertain, as it often is without laboratory diagnostics, the impulse to prescribe a broad-spectrum antibiotic is strong. On the other hand, *not* prescribing when an antibiotic is genuinely required can have serious consequences for the patient.

- *Developing local and national guidelines for prescribing antibiotics.* At the hospital, regional and country levels, the availability of microbiological data on bacterial resistance trends provides an evidence base for developing institutional and national treatment guidelines, and for evaluating the impact of different strategies. Furthermore, empirical decision-making algorithms can be revised to spare as much unnecessary antibiotic use as possible.

- *Identifying and combating global trends towards increased antibiotic resistance.* At the global level, resistance control must be based on national monitoring networks. Middle income countries—including many in the Middle East and South Asia that report disturbing levels of antibiotics resistance—generally do not have enough microbiology laboratories and resources to implement this monitoring.

Although implementing bacteriology laboratories in middle and low-income settings is usually seen as complex and expensive, the experience at Médecins Sans Frontières suggests that microbiology capacity can be developed (or achieved through partnerships) in most settings. This experience also highlights the advantages that microbiology brings to patient care, including surveillance of resistance, awareness of outbreaks, and rational use of antibiotics.

Access to Antibiotics not Excess: The Need for Conservation and Creation

Dr Arlene Chua, MSF Access Campaign, Switzerland

The MSF Access Campaign was established in 1999 to improve access and stimulate development of medical tools (drugs, diagnostics, vaccines) that could have a major impact on morbidity and mortality in low-resource settings where MSF works, and in similar contexts. For bacterial infections—and unlike malaria and HIV—medical workers in the field lack the tools to make diagnoses with a high degree of sensitivity or specificity; moreover, there are few national surveillance data available to guide empiric antibiotic treatment. In addition, there are no adequate tools to distinguish bacterial infections from those caused by mycobacteria or non-bacterial pathogens such as viruses and parasites, and to distinguish infections caused by antibiotic-sensitive bacteria from those caused by resistant strains.

To address the growing problem of antimicrobial resistance, it is essential both to conserve currently-used antibiotics and to create new classes of antibiotics. To successfully implement conservation strategies, there is an urgent need for diagnostic tests that are designed and developed specifically for low-resource settings. In terms of new drugs, no new classes of antibiotics have been discovered since 1987, and the pharmaceutical industry has largely abandoned research and development (R&D) activities in the field of antibiotics. This is largely because the patent-based innovation-system is ill-suited for developing drugs and diagnostic tests that are affordable for all. Overcoming these barriers will require, among other steps, introducing new R&D approaches that foster medical innovation based on need rather than potential profitability, and that guarantee affordable access to new diagnostic tests and antibiotics.

Key principles for health professionals new to infection prevention: How to train health care personnel

Omar M. Al-Rawajfah, RN, PhD, Assistant Professor, Faculty of Nursing, AL AL-Bayt University
Mafraq, Jordan

Background: Hospital-acquired infections (HAIs) are considered one of the most serious and complex health problems worldwide, and are even more problematic in developing countries with limited resources and inadequate government health care budgets. Implementing strategies for controlling HAIs is a priority for health care policy makers worldwide. The US Centers for Disease Prevention and Control (CDC) has recommended that educating health care workers regarding infection control measures should be the highest priority for preventing and controlling HAIs.

Results: In Jordan, several studies have documented weak compliance of healthcare professionals with standard infection control (IC) practices. Based on a national representative sample, we found that about one-third of registered nurses (RNs) in Jordanian hospitals demonstrated weak compliance, and about 3% were classified as using unsafe practices. About one-third of RNs had never attended an IC workshop or educational program inside the hospital where they worked. Another important finding is that more than half of RNs (56%) reported that they re-used tools and equipment from one patient to the next.

Implications for policy: In Jordan, there is an urgent need to reform our rules and regulations to ensure more optimal IC practice. Employment of a dedicated IC nurse in each hospital should be mandated. In addition, adequate qualification of IC nurses should be monitored and maintained. IC resources and infrastructure should be available for all healthcare professionals in all sites.

Implications for practice: Formal IC educational programs in our hospitals should be established, and IC nurses in our hospitals should be empowered to assume a stronger educational role. In addition, our hospitals should establish formal IC education programs tailored to available resources.

Infection prevention in the hospital: Basic principles

Mohammad Basel, RN, Infection Control Practitioner, MSF-Amman program

Healthcare-associated infections (HAI) affect hundreds of millions of patients annually worldwide, particularly in developing countries. In some settings hospital infection control teams have been established, with the primary objective of preventing hospital-acquired infections.

In this talk I will discuss implementation of hand hygiene (HH) as a core preventive intervention to reduce HAI and MDR strains cross-transmission, the patient's role in the process, and how these measures are supported by national regulations, attitudes of medical staff, education programmers and campaigns.

WHO has issued evidence-based recommendations for hand hygiene in healthcare settings and developed access to alcohol-based hand rub.