

Bacteria Fight Back, Also in Indonesia!

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Get an infection, take an antibiotic. That simple, sensible, and often life-saving intervention, repeated myriad times, has triggered an ever-escalating war between humans and microbes—a war the microbes seem to be winning.¹ Almost as soon as penicillin was introduced in 1942, bacteria started to develop resistance. Now, many common bacteria have acquired resistance to multiple antibiotics, making some infections extraordinarily difficult to treat.^{1,2}

Antibiotic resistance is the ability of a microorganism to withstand the effects of an antibiotic. In Indonesia, antibiotics can be purchased even without a doctor's prescription. Now, as bacterial resistance to antibiotic are increasing, the potency of an antibiotic to eradicate pathogenic bacteria seems to be decreasing, not very long after a new antibiotic is available in the market. Generally, the development of resistant bacteria to antibiotics happen spontaneously or because of a pressure of inappropriate antibiotic use in clinical practice. In Indonesia, the absence of antibiotic regulation to be used in human as well as animal health is also believed to have contributed to the rapidly increasing incidence of multidrug resistant bacteria. The antibiotic resistant bacteria has become a serious problem especially for patients hospitalized in intensive care units. More than 40% of the budget for drugs is allocated for antibiotics, and once the causative bacteria develops resistance to antibiotics, the case fatality rate of the infections increases.

Data on antibiotic resistance pattern from several hospital isolates in Indonesia showed an increase in resistance rates, not only in Gram negative bacteria such as *Pseudomonas aeruginosa*, *Enterobacteriaceae*, *Klebsiella pneumoniae* and *Acinetobacter baumannii*, but also in Gram positive bacteria such as *Staphylococcus aureus*. Isolation of methicillin

resistant *Staphylococcus aureus* (MRSA) which is more resistant to antibiotics from the beta-lactam group are also reported in several hospitals. Although there is no report on the isolation of MRSA from the community, the existence of this super bug is an indicator that nonrational use of antibiotic in Indonesia is highly practiced. Antibiotic resistant bacteria is also the major problem for patient care in the intensive care unit. The problem is dramatically increased whenever the causative bacteria is a multidrug resistant bacteria, meaning that the bacteria isolated from patients are resistant to more than one category of antibiotics, such as resistant to beta-lactam groups of antibiotics, at the same time also resistant to fluoroquinolones or aminoglycosides. Multidrug resistant bacteria such as *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*, were also isolated from ICU of Fatmawati Hospital, Jakarta. Most of them were resistant both to third generation Cephalosporin and Fluoroquinolones.³ These resistant bacteria are categorized in a group called extended spectrum beta-Lactamase producing bacteria (ESBL), which show a multidrug resistant bacteria mainly to beta lactam antibiotics. The increase of ESBLs in Indonesia has been proven by clinical microbiology laboratories, among others as reported by Karuniawati A, et al.⁴ Molecular epidemiology studies of antibiotic resistant pathogens in Indonesia are very rare, and this study conducted on clinical isolates from intensive care unit of Cipto Mangunkusumo Hospital in 2011 showed that the prevalence of carbapenem resistant Gram negative pathogens are increased in *Enterobacteriaceae* 27.6%, *Pseudomonas aeruginosa* 21.9% and in *Acinetobacter baumannii* 50.5%. Using such molecular epidemiology technique applied to antibiotic resistant strain isolated in hospital, a certain common genes among isolates can be

determined. The data obtained from molecular epidemiology study will be very useful for the development of an antibiotic guideline for physician working in that specific hospital. This evidence based hospital guidelines to treat infections in hospital will improve the quality of hospital prescription for antibiotics delivered by the clinicians.

Saharman YR and Lestari DC,⁵ present an interesting data on a simple modified Hodge test method to detect the existence of carbapenemase.⁵ The result shows the high prevalence of ESBLs in hospital isolates in Jakarta. This result shows similar pattern with results obtained from the similar surveillance conducted in other parts of Indonesia. A total of 300 ESBL-producing isolates have been collected in 2010 from three other teaching hospitals, i.e. in Semarang, Malang and Surabaya, with three most prevalent ESBL producers being *Escherichia coli*, *Klebsiella pneumoniae*, and *Enterobacter spp.*⁶ Routine examination and surveillance for hospital's bug should be conducted more often. This shows the important role of a clinical microbiology experts working together with other clinicians in hospital. To look for those superbugs mentioned above and to limit the spreading of hospital acquired infections, a robust and efficient clinical microbiology laboratory should be established in hospital.

Given the alarming problems of antibiotic resistant bacteria in hospital setting, we should look into the quality of antimicrobial drug prescription in hospital. J.W.M. van der Meer⁶ mentioned in his very interesting publication that even in The Netherlands where both antibiotic consumption and antibiotic resistant bacteria are low, the antimicrobial prescription is not optimal. In his survey, 15% of antibiotic therapy in surgical and internal medicine wards are not adequate. The major problem of an inappropriate prescribing is due to insufficient education about infectious diseases and antimicrobial therapy.⁷ Adjustment of the initial antimicrobial therapy based on the clinical microbiology result and clinical course

is one of the most relevant steps in antimicrobial prescribing, since it is clearly diminishes the selection pressure to microorganisms in hospital. Many physicians who prescribed antibiotic, does not even understand if their appropriate or inappropriate prescription can have an impact on bacterial resistance development. A reasonable and evidence based antibiotic guidance is one tool toward good antibiotic prescription. A clear antibiotic guidance in hospitals should be able to identify specific antibiotic use for oral versus parenteral therapy, combination versus single drug therapy and guidelines in changing between one antibiotic to other antibiotic whenever necessary. A continuous effort in hospital surveillance, infection control and clinical audits must be conducted as a routine hospital management to fight against the development of antibiotic resistant pathogens.

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