



## Urgent Need to Antibiotic Pharmacokinetic Services for Iranian Health Care Centers.

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Considering the emergence of both Gram negative and Gram positive resistant bacterial strains in the recent years, makes it more prominent to utilize the existed antibiotics in an appropriate and justified way in the treatment of drug resistant infections. Many of the agents currently used to treat bacterial, viral and fungal infections do not need to be pharmacokinetically monitored; it means we do not require their serum levels in order to adjust the dose in a routine manner. Examples of these antibiotics are penicillins, cephalosporins, macrolides, tetracyclines, fluoroquinolones, etc. Of course these agents need dose adjustment based on renal and hepatic functions. On the other hand there are antibiotics which need to be monitored through their serum levels because of three main following reasons:

- 1- To avoid overdosing patient and reduce the incidence of toxicities.
- 2- To avoid underdosing patient, this may lead to the emergence of resistant strains and treatment failure.
- 3- To optimize the dose of antibiotic to achieve the bactericidal or bacteriostatic effects needed to suppress the infective agent.

At this point, we are using vancomycin as a broad spectrum Gram positive agent and aminoglycosides both for the synergism for Gram positive coverage and also for treatment of Gram negative infection in combination with other agents. According to the guidelines published by the accredited organizations like Infectious Diseases Society of America (IDSA) and American Society of

Healthcare Pharmacists (ASHP), it is crucially important to perform Therapeutic Drug Monitoring (TDM) for both vancomycin and aminoglycosides based on their serum levels for all patients on these agents. In the other word, it is a wrong antibiotic therapy without monitoring the levels. Almost in all medical centers nationwide including teaching hospitals the clinicians prescribe vancomycin very often and aminoglycosides like gentamicin and amikacin for both empiric and culture based therapy. In some cases, it is necessary for patient to be on these antibacterial agents for weeks (endocarditis, osteomyelitis, pneumonia, etc.). Fever, white blood cells (WBC) besides other clinical measurements are often used to assess the clinical response to antimicrobial agents. On the other hand microbiological tests including cultures and sensitivity results are routinely utilized to guide the therapy. At our medical centers as the clinicians do not see any of the expected responses based on the above measurements, they change the agent or add another antibacterial to the regimen with no consideration of performing appropriate TDM. Based on the most updated guidelines, a vancomycin trough level at the steady state and peak and trough levels for aminoglycosides make it possible for clinicians to optimize the antibacterial doses without necessarily changing the whole regimen and significantly reduce the rate of treatment failures. If an aminoglycoside is dosed as extended interval, then a random level can help to adjust the frequency of the doses. This valuable pharmacokinetic service by clinical pharmacists would be a great asset to healthcare and medical team which significantly reduces the morbidity and mortality due to both underdosing or high dose induced toxicities in both hospitalized and outpatients. Pharmacokinetic services must be a 24 hour seven day

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task of the pharmaceutical care division of each medical center. It will be necessary for each hospital to have a permanent team of clinical pharmacists to maintain this TDM service. This is not possible unless there would be a close cooperation between pharmacy and medical laboratory of each hospital or an outsource laboratory

with drug serum level measuring services. As a result, it seems to be an absolute need to perform pharmacokinetic services with the cooperation of medical, clinical pharmacy and laboratory teams under the support of insurance companies since this is a “MUST” and not a luxury in therapy.