

Appendix 1: Details of Cippole classification system.

Drug related needs	Categories of drug therapy problems	Drug therapy problem cause
Indication	Unnecessary drug therapy	No medical indication at this time: There is no valid medical indication for the antibiotic therapy at this time
		Duplicate therapy: Multiple drug products are being used for a condition that requires single-drug therapy.
		Nondrug therapy more appropriate The medical condition is more appropriately treated with nondrug therapy
		Treating avoidable adverse reaction: The drug therapy is used to treat an avoidable adverse reaction associated with another medication.
		Addiction/recreational drug use: drug abuse, alcohol use, or smoking is causing the problem.
		Need for additional drug therapy
Preventive therapy: Preventive drug therapy is required to reduce the risk of developing a new condition.		
Synergistic therapy: The medical condition requires additional drug therapy to achieve synergistic or additive effects.		
Effectiveness	Ineffective drug	More effective drug available: The drug is not the most effective for the medical condition and a different drug is needed.
		Condition refractory to drug: The medical condition is refractory to the drug product and a different drug is needed.
		Contraindication present: The drug product is contraindicated in this patient.
		Dosage form inappropriate: The dosage form of the drug product is inappropriate
	Dosage too low	Drug not indicated for condition: The drug product used is not an effective product for the medical condition being treated
		Ineffective dose: The dose of the drug is too low to produce the desired response.
		Needs additional monitoring: clinical or laboratory parameters are required to determine if the dosage is too low for the patient.
Drug interaction: The drug interaction occurs that could reduce the amount of active drug available		
Duration inappropriate: The duration of drug therapy is too short to produce the desired response		

Safety	Adverse drug reactions	Frequency inappropriate: The dosing interval is too short to produce the desired response.
		Undesirable effect: The drug causes an undesirable reaction that was not dose-related
		Drug interaction: The drug interaction causes an undesirable reaction that is not dose-related
		Incorrect administration: the drug product was administered by the incorrect route or method resulting in an adverse reaction.
		Allergic reaction: The drug causes an allergic reaction.
		Dosage increase/decrease too fast: the drug dosage was administered or escalated too rapidly resulting in an adverse reaction.
		Unsafe drug for the patient: Unsafe drug for the patient: a safer drug product is required due to patient risk factors.
	Dosage too high	Dose too high: The dose of the drug is too high for the patient, resulting in toxicity.
		Needs additional monitoring: clinical or laboratory parameters are required to determine if the dosage is too high for the patient.
		Frequency too short: The dosing frequency is too short,
		Duration too long: The duration of drug therapy is too long,
		Drug interaction: The drug interaction occurs that could result in a toxic reaction to the drug product.
		The dose of the drug was administered too rapidly.
Adherence	Non-adherence	Not applicable for the study.
