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# Indiana Medicaid Drug Utilization Review Board Newsletter

## Rational Use of Antibiotics

Widely hailed as “magic bullets,” antibiotics have caused a marked reduction in morbidity and mortality caused by infectious diseases. However, with the advent of new infectious diseases and the development of antibiotic resistance, the armamentarium of antimicrobials is increasingly growing weaker. The problem of antibiotic resistance has escalated into a serious epidemiological concern. Antibiotic resistance is driving up health care costs, increasing the severity of infectious diseases, and escalating hospitalization and death rates. This natural, unstoppable phenomenon of antimicrobial resistance is exacerbated by the abuse, overuse, and misuse of antimicrobials.<sup>1</sup> Estimates suggest that approximately half of all antibiotic consumption may be unnecessary. Higher antibiotic utilization is associated with higher resistance levels.<sup>2</sup> Consequently, rational use of antibiotics should be based upon optimal prescribing where therapeutic outcomes are maximized with the most appropriate and cost-effective antibiotic for an optimal length of time.

In an effort to help reduce the development of drug-resistant bacterial strains, encourage the development of new antibiotics, and preserve existing antibiotics, the FDA published a final rule to

require labeling about antibiotic resistance. This labeling advises that antibiotics should be used only to treat infections that are believed to be caused by bacteria. The rule also requires a statement in the labeling encouraging physicians to counsel their patients about the proper use of these drugs and the importance of taking these medications exactly as directed.<sup>3</sup>

Although increased bacterial resistance to antibiotics has several causes, two key factors are the overuse and misuse of antibiotics. Antibiotics are frequently prescribed for indications in which their use is not warranted, or an incorrect or suboptimal antibiotic is prescribed.<sup>4</sup> Prudent prescribing of antibiotics is necessary to curtail antibiotic resistance. In response, the Council for Appropriate and Rational Antibiotic Therapy (CARAT), an independent, multidisciplinary panel of healthcare professionals, has developed criteria to guide appropriate and accurate antibiotic selection. The criteria, which are aimed at optimizing antibiotic therapy, include evidence-based results, therapeutic benefits, safety, optimal drug for the optimal duration, and cost-effectiveness.<sup>4</sup>

### Evidence-based Results

Evidence-based clinical guidelines supplement professional judgment in selecting an optimal antibiotic. Clinicians should consider the clinical evidence demonstrating that the drug is clinically and microbiologically appropriate, the efficacy of that drug in well-

designed clinical trials, and the antibiotic resistance patterns of the local region. Well-conducted, randomized, controlled clinical trials provide the highest quality information for making decisions.<sup>4</sup> In addition, the sample population should be adequate to draw an unbiased and clinically sound conclusion without compromising the validity of the research.

### Therapeutic Benefits

Therapeutic benefits are based on proper diagnosis, evaluation of drug therapy, and achieving optimal therapeutic outcomes. Proper diagnosis can be achieved by diagnostic procedures that may help to ensure that antimicrobials are prescribed only when needed. Many antimicrobials are prescribed unnecessarily because prescribers are unsure of the diagnosis.<sup>2</sup> Recent studies undertaken by WHO indicate that for every 100 respiratory infections, only 20% require antibiotic treatment. This means that 80% of patients are treated with unnecessary medications thereby increasing the likelihood of developing antibiotic resistance.<sup>1</sup> Evaluation of drug therapy would entail assessing the therapeutic benefit of the medication relative to the status of the patient's infection. Clinicians may also weigh the benefit of drug therapy versus the absence of a pharmacologic agent.<sup>4</sup> Finally, achieving optimal therapeutic outcomes should be intended to maximize health outcomes and quality of life and to minimize adverse events and cost.

### Safety

The safety and efficacy profile of a medication should be considered when prescribing an antibiotic. Clinically applicable treatment strategies should be chosen to maximize efficacy and minimize side effects. Although antibiotics are generally considered safe and well tolerated, they have been associated with a wide range of

adverse effects.<sup>4</sup> Interestingly, the safety profile of a newer agent may not be well established in comparison with those that have been in use for many years. In a study of the period between 1975 and 2000, 548 new chemical entities were approved for use in the United States; 45 of these (8.2%) acquired new black-box warnings and 16 (2.9%) were withdrawn from the market. Therefore, clinicians should keep abreast of new information and clinical developments especially post-marketing surveillance.<sup>4</sup>

### Optimal Drug for Optimal Duration

When prescribing an antibiotic, clinicians should select the most optimal drug to treat a particular infection. An optimal drug must be of sufficient duration to result in bacterial eradication, relief of symptoms, and prevention of the emergence of resistant organisms. The following must be considered in selecting an optimal antibiotic: patient signs and symptoms, medical history, allergies, results of diagnostic testing (if available), type of bacteria, and regional resistance patterns.<sup>4</sup> Success of treatment may be dependent on the patient taking the medication at the correct intervals and for an adequate duration.

### Cost-Effectiveness

Cost-effective therapy achieves the best therapeutic outcomes with minimal overall cost. Clinicians should be aware of generic availability and drugs on the preferred drug list. These drugs may provide the best choices based upon safety, effectiveness, and cost. Choosing inappropriate therapy is associated with increased costs, including the cost of the antibiotic and increases in overall costs of medical care because of treatment failures and adverse events.<sup>4</sup> Unnecessary and excessive use of medicines wastes resources and

results in significant harm to patients through poor health outcomes and adverse drug reactions. Efficient and effective use of healthcare resources can minimize overall medical costs, provide affordable care, and improve quality of life.

### Summary

Antibiotic resistance is a serious public health concern. Institution of the 5 CARAT criteria will optimize safe and well-tolerated treatment regimens, curb unnecessary prescribing of antibiotics, decrease treatment costs, and increase adherence.<sup>4</sup> Rational use of antibiotics and the effective use of these existing tools will help in conquering this battle against antimicrobial resistance.

### References:

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**Top 25 Drugs 1<sup>st</sup> Quarter 2006  
By Total Amount Paid**

Drug	Total Paid	Total Claims
Risperdal	\$3,408,966	14,363
Zyprexa	\$3,147,729	8,143
Seroquel	\$2,951,656	12,234
Antihemophilic Factor	\$2,721,911	99
Novoseven	\$2,511,330	10
Abilify	\$2,429,557	7,388
Depakote	\$1,658,882	12,162
Topamax	\$1,395,755	6,037
Lipitor	\$1,164,892	12,142
Zoloft	\$1,146,521	12,152
Lamictal	\$1,065,123	4,687
Geodon	\$975,119	3,783
Fentanyl	\$965,226	3,640
Protonix	\$833,771	7,250
Trileptal	\$833,413	4,811
Advair	\$808,572	5,116
Oxycodone	\$798,305	4,809
Zocor	\$758,476	5,462
Effexor	\$743,449	5,859
Plavix	\$731,867	5,798
Amphetamine salts	\$729,370	8,472
Methylphenidate	\$722,862	9,219
Bupropion	\$703,006	7,651
Lexapro	\$663,762	9,140
Nexium	\$582,302	3,837

**Top 25 Drugs 1<sup>st</sup> Quarter 2006  
Ranked by Claims Paid**

Drug	Total Claims	Total Paid
Hydrocodone/APAP	43,427	\$341,571
Aspirin	40,562	\$27,245
Docusate	38,476	\$84,099
Acetaminophen	34,293	\$94,659
Alprazolam	31,732	\$348,988
Calcium/Vit D	29,913	\$92,624
Loratadine	23,544	\$286,895
Multivitamins	21,835	\$26,799
Lorazepam	20,788	\$121,644
Clonazepam	20,332	\$112,086
Prilosec OTC	16,311	\$437,798
Risperdal	14,363	\$3,408,966
Ferrous Sulfate	13,308	\$14,065
Levothyroxine	12,462	\$137,534
Amoxicillin	12,330	\$93,338
Seroquel	12,234	\$2,951,656
Depakote	12,162	\$1,658,883
Zoloft	12,152	\$1,146,521
Lipitor	12,142	\$1,164,892
Furosemide	12,028	\$49,179
Diazepam	11,862	\$224,633
Lisinopril	11,315	\$78,590
Albuterol	10,573	\$78,502
Ranitidine	10,390	\$236,992
Potassium	9,578	\$128,008