

## SOFTWARE REVIEWS

**QMR: Quick Medical Reference**, Version 3.7 (1995). First Data-bank/Camdat Corp, 1111 Bayhill Drive, Suite 465, San Bruno, CA 94066. \$495.

**DOCUMENTATION:** Well-documented, 229-page manual, with numerous screen shots and exercises.

**HOW SUPPLIED:** Three 1.44MB diskettes. Also available in a CD-ROM version.

**HARDWARE REQUIREMENTS:** IBM-compatible 486 processor, 5MB of hard drive space (1.5MB for the CD-ROM version), 3MB RAM, VGA monitor, Microsoft Windows 3.1 or greater and mouse.

**CUSTOMER SUPPORT:** Customer service: 1-800-633-3453, technical support: (415) 624-8840.

**GUARANTEE:** 30-day money-back guarantee.

**RATING:** Marginal to good.

*QMR (Quick Medical Reference)* is described by its distributors as a comprehensive knowledge base of over 600 diseases and over 4500 clinical findings that acts as a decision support tool. The program allows the user to generate extensive differential diagnoses, identify the best test to rule-in or rule-out a diagnosis, build and manage patient cases, and test personal medical knowledge on randomly constructed case simulations. The development of "expert systems" such as *QMR* are likely to be increasingly common and hold promise to improve medical care by allowing physicians to manage information more effectively. How would *QMR* perform in the real world environment of a family physician's office?

The performance of the program itself is quite good. It installs easily and is relatively simple to use. The physician usually starts by entering a disease or clinical finding, a step

facilitated by an excellent search engine. Only rarely did an error message occur indicating that the term entered was not present in the database. Once this step is accomplished, characteristics of either the disease or the clinical findings can be examined. For example, after "infectious mononucleosis" is entered, the program lists all the clinical findings associated with the disease as well as the sensitivity (designated "frequency" by the program developers) and positive predictive value (designated "evoking strength") of each finding for mononucleosis.

The program also indicates whether and to what degree clinical findings mandate diagnostic evaluation, provides a list of other associated conditions, and offers possible complications of the disease. Interestingly, the program does not mention splenic rupture as a possible complication of infectious mononucleosis.

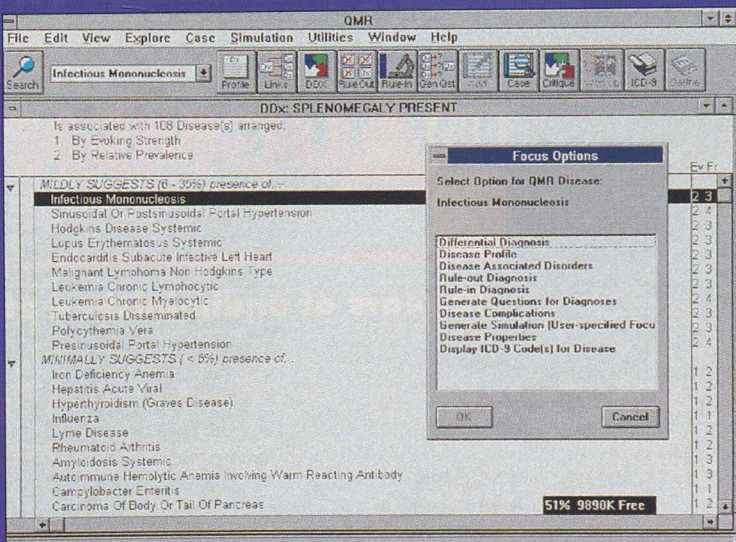
*QMR's* chief function is as a diag-

nostic tool. It allows the user to generate diagnostic hypotheses based on clinical findings using one or two methods. First, the user can enter up to six clinical findings, then click on the differential diagnosis button to generate a list of possible diagnoses. The second method of generating a differential diagnosis is the case building method. The user can enter between 6 and 200 positive or negative findings and, in response, the program poses diagnostic hypotheses. You can either use a drop-down window to search for each finding or view the entire list of clinical findings and mark relevant ones, either positive or negative.

Once a list of diagnoses is generated, the user can apply many program features to a proposed hypothesis to refine the diagnosis further. For example the finding "splenomegaly present" generates a list of diagnoses that includes infectious mononucleosis. Double-clicking on this line opens a dialogue box that allows you to find

### FIGURE

**QMR lists possible diagnoses based on the clinical findings, and even finds the associated ICD-9 code for the identified disease.**





**AUGMENTIN® amoxicillin/clavulanate potassium**  
**BRIEF SUMMARY FOR FULL PRESCRIBING INFORMATION, SEE PACKAGE INSERT.**  
**INDICATIONS AND USAGE:** *Augmentin* is indicated in the treatment of infections caused by susceptible strains of the designated organisms in the conditions listed below.  
 Lower Respiratory Tract Infections caused by  $\beta$ -lactamase-producing strains of *Haemophilus influenzae* and *Moraxella catarrhalis*.  
 Otitis Media caused by  $\beta$ -lactamase-producing strains of *Haemophilus influenzae* and *Moraxella catarrhalis*.  
 Skin and Skin Structure Infections caused by  $\beta$ -lactamase-producing strains of *Staphylococcus aureus*, *Escherichia coli*, and *Klebsiella spp.*  
 Urinary Tract Infections caused by  $\beta$ -lactamase-producing strains of *E. coli*, *Klebsiella spp.*, and *Enterobacter spp.*  
 While *Augmentin* is indicated only for the conditions listed above, other organisms susceptible to ampicillin-susceptible organisms are also amenable to *Augmentin* treatment due to its amoxicillin component. Therefore, mixed infections caused by ampicillin-susceptible organisms and  $\beta$ -lactamase-producing organisms susceptible to *Augmentin* should not require the addition of another antibiotic. Because amoxicillin has greater *in vitro* activity against *Streptococcus pneumoniae*, penicillin or ampicillin, the activity of *S. pneumoniae* strains with intermediate susceptibility to ampicillin or penicillin are fully susceptible to amoxicillin and *Augmentin*. (See Microbiology section.)

**CONTRAINDICATIONS:** Patients with a history of allergic reactions to any penicillin, or patients with a history of *Augmentin*-associated cholestatic jaundice/hepatic dysfunction.

**WARNINGS:** SERIOUS AND OCCASIONALLY FATAL HYPERSENSITIVITY (ANAPHYLACTIC) REACTIONS HAVE BEEN REPORTED IN PATIENTS ON PENICILLIN THERAPY. THESE REACTIONS ARE MORE LIKELY TO OCCUR IN INDIVIDUALS WITH A HISTORY OF PENICILLIN HYPERSENSITIVITY AND/OR A HISTORY OF SENSITIVITY TO MULTIPLE ALLERGENS. THERE HAVE ALSO BEEN REPORTS OF INDIVIDUALS WITH A HISTORY OF PENICILLIN HYPERSENSITIVITY WHO HAVE EXPERIENCED SEVERE REACTIONS WHEN TREATED WITH CEPHALOSPORINS. BEFORE INITIATING THERAPY WITH *AUGMENTIN*, CAREFUL INQUIRY SHOULD BE MADE CONCERNING PREVIOUS HYPERSENSITIVITY REACTIONS TO PENICILLIN, CEPHALOSPORINS OR OTHER ALLERGENS. IF AN ALLERGIC REACTION OCCURS, *AUGMENTIN* SHOULD BE DISCONTINUED AND THE APPROPRIATE THERAPEUTIC INTERVENTIONS INSTITUTED. SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE, OXYGEN, INTRAVENOUS STEROIDS AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, SHOULD ALSO BE ADMINISTERED AS INDICATED. *Pseudomonas colitis* has been reported with nearly all antibacterial agents, including *Augmentin*, and has ranged in severity from mild to life-threatening. Therefore, it is important to consider this diagnosis in patients who present with symptoms that suggest the administration of an antibiotic. In patients with evidence of antibiotic-associated colitis, the normal flora of the colon may permit overgrowth of clostridia. Studies indicate that antibiotic-associated colitis is one primary cause of "antibiotic-associated colitis." After the diagnosis of pseudomonas colitis has been established, appropriate therapeutic measures should be initiated. Mild cases of pseudomonas colitis usually respond to drug discontinuation alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation and treatment with an antibacterial drug clinically effective against *Clostridium difficile* colitis. Use *Augmentin* cautiously in patients with evidence of hepatic dysfunction. Hepatic toxicity associated with *Augmentin* use is usually reversible. On rare occasions, deaths have been reported (less than 1 death reported per estimated 4 million prescriptions worldwide). These have generally been associated with serious underlying diseases or concomitant medications. (See CONTRAINDICATIONS and ADVERSE REACTIONS.)

**PRECAUTIONS: General:** While *Augmentin* possesses the characteristic low toxicity of the penicillin group of antibiotics, a complete assessment of organ system functions, including renal, hepatic and hematopoietic functions, is advisable during prolonged therapy.

A high percentage of patients with mononucleosis who receive ampicillin develop an erythematous skin rash. Thus, ampicillin class antibiotics should not be administered to patients with mononucleosis. The possibility of superinfections with mycotic or bacterial pathogens should be kept in mind during therapy. If superinfections occur (usually involving *Candida* or *Clostridium*), therapy should be discontinued and/or appropriate therapy instituted. **Drug Interactions:** Probenecid decreases the renal tubular secretion of amoxicillin. Concurrent use with *Augmentin* may result in increased and prolonged blood levels of amoxicillin. Co-administration of probenecid cannot be recommended. The concurrent administration of allopurinol and ampicillin increases substantially the incidence of rashes in patients receiving both drugs as compared to patients receiving ampicillin alone. It is not known whether this potential for ampicillin rashes is due to alteration in the hyperuricemia present in these patients. There are no data with *Augmentin* and allopurinol administered concurrently.

**Drug/Laboratory Test Interactions:** Oral administration of *Augmentin* will result in high urine concentrations of amoxicillin. High urine concentrations of ampicillin may result in false-positive reactions when testing for the presence of glucose in urine using Clinintex®, Benedict's Solution or Fehling's Solution. Since this effect may also occur with amoxicillin and therefore *Augmentin*, it is recommended that glucose tests based on enzymatic glucose oxidase reactions as Clinintex® or Tes-Tape® be used. Following administration of ampicillin to pregnant women a transient decrease in plasma concentration of total conjugated estradiol, estradiol-glucuronide, conjugated estrone and estradiol has been noted. This effect may also occur with amoxicillin and therefore *Augmentin*.

**Contraception, Mutagenesis, Impairment of Fertility:** Long-term studies in animals have not been performed to determine the contraceptive potential. **Mutagenesis:** The mutagenic potential of *Augmentin* was investigated *in vitro* with Ames test, a human lymphocyte cytogenetic assay, a yeast test and a mouse lymphoma forward mutation assay, and *in vivo* with mouse micronucleus tests and a dominant lethal test. All were negative apart from the *in vitro* mouse lymphoma assay where weak activity was found at very high, cytotoxic concentrations.

**Impairment of Fertility:** *Augmentin* at oral doses of up to 1200 mg/kg/day (5.7 times the maximum human dose, 1480 mg/day, based on body surface area) was found to have no effect on fertility and reproductive performance in rats dosed at a 2:1 ratio formulation of amoxicillin/clavulanate.

**Reproductive effects: Pregnancy (Category B):** Reproduction studies performed in pregnant rats and mice given *Augmentin* at oral dosages up to 1200 mg/kg/day, equivalent to 7200 and 4080 mg/m<sup>2</sup>/day, respectively (4.9 and 2.8 times the maximum human oral dose based on body surface area), revealed no evidence of harm to the fetus due to *Augmentin*. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, use this drug during pregnancy only if clearly needed.

**Labor and Delivery:** Oral ampicillin class antibiotics are generally poorly absorbed during labor. Studies in guinea pigs have shown that intravenous administration of ampicillin decreased the uterine tone, frequency of contractions, height of contractions and duration of contractions. However, it is not known whether the use of *Augmentin* in humans during labor or delivery has immediate or delayed adverse effects on the fetus, prolongs the duration of labor, or increases the likelihood of cesarean delivery or other obstetrical intervention or resuscitation of the newborn will be necessary.

**Nursing Mothers:** *Augmentin* class antibiotics are excreted in the milk; therefore, caution should be exercised when *Augmentin* is administered to a nursing woman.

**ADVERSE REACTIONS:** *Augmentin* is generally well tolerated. The majority of side effects observed in clinical trials were mild and transient. <3% of patients discontinued therapy because of drug-related side effects. The most frequently noted adverse effects were diarrhea (9%), nausea (3%), skin rashes and urticaria (2%), vomiting (1%) and vaginitis (1%). The overall incidence of side effects, and in particular diarrhea, increased with the higher recommended dose. Other less frequently reported reactions include: abdominal discomfort, flatulence and headache. The following adverse reactions have been reported for ampicillin class antibiotics:

Diarrhea, nausea, vomiting, indigestion, gastritis, stomatitis, glossitis, black "hairy" tongue, enterocolitis, mucocutaneous and pseudomembranous colitis. Onset of pseudomembranous colitis symptoms may occur during or after antibiotic treatment. (See WARNINGS.) Skin rashes, pruritus, urticaria, angioedema, serum sickness-like reactions (urticaria or skin rash accompanied by arthritis, arthralgia, myalgia and frequently fever), erythema multiforme (rarely Stevens-Johnson Syndrome) and an occasional case of exfoliative dermatitis (including toxic epidermal necrolysis). These reactions may be controlled with antihistamines and, if necessary, systemic corticosteroids. Whenever such reactions occur, the drug should be discontinued, unless the opinion of the physician dictates otherwise. Serious and occasional fatal hypersensitivity (anaphylactic) reactions can occur with oral penicillin. (See WARNINGS.) A moderate rise in AST (SGOT) and/or ALT (SGPT) has been noted in patients treated with ampicillin class antibiotics but the significance of these findings is unknown. Hepatic dysfunction, including increases in serum transaminases (AST and/or ALT), serum bilirubin and/or alkaline phosphatase, has been infrequently reported with *Augmentin*. The histologic findings on liver biopsies have consisted of predominantly cholestatic, hepatocellular, or mixed cholestatic-hepatocellular changes. The onset of signs/symptoms of hepatic dysfunction may occur during or several weeks after therapy has been discontinued. The hepatic dysfunction, which may be severe, is usually reversible. On rare occasions, deaths have been reported (less than 1 death reported per estimated 4 million prescriptions worldwide). These have generally been cases associated with serious underlying diseases or concomitant medications. Interstitial nephritis and hematuria have been reported rarely. Anemia, thrombocytopenia, thrombocytopenic purpura, eosinophilia, leukopenia and agranulocytosis have been reported during therapy with penicillins. These reactions are usually reversible on discontinuation of therapy and are believed to be hypersensitivity phenomena. A slight thrombocytosis was noted in less than 1% of the patients treated with *Augmentin*. Reversible hyperactivity, agitation, anxiety, insomnia, confusion, behavioral changes, and/or convulsions have been reported rarely.

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complications, other associated findings, and disorders associated with mononucleosis, along with tests that can help rule-in or rule-out the disease. The program also suggests questions to ask the patient, and even finds the associated ICD-9 code (Figure).

While the program is well-designed, it is questionable whether a family physician would benefit from it. I found few opportunities to use the program in the several weeks that I tested it. This program was developed using an internal medicine database at the University of Pittsburgh, which may explain why this program may lend itself better to the realm of internal medicine than to family medicine. When diagnoses are generated, most of the diseases listed are quite esoteric; the vast majority I have never seen in 14 years of practice. The database deals only with an adult population and does not include some common gynecologic, dermatologic, and musculoskeletal diagnoses.

Few significant errors were identified in the use of this program. One was noted when looking up the ICD-9 code for gout. The program displayed the code for carcinoma of the tail of the pancreas. One other minor complaint relates to an inconsistency in the numbering scheme of findings and disease characteristics. For instance, an "importance" of 1 is used when it is most important to find the diagnostic reason for a finding. On the other hand, a "utility" of 1 indicates that making an etiologic diagnosis is not important in changing the natural history of the disease.

While comprehensive and well-designed, this program appears to be less useful to family physicians than what might be expected. The main attraction of this program would appear to be the extensive list of diagnostic test results related to the 400 diseases in this database. Considering the cost of this program, family physicians may not feel that they are getting their money's worth.

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