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# Responses to Questions by Medical Students About Family Practice

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*Medical students frequently have questions about the specialty of family practice. Responses to 30 questions commonly asked about family practice are presented with a review of recent literature. These responses may assist medical students and their advisors in considering the choice of family practice as a career.*

Medical students frequently have questions about the specialty of family practice. Because students receive most of their clinical education from academic, tertiary-care consultants, they may be given little or inappropriate information about family practice.

Since the publication in 1983 of the original article dealing with questions medical students ask about family practice,<sup>1</sup> there have been important changes in health care in the United States that make a revision timely. Most notably there has been dramatic growth in the managed health care industry, which has changed and expanded the market for family physicians. A growing crisis in medical liability insurance has stressed the role of the family physician, particularly in obstetrical care.

In preparing this second edition of responses to questions, interested medical students were surveyed at the University of California, Davis, the University of Wisconsin, Madison, and also surveyed were a national sample of students attending the 1986 National Conference of Student Members of the American Academy of Family Physicians. The students in these settings were remarkably uniform in placing greatest emphasis on questions regarding future opportunities for family physicians after residency, and expressing greatest concern for potential restrictions on the role of the family physician.

In response to these surveys and current trends, one question was deleted and five more were added. The responses to other questions have been updated as necessary. As in the previous article, the responses are succinct, with references, where possible, to support the statements. It is hoped these responses will be useful to medical students and their advisors as a part of a career-guidance program for students considering the specialty of family practice.

*Question 1: What is family practice, and how does this specialty differ from traditional general practice?*

Family practice is the medical specialty that is concerned with the total health care of the individual and the family. It is the specialty of breadth that integrates the biological, clinical, and behavioral sciences. The scope of family practice is not limited by age, sex, organ system, or disease entity.<sup>2</sup>

Family practice follows the general practice tradition but has some major differences. Family practice residencies were developed in response to a perceived need by the public, the medical profession, and the government for the development of a well-trained generalist. Before entering practice, in addition to broad hospital training, residents receive extensive training in comprehensive and continuous outpatient medicine for all ages. As a specialty, family practice has stringent requirements for continuing education and board certification. Family practice combines the content of general practice and other clinical disciplines, including the behavioral sciences and preventive medicine, and integrates them into a single specialty with a focus on patient care in the context of the family and the community.<sup>3,4</sup>

*Question 2: Is it possible to be a competent family physician? How can one know enough about the many clinical areas in medicine?*

The amount of knowledge necessary to be a good family physician is not greater than the amount of knowledge

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necessary to be any other specialist, such as a pediatrician or a neurologist.<sup>5</sup> Family medicine as a discipline integrates knowledge about many common health problems shared with other disciplines. About 70 percent of all problems seen by a family physician fit into 30 diagnoses.<sup>6,7</sup> It is not difficult to acquire and maintain high-quality clinical skills to manage the most frequent problems of patients in a primary care setting. Computer-based applications will allow the family physician to continue to manage a broad range of preventive needs and medical problems in an efficient and up-to-date manner.<sup>8-10</sup>

*Question 3: Do family physicians refer many of their patients to other specialists?*

Family physicians manage exclusively over 90 percent of problems they encounter with the confidence that they are handling these problems as well as, or better than, any other specialist. A consultation is requested for about 7 percent of problems, and the family physician continues to manage the patient. When a referral is made (0.9 percent to 3.0 percent of problems), the family physician remains active in the care of the patient.<sup>11-13</sup>

Managed health care systems, which place primary care physicians as the first contact and manager for all patient care, discourage unnecessary referrals to other specialists so that costs can be controlled.<sup>14</sup> These systems often prefer family physicians over general internists because the rate of referrals is lower and the overall cost of care is less.<sup>15,16</sup>

*Question 4: Will there be a need for family physicians in the future when there is a surplus of other specialists?*

Because of the efficiency and cost effectiveness of family physicians in the increasingly competitive health care system, their role seems secure.<sup>15-17</sup> It is clear that the relative surplus of physicians will be far greater in medical and surgical subspecialties than in the primary care specialties.<sup>18</sup>

With the growth of managed health care systems, which often prefer family physicians, the future need for family physicians is likely to be much greater than projected in the GMENAC report.<sup>19-21</sup>

*Question 5: What practice opportunities will be available in the future for family physicians?*

Many areas of the country are greatly underserved and need family physicians. Family practice openings are numerous in urban, suburban, and rural areas. The president of the National Association of Physician Recruiters stated recently that family physicians are in the greatest demand among all specialties.<sup>22</sup> A recent *Physician Placement Bulletin* of practice opportunities in California listed more family practice positions than internal medicine, pediatrics, and obstetrics-gynecology combined.<sup>23</sup> Family physicians have the widest variety and type of practice locations available of any specialty.

Family practice has an advantage over other specialties in that a population of 2,000 is adequate to keep a family physician busy. It takes an unserved population of over

10,000 to accommodate most other specialists.<sup>24</sup> Hence, growing communities frequently need more family physicians.

*Question 6: Is family practice only for rural communities, or is this specialty appropriate for urban areas?*

Family physicians are needed in communities of all sizes and types. Surveys of recent graduates of family practice residencies continue to demonstrate a wide variety of practice-location choices. In the most recent survey by the American Academy of Family Physicians (AAFP) of residency graduates, about 55 percent chose rural communities of 25,000 or less, and about 30 percent chose metropolitan areas of 100,000 or greater.<sup>25</sup>

A renewed interest in the role of the family physician in the urban environment has been expressed.<sup>26</sup> With the advent of managed health care systems, many of which are based on the family practice model of health care, there are increased opportunities for family physicians in urban and suburban areas throughout the country.

*Question 7: Will family physicians be able to maintain hospital privileges?*

The great majority of family physicians are active in the care of inpatients and have all the requested privileges for which they were trained. The AAFP has established the maintenance of hospital privileges for family physicians as a top priority.<sup>27,28</sup> Criteria have been negotiated with other specialties, such as cardiology and obstetrics-gynecology, for the approval of hospital privileges for family practice residency graduates. A national survey of family practice residency graduates has shown that over 96 percent have all the hospital privileges they requested, with 89 percent having privileges in intensive care units.<sup>29,30</sup> More recent regional surveys of residency graduates confirm an active role for family physicians in hospitals.<sup>31-34</sup> As long as the profession of family practice in this country considers hospital privileges to be an important priority, it is unlikely there will be any significant change in the hospital-based role of the family physician.

*Question 8: Is family practice a satisfying career choice or does it become monotonous?*

Surveys of family practice residency graduates indicate high levels of personal and professional satisfaction.<sup>29,35</sup> The variety of medical problems is such that no day in the office is the same. In an average month, a family physician may see patients with up to 400 different diagnoses.<sup>36</sup>

The family physician receives the greatest satisfaction, however, from an intense involvement in the changing lives of patients. The family physician has a fascinating and privileged role that increases with time as the physician gains a deeper understanding of his or her patients in the community setting.

*Question 9: Do family physicians take care of patients with serious illnesses?*

Many times family physicians are involved with the management of acute and chronic illnesses of a serious



nature. While family physicians may emphasize preventive care and the promotion of health, their care of patients with serious illness continues to be an important part of their practice. Overall, about one third of office visits are for potentially serious problems (eg, abdominal pain, cardiovascular disease).<sup>36</sup>

In a 1984 study of residency-trained internists and family physicians, both admitted patients to the intensive care and coronary care units, and both hospitalized about 195 patients per physician per year. Family physicians managed more acute illnesses and trauma patients and saw slightly fewer chronic care patients than did the internists.<sup>37</sup> In another study of office practice, there was no difference in the number and distribution of medical problems and the general health status of chronically ill patients treated by family physicians and internists.<sup>38</sup>

*Question 10: Are family physicians trained adequately for their job?*

Residency-trained family physicians deliver excellent primary care. The outcome of patient care is similar to that of other groups of highly trained physicians.<sup>39</sup> Because residency training is designed specifically to train family physicians for their job, the vast majority feel well prepared.<sup>29,35</sup> Only 1 to 2 percent of recent residency graduates stated that having to care for medical or surgical problems beyond their training was a serious problem.<sup>15</sup> One recent survey noted that only 1 percent of family physicians desired "more specialization," compared with 5 percent of internists, 8 percent of general surgeons, 7 percent of ophthalmologists, and 11 percent of neurosurgeons.<sup>40</sup>

*Question 11: What is life like for a family physician? Is there time for a good personal and family life?*

The typical family physician works 50 to 60 hours a week in direct patient care.<sup>29,41</sup> About 80 percent of residency graduates practice in partnerships or group practices that have call-sharing arrangements.<sup>29,42</sup> Coverage arrangements can be made so that the physician may work part-time and still maintain an active involvement with patient care. Family practice compares favorably with other specialties in the amount of free time and involvement with personal and civic activities.<sup>40,43</sup>

*Question 12: What about malpractice insurance? Could the high cost prevent family physicians from doing obstetrics and other procedures?*

During the mid-1980s there was another escalation in the cost of professional liability insurance for all physicians as a result of a marked increase in the number and amount of claims. In general, family physicians have had a favorable claims experience when compared with other physicians.<sup>44-46</sup> Premium rates are determined separately for each specialty. In one multistate insurance company, in 1987, the premium rates actually went down for family physicians performing minor surgery, including office surgery, vasectomy, dilation and curettage, and surgical assisting in the hospital.<sup>47</sup> Although there is great variation

in premium rates among the states, the average premium for a family physician performing the above-stated procedures would be about \$2,000 for the first year out of residency and about \$6,000 by the fourth year (claims-made coverage, which is becoming the national standard).<sup>45,46</sup>

Insuring for obstetrical care is a special problem. Given the current size of awards for undesired obstetrical outcome, delivering babies in the United States may become uninsurable. While most family physicians doing obstetrics pay about one half the premium of obstetricians, this care more than doubles the overall cost of insurance. If a family physician receives an average income of \$1,000 per birth, then the income from eight or more deliveries each year will be needed to pay the insurance (less in the first year, as the premium is lower). While many family physicians have discontinued obstetric care because of this problem, those placing a high priority on delivering babies continue doing obstetrics. Hospital privileges and quality of care have not been a problem.<sup>31</sup> Actually, family physicians compared favorably with obstetricians in the care of low-risk patients, with studies reporting less morbidity caused by technological interventions.<sup>48-50</sup>

Medical students have been shown to exaggerate the problem of insurance fees for family physicians delivering babies as a result of being given misinformation from physicians.<sup>51</sup> Such misinformation may negatively affect their career interest in family practice.<sup>52</sup>

*Question 13: How do family physicians keep up with medical advances?*

Continuing education occurs in a variety of ways, including dialogue with colleagues, learning from consultants, reading medical journals, and attending courses and medical meetings. The number of major advances each year affecting patient care at the primary care level is not that great.

The American Board of Family Practice was the first specialty board to require recertification for ongoing membership. Recertification involves a cognitive examination and an audit of a selected number of office practice records. No other specialty requires such a degree of continual updating of medical knowledge and skills.

Information management of patient care is rapidly expanding, with video and computer hardware supporting increasingly sophisticated software. Encyclopedic databases are now available on optical discs or by telephone data transfer. The family physician of the future will have ready access to ever-increasing amounts of information and continuing education to assist in the care of patients.<sup>9,10</sup>

*Question 14: Can I specialize in a field such as general surgery or obstetrics-gynecology and still do family practice?*

Although there is nothing to restrict any licensed physician from doing general practice or any specialty, physicians readily acknowledge their lack of expertise in han-



dling problems outside their specialty area. The ability to manage confidently a wide variety of problems requires years of generalist training beyond medical school. There has been a documented decline in broad clinical knowledge during the first year of residency training in specialties other than family practice.<sup>53</sup> Furthermore, board certification in family practice requires residency training in family practice and, as of 1990, only residency-trained family physicians will be able to join the American Academy of Family Physicians.

*Question 15: Can the family physician be an expert in anything?*

The family physician is an expert in the evaluation and management of common health problems, has an understanding of the whole person in the context of the family and the community, and emphasizes disease prevention and health promotion.

Along with this expertise, many family physicians develop a special interest in certain areas. For example, family physicians commonly have a special interest and expertise in sports medicine and fitness, preventive medicine, childbirth, and geriatrics. The variety in family practice allows the physician to have expertise and be active as a community leader in diverse areas.

The literature of family medicine is expanding with the growing scholarship and research in the discipline. Family physicians are being increasingly recognized as experts in many areas of medicine and are contributing to new knowledge.<sup>54-60</sup>

*Question 16: Is further training available after a family practice residency?*

While a great majority of family practice residents go into some form of practice or teaching after residency, there are a growing number of fellowship opportunities available. These include fellowships in geriatrics, faculty development, obstetrics, sports medicine, and others. The American Board of Family Practice recently negotiated with the American Board of Internal Medicine a common fellowship pathway for obtaining a certification of special competence in geriatrics. As a generalist specialty, family practice will resist the trend to subspecialize, however, there will be a growing range of opportunities for advanced training. A directory of fellowship opportunities in family practice is maintained by the American Academy of Family Physicians and the Society of Teachers of Family Medicine.

*Question 17: After residency training, what career options are available, for example, in settings other than a traditional practice?*

Family practice residency training provides broad and liberal knowledge that gives the graduate many options besides traditional practice. Many graduates work in community hospital emergency rooms, student health centers, health maintenance organizations, and as corporate physicians. Often the family physician is in a man-

agement role in these locations. The great variety of opportunities is evidenced by the offerings in the classified advertisements of many medical journals.

Family practice residency training also prepares a physician to pursue a role in public health and international medicine. The American Academy of Family Physicians, the Society of Teachers of Family Medicine, the Centers for Disease Control, and the World Health Organization maintain information on public health and international opportunities for family physicians. The family practice specialty concept is spreading rapidly throughout the world.

*Question 18: How do physician assistants, nurse practitioners, and midwives fit in with the role of the family physician in the future?*

Physician assistants, nurse practitioners, and midwives developed as new members of the health care team, particularly in response to the need for providers in medically underserved areas. These allied health professionals were never intended, nor trained, to replace family physicians. These practitioners, however, can extend the breadth and quality of family practice, particularly in health promotion, screening, and patient education. They work with the family physician, who remains the essential provider of comprehensive and continuing health care. As a substantial physician surplus develops, the number of training positions available for physician assistants and nurse practitioners is decreasing.

*Question 19: Do family physicians focus on the family in health care?*

Although family physicians frequently treat patients as individuals, there is a growing appreciation that many health problems are part of a family system that must be recognized and treated so as to achieve therapeutic success. Family physicians have combined with family therapists in researching and promoting this exciting dimension of family practice.<sup>61,62</sup>

*Question 20: Are family physicians responsive to meeting community needs?*

Family physicians have a long record of being responsive to community needs. Studies have shown that family physicians are more willing than other specialists to hold convenient office hours, make house calls, see emergency patients, and participate in community activities.<sup>43</sup> Family physicians also become involved in community health programs, such as smoking cessation, fitness, cardiopulmonary resuscitation training, student athletic screening, team physicians, hospice programs, and many others. Family practice is the specialty that best fits and promotes the concept of community-oriented primary care.<sup>63</sup>

*Question 21: What is a family practice residency, and how does it vary in structure around the country?*

Family practice residencies are accredited by the Accreditation Council for Graduate Medical Education and must meet certain educational criteria to ensure adequacy



of training. The overriding emphasis of family practice training is learning to provide continuous, comprehensive, cost-effective, family-centered health care. This knowledge is acquired through the resident's experience in a model outpatient clinic, called the family practice center, throughout the three years of residency training. While the family practice training is integrated with rotations in other specialty and subspecialty areas, family practice residents begin developing their own panel of patients and families in the family practice center from the outset of their first year. The amount of time spent in the family practice center increases with each year of training. This extensive outpatient experience makes the family physician uniquely prepared for today's cost-conscious health care systems.

The three-year family practice curriculum includes training in family medicine, internal medicine, obstetrics-gynecology, general surgery, pediatrics, geriatrics, psychiatry and human behavior, community medicine, emergency medicine, orthopedics, ophthalmology, otolaryngology, urology, radiology, and practice management.

Family practice residency programs vary both in structure (eg, public and private community hospitals and university hospitals) and curricular content depending on the individual program's faculty, hospital, and community resources. Each residency program has its own particular strengths and atmosphere. Residents have the flexibility to develop their own clinical interests within the specialty, for example, adolescent medicine, allergy and immunology, sports medicine, research, childbirth, geriatrics, international health, etc.

*Question 22: How difficult is it to get into a good family practice residency?*

Currently there are 381 accredited family practice residency programs with a total of 2,544 first-year positions.<sup>64</sup> Each year approximately 80 percent of the family practice positions offered through the National Residency Matching Program are filled. The remaining positions are filled through other mechanisms, so that at the beginning of each academic year, family practice residencies are 97 to 99 percent filled. This rate compares favorably with other specialties.<sup>65</sup> While there is some competition for the most popular family practice residencies, it is not difficult for most students to secure a position in a good residency program.

*Question 23: Is it possible to do a flexible internship and then enter a family practice residency?*

Yes. The flexible internship, however, must provide a diversified experience that includes two months of general internal medicine, one month of pediatrics, one month of general surgery, one month of obstetrics, one month of emergency medicine, and six months of broadly based experience acceptable to the American Board of Family Practice (ABFP). Straight pediatrics or internal medicine internships usually qualify for six months credit. These

experiences do not provide the ambulatory care education gained through seeing patients in the family practice center. It is at the discretion of the residency director as to whether credit for other internship experience should be requested from the American Board of Family Practice.

The attrition rate for family practice residencies is low, and the number of available positions in the second year is limited. Nevertheless, when these positions become available, family practice has been a leader in trying to accommodate those who have made a mismatch in their original speciality choice. Information on available second-year positions can be obtained by contacting the residency programs or the Education Division of the American Academy of Family Physicians.

*Question 24: Do combined residency programs, such as internal medicine-pediatrics, provide comparable training as family practice for primary care?*

It is difficult to compare the content of internal medicine-pediatrics training with family practice training, because these combined programs are not reviewed as single residencies by a separate accrediting body, and no document outlining their required content exists. The content of individual internal medicine-pediatrics programs varies considerably.<sup>66</sup>

These combined programs may appeal to those students who want to provide primary care to children and adults but do not have an interest in obstetrical care or the surgical elements of family practice. The difference, however, between family practice residencies and combined programs goes far beyond obstetrical and surgical training.

Combined programs do not require as much time in outpatient training and their residents do not care for whole families over a three-year period. They also do not provide, to the same extent, many of the elements offered by family practice training, such as community medicine, preventive medicine, techniques for home visiting, patient education, and training in the understanding of family systems.

A follow-up study of two combined internal medicine-pediatrics residencies revealed that only about one half of the graduates continued with the primary care of children and adults; the rest pursued just internal medicine, pediatrics, or a subspecialty.<sup>67</sup>

For these reasons a student is well-advised to pursue family practice as the best training for the primary care of children and adults.

*Question 25: What are the academic qualifications of students entering family practice?*

In one study the average part II National Board Examination scores for students entering family practice residencies was 541. The average score of the entire group of students entering all specialties was 539. For part III the score was 549 for family physicians and 526 for all specialties.<sup>53</sup> Another study indicated that the premedical academic qualifications of students selecting family prac-



tice (as measured by undergraduate grade point average and Medical College Admission Test scores) are comparable to those of students selecting other specialties.<sup>68</sup> In general, students entering family practice have the same qualifications as those entering other specialties.

*Question 26: What is the average income of a family physician, and how does this compare with other specialists?*

Family physicians enjoy an income that compares favorably with other specialists in primary care. A recent survey in *Medical Economics* indicated that the average net income for family physicians in 1986 was about \$86,000 per year.<sup>69</sup> Roth Young Personnel Service projected a 1987 median net income for family physicians of \$99,700 per year.<sup>70</sup> The range of income varies greatly depending on type of practice and full- or part-time practice.

In recent years procedural specialists (eg, surgeons) and hospital-based specialists (eg, radiologists, anesthesiologists) have had much higher incomes than primary care physicians. With the developing physician surplus and the greater control of fees by the managed-care industry, the disparity of income among primary care and other specialties is expected to lessen.<sup>71</sup> With the increased demand for family physicians as case managers in the managed-care industry, income for family physicians is expected to increase.<sup>22</sup>

*Question 27: What are the opportunities for teaching in family practice?*

Because family practice is a relatively new academic discipline that has grown rapidly, there are many unfilled teaching positions. Family physicians teach full-time or part-time in both medical schools and community hospital programs. There is also a great need for family physicians to teach medical students and residents in their office settings. Sixty percent of recent family practice residency graduates are involved in some form of teaching.<sup>42</sup> A voluntary clearinghouse service, provided by the American Academy of Family Physicians and the Society of Teachers of Family Medicine, maintains a list of currently available faculty positions in family practice residency programs and medical school departments.

*Question 28: What are the opportunities for research in family practice?*

The opportunities for research in family practice are varied and are receiving increasing support. The spectrum of family medicine research includes the natural history of disease and illness behavior in individuals and families, clinical studies of diagnostic and treatment methods, the organization of health services, and public policy.<sup>72,73</sup> The developing collaborative networks among practicing physicians will provide a rich base for future research.<sup>74</sup> The American Academy of Family Physicians and the Society of Teachers of Family Medicine have active research committees that work to improve research skills and

stimulate projects. The Family Health Foundation of America, the philanthropic arm of family practice, provides increasing support to research activities. The National Institutes of Health recently held a symposium of family medicine research.

*Question 29: Do family physicians have procedural skills in the office and in the hospital?*

Family physicians continue to practice procedural skills in the office and in the hospital. The majority of family physicians assist in major surgery on their patients. In the office family physicians participate in a wide range of procedural and technical skills depending on their interest, training, and practice setting. These skills include skin biopsy, lesion removal, cervical biopsy, endometrial aspiration, sigmoidoscopy, vasectomy, spirometry, and exercise electrocardiogram testing.

Family physicians have been instrumental in the development of office procedures that include flexible sigmoidoscopy, colposcopy and cryotherapy of the cervix, and obstetrical ultrasound.<sup>75-77</sup> The more office procedures the family physician does, the less need there is for costly referrals. Hence, a financial incentive exists to keep family physicians active in appropriate procedural skills.

*Question 30: Is family practice a growing specialty?*

The number of board-certified family physicians has risen from zero in 1969 to over 40,000 in 1987. During the same period the number of residencies has gone from zero to over 380. The number and percentage of US medical students matching in family practice has increased over the past two years.<sup>78,79</sup>

With newly organized health systems being so intensely interested in family physicians, the residency graduate has an unprecedented range of practice opportunities. The American Academy of Family Physicians is actively seeking to expand the number of residencies and available positions to meet the growing need for family physicians. Family practice is a specialty that is well established and here to stay.

## COMMENT

These responses reflect the collective wisdom of the authors who are residency trained and currently in practice, teaching, and administrative roles. There is room for further elaboration and varying opinions. Most students with an interest in, or a healthy skepticism about, family practice will have other questions. While many academic specialists in other fields will readily give their opinions about family practice, it is hoped students will obtain counsel from family physicians and will ask to see reference data whenever appropriate. Departments of family practice in medical schools should have a group of family practice advisors who are readily accessible and who frequently meet with students to discuss these questions.



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# MICROX<sup>®</sup>

(metolazone) 1/2 mg Tablets

Brief Summary of prescribing information

**DO NOT INTERCHANGE: MICROX<sup>®</sup> TABLETS ARE A RAPIDLY AVAILABLE FORMULATION OF METOLAZONE FOR ORAL ADMINISTRATION. MICROX TABLETS ARE NOT THERAPEUTICALLY EQUIVALENT TO ZAROLYN<sup>®</sup> TABLETS. FORMULATIONS BIOEQUIVALENT TO MICROX AND FORMULATIONS BIOEQUIVALENT TO ZAROLYN SHOULD NOT BE INTERCHANGED FOR ONE ANOTHER.**

**INDICATIONS AND USAGE** Microx Tablets are indicated for the treatment of hypertension, alone or in combination with other antihypertensive drugs of a different class. MICROX TABLETS HAVE NOT BEEN EVALUATED FOR THE TREATMENT OF CONGESTIVE HEART FAILURE OR EDEMA DUE TO RENAL OR HEPATIC DISEASE. MICROX TABLETS SHOULD NOT BE USED WHEN DIURESIS IS DESIRED.

**USAGE IN PREGNANCY** The routine use of diuretics is inappropriate and exposes mother and fetus to unnecessary hazard. Diuretics do not prevent development of toxemia of pregnancy, and there is no evidence that they are useful in the treatment of developed toxemia. See PRECAUTIONS.

**CONTRAINDICATIONS** Anuria, hepatic coma or pre-coma, known allergy or hypersensitivity to metolazone.

**WARNINGS** Rarely, the rapid onset of severe hyponatremia and/or hypokalemia has been reported following initial doses of thiazide and non-thiazide diuretics. When symptoms consistent with electrolyte imbalance appear rapidly, drug should be discontinued and supportive measures should be initiated immediately. Parenteral electrolytes may be required. Appropriateness of therapy with this class of drug should be carefully re-evaluated. Hypokalemia may occur with consequent weakness, cramps, and cardiac dysrhythmias. Serum potassium should be determined at regular intervals, and dose reduction, potassium supplementation or addition of a potassium-sparing diuretic instituted whenever indicated. Hypokalemia is a particular hazard in patients who are digitalized or who have or have had a ventricular arrhythmia; dangerous or fatal arrhythmias may be precipitated. Hypokalemia is dose related.

In general, diuretics should not be given concomitantly with lithium because they reduce its renal clearance and add a high risk of lithium toxicity. Unusually large or prolonged losses of fluids and electrolytes may result when metolazone is administered concomitantly to patients receiving furosemide (see DRUG INTERACTIONS). When Microx Tablets are used with other antihypertensive drugs, particular care must be taken to avoid excessive reduction of blood pressure, especially during initial therapy. Cross-allergy, while not reported to date, theoretically may occur when Microx Tablets are given to patients known to be allergic to sulfonamide-derived drugs, thiazides, or quinethazone.

**PRECAUTIONS** Formulations bioequivalent to Microx and formulations bioequivalent to Zaroxolyn should not be interchanged for one another. All patients receiving therapy with Microx Tablets should have serum electrolyte measurements done at appropriate intervals and be observed for clinical signs of fluid and/or electrolyte imbalance: namely, hyponatremia, hypochloremic alkalosis, and hypokalemia. In patients with severe edema accompanying cardiac failure or renal disease, a low-salt syndrome may be produced, especially with hot weather and a low-salt diet. Serum and electrolyte determinations are particularly important when the patient has protracted vomiting, severe diarrhea, or is receiving parenteral fluids. Warning signs of imbalance are: dryness of mouth, thirst, weakness, lethargy, drowsiness, restlessness, muscle pain or cramps, muscle fatigue, hypotension, oliguria, tachycardia, and gastrointestinal disturbances such as nausea and vomiting. Hyponatremia may occur at any time during long term therapy and, on rare occasions, may be life threatening. The risk of hypokalemia is increased when larger doses are used, when diuresis is rapid, when severe liver disease is present, when corticosteroids are given concomitantly, when oral intake is inadequate or when excess potassium is being lost extrarenally, such as with vomiting or diarrhea.

Metolazone may raise blood glucose concentrations possibly causing hyperglycemia and glycosuria in patients with diabetes or latent diabetes. Microx regularly causes an increase in serum uric acid and can occasionally precipitate gouty attacks even in patients without a prior history of them. Azotemia, presumably pre-renal azotemia, may be precipitated during the administration of Microx Tablets. If azotemia and oliguria worsen during treatment of patients with severe renal disease, Microx Tablets should be discontinued. Use caution when administering Microx Tablets to patients with severely impaired renal function. As most of the drug is excreted by the renal route, accumulation may occur. Orthostatic hypotension may occur; this may be potentiated by alcohol, barbiturates, narcotics, or concurrent therapy with other antihypertensive drugs. Hypercalcemia has been noted in a few patients treated with metolazone. Thiazide diuretics have exacerbated or activated systemic lupus erythematosus and this possibility should be considered with Microx Tablets.

**DRUG INTERACTIONS** Furosemide and probably other loop diuretics given concomitantly with metolazone can cause unusually large or prolonged losses of fluid and electrolytes (see WARNINGS). When Microx Tablets are used with other antihypertensive drugs, care must be taken, especially during initial therapy. Dosage adjustments of other antihypertensives may be necessary. The hypotensive effects of alcohol, barbiturates, and narcotics may be potentiated by the volume contraction that may be associated with metolazone therapy. Diuretic-induced hypokalemia can increase the sensitivity of the myocardium to digitalis; serious arrhythmias can result. Corticosteroids or ACTH may increase the risk of hypokalemia and increase salt and water retention. Serum lithium levels may increase (see WARNINGS). Diuretic-induced hypokalemia may enhance neuromuscular blocking effects of curariform drugs, the most serious effect would be respiratory depression which could proceed to apnea. Accordingly, it may be advisable to discontinue Microx Tablets three days before elective surgery. Salicylates and other non-steroidal anti-inflammatory drugs may decrease the antihypertensive effects of Microx Tablets. Requirements for insulin and other anti-diabetic agents may be altered during administration of Microx Tablets. Arterial responsiveness to norepinephrine may be decreased, but not sufficiently to preclude effectiveness of this pressor agent for therapeutic use. Efficacy of methenamine may be decreased due to urinary alkalinizing effect of metolazone.

**PREGNANCY: Teratogenic Effects—Pregnancy Category B** There are no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, Microx Tablets should be used during pregnancy only if clearly needed. Metolazone crosses the placental barrier and appears in cord blood.

**NURSING MOTHERS** Metolazone appears in breast milk. Because of the potential for serious adverse reactions in nursing infants from metolazone, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. **Not recommended for pediatric use.**

**ADVERSE REACTIONS** Incidence reported in controlled clinical trials with Microx greater than 2%: dizziness (lightheadedness), headaches, muscle cramps, fatigue (malaise, lethargy, lassitude), joint pain, swelling, chest pain (precordial discomfort). Reported in less than 2% of Microx patients: cold extremities, edema, orthostatic hypotension, palpitations, anxiety, depression, dry mouth, impotence, nervousness, neuropathy, weakness, "weird" feeling, pruritus, rash, skin dryness, cough, epistaxis, eye itching, sinus congestion, sore throat, tinnitus, abdominal discomfort (pain, bloating), bitter taste, constipation, diarrhea, nausea, vomiting, nocturia, back pain. Reported with other marketed metolazone: excessive volume depletion, hemoconcentration, venous thrombosis, syncope, paresthesias, drowsiness, restlessness (sometimes resulting in insomnia), necrotizing angitis (cutaneous vasculitis) purpura, dermatitis, photosensitivity, urticaria, hepatitis, intrahepatic cholestatic jaundice, pancreatitis, anorexia, aplastic (hypoplastic) anemia, agranulocytosis, leukopenia, hypokalemia, hyponatremia, hyperuricemia, hypochloremia, hypochloremic alkalosis, hyperglycemia, glycosuria, increase in serum urea nitrogen (BUN) or creatinine, hypophosphatemia, acute gouty attacks, transient blurred vision, chills. Associated, but not reported to date for metolazone: sialadenitis, xanthopsia, respiratory distress (including pneumonitis), thrombocytopenia and anaphylactic reactions.

**USUAL INITIAL ONCE-DAILY DOSAGE** For initial treatment of mild to moderate hypertension, one Microx Tablet (1/2 mg) once daily. If patients are inadequately controlled with one 1/2 mg tablet, the dose can be increased to two Microx Tablets (1 mg) once a day. An increase in hypokalemia may occur. Doses larger than 1 mg do not give increased effectiveness.

**HOW SUPPLIED** Microx (metolazone) Tablets, 1/2 mg: White, flat-faced, round tablets embossed, MICROX, on one side and, 1/2, on reverse side.

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