VITAL & HEALTH STATISTICS

Use of Antimicrobial Drugs in Office-Based Practice

United States, 1980–81

Data on the use of antimicrobial drugs during office visits to office-based physicians are presented. Emphasis is placed on the types of drug used: penicillins, cephalosporins, macrolides and lincosamides, tetracyclines, the sulfonamides and/or trimethoprim, and miscellaneous antimicrobial medications. The level of use of the various types of drug is assessed by comparing drug mention frequencies and rates. The characteristics of the drugs used also are investigated. Various aspects of the visits involving the use of these drugs are examined. These include the demographic characteristics of the patients who made the visits, patient complaints, diagnoses recorded, diagnostic and therapeutic services ordered or provided, patient disposition, and visit duration.

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. . .	Category not applicable
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Use of Antimicrobial Drugs in Office-Based Practice: United States, 1980–81

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Introduction

In this report, physicians' patterns of ordering or providing antimicrobial medications to ambulatory patients in the office-based setting are examined. The importance of these drugs and their use cannot be overemphasized. The development of antimicrobial drugs in the last 40 years has had a strong impact on public health by allowing a previously unknown level of control over infective diseases. When used prophylactically under certain conditions, antimicrobial drugs also help prevent the development of infections complicating primary disease processes.

Information highlights

- During 1980 and 1981, office-based physicians prescribed or administered at least one antimicrobial drug in 188.8 million office visits, or approximately 1 of every 6 visits. An average of 1.10 antimicrobial drugs was used during each of these visits.
- The most frequently used types of antimicrobial drug were the penicillins (with an average of 41.4 million drug mentions per year), macrolides and lincosamides (20.1 million mentions per year), and the tetracyclines (16.9 million mentions per year).
- Approximately half of all active generic ingredients included in the antimicrobial drug mentions were accounted for by only four antimicrobial generic ingredients—penicillin, erythromycin, amoxicillin, and tetracycline.
- Most antimicrobial drug mentions were single ingredient drugs and were available to the patients only with a physician's prescription.
- Physicians reported that they used brand names in ordering antimicrobial drugs much more frequently than they used generic names (61 percent compared with 38 percent).
- The rate of antimicrobial drug mentions was significantly higher for females than for males (501.8 mentions per 1,000 female population per year compared with 431.1 per 1,000 male population per year). Similarly, the rate for children under 15 years of age (698.4 per 1,000 population per year) was higher than the rate for any other age group.
- In three-fourths (71.8 percent) of the visits involving antimicrobial drugs, the patients were suffering from acute problems. Visits involving the penicillins had the largest proportion of patients with acute problems (84.7 percent).
- The reasons for visit given by the patients who made antimicrobial drug visits were usually symptoms (84.7 percent of visits). A set of only eight specific patient complaints accounted for half of all antimicrobial drug visits. These were symptoms referable to the throat, cough, fever, head cold (upper respiratory infection), earache or ear infection, acne or pimples, skin rash, and nasal congestion.
- When physicians used antimicrobial drugs, the most common type of principal diagnosis reported was diseases of the respiratory system (42.4 percent of visits). Half of the antimicrobial drug visits were accounted for by only eight specific diagnoses: suppurative and unspecified otitis media; acute upper respiratory infections of multiple and unspecified sites; acute pharyngitis; diseases of the sebaceous glands; bronchitis, not specified as acute or chronic; acute tonsillitis; chronic sinusitis; and disorders of the urethra and urinary tract not elsewhere classified.
- Antimicrobial drugs were used in a larger proportion of all new-problem visits (23.4 percent) than of all return visits (12.1 percent).
- Females accounted for the majority of all antimicrobial drug visits (55.7 percent) and a majority of the visits associated with each major type of antimicrobial drug except the cephalosporins. Similarly, children 0–14 years of age made one-third (34.9 percent) of all antimicrobial drug visits.
- General and family practitioners and pediatricians were the prescribing physicians in almost two-thirds (65.6 percent) of all antimicrobial drug visits.
- Antimicrobial drug visits were more concentrated in the South than other visits were (38.8 percent compared with 31.4 percent) and less concentrated in the Northeast and West (20.1 percent compared with 24.3 percent, and 15.2 percent compared with 19.0 percent, respectively).
- In most of the visits involving antimicrobial drugs (95.9 percent), at least one diagnostic service was ordered or provided. The most commonly used diagnostic services were a limited examination and/or history (72.8 percent of all antimicrobial drug visits), clinical laboratory testing (24.7 percent), and blood pressure checks (23.9 percent).
- A minority of the visits in which antimicrobial drugs were used (34.8 percent) also entailed the order or provision of at least one nonmedication therapeutic service. The two most frequently provided services were medical counseling (22.0 percent of all antimicrobial drug visits) and office surgery (6.4 percent).
- In half of the visits in which antimicrobial drugs were used, the patients were asked to return at a specified time, and in one-third of the visits the patients were asked to return if needed.
- Two-thirds of all antimicrobial drug visits involved 6–15 minutes of physician-patient contact.
- During the 1980 and 1981 antimicrobial drug visits, 172.5 million mentions of other drugs were made; this was an average of 0.91 co-occurring drugs per visit. The average number of co-occurring drugs per visit increased with patient age, from 0.71 for children 0–14 years of age to 1.34 for persons 65 years of age and older.
- The four types of drug most frequently used in combination with the antimicrobial medications were antihistamines

(17.7 percent of all co-occurring drugs), skin and mucous membrane preparations (16.6 percent), expectorants and cough preparations (14.2 percent), and central nervous system drugs (12.7 percent).

- During 1980 and 1981, two or more antimicrobial drug mentions were reported for the same visit in 19.0 million visits, or 10.1 percent of all antimicrobial drug visits. The six specific combinations that appeared at least 1 million times each over the 2-year period were two or more penicillins used together, macrolides and lincosamides used with tetracyclines, penicillins used with macrolides and lincosamides, penicillins used with tetracyclines, two or more macrolides and lincosamides used together, and penicillins used with miscellaneous antimicrobial drugs.
- The antimicrobial drugs examined in this report were ordered or provided in combination with topical antimicrobial drugs in 11.7 million visits. This represents 6.2 percent of all 1980 and 1981 antimicrobial drug visits included in this report and 25.5 percent of all 1980 and 1981 visits in which topical antimicrobial drugs were used.

Data background

Scope of the report

The information reported here was obtained through the National Ambulatory Medical Care Survey (NAMCS), a sample survey of the medical care provided in the office setting by physicians primarily engaged in office-based practice. Conducted annually by the National Center for Health Statistics (NCHS) from 1973 through 1981, the survey was converted to a triennial cycle beginning in 1985. Omitted from the analyses presented here are all antimicrobial medications known to be used only topically, as a separate report on the use of those drugs has been published.[1] All antineoplastic antibiotics also are omitted.[a]

It is important to note that, because of the nature of the data collected by means of NAMCS, this investigation is limited to an inspection of the patterns in physicians' ordering or providing antimicrobial drugs to patients. It is not possible to describe the drug dosages ordered for patients or the extent to which patients actually filled prescription orders and complied with instructions for use. It also is not possible to assess the appropriateness of antimicrobial drug use. The usual drug of choice in the treatment of a given infective disease may not be the drug of choice for a particular patient. For example, the patient may be allergic to the preferred drug, may have experienced negative side effects from it in the past, or may have complicating conditions rendering its use inadvisable. Consequently, a valid judgment regarding the appropriateness of medication therapy can be made only after detailed inspection of all the relevant aspects of an individual case. NAMCS was not designed for this purpose. Numerous guidelines on the medical indications for the use of antimicrobial drugs with outpatients have been published in the medical literature, and the reader is urged to consult them if needed.[2–6]

Data source and limitations

Detailed information on the background and methodology of NAMCS has been published.[7] In brief, the basic sampling unit for the survey is the physician-patient encounter or visit. The scope of NAMCS includes all office visits within the conterminous United States made by ambulatory patients to nonfederally employed, office-based physicians as classified by the American Medical Association or the American Osteopathic Association. The NAMCS physician universe excludes anesthesiologists, pathologists, and radiologists, as well as all physicians principally engaged in other professional activities, such as teaching, research, or administration. Telephone contacts and visits conducted outside the physician's office also are excluded.

The data collected on sample patient visits include patient demographic and medical characteristics (for example, age and significant diagnoses) and information on the conduct of the visits (for example, diagnostic tests ordered or provided and duration of physician-patient contact). The latter information includes prescription and nonprescription therapeutic medications ordered or provided during each visit (that is, drug mentions). The medications with antimicrobial activity and the visits associated with them (that is, antimicrobial drug visits) are the subject of this analysis.

Because the unit of measurement used in NAMCS is the patient visit, and because the average member of the civilian noninstitutionalized population makes multiple patient visits each year, NAMCS data reflect considerable duplication of persons. For this reason, use of the term "patient" in discussing the characteristics and treatment of the persons who made the visits examined in this report is avoided wherever practicable. When needed for clarity, the term "patient" is used. It refers to the person who made a particular visit, rather than to a person who may receive continuing care by making a number of visits.

The 1980 and 1981 surveys were conducted in identical fashion using the same instruments, definitions, and procedures. The 2 years of data were combined to provide more reliable estimates. Therefore, the reader should note that estimates of numbers of visits and drug mentions contained in this report are totals for the 2-year period, but ratios and rates represent average annual estimates.

Data from individual sample visits were inflated to produce national estimates. Because of the complexity of the survey design and estimation procedures, appendixes I–IV should be reviewed to ensure accurate understanding and interpretation of the statistical estimates presented. Appendix I presents a description of the 1980 and 1981 surveys, including the survey design, data collection and processing procedures, and estimation procedures. Guidelines for judging the precision of estimates also are included in this appendix. Appendix II contains definitions of terms used in the survey. A facsimile of the Patient Record form—the survey instrument

[a]These drugs accounted for only a small number of the drugs ordered or provided in office-based practice over the 1980–81 period. (Bleomycin, dactinomycin, doxorubicin, mithramycin, and mitomycin were ordered or provided a total of 700,000 times.)

used to report visit information—appears in appendix III. Appendix IV presents the American Hospital Formulary Service classification system and therapeutic category codes.[8]

Selection and classification of antimicrobial drugs

In selecting the specific drugs to be included in this analysis, *AMA Drug Evaluations, Fifth Edition*[9] was utilized first to establish a comprehensive list of drug ingredients (according to generic or nonproprietary name) considered to have antimicrobial activity. All drug mentions (that is, all drugs listed by physicians as ordered or provided to patients) in the 1980 and 1981 NAMCS were then screened for these ingredients.

The resulting list of antimicrobial drugs was divided into two sets: those known to be used only topically and all others. The topical drugs, and the patient visits associated with them, were discussed in an earlier report.[1] Information on the use of the remaining antimicrobial drugs, which are referred to in this report simply as "antimicrobial drugs" or "antimicrobial medications," is presented here.

It cannot be assumed that all of these medications were ingested, injected, or otherwise administered systemically. In some sample cases, physicians reported the order or provision of an antimicrobial medication using a generic drug name, an incomplete trade name, or a trade name not known to be complete. In those cases, the exact drug products used are not known. When the active antimicrobial agents in question could be used either systemically or topically, the actual usage of the agents also is unknown. Consequently, the antimicrobial medications encompassed by this analysis include both drug products known to be used only by ingestion or another route of systemic administration and drugs frequently used systemically, but with unknown routes of administration in these visits.

Seventy-two specific antimicrobial generic entities appeared in the antimicrobial drug mentions recorded in the 1980 and 1981 NAMCS. They have been grouped into six types based on the classification scheme used in *AMA Drug Evaluations, Fifth Edition*[9] and on their frequencies of mention in the 1980 and 1981 surveys. These major types are the focus of the analyses presented in this report. In addition, some aspects of the utilization of selected subtypes contained within the six major types are presented. Further information on the use of the antimicrobial drug types and subtypes is contained in detailed tables 1–11 following the text and references. The types of generic substance are as follows:

1. *Penicillins* (including the subtypes *penicillin, amoxicillin,* and *ampicillin*).
2. *Cephalosporins* (including the subtypes *first generation cephalosporins* and *second generation cephalosporins*).
3. *Macrolides and lincosamides* (including *erythromycin* and *other macrolides and lincosamides*).
4. *Tetracyclines* (including *short-acting tetracyclines* and *intermediate-* and *long-acting tetracyclines*).
5. *Sulfonamides and trimethoprim* (including *sulfonamides and trimethoprim in combination* and *other sulfonamides and trimethoprim*).
6. *Miscellaneous antimicrobials* (including the subtypes *urinary tract antiseptics* and *antifungal agents for nonsystemic mycoses*).

The classification of specific antimicrobial generic entities into these types and subtypes is illustrated in figure 1. Similarly, figures 2–7 show the classification in these groups of the specific drugs named in the 1980 and 1981 NAMCS.[b]

[b]The use of trade names in this report is for identification only and does not imply endorsement by the Public Health Service or the U.S Department of Health and Human Services.

Penicillins

Penicillin

penicillin

Amoxicillin

amoxicillin

Ampicillin

ampicillin

Other

bacampacillin
carbenicillin
cloxacillin
cyclacillin
dicloxacillin
methicillin
nafcillin
oxacillin
ticarcillin

Cephalosporins

First generation

cefadroxil
cefazolin
cephalexin
cephaloridine[a]
cephalothin
cephapirin
cephradine

Second generation

cefaclor
cefamandole

Other

cephalosporin[b]

Macrolides and Lincosamides

Erythromycin

erythromycin

Other

clindamycin
lincomycin
troleandomycin

Tetracyclines

Short-acting

oxytetracycline
tetracycline
tetracycline hydrochloride

Intermediate- and long-acting

demeclocycline
doxycycline
methacycline
minocycline

Sulfonamides and Trimethoprim

Sulfonamides and trimethoprim, in combination

sulfadiazine
sulfamerazine
sulfamethazine
sulfamethoxazole
sulfisoxazole
trimethoprim

Other

sulfacytine
sulfadiazine
sulfameter
sulfamethizole
sulfamethoxazole
sulfapyridine
sulfasalazine
sulfisoxazole
trimethoprim

Miscellaneous Antimicrobials

Urinary tract antiseptics

methenamine
nalidixic acid
nitrofurantoin
urinary antiseptic[b]

Antifungal agents for nonsystemic mycoses

griseofulvin
nystatin

Other

antibiotic agent[b]
anti-infective agent[b]
aminosalicylic acid
amphotericin B
chloramphenicol
colistin
dapsone
ethambutol
gentamicin
isoniazid
kanamycin
metronidazole
polymyxin
polymyxin B
potassium iodide
pyrazinamide
rifampin
spectinomycin
streptomycin
sulfoxone
tobramycin

[a]Although available at the time of data collection, this substance now has been removed from the market.
[b]Name used by physician for data entry; specific generic name unknown.

Figure 1. Classification of antimicrobial generic entities appearing in the National Ambulatory Medical Care Survey: United States, 1980–81

Penicillins

Penicillin

Bicillin
Bicillin C-R
Bicillin Long-Acting
Crysticillin
Duracillin
K-Cillin 500
Ledercillin VK
Pen-Vee K
Penapar VK
penicillin
penicillin G
penicillin procaine
penicillin V
penicillin VK
Pentids
Pfizerpen
Repen-VK
Robicillin VK
SK-Penicillin VK
Uticillin VK
V-Cillin
V-Cillin K
Veetids
Wycillin
Wycillin Injection and Probenecid Tablets

Amoxicillin

amoxicillin
amoxicillin trihydrate
Amoxil
Larotid
Polymox
Robamox
Sumox
Trimox
Wymox

Ampicillin

Amcill
ampicillin
Omnipen
Penbritin
Pensyn
Polycillin
Principen
Principen w/ Probenecid
Supen

Other

carbenicillin
cloxacillin
cyclacillin
Cyclapen
dicloxacillin
Dynapen
Geocillin
Geopen
oxacillin
Prostaphlin
Spectrobid
Staphcillin
Tegopen
Ticar
Unipen

Figure 2. Drugs named by physician respondents in reporting the order or provision of penicillins: United States, 1980–81

Cephalosporins

First generation

Ancef
Anspor
cefadroxil
Cefadyl
cefazolin
cephalexin
cephaloridine
Cephradine
Duricef
Keflex
Keflin
Kefzol
Loridine
Ultracef
Velosef

Second generation

Ceclor
Mandol

Other

cephalosporin

Figure 3. Drugs named by physician respondents in reporting the order or provision of cephalosporins: United States, 1980–81

Macrolides and Lincosamides

Erythromycin

E.E.S.
E-biotic
E-Mycin
Erypar
Erythrocin
erythromycin
Ethril
Ilosone
Ilotycin
Pediamycin
Pediazole[a]
SK-Erythromycin
Wyamycin

Other

Cleocin
Cleocin Phosphate
clindamycin
Lincocin
lincomycin
TAO

[a]Product includes sulfisoxazole.

Figure 4. Drugs named by physician respondents in reporting the order or provision of macrolides and lincosamides: United States, 1980–81

Tetracyclines

Short-acting

Achromycin
Achromycin V
Achrostatin V[a]
Azotrex[b]
Cyclopar
Mysteclin-F[c]
Nor-Tet
oxytetracycline
Panmycin
Robitet
Sumycin
Terramycin
Tetra
tetracycline
tetracycline hydrochloride
Tetracyn
Tetrex
Urobiotic-250[d]

Intermediate-action length and long-acting

Declomycin
doxycycline
Minocin
minocycline
Rondomycin
Vectrin
Vibra
Vibramycin

[a]Product includes nystatin.
[b]Product includes sulfathiazole.
[c]Product includes amphotericin B.
[d]Product includes sulfamethizole.

Figure 5. Drugs named by physician respondents in reporting the order or provision of tetracyclines: United States, 1980–81

Sulfonamides and Trimethoprim

Sulfonamides and trimethroprim, in combination

Bactrim
Bactrim-DS
Septra
Septra-DS
Sulfonamides Duplex
Terfonyl
trimethoprim w/ sulfisoxazole
triple sulfa
trisulfapyrimidines

Other

Azo Gantanol
Azo Gantrisin
Azo-Sulfisoxazole
Azulfidine
Gantanol
Gantrisin
Proloprim
Renoquid
sulfapyridine
sulfasalazine
sulfasoxazole
sulfisoxazole
Sulla
Thiosulfil
Thiosulfil-A
Thiosulfil Forte
Thiosulfil-A Forte
Trimpex
trimethoprim
Uremide
Urifon

Figure 6. Drugs named by physician respondents in reporting the order or provision of sulfonamides and trimethoprim: United States, 1980–81

Miscellaneous Antimicrobials

Urinary tract antiseptics

Azo Methalate
Azo-Mandelamine
Cystex
Furadantin
Hiprex
Lanased
Macrodantin
Mandelamine
methenamine
NegGram
Nitrex
nitrofurantoin
Renalgin
Thiacide
Trantoin
Urex
urinary antiseptic
Urised
Uritral
Uro-Quid Acid

Antifungal agents for nonsystemic mycoses

Fulvicin
Grifulvin
Gris-PEG
Grisactin
griseofulvin
Mycostatin
Nilstat
nystatin

Other

Aerosporin
Amphicol
antibiotic agent
anti-infective agent
chloramphenicol
Chloromycetin
Coly-Mycin
Coly-Mycin S
Coly-Mycin S Pediatric
Dapsone
Di-Isopacin
Diasone Sodium Enterab
ethambutol
Flagyl
Fungizone Intravenous
Garamycin
gentamicin
INH
isoniazid
kanamycin
Kantrex
metronidazole
Myambutol
Nebcin
polymyxin
potassium iodide
pyrazinamide
rifampin
streptomycin
tobramycin
Triniad
Trobicin

Figure 7. Drugs named by physician respondents in reporting the order or provision of miscellaneous antimicrobials: United States, 1980–81

Findings

NAMCS data confirm that antimicrobial drugs were used extensively in office-based practice during 1980 and 1981. Over this 2-year period, there were 1.2 billion visits to office-based physicians, of which 0.7 billion (61.8 percent) were drug visits (that is, visits during which at least one therapeutic medication was ordered or provided). The drug visits involved 1.3 billion drug mentions. A total of 208.3 million antimicrobial drug mentions were made during 188.8 million visits, an average of 1.10 antimicrobial drugs per antimicrobial drug visit. Antimicrobial drug mentions constituted 15.7 percent of all drug mentions. Visits involving antimicrobial drugs constituted 16.3 percent of all visits and 26.3 percent of all drug visits. Thus approximately 1 of every 6 visits to an office-based physician during these years involved the use of an antimicrobial drug.

Drug mention information

Types of antimicrobial drug

A breakdown of all antimicrobial drug mentions into the major types and subtypes outlined above can be seen in table A. The penicillins were the most commonly used major type, with 82.9 million drug mentions during 1980 and 1981, or 39.8 percent of the total. "The penicillins are bactericidal antibiotics which include both natural and semisynthetic derivatives.... In addition to the prototype compound, penicillin G, this class includes an acid stable penicillin G derivative (penicillin V), penicillinase-resistant penicillins, the ampicillins, and the extended spectrum derivatives (carbenicillin, ticarcillin, mezlocillin, and piperacillin).... Amoxicillin and cyclacillin are closely related to ampicillin."[10] Of all the penicillin subtypes, penicillin itself was the most frequently mentioned, with 34.0 million drug mentions, or 41.0 percent of all penicillins. This was fcllowed by amoxicillin, with 23.5 million drug mentions (28.3 percent of all penicillins), and ampicillin, with 21.8 million drug mentions (26.3 percent of all penicillins). All other penicillins accounted for a significantly smaller number of drug mentions—3.6 million, or 4.3 percent of all penicillins.

The second largest group of antimicrobial drugs consisted of the macrolides and lincosamides, with 40.1 million drug mentions in 1980 and 1981. This was 19.3 percent of all antimicrobial drug mentions. "Erythromycin, troleandomycin, rosaramicin, and josamycin comprise the macrolide group of antibiotics.... Erythromycin and its derivatives are antibacterial agents of major clinical importance.... Lincomycin and clindamycin comprise the lincosamide group of antibiotics. They are considered with the macrolides because their antibacterial spectra, mechanisms of action and resistance, and clinical applications are similar (Steigbigel, 1979)."[9,11] Erythromycin accounted for a large majority—32.7 million, or 81.6 percent—of all macrolide and lincosamide antibiotic drug mentions. All other macrolides and lincosamides accounted for only 7.4 million drug mentions, or 18.4 percent of this major type.

The third most commonly ordered or provided type of antimicrobial drug was the tetracyclines. During 1980 and 1981 there were 33.8 million mentions of tetracyclines, accounting for 16.2 percent of all antimicrobial drug mentions. "The tetracyclines are broad spectrum antibacterial agents extracted from species of *Streptomyces* or produced by chemical modification of the naturally occurring compounds. All members of this class are closely related chemically....The tetracyclines differ considerably in their pharmacology, and these antibiotics are usually subdivided into short-..., intermediate..., and long-acting...analogues."[9] In the NAMCS data,

Table A. Number and percent distribution of antimicrobial drug mentions, by type of antimicrobial drug: United States, 1980–81

Type of antimicrobial drug	Number of mentions in thousands	Percent distribution
All antimicrobial drug mentions	208,288	100.0
Penicillins	82,896	39.8
Penicillin	34,025	16.3
Amoxicillin	23,470	11.3
Ampicillin	21,819	10.5
Other	3,583	1.7
Cephalosporins	16,044	7.7
First generation	12,024	5.8
Second generation	3,984	1.9
Unknown generation	*37	*0.0
Macrolides and lincosamides	40,106	19.3
Erythromycin	32,746	15.7
Other	7,361	3.5
Tetracyclines	33,787	16.2
Short-acting	25,690	12.3
Intermediate- or long-acting	8,096	3.9
Sulfonamides and trimethoprim	18,607	8.9
Sulfonamide(s) with trimethoprim	12,786	6.1
Other	5,820	2.8
Miscellaneous antimicrobial drugs	16,848	8.1
Urinary tract antiseptics	4,858	2.3
Antifungal agents for nonsystemic mycoses	3,674	1.8
Other	8,316	4.0

the short-acting tetracyclines constituted a large majority—25.7 million, or 76.0 percent—of all tetracycline mentions. There were only 8.1 million mentions of intermediate- or long-acting tetracyclines (24.0 percent of all tetracycline drug mentions).

The remaining three major types of antimicrobial drugs were each mentioned less frequently than tetracyclines, but there were no significant differences among the three. During 1980 and 1981 there were 18.6 million mentions of sulfonamides and trimethoprim (8.9 percent of all antimicrobial drug mentions), 16.0 million mentions of cephalosporins (7.7 percent), and 16.8 million mentions of miscellaneous antimicrobial drugs (8.1 percent). Sulfonamides are broad spectrum antibacterial agents, and trimethoprim is a chemically and pharmacologically distinct antibacterial agent. "[T]he combination of trimethoprim with a sulfonamide...results in a synergistic antibacterial effect."[9] Because of the desirability of this interaction effect, sulfonamides and trimethoprim are used in combination frequently. In office-based practice during 1980 and 1981, fully two-thirds (68.7 percent), or 12.8 million, of the drug mentions in this group were compounds of trimethoprim and one or more sulfonamides. Only 5.8 million (31.3 percent of all sulfonamide and trimethoprim mentions) contained only trimethoprim or one or more sulfonamides.

"The cephalosporins are structurally and pharmacologically related to the penicillins.... Cephalosporins may be bactericidal or bacteriostatic.... The cephalosporins possess a broad spectrum of activity."[10] Furthermore, "it is convenient to consider the cephalosporins and other agents related to them as first, second, or third generation compounds. The first generation cephalosporins were the initial agents developed and they have a narrower spectrum of antibacterial activity than the compounds discovered later.... Second generation cephalosporins generally are more active against gram-negative enteric bacteria than first generation analogues.... The third generation cephalosporins have a still broader in vitro antibacterial spectrum against gram-negative organisms, including bacteria resistant to the other cephalosporins."[9] In 1980 and 1981 no office-based usage of third generation cephalosporins was reported to NAMCS. Of the cephalosporins that were used, the majority (74.9 percent, or 12.0 million drug mentions) were first generation drugs. Only 4.0 million mentions (24.8 percent of all cephalosporin mentions) were made of second generation drugs.

The final group, miscellaneous antimicrobial drugs, includes urinary tract antiseptics, which are "[a]nti-infective agents that are excreted primarily in the urine"[9] and antifungal agents for nonsystemic mycoses, which are ingestible antifungal compounds that can be used for dermatophytic infections and fungal intestinal infections. During 1980 and 1981 there were 4.9 million mentions of urinary tract antiseptics (28.8 percent of all miscellaneous antimicrobial drugs) and 3.7 million mentions of antifungal agents for nonsystemic mycoses (21.8 percent). The remaining drugs in this residual group (that is, aminoglycosides and spectinomycin, polymyxins, antifungal agents for systemic mycoses, antimycobacterial agents, amphenicols, miscellaneous antibacterial agents, and unidentified antibiotic or anti-infective agents) together accounted for only 8.3 million drug mentions.

Drug characteristics

The 20 most common generic ingredients contained in the antimicrobial drug mentions are shown in table B. All of these leading substances have antimicrobial activity; none has other primary therapeutic effects. These 20 ingredients accounted for the vast majority (93.1 percent) of all active generic substances appearing in the antimicrobial drug mentions. The relative absence of ingredients with other therapeutic effects indicates that use of drugs combining antimicrobials with other active ingredients is unusual. The predominance of the leading 20 antimicrobial ingredients also indicates that the use of antimicrobial medications is strongly concentrated in a narrow range of active antimicrobial substances. In fact, just the leading four substances (penicillin, erythromycin, amoxicillin, and tetracycline) accounted for approximately half (51.3 percent) of all generic ingredients.

The 30 specific antimicrobial drugs that were used most frequently are listed in table C according to the names under which they were ordered or provided. These drugs accounted for a majority (78.7 percent) of the 208.3 million antimicrobial drug mentions. The leading 10 drugs alone accounted for half (51.6 percent).

NAMCS data files also contain American Hospital Formulary Service information as to the expected therapeutic effects of the drugs mentioned. Table D confirms the expectation that most of the antimicrobial drug mentions (96.7 percent) were classified as anti-infective agents, principally antibiotics (which constituted 84.6 percent of all antimicrobial drug mentions). Of the remaining antimicrobial drugs, the largest group was classified as anti-infective skin and mucous membrane preparations (5.1 million drug mentions, or 2.4 percent of the total).

Table B. Number and percent distribution of the 20 generic ingredients most frequently appearing in antimicrobial drug mentions: United States, 1980–81

Rank	Generic ingredient	Number of times ingredient appeared in antimicrobial drug mentions in thousands	Percent distribution
	All generic ingredients	221,474	100.0
1	Penicillin	34,025	15.4
2	Erythromycin	32,746	14.8
3	Amoxicillin	23,470	10.6
4	Tetracycline	23,263	10.5
5	Ampicillin	21,648	9.7
6	Sulfamethoxazole	13,689	6.2
7	Trimethoprim	13,134	5.9
8	Cephalexin	8,529	3.9
9	Clindamycin	5,037	2.3
10	Doxycycline	4,852	2.2
11	Cefaclor	3,914	1.8
12	Nitrofurantoin	3,397	1.5
13	Sulfisoxazole	2,986	1.3
14	Minocycline	2,774	1.3
15	Nystatin	2,526	1.1
16	Oxytetracycline	2,427	1.1
17	Lincomycin	2,283	1.0
18	Metronidazole	2,237	1.0
19	Cephradine	1,705	0.8
20	Gentamicin	1,627	0.7
...	All other generic ingredients	15,207	6.9

Table C. Number and percent distribution of the 30 antimicrobial drugs most frequently mentioned in office-based practice: United States, 1980–81

Rank	Name of drug and antimicrobial ingredients, if different	Number of mentions in thousands	Percent distribution
	All antimicrobial drug mentions	208,288	100.0
1	Ampicillin	18,968	9.1
2	Tetracycline	16,089	7.7
3	Penicillin	14,107	6.8
4	Amoxicillin	11,353	5.5
5	Erythromycin	10,968	5.3
6	E.E.S. (erythromycin)	9,711	4.7
7	Keflex (cephalexin)	8,462	4.1
8	Amoxil (amoxicillin)	7,634	3.7
9	E-Mycin (erythromycin)	5,095	2.4
10	Pen-Vee K (penicillin)	4,787	2.3
11	Cleocin (clindamycin)	4,667	2.2
12	Ceclor (cefaclor)	3,914	1.9
13	Vibramycin (doxycycline)	3,801	1.8
14	Bactrim (trimethoprim, sulfamethoxazole	3,677	1.8
15	Septra (trimethoprim, sulfamethoxazole	3,630	1.7
16	Larotid (amoxicillin)	3,179	1.5
17	Macrodantin (nitrofurantoin)	3,129	1.5
18	V-Cillin K (penicillin)	3,103	1.5
19	Ilosone (erythromycin)	2,976	1.4
20	Minocin (minocycline)	2,706	1.3
21	Septra DS (trimethoprim, sulfamethoxazole)	2,628	1.3
22	Bactrim DS (trimethoprim, sulfamethoxazole)	2,603	1.2
23	Terramycin (oxytetracycline)	2,344	1.1
24	Lincocin (lincomycin)	2,254	1.1
25	Flagyl (metronidazole)	2,182	1.0
26	Gantrisin (sulfisoxazole)	2,130	1.0
27	Bicillin C-R (penicillin, penicillin G procaine)	2,091	1.0
28	Mycostatin (nystatin)	1,956	0.9
29	Sumycin (tetracycline)	1,853	0.9
30	Penicillin VK (penicillin)	1,822	0.9
...	All other antimicrobial drugs	44,469	21.3

Table D. Number and percent distribution of antimicrobial drug mentions, by American Hospital Formulary Service therapeutic category: United States, 1980–81

American Hospital Formulary Service therapeutic category[1]	Number of mentions in thousands	Percent distribution
All therapeutic categories	208,288	100.0
Anti-infective agents	201,457	96.7
Antibiotics	176,193	84.6
Sulfonamides	17,405	8.4
Trichomonacides	2,237	1.1
Urinary germicides	4,858	2.3
Other	764	0.4
Expectorants and cough preparations	*73	*0.0
Eye, ear, nose, and throat preparations	1,692	0.8
Anti-infectives	1,336	0.6
Anti-inflammatory agents	*356	*0.2
Skin and mucous membrane preparations (anti-infectives)	5,066	2.4

[1]Based on *American Hospital Formulary Service Classification System and Therapeutic Category Codes*. Washington. American Society of Hospital Pharmacists, Inc. 1980.

Table E shows that most antimicrobial drug mentions were indeed single ingredient drugs (187.2 million, or 89.9 percent of all). Only 19.3 million (9.3 percent) were combination drugs. The proportion of single ingredient drugs varies according to the type of antimicrobial drug, however. Four of the major types were composed almost entirely of single ingredient drugs—cephalosporins (99.8 percent), tetracyclines (98.7 percent), penicillins (97.3 percent), and macrolides and lincosamides (96.7 percent). A significantly smaller proportion of the miscellaneous antimicrobials, 82.4 percent, was composed of single ingredient drugs. The smallest proportion of single ingredient drugs (24.1 percent) was found in the group of sulfonamides and trimethoprim. This finding is not surprising, because two-thirds of the drugs in this group combine one or more sulfonamides with trimethoprim to obtain a desirable synergistic effect. The 14.1 million combination drugs in this group accounted for almost three-fourths (72.4 percent) of all antimicrobial combination drugs.

Virtually all of the antimicrobial drug mentions (206.5 million, or 99.2 percent) were of drugs available to patients only with a physician's prescription. Similarly, 206.5 million of the drug mentions (99.2 percent) were not subject to the regulatory control of the Drug Enforcement Administration (DEA) of the U.S. Department of Justice. Most of the remaining drugs were of indeterminate prescription or control status and were concentrated in the group of miscellaneous antimicrobials, which includes all unclassifiable entries, such as "anti-infective agent."

Table F displays the distribution of antimicrobial drug mentions among entry status categories, that is, the types of names used by responding physicians in reporting the order or provision of drugs.[c] The data indicate that brand names were used to order drugs much more frequently than generic names were (127.3 million drug mentions, 61.1 percent of all antimicrobial drug mentions, compared with 79.3 million, or 38.1 percent). Only 1.8 million drug mentions (0.8 percent) were reported according to their therapeutic effect. However, the different types of antimicrobial drugs were not equally likely to be ordered under brand names. Cephalosporins, as well as the sulfonamides and trimethoprim, were almost always ordered under their trade names (98.4 percent and 98.0 percent, respectively), followed by miscellaneous antimicrobials (81.1 percent) and then macrolides and lincosamides (72.3 percent). Even less frequently ordered under their trade names were tetracyclines (49.9 percent), followed by penicillins (40.7 percent). Thus, office-based physicians used generic names more frequently than trade names for only two types of antimicrobials—penicillins and tetracyclines—but these were the first and third most commonly ordered antimicrobials. Undoubtedly the frequency of using trade names in ordering the different

[c]Although sample physicians were requested to report drug use by listing the drug names entered in patient medical records or on prescription forms, some physicians reported a portion of drug use in terminology describing or implying the desired therapeutic effect. Consequently, NAMCS uses "therapeutic effect" as an entry status category, as well as "generic name" and "brand name."

Table E. Number and percent distribution of antimicrobial drug mentions by composition status, according to type of antimicrobial drug: United States, 1980–81

Type of antimicrobial drug	Total	Composition status[1]		
		Single ingredient drug	Combination drug	Undetermined
	Number in thousands			
All antimicrobial drug mentions	208,288	187,188	19,346	1,754
Penicillins	82,896	80,677	2,219	–
Cephalosporins	16,044	16,007	–	*37
Macrolides and lincosamides	40,106	38,771	1,335	–
Tetracyclines	33,787	33,360	*427	–
Sulfonamides and trimethoprim	18,607	4,492	14,115	–
Miscellaneous antimicrobials	16,848	13,881	1,250	1,717
	Percent distribution			
All antimicrobial drug mentions	100.0	89.9	9.3	0.8
Penicillins	100.0	97.3	2.7	–
Cephalosporins	100.0	99.8	–	*0.2
Macrolides and lincosamides	100.0	96.7	3.3	–
Tetracyclines	100.0	98.7	*1.3	–
Sulfonamides and trimethoprim	100.0	24.1	75.9	–
Miscellaneous antimicrobials	100.0	82.4	7.4	10.2

Table F. Number and percent distribution of antimicrobial drug mentions by entry status, according to type of antimicrobial drug: United States, 1980–81

Type of antimicrobial drug	Total	Entry status[1]		
		Generic name	Brand name	Therapeutic effect
	Number in thousands			
All antimicrobial drug mentions	208,288	79,255	127,278	1,754
Penicillins	82,896	49,191	33,705	–
Cephalosporins	16,044	*219	15,788	*37
Macrolides and lincosamides	40,106	11,093	29,014	–
Tetracyclines	33,787	16,914	16,873	–
Sulfonamides and trimethoprim	18,607	*373	18,233	–
Miscellaneous antimicrobials	16,848	1,466	13,665	1,717
	Percent distribution			
All antimicrobial drug mentions	100.0	38.1	61.1	0.8
Penicillins	100.0	59.3	40.7	–
Cephalosporins	100.0	*1.4	98.4	*0.2
Macrolides and lincosamides	100.0	27.7	72.3	–
Tetracyclines	100.0	50.1	49.9	–
Sulfonamides and trimethoprim	100.0	*2.0	98.0	–
Miscellaneous antimicrobials	100.0	8.7	81.1	10.2

[1]The entry status of a drug mention is the type of drug name used by the responding physician in reporting the drug's use.

types of antimicrobials was influenced both by the desirability of ordering a particular combination drug (as with the sulfonamides and trimethoprim, which are frequently used in combination) and by the availability of very similar products from different manufacturers. (A number of penicillin compounds, for example, are manufactured by a variety of companies.)

Population-based rates

The last aspect of antimicrobial drug mentions to be investigated in this report concerns the relationship of certain demographic characteristics—patient sex and patient age—to the use of these drugs. (See table G.) For all antimicrobial drugs, the average annual rate of use was 467.7 drug mentions per 1,000 civilian noninstitutionalized population. The rates of use of the major types differed significantly according to the same pattern described for the numbers of drug mentions, with one exception. The average annual rate for macrolides and lincosamides was not significantly greater than that for tetracyclines.

Significantly more antimicrobial drugs were ordered or provided for female patients than for male patients—115.7 million compared with 92.6 million, or 25 percent more. Controlling for the relative sizes of the male and female populations by comparing rates reduces the magnitude of this difference, but it remains significant (501.8 antimicrobial drug mentions per 1,000 population per year for females compared

Table G. Number, percent distribution, and average annual rate (per 1,000 civilian noninstitutionalized population) of antimicrobial drug mentions by sex and age of patient, according to type of antimicrobial drug: United States, 1980–81

Sex and age of patient	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and/or trimethoprim	Miscellaneous antimicrobials
				Number in thousands			
All antimicrobial drug mentions	208,288	82,896	16,044	40,106	33,787	18,607	16,848
Sex							
Male	92,632	38,462	7,765	17,633	15,050	7,981	5,741
Female	115,656	44,434	8,279	22,473	18,737	10,626	11,108
Age							
Under 15 years	71,003	40,157	5,426	14,315	2,230	6,033	2,841
15–24 years	38,352	12,995	2,188	8,447	9,809	1,869	3,044
25–44 years	46,604	15,183	3,952	8,852	10,519	3,599	4,499
45–64 years	31,636	9,598	2,983	5,581	6,637	3,461	3,376
65 years and over	20,694	4,962	1,495	2,911	4,592	3,645	3,088
				Percent distribution			
All antimicrobial drug mentions	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sex							
Male	44.5	46.4	48.4	44.0	44.5	42.9	34.1
Female	55.5	53.6	51.6	56.0	55.5	57.1	65.9
Age							
Under 15 years	34.1	48.4	33.8	35.7	6.6	32.4	16.9
15–24 years	18.4	15.7	13.6	21.1	29.0	10.0	18.1
25–44 years	22.4	18.3	24.6	22.1	31.1	19.3	26.7
45–64 years	15.2	11.6	18.6	13.9	19.6	18.6	20.0
65 years and over	9.9	6.0	9.3	7.3	13.6	19.6	18.3
				Average annual rate			
All antimicrobial drug mentions	467.7	186.1	36.0	90.1	75.9	41.8	37.8
Sex							
Male	431.1	179.0	36.1	82.1	70.0	37.1	26.7
Female	501.8	192.8	35.9	97.5	81.3	46.1	48.2
Age							
Under 15 years	698.4	395.0	53.4	140.8	21.9	59.3	27.9
15–24 years	471.0	159.6	26.9	103.7	120.5	23.0	37.4
25–44 years	371.9	121.2	31.5	70.6	83.9	28.7	35.9
45–64 years	359.8	109.2	33.9	63.5	75.5	39.4	38.4
65 years and over	422.1	101.2	30.5	59.4	93.7	74.3	63.0

with 431.1 for males, or 16 percent more). The residual category of miscellaneous antimicrobials, however, was the only major group in which the annual average rate for females (48.2 per 1,000 population) significantly exceeded that for males (26.7).

Age differences in the use of antimicrobial drugs also are shown in table G. The largest number of antimicrobial drugs (71.0 million, or 34.1 percent of all) was ordered or provided for children 14 years of age and younger. This group also accounted for the highest rate (698.4 per 1,000 population per year). Young adults 15–24 years of age had the second highest average annual rate (471.0). Although the rate continued to fluctuate with increasing age, the changes were not statistically significant. Thus, these data indicate that overall antimicrobial usage dropped with age up to 25–44 years of age, at which point usage changed little.

For the specific types of antimicrobial drug, however, different patterns emerge. For both penicillins and cephalosporins, which are very similar both chemically and pharmacologically, the sole difference from the overall pattern was that the rates for persons 15–24 years of age did not differ significantly from those for persons 25–44 years of age (159.6 per 1,000 population per year compared with 121.2, and 26.9 compared with 31.5, respectively). Thus, for these drugs, usage by children was significantly higher than usage by the next youngest age group, but no further significant changes between successive age groups were observed.

Usage rates for the sulfonamides and trimethoprim followed the same pattern as those for the penicillins and cephalosporins, except that usage among the elderly was higher than usage among persons 45–64 years of age. (The average annual rate was 39.4 per 1,000 population for persons aged 45–64

and 74.3 for those aged 65 and older.) This pattern reflects the relative susceptibility of children and the elderly to urinary tract infections.

Usage rates for the tetracyclines also followed the same pattern as those for the penicillins and cephalosporins, with only one difference. Children [0–14 years of age] were ordered or provided with tetracyclines significantly less often than were persons 15–24 years of age (21.9 per 1,000 per year compared with 120.5). In fact, they were ordered or provided with these drugs significantly less frequently than any other age group. This finding is undoubtedly a result of the fact that, unless no other satisfactory treatment plan can be devised, use of tetracyclines in young children is contraindicated because these drugs can cause permanent discoloration of developing teeth.

Finally, usage of macrolides and lincosamides and of miscellaneous antimicrobials was similar in that successive age groups displayed no significant differences between rates. Only differences between the rates for successive age groups have been discussed here; readers interested in making other comparisons should consult the discussion of significance testing presented in appendix I.

Visit information

The 208.3 million antimicrobial drug mentions made during 1980 and 1981 involved 188.8 million patient visits. The remainder of this report concentrates on examining the characteristics of these visits and of the patients who made them.

Of all antimicrobial drug visits, by far the largest proportion (41.2 percent) was made by patients for whom one or more penicillins were ordered or provided. (See table H.) Substantially smaller than this was the set of visits made by patients who received one or more macrolides and lincosamides. These visits composed 20.5 percent of the total. Visits involving one or more tetracyclines constituted 17.5 percent of the total, a proportion that was significantly, but not substantially, smaller than that involving macrolides and lincosamides. The three remaining groups of antimicrobial drug visits each accounted for significantly smaller proportions of the total.

Table H. Number and percent distribution of antimicrobial drug visits, by type of antimicrobial drug ordered or provided: United States, 1980–81

Type of antimicrobial drug	*Number of visits in thousands*	*Percent distribution*[1]
All antimicrobial drug visits	188,754	100.0
Penicillins	77,811	41.2
Cephalosporins	15,699	8.3
Macrolides and lincosamides	38,663	20.5
Tetracyclines	33,104	17.5
Sulfonamides and trimethoprim	18,515	9.8
Miscellaneous antimicrobials	16,282	8.6

[1]Percents will not total 100.0 because some visits involved drugs from more than one antimicrobial drug group.

Patients' reasons for visit

The distribution of antimicrobial drug visits according to major reason for visit is shown in table J. Based on the assumption that many infective disease processes are acute in nature, it was expected that a large proportion of NAMCS visits involving antimicrobial drugs would be prompted by a need for care of an acute problem. This expectation was supported by the data, with almost three-fourths of all antimicrobial drug visits (71.8 percent) being for the care of an acute problem. In contrast, only one-third (29.5 percent) of all other NAMCS visits were precipitated by an acute problem. As a consequence of this difference, antimicrobial drug visits accounted for 16.3 percent of all NAMCS visits but for fully 32.1 percent of all acute-problem visits.

The proportions of antimicrobial drug visits associated with other major reasons for visit were, of course, all significantly smaller. Visits for routine care of a chronic problem accounted for 13.8 percent of all antimicrobial drug visits, and visits for care of a chronic problem flareup accounted for a significantly smaller 10.0 percent.

Although acute problems represented the major reason for visit for more than half of the visits associated with each type of antimicrobial drug, the proportion of acute problem visits varied significantly with drug type. The penicillins had the largest proportion of acute problem visits (84.7 percent), followed by the cephalosporins (71.6 percent) and macrolides and lincosamides (70.4 percent). The remaining three drug types had the smallest proportions of acute-problem visits (less than 60 percent each).

One other notable difference appeared in the distribution of visits involving the different types of antimicrobial drugs among the various major reasons for visit. Visits in which tetracyclines were ordered or provided were more likely to be visits for routine care of a chronic problem (28.3 percent) than were visits involving any other type of antimicrobial drug. This is because of the relatively high frequency of diseases of the sebaceous glands (including the common chronic skin condition, acne) as the principal diagnosis in visits involving tetracyclines.

Physicians participating in NAMCS are asked not only to report the major reason for visit, but also to provide verbatim accounts of the specific reasons for the visit given by each sample patient. These reasons are coded according to "A Reason for Visit Classification for Ambulatory Care,"[12] which both assigns codes to specific reasons and groups the specific reasons into meaningful categories. As would be expected in any group of visits predominantly precipitated by acute problems, by far the most common category of principal reason for visit cited by patients making antimicrobial drug visits during 1980 and 1981 was symptoms. Fully five of every six of these visits (84.7 percent) fell into this category. Patient complaints of a disease accounted for only 6.1 percent of all antimicrobial drug visits, and visits made for diagnostic, screening, and preventive reasons and for treatment reasons accounted for even smaller proportions (3.1 percent each).

Table J. Number and percent distribution of antimicrobial drug visits by major reason for visit, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Type of antimicrobial drug	All reasons	Major reason for visit: Acute problem	Chronic problem, routine visit	Chronic problem flareup	Post surgery or injury	Nonillness care
		Number in thousands[1]				
All antimicrobial drug visits	188,754	135,534	26,104	18,913	3,704	4,499
Penicillins	77,811	65,897	4,601	4,728	921	1,663
Cephalosporins	15,699	11,245	1,193	2,130	848	*284
Macrolides and lincosamides	38,663	27,234	6,410	3,974	*356	689
Tetracyclines	33,104	18,661	9,367	4,319	*356	*400
Sulfonamides and trimethoprim	18,515	10,852	3,634	3,021	462	545
Miscellaneous antimicrobials	16,282	8,762	3,417	2,191	879	1,032
		Percent distribution				
All antimicrobial drug visits	100.0	71.8	13.8	10.0	2.0	2.4
Penicillins	100.0	84.7	5.9	6.1	1.2	2.1
Cephalosporins	100.0	71.6	7.6	13.6	5.4	*1.8
Macrolides and lincosamides	100.0	70.4	16.6	10.3	*0.9	1.8
Tetracyclines	100.0	56.4	28.3	13.0	*1.1	*1.2
Sulfonamides and trimethoprim	100.0	58.6	19.6	16.3	2.5	2.9
Miscellaneous antimicrobials	100.0	53.8	21.0	13.5	5.4	6.3

[1]Sums of antimicrobial drug categories do not equal totals because some visits involved drugs from more than one antimicrobial drug group.

Table K. Number and percent distribution of the 20 specific principal reasons for visit most commonly given during antimicrobial drug visits: United States, 1980–81

Rank	Principal reason for visit and RVC code[1]	Number of visits in thousands	Percent distribution
	All principal reasons for visit	188,754	100.0
1	Symptoms referable to throat (S455)	22,007	11.7
2	Cough (S440)	17,818	9.4
3	Fever (S010)	12,958	6.9
4	Head cold, upper respiratory infection (S445)	12,086	6.4
5	Earache or ear infection (S355)	11,435	6.1
6	Acne or pimples (S830)	11,016	5.8
7	Skin rash (S860)	3,626	1.9
8	Nasal congestion (S400)	3,542	1.9
9	Abdominal pain, cramps, spasms (S550)	3,312	1.8
10	Painful urination (S650)	3,178	1.7
11	Progress visit, NOS (T800)	2,873	1.5
12	Other symptoms referable to ears, NEC (S365)	2,501	1.3
13	General medical examination (X100)	2,170	1.1
14	Frequency and urgency of urination (S645)	2,126	1.1
15	Headache, pain in head (S210)	2,085	1.1
16	Skin lesion (S865)	1,859	1.0
17	Congestion in chest (S475)	1,747	0.9
18	Chest pain and related symptoms (not referable to body system) (S050)	1,698	0.9
19	Sinus problems (S410)	1,592	0.8
20	Vaginal discharge (S760)	1,486	0.8
...	All other principal reasons for visit	67,636	35.8

[1]Based on *A Reason for Visit Classification for Ambulatory Care*, (RVC).[12]

In contrast to these visits, fewer than half (48.1 percent) of all other visits, which reflected a much larger proportion of chronic problems, were made by patients who principally complained of symptoms.

The 20 specific reasons for visit most commonly given for antimicrobial drug visits are shown in table K. The data indicate that the visits are concentrated in a small number of codes which are primarily symptoms, thereby reflecting the narrow range of complaints presented by patients with underlying infective disease processes. Eighteen of these 20 reasons were symptoms, and together accounted for almost two-thirds (64.2 percent) of all antimicrobial drug visits. In fact, half of all antimicrobial drug visits (50.1 percent) were accounted for by the eight leading patient complaints alone: symptoms referable to the throat, cough, fever, head cold (upper respiratory infection), earache or ear infection, acne or pimples, skin rash, and nasal congestion.

Diagnoses

For NAMCS, diagnoses recorded during patient visits are coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

The distribution of the principal diagnoses associated with antimicrobial drug visits among the major diagnostic classes of the ICD–9–CM is shown in table L. By far the most common diagnostic class was diseases of the respiratory system, which accounted for 42.4 percent of these visits. This is not unexpected because of the large proportion of complaints related to the respiratory system among the principal reasons for visit cited by patients. (See table K.) The rank of second most common type of principal diagnosis is shared by three diagnostic classes. They are diseases of the nervous system and sense organs (13.8 percent), diseases of the skin and subcutaneous tissue (12.6 percent), and diseases of the genitourinary system (11.7 percent). Thus, the four most common classes of diagnosis together accounted for 4 of every 5 antimicrobial drug visits (80.5 percent).

This finding is in sharp contrast to the diagnostic distribution of all visits not involving antimicrobial drugs. Only 24.9 percent of the latter were associated with these four classes of principal diagnosis. It is apparent that those organ systems most vulnerable to infective contamination by the environment develop a highly disproportionate share of the problems that precipitate the use of antimicrobial medications.

The limited diagnostic range of visits involving the use of antimicrobial drugs is even more clearly shown in table M, which presents the specific principal diagnoses most frequently encountered in these visits. It is important to note that this ranking of diagnoses is only approximate, as some differences among the diagnostic frequencies are not statistically significant. Two-thirds (66.5 percent) of all antimicrobial drug visits during 1980 and 1981 were attributable to only

Table L. Number and percent distribution of antimicrobial drug visits, by class of principal diagnosis: United States, 1980–81

Class of principal diagnosis and ICD–9–CM codes[1]	*Number of antimicrobial drug visits in thousands*	*Percent distribution*
All principal diagnoses	188,754	100.0
Infectious and parasitic diseases (001–139)	10,162	5.4
Diseases of the nervous system and sense organs (320–389)	26,088	13.8
Diseases of the circulatory system (390–459)	3,118	1.7
Diseases of the respiratory system (460–519)	80,031	42.4
Diseases of the digestive system (520–579)	5,006	2.7
Diseases of the genitourinary system (580–629)	22,038	11.7
Diseases of the skin and subcutaneous tissue (680–709)	23,742	12.6
Diseases of the musculoskeletal system and connective tissue (710–739)	1,784	0.9
Symptoms, signs, and ill-defined conditions (780–799)	3,446	1.8
Injury and poisoning (800–999)	4,457	2.4
Supplemental classification of factors influencing health status and contact with health services (V01–V82)	3,770	2.0
All other principal diagnoses[2] Residual	5,111	2.7

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]
[2]Includes neoplasms (140–239); endocrine, nutritional, and metabolic diseases, and immunity disorders (240–279); mental disorders (290–319); and blank, noncodable, and illegible diagnoses.

Table M. Number and percent distribution of the 20 specific principal diagnoses most commonly made during antimicrobial drug visits: United States, 1980–81

Rank	*Principal diagnosis and ICD–9–CM code*[1]	*Number of visits in thousands*	*Percent distribution*
	All principal diagnoses	188,754	100.0
1	Suppurative and unspecified otitis media (382)	19,175	10.2
2	Acute upper respiratory infections of multiple or unspecified sites (465)	18,795	10.0
3	Acute pharyngitis (462)	13,859	7.3
4	Diseases of sebaceous glands (706)	13,426	7.1
5	Bronchitis, not specified as acute or chronic (490)	9,947	5.3
6	Acute tonsillitis (463)	8,318	4.4
7	Chronic sinusitis (473)	5,653	3.0
8	Other disorders of urethra and urinary tract (599)	5,402	2.9
9	Cystitis (595)	4,628	2.5
10	Acute bronchitis and bronchiolitis (466)	4,204	2.2
11	Influenza (487)	3,397	1.8
12	Streptococcal sore throat and scarlet fever (034)	2,916	1.5
13	Asthma (493)	2,288	1.2
14	Pneumonia, organism unspecified (486)	2,231	1.2
15	Inflammatory diseases of prostate (601)	2,202	1.2
16	Other cellulitis and abscess (682)	2,131	1.1
17	Disorders of external ear (380)	1,928	1.0
18	Inflammatory disease of cervix, vagina, and vulva (616)	1,785	1.0
19	Nonsuppurative otitis media and Eustachian tube disorders (381)	1,636	0.9
20	Inflammatory disease of ovary, fallopian tube, pelvic cellular tissue, and peritoneum (614)	1,602	0.9
...	All other principal diagnoses Residual	63,230	33.5

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

20 diagnoses. In contrast, only 7.3 percent of all other visits were associated with these principal diagnoses. All but one of these diagnoses fall into the four ICD–9–CM diagnostic classes that account for most antimicrobial drug visits. Half of the antimicrobial drug visits (50.1 percent, or an average of 47.3 million visits per year) were accounted for by only eight diagnoses: suppurative and unspecified otitis media; acute upper respiratory infections of multiple and unspecified sites; acute pharyngitis; diseases of the sebaceous glands; bronchitis, not specified as acute or chronic; acute tonsillitis; chronic sinusitis; and other disorders of the urethra and urinary tract.

For the visits associated with each major group of antimicrobial drug, table N shows the principal diagnoses with combined 1980 and 1981 visit frequencies of at least 1 million. A remarkable consistency in the ranking of diagnoses can be observed. Suppurative and unspecified otitis media was the most common diagnosis for 3 of the 5 antimicrobial groups. This accounted for 15.8 percent of the visits associated with

Table N. For visits associated with each type of antimicrobial drug, number and percent distribution of the most common specific principal diagnoses: United States, 1980–81

Rank	Type of antimicrobial drug, principal diagnosis, and ICD–9–CM code[1]	Number of visits in thousands	Percent distribution
	Penicillins		
	All principal diagnoses in visits involving penicillins	77,811	100.0
1	Suppurative and unspecified otitis media (382)	12,293	15.8
2	Acute upper respiratory infections of multiple or unspecified sites (465)	9,392	12.1
3	Acute pharyngitis (462)	9,061	11.6
4	Acute tonsillitis (463)	6,210	8.0
5	Bronchitis, not specified as acute or chronic (490)	3,909	5.0
6	Streptococcal sore throat and scarlet fever (034)	2,293	2.9
7	Chronic sinusitis (473)	2,077	2.7
8	Acute bronchitis and bronchiolitis (466)	1,819	2.3
9	Influenza (487)	1,670	2.2
10	Disorders of external ear (380)	1,070	1.4
11	Pneumonia, organism unspecified (486)	1,061	1.4
...	All other principal diagnoses Residual	26,957	34.6
	Cephalosporins		
	All principal diagnoses in visits involving cephalosporins	15,699	100.0
1	Suppurative and unspecified otitis media (382)	1,941	12.4
2	Acute upper respiratory infections of multiple or unspecified sites (465)	1,685	10.7
...	All other principal diagnoses Residual	12,373	76.9
	Macrolides and Lincosamides		
	All principal diagnoses in visits involving macrolides or lincosamides	38,663	100.0
1	Diseases of sebaceous glands (706)	6,170	16.0
2	Acute upper respiratory infections of multiple or unspecified sites (465)	5,205	13.5
3	Bronchitis, not specified as acute or chronic (490)	3,246	8.4
4	Acute pharyngitis (462)	2,858	7.4
5	Suppurative and unspecified otitis media (382)	2,251	5.8
6	Acute tonsillitis (463)	1,538	4.0
7	Acute bronchitis and bronchiolitis (466)	1,241	3.2
8	Chronic sinusitis (473)	1,097	2.8
...	All other principal diagnoses Residual	15,058	38.9
	Tetracyclines		
	All principal diagnoses in visits involving tetracyclines	33,104	100.0
1	Diseases of sebaceous glands (706)	8,587	25.9
2	Acute upper respiratory infections of multiple or unspecified sites (465)	3,212	9.7
3	Bronchitis, not specified as acute or chronic (490)	2,154	6.5
4	Chronic sinusitus (473)	1,797	5.4
5	Acute pharyngitis (462)	1,197	3.6
...	All other principal diagnoses Residual	16,156	48.8
	Sulfonamides and trimethoprim		
	All principal diagnoses in visits involving sulfonamides and/or trimethoprim	18,515	100.0
1	Suppurative and unspecified otitis media (382)	2,856	15.4
2	Other disorders of urethra and urinary tract (599)	2,675	14.5
3	Cystitis (595)	2,571	13.9
4	Inflammatory diseases of prostate (601)	1,217	6.6
...	All other principal diagnoses Residual	9,196	49.7

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

NOTES: Miscellaneous antimicrobial drugs are omitted from this table.
More than one type of antimicrobial drug was ordered or provided during some visits.

the use of penicillins, 15.4 percent of the visits in which sulfonamides and/or trimethoprim were used, and 12.4 percent of the visits associated with cephalosporins. Diseases of the sebaceous glands constituted the leading diagnosis for the remaining antimicrobial drug groups. This diagnosis, which includes acne, accounted for 25.9 percent of all visits in which the tetracyclines were used and 16.0 percent of those in which the macrolides and lincosamides were used. Orally administered tetracyclines and erythromycin (a macrolide antibiotic) are used frequently in the treatment of acne, as are topical applications of the lincosamide clindamycin. (NAMCS does not gather information on the route of administration of medications that are ordered or provided. Consequently, topical antimicrobial medications can be itemized for separate analysis only when their use is reported under names of drug preparations that are solely for topical application. Those drug mentions reported under names indicating drugs that can be used either topically or systemically are included in this analysis.)

Furthermore, 4 of the 5 antimicrobial groups had the same diagnosis as the second most common one—acute upper respiratory infections of multiple or unspecified sites. This diagnosis accounted for 13.5 percent of the visits in which the macrolides and lincosamides were used, 12.1 percent of the visits involving penicillins, 10.7 percent of the visits involving cephalosporins, and 9.7 percent of the visits in which the tetracyclines were used. Substantial overlap among the remaining diagnoses also can be seen in the visits associated with each antimicrobial group except the sulfonamides and/or trimethoprim. For the visits in which drugs from the latter group were used, all leading diagnoses except the first-ranked one were diseases of the genitourinary system, which tend to be particularly amenable to treatment with this type of medication.

Although the diagnostic distributions presented in tables M and N contribute to an understanding of the principal uses made of antimicrobial drugs in office-based practice, they do not address the equally important question of the extent to which all occurrences of these conditions were treated by using antimicrobial drugs of various types. Table O investigates this issue. The 20 diagnoses most commonly reported for all antimicrobial drug visits are presented with the total numbers of all visits assigned these principal diagnoses during 1980 and 1981. Also included are the numbers and percents of these visits that were antimicrobial drug visits, and the antimicrobial drugs most frequently mentioned in the treatment of these conditions. The diagnoses are listed according to their rank order among all antimicrobial drug visits. A cutoff point of 750,000 visits was used in selecting the most frequently mentioned types of antimicrobial drug for presentation.

NAMCS recorded a total of 196.2 million visits with these 20 principal diagnoses during 1980 and 1981. One or more antimicrobial drugs was ordered or provided during 125.5 million, or 64.0 percent, of these visits. For individual diagnoses, however, the proportion of all visits that were antimicrobial drug visits ranged from about 20 percent to almost 90 percent. The diagnoses with the largest proportions of antimicrobial drug visits were acute tonsillitis (87.2 percent); streptococcal sore throat and scarlet fever (81.7 percent); acute bronchitis and bronchiolitis (79.2 percent); bronchitis, not specified as acute or chronic (78.0 percent); acute pharyngitis (77.7 percent); and suppurative and unspecified otitis media (77.2 percent). The diagnoses with the smallest proportions of antimicrobial drug use were asthma (20.9 percent); inflammatory disease of cervix, vagina, and vulva (25.5 percent); disorders of external ear (26.6 percent); and nonsuppurative otitis media and Eustachian tube disorders (30.2 percent). Consequently, it is apparent that although antimicrobial drugs were used in a substantial majority of all visits concerned with the most common diagnoses, the frequency of the use of these drugs in the treatment of specific diagnoses varied considerably.

An inspection of the leading antimicrobial drug groups for these diagnoses reveals that the penicillins were the most frequently used type of drug for 14 of the 20 diagnoses. Of these, the majority (10 diagnoses) were diseases of the respiratory system. For 3 of the 20 diagnoses, all of which were diseases of the genitourinary system, the sulfonamides and trimethoprim were the most commonly used antimicrobials. For diseases of the sebaceous glands, including acne, the tetracyclines were the leading antimicrobial used. For one diagnosis—nonsuppurative otitis media and Eustachian tube disorders—no antimicrobial drug group met the visit cutoff point.

The structure of NAMCS also permits differentiation between initial visits made to obtain care for a new problem and return visits made to obtain care for a continuing problem. At least one antimicrobial medication was ordered or provided for 23.4 percent of the patients in all new-problem visits recorded by NAMCS. This is in sharp contrast to all return visits, of which only 12.1 percent involved these drugs. This difference was expected because a large proportion of antimicrobial drug visits, in comparison to all other visits, were precipitated by acute problems. The difference also could be the result of differing diagnostic distributions among new-problem and return visits.

These observations raise the question of the extent to which antimicrobial drug use for a specific condition depended on whether or not a particular visit was the initial one or was a return visit made to obtain continuing care for that condition. Table P was constructed to address this question. For each of the 20 principal diagnoses most frequently mentioned among antimicrobial drug visits, the table presents the 1980 and 1981 total numbers of new and return visits, and the percents of each that were antimicrobial drug visits. These data indicate that usage of antimicrobial drugs did tend to vary according to whether or not the patient had previously seen the reporting physician for the same condition. For 8 of these 20 diagnoses, the use of antimicrobial drugs was significantly lower in return visits than in new-problem visits. These diagnoses were pneumonia (organism unspecified); inflammatory diseases of the prostate; asthma; cystitis; streptococcal sore throat and scarlet fever; suppurative and unspecified otitis media; bronchitis, not specified as acute or chronic; and chronic sinusitis. The use of antimicrobial drugs was significantly higher for return visits than for new-problem

Table O. Number of all visits, number of antimicrobial drug visits, antimicrobial drug visits as a percent of all visits, and the most frequently mentioned types of antimicrobial drug, for each of the 20 principal diagnoses most commonly made during antimicrobial drug visits: United States, 1980–81

Principal diagnosis and ICD–9–CM code[1]	Number of all visits in thousands	Antimicrobial drug visits		Most frequently mentioned types of antimicrobial drugs
		Number of visits in thousands	Percent of all visits	
Suppurative and unspecified otitis media . . . (382)	24,853	19,175	77.2	Penicillins (12,293,000 visits) Sulfonamides and trimethoprim (2,856,000 visits) Macrolides and lincosamides (2,251,000 visits) Cephalosporins (1,941,000 visits)
Acute upper respiratory infections of multiple or unspecified sites . . . . . (465)	29,903	18,795	62.9	Penicillins (9,392,000 visits) Macrolides and lincosamides (5,205,000 visits) Tetracyclines (3,212,000 visits) Cephalosporins (1,685,000 visits)
Acute pharyngitis . . . . . (462)	17,834	13,859	77.7	Penicillins (9,061,000 visits) Macrolides and lincosamides (2,858,000 visits) Tetracyclines (1,197,000 visits) Cephalosporins (869,000 visits)
Diseases of sebaceous glands . . . . . (706)	20,239	13,426	66.3	Tetracyclines (8,587,000 visits) Macrolides and lincosamides (6,170,000 visits)
Bronchitis, not specified as acute or chronic . . (490)	12,755	9,947	78.0	Penicillins (3,909,000 visits) Macrolides and lincosamides (3,246,000 visits) Tetracyclines (2,154,000 visits) Cephalosporins (850,000 visits)
Acute tonsillitis . . . . . (463)	9,541	8,318	87.2	Penicillins (6,210,000 visits) Macrolides and lincosamides (1,538,000 visits)
Chronic sinusitis . . . . . (473)	8,068	5,653	70.1	Penicillins (2,077,000 visits) Tetracyclines (1,797,000 visits) Macrolides and lincosamides (1,097,000 visits)
Other disorders of urethra and urinary tract . . . . . (599)	8,604	5,402	62.8	Sulfonamides and trimethoprim (2,675,000 visits) Miscellaneous antimicrobials (1,081,000 visits) Penicillins (982,000 visits)
Cystitis . . . . . (595)	6,109	4,628	75.8	Sulfonamides and trimethoprim (2,571,000 visits) Miscellaneous antimicrobials (1,096,000 visits) Penicillins (814,000 visits)
Acute bronchitis and bronchiolitis . . . . . (466)	5,312	4,204	79.2	Penicillins (1,819,000 visits) Macrolides and lincosamides (1,241,000 visits) Tetracyclines (961,000 visits)
Influenza . . . . . (487)	5,922	3,397	57.4	Penicillins (1,670,000 visits) Macrolides and lincosamides (941,000 visits)
Streptococcal sore throat and scarlet fever . . (034)	3,567	2,916	81.7	Penicillins (2,293,000 visits)
Asthma . . . . . (493)	10,945	2,288	20.9	Penicillins (895,000 visits)
Pneumonia, organism unspecified . . . . . (486)	3,476	2,231	64.2	Penicillins (1,061,000 visits) Macrolides and lincosamides (851,000 visits)
Inflammatory diseases of prostate . . . . . (601)	3,041	2,202	72.4	Sulfonamides and trimethoprim (1,217,000 visits)
Other cellulitis and abscess . . . . . (682)	3,606	2,131	59.1	Penicillins (996,000 visits)
Disorders of external ear . . . . . (380)	7,248	1,928	26.6	Penicillins (1,070,000 visits)
Inflamatory disease of cervix, vagina, and vulva . . . . . (616)	6,995	1,785	25.5	Miscellaneous antimicrobials (768,000 visits)
Nonsuppurative otitis media and Eustachian tube disorders . . . . . (381)	5,411	1,636	30.2	
Inflammatory disease of ovary, fallopian tube, pelvic cellular tissue, and peritoneum . . . . . (614)	2,719	1,602	58.9	Penicillins (975,000 visits)

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

NOTE: More than one type of antimicrobial drug was ordered or provided during some visits.

visits for only 2 diagnoses—diseases of the sebaceous glands, and acute upper respiratory infections of multiple or unspecified sites. There was no significant difference in antimicrobial drug use between the new-problem and return visits for the remaining 10 diagnoses.

The differences highlighted here illustrate that the greater use of antimicrobial drugs in new-problem visits than in return visits tended to be diagnosis-specific as well as general. Thus, the overall difference between antimicrobial drug visits and all other visits in this respect was not caused solely by the higher concentration of acute condition diagnoses, which were relatively likely to be new-problem visits, among antimicrobial drug visits. However, it is not possible to use NAMCS data to determine the extent to which the observed differences between the new-problem and return visits were the result of demonstrated improvement that obviated the need for antimicrobial treatment, of terminating courses of antimicrobial therapy that had failed, or of failure on the part of participating physicians to report the continuing use of previously prescribed medications as completely as the initial use of medications. Logic favors the first of these explanations, however, for two reasons. First, physicians dealing with unsuccessful anti-

Table P. Number of all new-problem and return visits and percent of new-problem and return visits involving antimicrobials, for each of the 20 principal diagnoses most commonly made during antimicrobial drug visits: United States, 1980–81

Principal diagnosis and ICD–9–CM code[1]		New-problem visits		Return visits	
		Number in thousands	Percent that were antimicrobial drug visits	Number in thousands	Percent that were antimicrobial drug visits
Suppurative and unspecified otitis media	(382)	11,539	86.6	13,315	68.9
Acute upper respiratory infections of multiple or unspecified sites	(465)	18,803	58.4	11,100	70.5
Acute pharyngitis	(462)	11,557	75.5	6,277	81.7
Diseases of sebaceous glands	(706)	5,320	53.0	14,920	71.1
Bronchitis, not specified as acute or chronic	(490)	6,793	85.2	5,963	69.8
Acute tonsillitis	(463)	5,589	88.6	3,952	85.2
Chronic sinusitis	(473)	4,150	76.2	3,918	63.5
Other disorders of urethra and urinary tract	(599)	4,344	67.6	4,260	57.9
Cystitis	(595)	2,923	86.6	3,186	65.8
Acute bronchitis and bronchiolitis	(466)	3,099	81.4	2,213	76.0
Influenza	(487)	4,507	55.6	1,415	63.2
Streptococcal sore throat and scarlet fever	(034)	2,363	88.6	1,204	68.3
Asthma	(493)	2,023	38.6	8,923	16.9
Pneumonia, organism unspecified	(486)	1,544	78.6	1,932	52.6
Inflammatory diseases of prostate	(601)	836	91.1	2,205	65.3
Other cellutitis and abscess	(682)	1,837	66.9	1,769	51.0
Disorders of external ear	(380)	4,860	29.3	2,388	21.0
Inflammatory disease of cervix, vagina, and vulva	(616)	3,765	26.1	3,230	24.8
Nonsupportive otitis media and Eustachian tube disorders	(381)	1,889	37.0	3,521	26.6
Inflammatory disease of ovary, fallopian tube, pelvic cellular tissue, and peritoneum	(614)	1,168	66.2	1,552	53.4

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

microbial therapy may substitute different antimicrobial medications for the ineffective ones. To the extent that they occurred, such changes of medication are not reflected in these data. Second, although all of the statistics on the continuing use of medications may reflect some incomplete reporting, there is no reason to expect the amount of such incomplete reporting to vary among the specific diagnoses examined here as substantially as the observed usage differences varied.

Patient demographics

A significant majority (55.7 percent) of all antimicrobial drug visits were made by females (see table Q). It is noteworthy that this proportion is significantly smaller than the proportion of all other visits made by females (61.2 percent).

Female patients also accounted for a majority of the visits associated with each major type of antimicrobial drug except the cephalosporins. The proportion of visits made by females did not vary significantly among the groups of visits associated with the different antimicrobial drug types, with one notable exception. Females made a larger proportion of the visits in which miscellaneous antimicrobials were used than of the visits associated with any other antimicrobial drug type except the sulfonamides and trimethoprim. This may be attributable to the inclusion of urinary tract antiseptics in the miscellaneous antimicrobial drug category, with females receiving a disproportionate share of that drug subtype because they are particularly susceptible to urinary tract infections.

The relative youth of patients receiving antimicrobial drugs is apparent in a comparison of the percent distribution of all antimicrobial visits according to patient's age with the comparable distribution for all other visits. Fully one-third (34.9 percent) of all antimicrobial drug visits were made by children under the age of 15. In contrast, the proportion of all other office visits made by children was less than half of this (15.5 percent). The proportion of antimicrobial drug visits made by the next youngest age group, 15–24 years, again was larger (17.7 percent) than the proportion of all other visits made by that age group (13.1 percent), but the difference is not as striking. Visits involving antimicrobial drugs were correspondingly less concentrated in each of the older patient age groups than all other visits were.

Children under the age of 15 years made almost half of all visits involving the penicillins (49.0 percent), and also made about one-third of the visits associated with the use of macrolides and lincosamides (36.4 percent), cephalosporins (33.9 percent), and the sulfonamides and trimethoprim (32.4 percent). Undoubtedly because of the medical limitations on the use of tetracyclines, children accounted for only 6.6 percent of all visits in which these drugs were used.

The overall rate of antimicrobial drug visits for the civilian noninstitutionalized population was 423.8 per 1,000 per year. The major drug type with the highest rate was the penicillins (174.7 per 1,000 population per year). This was approximately double the rate of each of the two groups that ranked second (macrolides and lincosamides, with a rate of 86.8, and tetracyclines, with a rate of 74.3). The visit rates for the remaining three major types of antimicrobial drug did not differ significantly among themselves.

For all antimicrobial drug visits, the female rate of 456.1 per 1,000 population per year was 17 percent higher than the male rate of 389.3. With only one exception, the remaining rates for the sex, age, and antimicrobial drug groups displayed the same patterns that appeared among the corresponding drug mention rates. The exception was that the age-specific rates for visits involving macrolides and lincosamides showed a significant decrease with age, followed by stable use rates.

The visits associated with the different major groups and subtypes of antimicrobial drugs displayed striking differences

Table Q. Number, percent distribution, and average annual rate (per 1,000 civilian noninstitutionalized population) of antimicrobial drug visits by sex and age of patient, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Sex and age of patient	All types	Type of antimicrobial drug					
		Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
		Number in thousands[1]					
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
Sex							
Male	83,636	36,206	7,639	16,991	14,696	7,889	5,478
Female	105,117	41,605	8,060	21,672	18,408	10,626	10,804
Age							
Under 15 years	65,803	38,112	5,325	14,087	2,201	5,991	2,754
15–24 years	33,463	11,977	2,118	7,951	9,766	1,869	2,907
25–44 years	41,915	14,296	3,848	8,550	10,141	3,599	4,395
45–64 years	28,884	8,817	2,983	5,458	6,514	3,441	3,325
65 years and over	18,689	4,609	1,425	2,617	4,482	3,615	2,901
		Percent distribution					
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sex							
Male	44.3	46.5	48.7	43.9	44.4	42.6	33.6
Female	55.7	53.5	51.3	56.1	55.6	57.4	66.4
Age							
Under 15 years	34.9	49.0	33.9	36.4	6.6	32.4	16.9
15–24 years	17.7	15.4	13.5	20.6	29.5	10.1	17.9
25–44 years	22.2	18.4	24.5	22.1	30.6	19.4	27.0
45–64 years	15.3	11.3	19.0	14.1	19.7	18.6	20.4
65 years and over	9.9	5.9	9.1	6.8	13.5	19.5	17.8
		Average annual rate					
All antimicrobial drug visits	423.8	174.7	35.3	86.8	74.3	41.6	36.6
Sex							
Male	389.3	168.5	35.6	79.1	68.4	36.7	25.5
Female	456.1	180.5	35.0	94.0	79.9	46.1	46.9
Age							
Under 15 years	647.3	374.9	52.4	138.6	21.7	58.9	27.1
15–24 years	411.0	147.1	26.0	97.7	119.9	23.0	35.7
25–44 years	334.5	114.1	30.7	68.2	80.9	28.7	35.1
45–64 years	328.5	100.3	33.9	62.1	74.1	39.1	37.8
65 years and over	381.2	94.0	29.1	53.4	91.4	73.7	59.2

[1]Sums of types do not equal totals because more than one type of antimicrobial drug was ordered or provided during some visits.

in patient age, which are best illustrated by using median patient ages. Table R shows that the median patient age for all antimicrobial drug visits was 23.5, substantially lower than the median patient age of 39.1 observed for all other visits. This undoubtedly reflects both the relatively great susceptibility of youth to infection and the relatively low prevalence of chronic conditions among youth.

The major antimicrobial drug group visits with the lowest median patient ages were the visits associated with the penicillins (with a median patient age of 15.9), the visits involving the macrolides and lincosamides (with a median patient age of 20.1), and the visits in which the cephalosporins (with a median patient age of 27.6) were used. The median patient ages for the groups of visits involving the remaining major types of drug ranged from 31.0 to 34.8.

The low median patient age for the visits involving the penicillins is partly attributable to the extremely low median patient age (4.6 years) for the visits in which the subtype amoxicillin was used. Similarly, the low median patient age for the visits involving the cephalosporins reflects the inclusion of visits in which the subtype of second generation cephalosporins (for which the median patient age was only 6.9 years) was used. The extremely low median patient ages for the visits in which these two drug subtypes were used result from the high proportion of visits during which suppurative and unspecified otitis media were recorded as the principal diagnosis. This condition, which occurs most frequently in children under 5 years of age, accounted for one-third of the visits in which amoxicillin or second generation cephalosporins were used.

Table R. Median age of patients making antimicrobial drug visits, by type and selected subtype of antimicrobial drug ordered or provided: United States, 1980–81

Type and selected subtype of antimicrobial drug	*Median age in years*
All antimicrobial drug visits	23.5
Penicillins	15.9
Penicillin	19.5
Amoxicillin	4.6
Ampicillin	23.1
Cephalosporins	27.6
First generation	31.8
Second generation	6.9
Macrolides and lincosamides	20.1
Erythromycin	19.9
Other	21.0
Tetracyclines	31.0
Short-acting	30.7
Intermediate- and long-acting	32.6
Sulfonamides and trimethoprim	31.9
Sulfonamides and trimethoprim in combination	26.5
Miscellaneous antimicrobials	34.8
Urinary tract antiseptics	55.1
Antifungal agents for nonsystemic mycoses	29.1

NOTE: More than one type or subtype of antimicrobial drug was ordered or provided during some visits.

Visits associated with the use of miscellaneous antimicrobials showed a similar effect in that the overall median patient age of 34.8 was raised through the inclusion of visits in which urinary tract antiseptics were used. In the latter visits, the median patient age was 55.1, reflecting the relatively high susceptibility of the elderly, particularly women, to urinary tract infections.

The final patient demographic characteristics to be considered are race and ethnicity. Of all antimicrobial drug visits, 89.2 percent were made by white persons, 9.7 percent were made by black persons, and 1.1 percent were made by persons of other races. Also, 4.9 percent of the visits were made by persons of Hispanic origin. Neither of these distributions differs significantly from those observed in the visits not involving antimicrobial drugs.

Physician characteristics

The distribution of antimicrobial drug visits among the various physician specialties is displayed in table S. General and family practitioners handled the largest proportion of these visits (43.3 percent), followed by medical specialists (40.3 percent). Approximately half of all visits to medical specialists were made to pediatricians (22.3 percent of all antimicrobial drug visits). Surgical specialists handled a significantly smaller proportion of all antimicrobial drug visits (14.1 percent), and other specialists handled the smallest amount (2.3 percent). This distribution was quite different from that observed for all other visits. Antimicrobial drug visits were made to general and family practitioners and to medical specialists substantially more often than all other visits were. (Of all other visits, 30.8 percent were made to general and family practitioners and 29.2 percent were made to medical specialists.) Correspondingly fewer antimicrobial drug visits were made to surgical and other specialists. (Of all other visits, 33.9 percent were made to surgical specialists and 6.0 percent were made to all other specialists.) Because the conditions for which the antimicrobial drugs were used are usually managed medically, rather than surgically, this relatively high concentration of antimicrobial drug visits among medical practitioners was expected.

The physician specialty distribution of the antimicrobial drug visits varies with the major type of antimicrobial drug used. The proportion of visits made to general and family practitioners was smaller for miscellaneous antimicrobials than for any other major drug group (29.3 percent compared with a range of 40.4 percent to 47.2 percent). This stems from the fact that this drug group includes urinary tract antiseptics used for urinary tract infections, which are frequently treated by gynecologists. In fact, visits to obstetricians and gynecologists accounted for a substantially larger proportion of the visits involving this major drug group than of the visits associated with any other major drug group (15.2 percent compared with a range of 1.1 percent to 3.3 percent).

The visits during which the macrolides and lincosamides were ordered or provided were made to medical specialists more frequently than were the visits involving the other types of antimicrobial drug (50.5 percent, compared with a range of 26.7 percent to 41.7 percent). These visits, along with those involving tetracyclines, were made to dermatologists more frequently than were the visits during which the other types of antimicrobial drug were ordered or provided (19.4 percent and 29.5 percent, respectively, compared with a range of 0.6 percent to 8.2 percent). This is because of the relatively high frequency of diseases of the sebaceous glands as the principal diagnosis in the visits involving these two types of drug.

Solo practitioners accounted for the majority (56.7 percent) of all antimicrobial drug visits. Although this was significantly higher than the corresponding proportion for all other visits (54.4 percent), the difference was only a slight one. Most antimicrobial drug visits were divided almost equally between physicians under 45 years of age (42.5 percent) and physicians 45–60 years of age (43.3 percent). Neither of these proportions differed significantly from the corresponding proportions for all other visits.

A comparison of the regional distributions of the antimicrobial drug visits and of all other visits reveals that the former were significantly more concentrated than the other visits in the South (38.8 percent compared with 31.4 percent). In addition, the antimicrobial drug visits were significantly less concentrated in the Northeast (20.1 percent compared with 24.3 percent) and West (15.2 percent compared with 19.0 percent). Although the South had the highest average annual rate of antimicrobial drug visits for the civilian noninstitutionalized population (496.8 per 1,000), the rates for the other regions did not differ significantly among themselves. The average annual rate of antimicrobial drug visits was 412.2 per 1,000 population for the North Central Region, 381.4 for the Northeast, and 350.3 for the West.

Finally, 72.5 percent of all antimicrobial drug visits took place in metropolitan areas. Although this was significantly

Table S. Number and percent distribution of antimicrobial drug visits by physician specialty, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Physician specialty	All types	Type of antimicrobial drug					
		Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
	Number in thousands[1]						
All specialties	188,754	77,811	15,699	38,663	33,104	18,515	16,282
General and family practice	81,811	36,702	7,350	15,851	14,814	7,484	4,777
Medical specialties	76,025	31,722	4,596	19,514	13,794	6,470	4,339
Internal medicine	14,692	4,881	1,381	2,806	3,070	1,661	1,172
Pediatrics	42,022	25,671	2,812	8,832	*419	4,187	1,659
Dermatology	16,898	481	*167	7,511	9,751	*197	1,329
Other medical specialties	2,412	688	*236	*365	555	*426	*180
Surgical specialties	26,606	7,501	3,269	2,729	3,777	4,216	6,774
General surgery	5,853	2,354	1,327	981	884	*304	581
Obstetrics and gynecology	6,726	2,335	*285	*442	1,102	617	2,480
Urology	6,120	*411	*428	*14	886	2,630	1,972
Other surgical specialties	7,907	2,401	1,229	1,292	906	666	1,740
All other specialties	4,312	1,886	484	569	718	*344	*392
	Percent distribution						
All specialties	100.0	100.0	100.0	100.0	100.0	100.0	100.0
General and family practice	43.3	47.2	46.8	41.0	44.7	40.4	29.3
Medical specialties	40.3	40.8	29.3	50.5	41.7	34.9	26.7
Internal medicine	7.8	6.3	8.8	7.3	9.3	9.0	7.2
Pediatrics	22.3	33.0	17.9	22.8	*1.3	22.6	10.2
Dermatology	9.0	0.6	*1.1	19.4	29.5	*1.1	8.2
Other medical specialties	1.3	0.9	*1.5	*0.9	1.7	*2.3	*1.1
Surgical specialties	14.1	9.6	20.8	7.1	11.4	22.8	41.6
General surgery	3.1	3.0	8.5	2.5	2.7	*1.6	3.6
Obstetrics and gynecology	3.6	3.0	*1.8	*1.1	3.3	3.3	15.2
Urology	3.2	*0.5	*2.7	*0.0	2.7	14.2	12.1
Other surgical specialties	4.2	3.1	7.8	3.3	2.7	3.6	10.7
All other specialties	2.3	2.4	3.1	1.5	2.2	*1.9	*2.4

[1]Sums of types do not equal totals because more than one type of antimicrobial drug was ordered or provided during some visits.

smaller than the comparable proportion of all other office visits (76.7 percent), the difference was not a substantial one.

Visit conduct

At least one specific diagnostic service was ordered or provided during most antimicrobial drug visits (95.9 percent). Antimicrobial drug visits were more likely than all other visits to involve a single diagnostic service (57.9 percent compared with 41.6 percent) and less likely to involve two, three or more, or none at all (27.3 percent compared with 31.2 percent, 10.7 percent compared with 18.3 percent, and 4.1 percent compared with 8.9 percent, respectively).

The specific diagnostic service most commonly ordered or provided during antimicrobial drug visits was a limited examination and/or history, which was done in almost three-fourths (72.8 percent) of these visits (see table T). The next most common diagnostic services, clinical laboratory tests and blood pressure checks, appeared only one-third as frequently (in 24.7 percent and 23.9 percent of visits, respectively), followed by a general examination and/or history, which was performed in 14.1 percent of visits. Least common were x rays, ordered or provided in 4.6 percent of the visits, and Pap tests, ordered or provided in 1.7 percent of the visits. The usage of every one of these tests during these visits differed significantly from their usage in all other visits. In all other visits, a limited examination and/or history was used less frequently (62.7 percent of visits), as was clinical laboratory testing (21.4 percent). All other diagnostic services were used more frequently: blood pressure check (used in 36.2 percent of all other visits), x ray (8.0 percent), Pap test (4.9 percent), and a general examination and/or history (15.7 percent).

The visits associated with the different major types of antimicrobial drug show some variation in the use of diagnostic services. Clinical laboratory tests were utilized most frequently in visits involving the sulfonamides and/or trimethoprim (47.1 percent) or one or more of the miscellaneous antimicrobials (37.5 percent). In contrast, only 15.9 percent to 24.5 percent of the visits associated with any other major drug type involved these tests. Similarly, a Pap test was ordered or provided in almost one-tenth (9.1 percent) of the visits associated with use of the miscellaneous antimicrobials, compared with only 0.3 percent to 2.6 percent of the visits associated with the use of each other drug type. This is undoubtedly a consequence of the fact that the visits involving miscellaneous antimicrobials were made to physicians who specialized in obstetrics and/or gynecology far more frequently than any other group of visits was.

Table T. Number and percent of antimicrobial drug visits, by type of antimicrobial drug ordered or provided and diagnostic service ordered or provided: United States, 1980–81

Diagnostic service	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
Limited history/exam	137,468	56,863	11,660	29,499	23,730	12,713	10,924
General history/exam	26,582	13,004	2,326	4,377	3,278	2,816	2,353
Pap test	3,270	750	*55	*131	538	482	1,481
Clinical lab test	46,662	19,067	3,498	6,132	5,425	8,719	6,108
X ray	8,738	2,905	1,099	1,862	1,782	650	661
Blood pressure check	45,201	16,348	4,385	7,336	9,514	5,384	5,034
Other	9,836	3,336	811	1,698	1,537	1,522	1,566
				Percent			
Limited history/exam	72.8	73.1	74.3	76.3	71.7	68.7	67.1
General history/exam	14.1	16.7	14.8	11.3	9.9	15.2	14.5
Pap test	1.7	1.0	*0.4	*0.3	1.6	2.6	9.1
Clinical lab test	24.7	24.5	22.3	15.9	16.4	47.1	37.5
X ray	4.6	3.7	7.0	4.8	5.4	3.5	4.1
Blood pressure check	23.9	21.0	27.9	19.0	28.7	29.1	30.9
Other	5.2	4.3	5.2	4.4	4.6	8.2	9.6

[1]Sums of antimicrobial drug types do not equal totals because more than one type of drug was ordered or provided during some visits.

An examination of the specific diagnostic services used in the antimicrobial drug visits with the 20 most common principal diagnoses reveals significant differences. The visits most likely to involve no diagnostic services were those in which the patients were diagnosed as having diseases of the sebaceous glands (28.4 percent). A limited examination and/or history was conducted in approximately 6 of every 7 visits in which the patient's principal diagnosis was nonsuppurative otitis media and Eustachian tube disorders (86.1 percent) or other cellulitis and abscess (84.4 percent). A general examination and/or history was ordered or provided in 33.2 percent of the visits made by patients with inflammatory disease of ovary, fallopian tube, pelvic cellular tissue, and peritoneum, and 27.6 percent of the visits made by patients with pneumonia (organism unspecified). For four of the diagnoses, clinical laboratory tests were ordered or provided in more than half of the visits: cystitis (75.6 percent); other disorders of urethra and urinary tract (74.3 percent); inflammatory diseases of prostate (65.0 percent); and inflammatory disease of cervix, vagina, and vulva (54.8 percent). The only other diagnostic service that was frequently ordered or provided was a blood pressure check, which was done in more than two-fifths of the vists for three of the most common principal diagnoses: inflammatory disease of ovary, fallopian tube, pelvic cellular tissue, and peritoneum (46.8 percent); inflammatory disease of cervix, vagina, and vulva (44.3 percent); and other disorders of urethra and urinary tract (40.3 percent). The two remaining services each were used extensively in the visits associated with only one of the most common diagnoses: x rays were ordered or provided during 44.7 percent of the visits made by patients with pneumonia, organism unspecified; and Pap tests were used in 42.0 percent of the visits made by patients with inflammatory disease of cervix, vagina, and vulva.

In addition to these diagnostic services, some visits in which antimicrobial drugs were ordered or provided also involved the use of nonmedication therapeutic services. Usage of these services, however, was significantly lower in these visits than in all other visits. Two-thirds (65.2 percent) of the antimicrobial drug visits, but only half (51.6 percent) of all other visits, involved no nonmedication therapy. One of these services was used in 30.6 percent of the antimicrobial drug visits; two or more were used in only 4.2 percent. Of all other visits, 40.2 percent involved one nonmedication therapeutic service, and 8.2 percent involved two or more of these services.

Specific therapeutic services involved in the antimicrobial drug visits are shown in table U. The most common service was medical counseling, which was reported for 22.0 percent of these visits. The second most common was office surgery (6.4 percent). Both of these services were ordered or provided during all other visits at similar rates (23.2 percent and 7.6 percent, respectively). Less commonly used services during antimicrobial drug visits were diet counseling (3.9 percent), physiotherapy (3.7 percent), and all other nonmedication therapeutic services (3.2 percent). Each of these types of service was used significantly more frequently during all other visits—8.9 percent, 5.1 percent, and 12.3 percent, respectively.

The use of these therapeutic services varied little among the groups of visits associated with the use of the different major types of antimicrobial drug. The sole exception was office surgery, which was used in the visits made by patients who received tetracyclines significantly more frequently than in the visits made by patients receiving any of the other drugs (13.8 percent compared with a range of 2.7 percent to 8.5 percent).

Far more variation in the use of the therapeutic services appears when the visits with the 20 most common principal diagnoses are inspected. Patients with diseases of the sebaceous glands had the lowest rate of visits with no nonmedication therapeutic services. Only 39.1 percent of the visits made by these patients resulted in none of these services being

Table U. Number and percent of antimicrobial drug visits, by type of antimicrobial drug ordered or provided and nonmedication therapeutic service ordered or provided: United States, 1980–81

Nonmedication therapeutic service	All types	Type of antimicrobial drug					
		Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
Physiotherapy	6,924	1,822	843	1,762	2,193	*353	527
Office surgery	12,109	2,065	1,093	3,276	4,563	1,036	1,306
Diet counseling	7,429	2,251	609	1,249	1,505	1,396	797
Medical counseling	41,604	17,415	3,750	7,297	6,785	4,756	4,198
Other	6,112	1,690	586	1,005	1,082	818	1,290
				Percent			
Physiotherapy	3.7	2.3	5.4	4.6	6.6	*1.9	3.2
Office surgery	6.4	2.7	7.0	8.5	13.8	5.6	8.0
Diet counseling	3.9	2.9	3.9	3.2	4.5	7.5	4.9
Medical counseling	22.0	22.4	23.9	18.9	20.5	25.7	25.8
Other	3.2	2.2	3.7	2.6	3.3	4.4	7.9

[1]Sums of antimicrobial drug types do not equal totals because more than one type of drug was ordered or provided during some visits.

ordered or provided. In contrast, at least three-fourths of the visits made by patients with four of these diagnoses involved none of these nonmedication therapeutic services: streptococcal sore throat and scarlet fever (80.7 percent); acute pharyngitis (79.7 percent); acute upper respiratory infections of multiple or unspecified sites (77.4 percent); and influenza (75.5 percent). Visits made by patients with diseases of the sebaceous glands involved office surgery far more frequently than did the visits made by patients with any of the other leading diagnoses (38.2 percent, compared with a range of 0.0 percent to 15.6 percent). These visits also had the highest statistically reliable proportion of visits with physiotherapy (12.9 percent).

The disposition of patients who received antimicrobial drugs differed substantially from that of other patients. In almost half of all antimicrobial drug visits (48.7 percent), the patients were instructed to return at a specified time, and in one-third of these visits (34.1 percent) the patients were told to return if needed. During the visits in which antimicrobial drugs were not used, patients were asked to return at a specified time more frequently (63.0 percent), and were asked to return if needed less frequently (20.5 percent). This large difference reflects the relatively high concentration of acute, rather than chronic, conditions among the patients who made the antimicrobial drug visits. The patients who made these visits also were significantly more likely than all other patients to be told they needed no followup (12.9 percent of visits compared with 11.2 percent) or to be requested to follow up by telephone (4.9 percent compared with 3.2 percent), and were significantly less likely to have any other disposition (2.8 percent compared with 6.3 percent).

An inspection of the patient disposition data for the antimicrobial drug visits during which the 20 most common principal diagnoses were recorded reveals that disposition also varied with diagnosis. For two of the most common diagnoses—diseases of the sebaceous glands and inflammatory disease of ovary, fallopian tube, pelvic cellular tissue and peritoneum—the patients were asked to return at a specified time in at least three-fourths of the visits (87.8 percent and 76.3 percent, respectively). For another three of the diagnoses, the patients were asked to return if needed during at least half of the visits. These diagnoses were influenza (58.3 percent), acute respiratory infections of multiple of unspecified sites (51.5 percent), and acute pharyngitis (51.4 percent).

The duration of visits is the last aspect of visit conduct to be investigated. In a large majority of all antimicrobial drug visits (67.9 percent), the physician spent 6–15 minutes with the patient. A significantly smaller proportion of visits (18.0 percent) lasted 16 minutes or longer, and the smallest proportion (14.0 percent) involved 0–5 minutes of physician-patient contact. Antimicrobial drug visits differed from all other visits in that they were more likely to last 6–15 minutes (67.9 percent compared with 55.9 percent) and significantly less likely to last 0–5 minutes (14.0 percent compared with 15.4 percent) or 16 minutes or longer (18.0 percent compared with 28.7 percent). The relatively small concentration of antimicrobial drug visits in the longest duration category can be explained by the relatively limited and acute nature of the diseases being treated and by the relative youth of the patients. Younger patients are less likely than older patients to have multiple conditions complicating diagnosis and treatment.

Co-occurring drugs

The final topic to be considered in this report concerns the extent to which other medications were used in conjunction with antimicrobial medications. There were 172.5 million co-occurring drug mentions during the 1980 and 1981 antimicrobial drug visits. This was an average of 0.91 co-occurring drugs per visit. (See table W.) The averages for visits made by male patients (0.85) and by female patients (0.96) did not differ significantly.

However, other medications were used in conjunction with the antimicrobial medications significantly less frequently among the younger patients than among the older patients. The average number of co-occurring drugs for each of the three youngest age groups—0.71 for visits made by children under 15 years of age, 0.88 for visits made by patients 15–24 years of age, and 0.90 for visits made by patients 25–44

Table W. Average number of co-occurring medications per antimicrobial drug visit, by type of antimicrobial drug ordered or provided and sex and age of patient: United States, 1980–81

Sex and age of patient	All types	Type of antimicrobial drug					
		Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
All antimicrobial drug visits	0.91	0.89	0.96	1.18	1.39	0.82	0.96
Sex							
Male	0.85	0.88	0.91	1.10	1.31	0.72	0.80
Female	0.96	0.90	1.00	1.24	1.45	0.89	1.05
Age							
Under 15 years	0.71	0.73	0.80	0.88	1.37	0.76	0.78
15–24 years	0.88	0.87	0.76	1.27	1.37	0.65	0.85
25–44 years	0.90	0.94	1.01	1.27	1.21	0.72	0.76
45–64 years	1.16	1.18	1.23	1.51	1.54	0.85	1.08
65 years and over	1.34	1.60	1.18	1.50	1.61	1.08	1.42

years of age—was significantly lower than each of the corresponding averages for the two oldest age groups (1.16 for visits made by persons 45–64 years of age, and 1.34 for those made by persons 65 years of age and older). This finding is at least partly explained by the gradual accretion of chronic conditions requiring maintenance medication therapy among the elderly and aging.

The average number of co-occurring drugs per visit for the groups of visits associated with each of the major types of antimicrobial drug ranged from 0.82 for the sulfonamides and trimethoprim to 1.39 for tetracyclines. Of the visits made by patients 15–24 years of age, those involving tetracyclines and those involving macrolides and lincosamides also involved the order or provision of significantly more co-occurring drugs than did the other groups of visits (1.37 per visit and 1.27 per visit, respectively, compared with a range of 0.65 to 0.87 per visit). Because diagnoses of diseases of the sebaceous glands were particularly common in the visits associated with these two types of drug, this difference may result from a high rate of ordering skin preparations to treat this condition.

The distribution of the types of co-occurring drugs, as classified in the American Hospital Formulary Service classification system,[8] are displayed in table Y. For all antimicrobial drug visits, four specific drug types were used in conjunction with the antimicrobial drugs significantly more frequently than any other type was used. These were antihistamines (an average of 15.3 million drug mentions per year, or 17.7 percent of all co-occurring drug mentions); skin and mucous membrane preparations (14.3 million per year, or 16.6 percent); expectorants and cough preparations (12.2 million per year, or 14.2 percent); and central nervous system drugs (10.9 million per year, or 12.7 percent).

The most commonly used co-occurring drugs varied among the groups of visits associated with the different major types of antimicrobial drug. In the visits in which one or more of the penicillins were used, the patients also were ordered or provided with 40.3 percent of all co-occurring drugs. During these visits, the most frequently used drugs were antihistamines (21.9 percent of the co-occurring drugs associated with the penicillins), expectorants and cough preparations (16.5 percent), and central nervous system drugs (13.9 percent).

The visits involving the macrolides and lincosamides accounted for 26.4 percent of all co-occurring drugs, with four categories used significantly more frequently than any other category. These categories were skin and mucous membrane preparations (21.3 percent of all drugs used concurrently with the macrolides and lincosamides), antihistamines (15.8 percent), expectorants and cough preparations (13.2 percent), and anti-infective agents (12.8 percent). The latter drug category includes all anti-infective preparations except those classified as macrolides and lincosamides; those classified as eye, ear, nose, or throat preparations; and those classified as skin and mucous membrane preparations.

The visits in which one or more tetracyclines were used accounted for 26.6 percent of all co-occurring drugs. Of these, the largest category was skin and mucous membrane preparations (27.5 percent). The visits involving the miscellaneous antimicrobial medications accounted for only 9.1 percent of all co-occurring drug mentions. During these visits, the two most frequently used drug categories were anti-infective agents (20.2 percent) and skin and mucous membrane preparations (20.1 percent). (For the miscellaneous antimicrobial drug visits, the anti-infective agent category excludes anti-infective agents classified as miscellaneous antimicrobials in this report; anti-infective drugs classified as skin and mucous membrane preparations; and anti-infective drugs classified as eye, ear, nose, or throat preparations.)

Of all co-occurring drugs, 8.7 percent were associated with the use of cephalosporins, and 8.8 percent were associated with the use of the sulfonamides and trimethoprim. The visits associated with the use of these two major types of antimicrobial drug did not involve any one category of co-occurring drug to a noteworthy degree.

Table Z presents the 10 specific drug names most frequently mentioned in conjunction with the antimicrobial medications. Together they accounted for only 15.5 percent of all co-occurring drug mentions. This illustrates how the co-occurring drug mentions were spread across a wide variety of drug products rather than concentrated in just a few.

Table Y. Number and percent distribution of co-occurring drugs ordered or provided during antimicrobial drug visits by therapeutic category of co-occurring drug, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Therapeutic category[1]	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
		Number in thousands[2]					
All co-occurring drugs	172,531	69,510	15,080	45,504	45,895	15,194	15,686
Antihistamines	30,527	15,190	2,560	7,211	4,572	1,934	743
Anti-infective agents[3]	2,080	6,435	1,593	5,830	5,431	2,177	3,165
Autonomic drugs	7,670	3,036	779	1,519	1,324	925	*538
Cardiovascular drugs	7,537	2,335	768	979	1,541	1,309	902
Central nervous system drugs	21,861	9,696	1,862	3,605	3,839	2,150	1,737
Electrolytic, caloric, and water balance agents	6,851	1,907	*381	1,185	1,629	1,037	952
Expectorants and cough preparations	24,470	11,496	2,166	6,013	4,998	909	*199
Eye, ear, nose, and throat preparations	7,787	3,559	749	2,105	928	*419	815
Gastrointestinal drugs	4,474	1,925	*398	*505	809	666	*425
Hormones and synthetic substances	10,266	2,712	952	1,952	3,047	993	1,209
Skin and mucous membrane preparations	28,673	4,286	1,345	9,711	12,618	1,240	3,148
Spasmolytic agents	6,372	2,093	*558	2,170	1,179	*366	*217
Vitamins	4,015	1,044	*265	695	1,536	*409	*592
Other[4]	9,949	3,795	707	2,024	2,444	659	1,044
		Percent distribution					
All co-occurring drugs	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Antihistamines	17.7	21.9	17.0	15.8	10.0	12.7	4.7
Anti-infective agents[3]	1.2	9.3	10.6	12.8	11.8	14.3	20.2
Autonomic drugs	4.4	4.4	5.2	3.3	2.9	6.1	*3.4
Cardiovascular drugs	4.4	3.4	5.1	2.2	3.4	8.6	5.8
Central nervous system drugs	12.7	13.9	12.3	7.9	8.4	14.2	11.1
Electrolytic, caloric, and water balance agents	4.0	2.7	*2.5	2.6	3.5	6.8	6.1
Expectorants and cough preparations	14.2	16.5	14.4	13.2	10.9	6.0	*1.3
Eye, ear, nose, and throat preparations	4.5	5.1	5.0	4.6	2.0	*2.8	5.2
Gastrointestinal drugs	2.6	2.8	*2.6	*1.1	1.8	4.4	*2.7
Hormones and synthetic substitutes	6.0	3.9	6.3	4.3	6.6	6.5	7.7
Skin and mucous membrane preparations	16.6	6.2	8.9	21.3	27.5	8.2	20.1
Spasmolytic agents	3.7	3.0	*3.7	4.8	2.6	*2.4	*1.4
Vitamins	2.3	1.5	*1.8	1.5	3.3	*2.7	*3.8
Other[4]	5.8	5.5	4.7	4.4	5.3	4.3	6.7

[1] *American Hospital Formulary Service Classification System and Therapeutic Category Codes.*[6]
[2] Sums of antimicrobial drug types do not equal totals because some visits involved more than one type of antimicrobial drug.
[3] For all antimicrobial drug visits, this category includes only those drugs that are classified by the *American Hospital Formulary Service* classification system as anti-infective agents and that are not included in the typology of antimicrobial medications used in this report (for example, antivirals). For each type of antimicrobial drug, this category also includes all antimicrobial drugs of other types. (For example, for visits in which one or more penicillins were ordered or provided, the anti-infective agent category of co-occurring drugs includes cephalosporins, tetracyclines, and other antimicrobial drugs, as well as antivirals and other anti-infective agents.)
[4] Includes: antineoplastic agents; blood derivatives; blood formation and coagulation agents; diagnostic agents; enzymes; gold compounds; heavy metal antagonists; local anesthetics; oxytocics; radioactive agents; serums, toxoids and vaccines; devices; pharmaceutic aids; and unclassified therapeutic agents.

Table Z. Number and percent distribution of the 10 co-occurring drugs most frequently ordered or provided during antimicrobial drug visits, by drug name: United States, 1980–81

Rank	Co-occurring drug name	Number of mentions in thousands	Percent distribution
	All co-occurring drugs	172,531	100.0
1	Dimetapp	5,544	3.2
2	Actifed	4,596	2.7
3	Phenergan expectorant with codeine	2,634	1.5
4	Retin-A	2,250	1.3
5	Naldecon	2,105	1.2
6	Cortisporin	2,094	1.2
7	A.S.A.	1,968	1.1
8	Aspirin	1,958	1.1
9	Tuss-Ornade	1,819	1.1
10	Tylenol	1,708	1.0
...	All others	145,856	84.5

Drug mention frequencies of 1 million or more for specific co-occurring drugs appeared in the 1980 and 1981 visits associated with only two of the major antimicrobial drug types. Among the 38.7 million visits associated with the macrolides and lincosamides during these 2 years, tetracycline was mentioned 1.4 million times, Dimetapp 1.3 million times, and Actifed and Retin-A 1.1 million times each. Among the 33.1 million visits associated with the tetracyclines during 1980 and 1981, Cleocin was mentioned 1.8 million times and Retin-A was mentioned 1.4 million times. It is apparent that acne patients accounted for many of these observations.

The final aspect of antimicrobial drug use to be considered is the question of the extent to which two or more antimicrobial drugs were used during the same visit. During 1980 and 1981, this occurred in a total of 19.0 million visits, or 10.1 percent of all antimicrobial drug visits. Six specific combina-

tions of the major antimicrobial drug groups occurred at least 1 million times each during these 2 years:

- Two or more drug mentions classifiable as penicillins were made in 5.1 million visits.
- One or more macrolides and lincosamides were used in conjunction with one or more tetracyclines in 3.0 million visits.
- One or more penicillins were used in conjunction with one or more macrolides and lincosamides in 1.7 million visits.
- One or more penicillins were used with one or more tetracyclines in 1.6 million visits.
- Two or more drugs of the macrolide and lincosamide type were used simultaneously in 1.4 million visits.
- One or more penicillins were used in combination with one or more of the miscellaneous antimicrobial drugs in 1.1 million visits.

In addition, the antimicrobial drugs focused on in this report were used in combination with the topical antimicrobial drugs appearing in an earlier report in 11.7 million visits.[1] This represented 6.2 percent of all the 1980 and 1981 antimicrobial drug visits examined in this report and 25.5 percent of all the visits that involved topical antimicrobial drugs during these 2 years.

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List of detailed tables

Table 1. Number, percent distribution, and average annual rate (per 1,000 civilian noninstitutionalized population) of antimicrobial drug mentions by sex and age of patient, according to type of antimicrobial drug: United States, 1980–81

Sex and age of patient	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands			
All antimicrobial drug mentions	208,288	82,896	16,044	40,106	33,787	18,607	16,848
Male							
All ages	92,632	38,462	7,765	17,633	15,050	7,981	5,741
Under 15 years	36,426	20,223	3,062	7,593	1,147	3,112	1,289
15–24 years	15,604	5,186	1,034	3,392	4,792	*382	817
25–44 years	17,609	6,558	1,621	2,984	4,181	1,250	1,016
45–64 years	13,237	4,122	1,318	2,065	2,826	1,590	1,317
65 years and over	9,756	2,373	730	1,600	2,105	1,647	1,301
Female							
All ages	115,656	44,434	8,279	22,473	18,737	10,626	11,108
Under 15 years	34,576	19,934	2,364	6,723	1,083	2,921	1,552
15–24 years	22,749	7,809	1,154	5,055	5,017	1,487	2,227
25–44 years	28,995	8,625	2,331	5,868	6,339	2,349	3,483
45–64 years	18,399	5,476	1,665	3,516	3,811	1,871	2,059
65 years and over	10,937	2,589	764	1,312	2,487	1,998	1,787
				Percent distribution			
All antimicrobial drug mentions	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Male							
All ages	44.5	46.4	48.4	44.0	44.5	42.9	34.1
Under 15 years	17.5	24.4	19.1	18.9	3.4	16.7	7.7
15–24 years	7.5	6.3	6.4	8.5	14.2	*2.1	4.8
25–44 years	8.5	7.9	10.1	7.4	12.4	6.7	6.0
45–64 years	6.4	5.0	8.2	5.1	8.4	8.5	7.8
65 years and over	4.7	2.9	4.6	4.0	6.2	8.9	7.7
Female							
All ages	55.5	53.6	51.6	56.0	55.5	57.1	65.9
Under 15 years	16.6	24.0	14.7	16.8	3.2	15.7	9.2
15–24 years	10.9	9.4	7.2	12.6	14.8	8.0	13.2
25–44 years	13.9	10.4	14.5	14.6	18.8	12.6	20.7
45–64 years	8.8	6.6	10.4	8.8	11.3	10.1	12.2
65 years and over	5.3	3.1	4.8	3.3	7.4	10.7	10.6
				Average annual rate			
All antimicrobial drug mentions	467.7	186.1	36.0	90.1	75.9	41.8	37.8
Male							
All ages	431.1	179.0	36.1	82.1	70.0	37.1	26.7
Under 15 years	701.1	389.3	58.9	146.2	22.1	59.9	24.8
15–24 years	388.6	129.2	25.8	84.5	119.4	*9.5	20.3
25–44 years	288.8	107.6	26.6	48.9	68.6	20.5	16.7
45–64 years	317.4	98.8	31.6	49.5	67.8	38.1	31.6
65 years and over	485.8	118.2	36.4	79.6	104.8	82.0	64.8
Female							
All ages	501.8	192.8	35.9	97.5	81.3	46.1	48.2
Under 15 years	695.5	401.0	47.6	135.2	21.8	58.8	31.2
15–24 years	551.2	189.4	28.0	122.5	121.6	36.0	54.0
25–44 years	450.6	134.1	36.2	91.2	98.5	36.5	54.1
45–64 years	398.0	118.5	36.0	76.1	82.4	40.5	44.5
65 years and over	377.9	89.5	26.4	45.3	85.9	69.0	61.7

NOTE: More than one type of antimicrobial drug was ordered or provided during some visits.

Table 2. Number and percent distribution of the principal diagnoses most commonly made during antimicrobial drug visits for selected subtypes of antimicrobial drugs: United States, 1980–81

Rank	Principal diagnosis and ICD–9–CM code[1]	Number of visits in thousands	Percent distribution
	Penicillin		
	All principal diagnoses in visits involving penicillin	32,373	100.0
1	Acute pharyngitis (462)	5,869	18.1
2	Acute tonsillitis (463)	4,323	13.4
3	Acute upper respiratory infections of multiple or unspecified sites (465)	4,184	12.9
4	Suppurative and unspecified otitis media (382)	2,092	6.5
5	Streptococcal sore throat and scarlet fever (034)	2,004	6.2
6	Bronchitis, not specified as acute or chronic (490)	1,353	4.2
...	All other principal diagnoses	12,548	38.8
	Amoxicillin		
	All principal diagnoses in visits involving amoxicillin	23,419	100.0
1	Suppurative and unspecified otitis media (382)	7,600	32.4
2	Acute upper respiratory infections of multiple or unspecified sites (465)	3,048	13.0
3	Acute pharyngitis (462)	1,524	6.5
4	Bronchitis, not specified as acute or chronic (490)	1,368	5.8
...	All other principal diagnoses	9,878	42.2
	Ampicillin		
	All principal diagnoses in visits involving ampicillin	21,510	100.0
1	Suppurative and unspecified otitis media (382)	2,743	12.8
2	Acute upper respiratory infections of multiple or unspecified sites (465)	2,548	11.8
3	Acute pharyngitis (462)	1,921	8.9
4	Bronchitis, not specified as acute or chronic (490)	1,267	5.9
5	Acute tonsillitis (463)	1,176	5.5
...	All other principal diagnoses	11,855	55.1
	First generation cephalosporins		
	All principal diagnoses in visits involving first generation cephalosporins	11,749	100.0
1	Acute upper respiratory infections of multiple or unspecified sites (465)	1,106	9.4
...	All other principal diagnoses	10,643	90.6
	Second generation cephalosporins		
	All principal diagnoses in visits involving second generation cephalosporins	3,984	100.0
1	Suppurative and unspecified otitis media (382)	1,290	32.4
...	All other principal diagnoses	2,694	67.6
	Erythromycin		
	All principal diagnoses in visits involving erythromycin	32,334	100.0
1	Acute upper respiratory infections of multiple or unspecified sites (465)	4,991	15.4
2	Bronchitis, not specified as acute or chronic (490)	3,040	9.4
3	Acute pharyngitis (462)	2,722	8.4
4	Diseases of sebaceous glands (706)	2,385	7.4
5	Suppurative and unspecified otitis media (382)	2,160	6.7
6	Acute tonsillitis (463)	1,286	4.0
7	Acute bronchitis and bronchiolitis (466)	1,206	3.7
8	Chronic sinusitis (473)	1,009	3.1
...	All other principal diagnoses	13,535	41.9
	Short-acting tetracyclines		
	All principal diagnoses in visits involving short-acting tetracyclines	25,224	100.0
1	Diseases of sebaceous glands (706)	7,235	28.7
2	Acute upper respiratory infections of multiple or unspecified sites (465)	2,580	10.2
3	Bronchitis, not specified as acute or chronic (490)	1,400	5.6
4	Chronic sinusitis (473)	1,015	4.0
...	All other principal diagnoses	12,993	51.5
	Intermediate- and long-acting tetracyclines		
	All principal diagnoses in visits involving intermediate- and long-acting tetracyclines	8,066	100.0
1	Diseases of sebaceous glands (706)	1,430	17.7
...	All other principal diagnoses	6,635	82.3

See footnotes at end of table.

Table 2. Number and percent distribution of the principal diagnoses most commonly made during antimicrobial drug visits for selected subtypes of antimicrobial drugs: United States, 1980–81—Con.

Rank	Principal diagnosis and ICD–9–CM code[1]	Number of visits in thousands	Percent distribution
	Sulfonamides and trimethoprim in combination		
	All principal diagnoses in visits involving sulfonamides and trimethoprim in combination	12,724	100.0
1	Suppurative and unspecified otitis media (382)	2,322	18.3
2	Other disorders of urethra and urinary tract (599)	1,977	15.5
3	Cystitis (595)	1,368	10.8
4	Inflammatory diseases of prostate (601)	1,031	8.1
...	All other principal diagnoses	6,026	47.4

[1]Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM).[13]

NOTE: More than one subtype of antimicrobial drug was ordered or provided during some visits.

Table 3. Number and percent distribution of antimicrobial drug visits by patient's principal reason for visit, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Type of antimicrobial drug	All principal reasons for visit	Principal reason for visit and RVC code[1]: Symptom module (S001–S999)	Disease module (D001–D999)	Diagnostic, screening, and preventive module (X100–X599)	Treatment module (T100–T899)	Injuries and adverse effects module (J001–J999)	Other[2]
		Number in thousands[3]					
All antimicrobial drug visits	188,754	159,955	11,505	5,933	5,914	3,674	1,772
Penicillins	77,811	68,519	3,902	1,876	1,462	1,492	560
Cephalosporins	15,699	12,329	1,540	*189	892	661	*88
Macrolides and lincosamides	38,663	34,095	2,042	835	715	616	*361
Tetracyclines	33,104	28,402	1,653	1,041	1,144	*385	479
Sulfonamides and trimethoprim	18,515	14,768	1,458	965	954	*94	*275
Miscellaneous antimicrobials	16,282	11,614	1,456	1,186	1,152	554	*319
		Percent distribution					
All antimicrobial drug visits	100.0	84.7	6.1	3.1	3.1	1.9	0.9
Penicillins	100.0	88.1	5.0	2.4	1.9	1.9	0.7
Cephalosporins	100.0	78.5	9.8	*1.2	5.7	4.2	*0.6
Macrolides and lincosamides	100.0	88.2	5.3	2.2	1.9	1.6	*0.9
Tetracyclines	100.0	85.8	5.0	3.1	3.5	*1.2	1.4
Sulfonamides and trimethoprim	100.0	79.8	7.9	5.2	5.2	*0.5	*1.5
Miscellaneous antimicrobials	100.0	71.3	8.9	7.3	7.1	3.4	*2.0

[1]Based on *A reason for visit classification for ambulatory care.*[12]
[2]Includes reasons coded in the test results and administrative modules, as well as blanks, problems, and complaints not elsewhere classified, entries of "none," and illegible entries.
[3]Sums of antimicrobial drug categories do not equal totals because some visits involved drugs from more than one antimicrobial drug group.

Table 4. Number, percent distribution, and average annual rate (per 1,000 civilian noninstitutionalized population) of antimicrobial drug visits by sex and age of patient, according to type and selected subtype of antimicrobial drug ordered or provided: United States, 1980–81

Sex and age of patient	All types	Type of antimicrobial drug ordered or provided														
		Penicillins				Cephalosporins	Macrolides and lincosamides			Tetracyclines			Sulfonamides and trimethoprim		Miscellaneous antimicrobials	
		All penicillins	Penicillin	Amoxicillin	Ampicillin		All macrolides and lincosamides	Erythromycin	Other	All tetracyclines	Short-acting	Intermediate- and long-acting	All sulfonamides and trimethoprim	Sulfonamides and trimethoprim in combination	All miscellaneous antimicrobials	Urinary tract antiseptics
	Number in thousands															
All antimicrobial drug visits	188,754	77,811	32,373	23,419	21,510	15,699	38,663	32,334	7,267	33,104	25,224	8,066	18,515	12,724	16,282	4,768
Male																
All ages	83,636	36,206	14,901	11,661	9,129	7,639	16,991	14,477	2,913	14,696	11,202	3,613	7,889	6,046	5,478	1,428
Under 15 years	33,571	19,235	6,623	9,073	3,441	2,994	7,483	7,087	465	1,134	932	*202	3,069	2,403	1,257	*21
15–24 years	13,414	4,718	2,504	728	1,461	981	3,229	1,829	1,549	4,776	3,716	1,076	*382	*294	765	*29
25–44 years	15,824	6,210	2,994	912	2,093	1,617	2,937	2,574	*395	3,942	3,062	982	1,250	883	969	*176
45–64 years	12,073	3,870	1,667	581	1,438	1,318	2,022	1,750	*282	2,797	1,891	906	1,570	1,229	1,275	513
65 years and over	8,754	2,173	1,113	*366	697	730	1,320	1,237	*223	2,046	1,600	*446	1,618	1,237	1,213	688
Female																
All ages	105,117	41,605	17,472	11,758	12,381	8,060	21,672	17,857	4,354	18,408	14,022	4,453	10,626	6,678	10,804	3,340
Under 15 years	32,232	18,877	6,642	8,128	4,152	2,332	6,603	6,084	604	1,067	694	*373	2,921	2,350	1,497	*170
15–24 years	20,049	7,259	3,577	967	2,676	1,137	4,722	3,051	1,855	4,990	3,909	1,099	1,487	1,110	2,142	482
25–44 years	26,090	8,087	3,688	1,426	2,920	2,231	5,613	4,475	1,337	6,199	4,691	1,553	2,349	1,074	3,426	1,001
45–64 years	16,811	4,947	2,369	866	1,858	1,665	3,436	3,034	473	3,716	2,837	879	1,871	1,051	2,050	804
65 years and over	9,936	2,436	1,196	*371	775	694	1,297	1,213	*85	2,436	1,891	550	1,998	1,093	1,688	884
	Percent distribution															
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Male																
All ages	44.3	46.5	46.0	49.8	42.4	48.7	43.9	44.8	40.1	44.4	44.4	44.8	42.6	47.5	33.6	29.9
Under 15 years	17.8	24.7	20.5	38.7	16.0	19.1	19.4	21.9	6.4	3.4	3.7	*2.5	16.6	18.9	7.7	*0.4
15–24 years	7.1	6.1	7.7	3.1	6.8	6.2	8.4	5.7	21.3	14.4	14.7	13.3	*2.1	*2.3	4.7	*0.6
25–44 years	8.4	8.0	9.2	3.9	9.7	10.3	7.6	8.0	*5.4	11.9	12.1	12.2	6.8	6.9	6.0	*3.7
45–64 years	6.4	5.0	5.1	2.5	6.7	8.4	5.2	5.4	*3.9	8.4	7.5	11.2	8.5	9.7	7.8	10.8
65 years and over	4.6	2.8	3.4	*1.6	3.2	4.7	3.4	3.8	*3.1	6.2	6.3	5.5	8.7	9.7	7.4	14.4

Female																
All ages	55.7	53.5	54.0	50.2	57.6	51.3	56.1	55.2	59.9	55.6	55.6	55.2	57.4	52.5	66.4	70.1
Under 15 years	17.1	24.3	20.5	34.7	19.3	14.9	17.1	18.8	8.3	3.2	2.8	*4.6	15.8	18.5	9.2	*3.6
15–24 years	10.6	9.3	11.0	4.1	12.4	7.2	12.2	9.4	25.5	15.1	15.5	13.6	8.0	8.7	13.2	10.1
25–44 years	13.8	10.4	11.4	6.1	13.6	14.2	14.5	13.8	18.4	18.7	18.6	19.2	12.7	8.4	21.0	21.0
45–64 years	8.9	6.4	7.3	3.7	8.6	10.6	8.9	9.4	6.5	11.2	11.2	10.9	10.1	8.3	12.6	16.9
65 years and over	5.3	3.1	3.7	*1.6	3.6	4.4	3.4	3.8	*1.2	7.4	7.5	6.8	10.8	8.6	10.4	18.5
								Average annual rate								
All antimicrobial drug visits	423.8	174.7	72.7	52.6	48.3	35.3	86.8	72.6	16.3	74.3	56.6	18.1	41.6	28.6	36.6	10.7
Male																
All ages	389.3	168.5	69.4	54.3	42.5	35.6	79.1	67.4	13.6	68.4	52.1	16.8	36.7	28.1	55.5	6.6
Under 15 years	646.2	370.2	127.5	174.6	66.2	57.6	144.0	136.4	8.9	21.8	17.9	*3.9	59.1	46.3	24.2	*0.4
15–24 years	334.1	117.5	62.4	18.1	36.4	24.4	80.4	45.6	38.6	119.0	92.5	26.8	*9.5	*7.3	19.1	*0.7
25–44 years	259.5	101.8	49.1	15.0	34.3	26.5	48.2	42.2	*6.5	64.7	50.2	16.1	20.5	14.5	15.9	*2.9
45–64 years	289.5	92.8	40.0	13.9	34.5	31.6	48.5	42.0	*6.8	67.1	45.4	21.7	37.7	29.5	30.6	12.3
65 years and over	435.9	108.2	55.4	*18.2	34.7	36.4	65,7	61.6	*11.1	101.9	79.7	*22.2	80.5	61.6	60.4	34.3
Female																
All ages	456.1	180.5	75.8	51.0	53.7	35.0	94.0	77.5	18.9	79.9	60.8	19.3	46.1	29.0	46.9	14.5
Under 15 years	648.4	379.7	133.6	163.5	83.5	46.9	132.8	122.4	12.2	21.5	14.0	*7.5	58.8	47.3	30.1	*3.4
15–24 years	485.8	175.9	86.7	23.4	64.8	27.6	114.4	73.9	44.9	120.9	94.7	26.6	36.0	26.9	51.9	11.7
25–44 years	405.5	125.7	57.3	22.2	45.4	34.7	87.2	69.6	20.8	96.3	72.9	24.1	36.5	16.7	53.2	15.6
45–64 years	363.6	107.0	51.2	18.7	40.2	36.0	74.3	65.6	10.2	80.4	61.4	19.0	40.5	22.7	44.3	17.4.
65 years and over	343.3	84.2	41.3	*12.8	26.8	24.0	44.8	41.9	*2.9	84.2	65.3	19.0	69.0	37.8	58.3	30.5

NOTE: More than one type and/or subtype of antimicrobial drug was ordered or provided during some visits.

Table 5. Number and percent distribution of antimicrobial drug visits by race and ethnicity of patient, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Race and ethnicity of patient	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
Race							
White	168,277	67,012	14,664	35,150	30,450	16,751	14,566
Black	18,369	9,557	866	3,212	2,352	1,654	1,652
Other	2,108	1,241	*170	*301	*301	*110	*64
Ethnicity							
Hispanic	9,159	3,902	1,038	1,700	1,329	897	1,086
Other	179,594	73,909	14,661	36,963	31,775	17,618	15,196
				Percent distribution			
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Race							
White	89.2	86.1	93.4	90.9	92.0	90.5	89.5
Black	9.7	12.3	5.5	8.3	7.1	8.9	10.1
Other	1.1	1.6	*1.1	*0.8	*0.9	*0.6	*0.4
Ethnicity							
Hispanic	4.9	5.0	6.6	4.4	4.0	4.8	6.7
Other	95.1	95.0	93.4	95.6	96.0	95.2	93.3

[1]Sums of types do not equal totals because more than one type of antimicrobial drug was ordered or provided during some visits.

Table 6. Number and percent distribution of antimicrobial drug visits by referral status of patient, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Referral status of patient	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
Patient was referred for this visit	5,559	1,518	585	880	1,110	836	808
Patient was not referred for this visit	183,194	76,293	15,114	37,783	31,994	17,678	15,474
				Percent distribution			
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Patient was referred for this visit	2.9	2.0	3.7	2.3	3.4	4.5	5.0
Patient was not referred for this visit	97.1	98.0	96.3	97.7	96.6	95.5	95.0

[1]Sums of antimicrobial drug types do not equal totals because more than one type of drug was ordered or provided during some visits.

Table 7. Number and percent distribution of antimicrobial drug visits by type of physician practice and age of physician, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Type of physician practice and age of physician	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
Type of practice							
Solo	107,061	41,800	8,976	22,856	23,493	8,844	8,968
Other[2]	81,693	36,011	6,723	15,807	9,611	9,671	7,314
Age of physician							
Under 45	80,160	32,368	7,513	17,980	13,925	7,605	6,088
45–60	81,716	34,173	6,511	15,465	14,633	8,033	7,396
61 and over	26,878	11,270	1,675	5,219	4,546	2,877	2,798
				Percent distribution			
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Type of physician practice							
Solo	56.7	53.7	57.2	59.1	71.0	47.8	55.1
Other[2]	43.3	46.3	42.8	40.9	29.0	52.2	44.9
Age of physician							
Under 45	42.5	41.6	47.9	46.5	42.1	41.1	37.4
45–60	43.3	43.9	41.5	40.0	44.2	43.4	45.4
61 and over	14.2	14.5	10.7	13.5	13.7	15.5	17.2

[1]Sums of types do not equal totals because more than one type of antimicrobial drug was ordered or provided during some visits.
[2]Includes partnership, group, and other types of practice.

Table 8. Number and percent distribution of antimicrobial drug visits by geographic region and metropolitan status, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Geographic region and metropolitan status	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
				Number in thousands[1]			
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
Geographic region							
Northeast	37,855	15,197	2,006	8,818	7,775	2,875	3,010
North Central	49,030	19,908	3,288	10,831	8,568	5,013	3,853
South	73,175	32,474	8,324	13,487	10,875	7,015	6,651
West	28,693	10,231	2,083	5,526	5,885	3,611	2,767
Metropolitan status							
Metropolitan area	136,935	54,722	10,998	28,876	25,174	12,938	12,060
Nonmetropolitan area	51,818	23,089	4,702	9,787	7,930	5,577	4,222
				Percent distribution			
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Geographic region							
Northeast	20.1	19.5	12.8	22.8	23.5	15.5	18.5
North Central	26.0	25.6	20.9	28.0	25.9	27.1	23.7
South	38.8	41.7	53.0	34.9	32.9	37.9	40.8
West	15.2	13.1	13.3	14.3	17.8	19.5	17.0
Metropolitan status							
Metropolitan area	72.5	70.3	70.1	74.7	76.0	69.9	74.1
Nonmetropolitan area	27.5	29.7	29.9	25.3	24.0	30.1	25.9

[1]Sums of types do not equal totals because more than one type of antimicrobial drug was prescribed during some visits.

Table 9. Number and percent distribution of antimicrobial drug visits by number of diagnostic services ordered or provided, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Number of diagnostic services	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
		Number in thousands[1]					
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
No services	7,818	1,302	469	2,404	3,506	*271	670
One service	109,195	48,850	8,936	24,478	17,754	8,532	7,385
Two services	51,490	21,120	4,549	9,284	8,279	5,986	4,888
Three services or more	20,250	6,539	1,745	2,498	3,565	3,726	3,339
		Percent distribution					
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
No services	4.1	1.7	3.0	6.2	10.6	*1.5	4.1
One service	57.9	62.8	56.9	63.3	53.6	46.1	45.4
Two services	27.3	27.1	29.0	24.0	25.0	32.3	30.0
Three services or more	10.7	8.4	11.1	6.5	10.8	20.1	20.5

[1]Sums of antimicrobial drug types do not equal totals because more than one type of drug was ordered or provided during some visits.

Table 10. Number and percent distribution of antimicrobial drug visits by number of nonmedication therapeutic services ordered or provided, according to type of antimicrobial drug ordered or provided: United States, 1980–81

Number of nonmedication therapeutic services	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
		Number in thousands[1]					
All antimicrobial drug visits	188,754	77,811	15,699	38,663	33,104	18,515	16,282
No services	123,021	54,978	9,485	25,860	18,943	11,477	9,289
One service	57,802	20,539	5,603	11,159	12,233	5,818	5,950
Two services or more	7,930	2,294	611	1,644	1,928	1,220	1,043
		Percent distribution					
All antimicrobial drug visits	100.0	100.0	100.0	100.0	100.0	100.0	100.0
No services	65.2	70.7	60.4	66.9	57.2	62.0	57.0
One service	30.6	26.4	35.7	28.9	37.0	31.4	36.5
Two services or more	4.2	2.9	3.9	4.3	5.8	6.6	6.4

[1]Sums of antimicrobial drug types do not equal totals because more than one type of drug was ordered or provided during some visits.

Table 11. Number and percent of antimicrobial drug visits, by type of antimicrobial drug ordered or provided and disposition of patient: United States, 1980–81

Patient disposition[1]	All types	Type of antimicrobial drug: Penicillins	Cephalosporins	Macrolides and lincosamides	Tetracyclines	Sulfonamides and trimethoprim	Miscellaneous antimicrobials
		Number in thousands[2]					
No followup	24,257	11,988	1,619	5,569	3,671	994	1,606
Return at specified time	91,956	31,581	7,922	17,860	18,627	12,518	10,154
Return if needed	64,281	30,531	5,352	13,836	9,761	4,190	3,856
Telephone followup	9,210	4,506	627	1,970	1,018	928	491
Other	5,194	2,003	803	595	553	770	672
		Percent					
No followup	12.9	15.4	10.3	14.4	11.1	5.4	9.9
Return at specified time	48.7	40.6	50.5	46.2	56.3	67.6	62.4
Return if needed	34.1	39.2	34.1	35.8	29.5	22.6	23.7
Telephone followup	4.9	5.8	4.0	5.1	3.1	5.0	3.0
Other	2.8	2.6	5.1	1.5	1.7	4.2	4.1

[1]More than one patient disposition was recorded for some visits.
[2]Sums of types do not equal totals because more than one type of antimicrobial drug was ordered or provided during some visits.

Appendixes

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Appendix I
Technical notes

This report is based on data collected during 1980 and 1981 in the National Ambulatory Medical Care Survey (NAMCS), an annual sample survey of office-based physicians conducted by the Division of Health Care Statistics of the National Center for Health Statistics (NCHS). The two surveys were conducted with identical instruments, definitions, and procedures. Two years of data were combined to increase the reliability of the estimates. The annual survey design and procedures are presented in the following sections.

Statistical design

Scope of the survey

The target population of NAMCS includes office visits made within the conterminous United States by ambulatory patients to nonfederally employed physicians who are principally engaged in office-based patient care practice, but not in the specialties of anesthesiology, pathology, or radiology. Telephone contacts and nonoffice visits are excluded from NAMCS.

Sample design

The NAMCS utilizes a three-stage survey design that involves probability samples of primary sampling units (PSU's), physician practices within PSU's, and patient visits within physician practices. The first-stage sample of 87 PSU's, was selected by the National Opinion Research Center (NORC) of the University of Chicago, the organization responsible for NAMCS field and data processing operations under contract to NCHS. A PSU is a county, a group of adjacent counties, or a standard metropolitan statistical area (SMSA). A modified probability-proportional-to-size procedure using separate sampling frames for SMSA's and for nonmetropolitan counties was used to select the sample PSU's. Each frame was stratified by region, size of population, and demographic characteristics of the PSU's, and was divided into sequential zones of 1 million residents; then, a random number was drawn to determine which PSU came into the sample from each zone.

The second stage consisted of a probability sample of practicing physicians, selected from the masterfiles maintained by the American Medical Association (AMA) and the American Osteopathic Association (AOA), who met the following criteria:

- Office-based, as defined by AMA and AOA.
- Principally engaged in patient care activities.
- Nonfederally employed
- Not in the specialties of anesthesiology, pathology, clinical pathology, forensic pathology, radiology, diagnostic radiology, pediatric radiology, or therapeutic radiology.

Within each PSU, all eligible physicians were sorted by nine specialty groups: general and family medicine, internal medicine, pediatrics, other medical specialties, general surgery, obstetrics and gynecology, other surgical specialties, psychiatry, and all other specialties. Then, within each PSU, a systematic random sample of physicians was selected so that the overall probability of selecting any physician in the United States was approximately constant.

During 1980 and 1981 the NAMCS physician sample included 5,805 physicians. Sample physicians were screened at the time of the survey to ensure that they met the aforementioned criteria; 1,124 physicians did not meet the criteria and were, therefore, ruled out of scope (ineligible) for the study. The most common reasons for being out of scope were that the physician was retired, deceased, or employed in teaching, research, or administration. Of the 4,681 inscope (eligible) physicians, 3,676 (78.5 percent) participated in the study. Of the participating physicians, 509 saw no patients during their assigned reporting period because of vacations, illnesses, or other reasons for being temporarily out of office-based practice. The physician sample size and response data by physician specialty are shown in table I.

The third stage was the selection of patient visits within the annual practices of the sample physicians. This stage involved two steps. First, the total physician sample was divided into 52 random subsamples of approximately equal size; then each subsample was randomly assigned to 1 of the 52 weeks in the survey year. Second, a systematic random sample of visits was selected by the physician during the assigned reporting week. The visit sampling rate varied for this final step from a 100-percent sample for very small practices to a 20-percent sample for very large practices. The method for determining the visit sampling rate is described later in this appendix. During 1980 and 1981 sample physicians completed 89,447 usable Patient Record forms.

NOTE: Prepared by Thomas McLemore, Division of Health Care Statistics.

Table I. Distribution of physicians in the 1980–81 National Ambulatory Medical Care Survey samples and response rates, by physician specialty

Physician specialty	Gross total	Out of scope	Net total	Nonrespondents	Respondents	Response rate
All specialties	5,805	1,124	4,681	1,005	3,676	78.5
General and family practice	1,340	289	1,051	272	779	74.1
Medical specialties	1,695	296	1,399	298	1,101	78.7
Internal medicine	871	158	713	182	531	74.5
Pediatrics	414	83	331	42	289	87.3
Other medical specialties	410	55	355	74	281	79.2
Surgical specialties	1,978	246	1,732	351	1,381	79.7
General surgery	521	75	446	115	331	74.2
Obstetrics and gynecology	484	71	413	63	350	84.7
Other surgical specialties	973	100	873	173	700	80.2
Other specialties	792	293	499	84	415	83.2
Psychiatry	414	96	318	43	275	86.5
Other specialties	378	197	181	41	140	77.3

Data collection and processing

Field procedures

Both mail and telephone contacts were used to enlist sample physicians for NAMCS. Initially, physicians were sent introductory letters from the Director of NCHS, facsimiles of which have been published.[14–18] When appropriate, a letter from the physician's specialty organization endorsing the survey and urging his participation was enclosed with the NCHS letter. Approximately 2 weeks prior to the physician's assigned reporting period, a field representative telephoned the physician to explain briefly the study and arrange an appointment for a personal interview. Physicians who did not initially respond were usually recontacted via telephone or special explanatory letter and requested to reconsider participation in the study.

During the personal interview the field representative determined the physician's eligibility for the study, obtained his cooperation, delivered survey materials with verbal and printed instructions, and assigned a predetermined Monday-Sunday reporting period. A short induction interview concerning basic practice characteristics, such as type of practice and expected number of office visits, was conducted. Facsimiles of the induction interview form also have been published.[14–18] Office staff who were to assist with data collection were invited to attend the instructional session or were offered separate instructional sessions.

The field representative telephoned the sample physician prior to and during the assigned reporting week to answer questions that might have arisen and to ensure that survey procedures were going smoothly. At the end of the reporting week, the participating physician mailed the completed survey materials to the field representative who edited the forms for completeness before transmitting them for central data processing. At this point problems of missing or incomplete data were resolved by telephone followup by the field representative to the sample physician; if no problems were found, field procedures were considered complete regarding the sample physician's participation in NAMCS.

NOTE: A list of references follows the text.

Data collection

The actual data collection for NAMCS was carried out by the physician, assisted by his office staff when possible. Two data collection forms were employed by the physician: the Patient Log and the Patient Record form (see appendix III). The Patient Log, a sequential listing of patients seen in the physician's office during his assigned reporting week, served as the sampling frame to indicate the office visits for which data were to be recorded. A perforation between the patient's name and patient visit information permitted the physician to detach and retain the listing of patients, thus assuring the anonymity of the physician's patients.

Based on the physician's estimate of the expected number of office visits and expected number of days in practice during the assigned reporting week, each physician was assigned a visit sampling rate. The visit sampling rates were designed so that about 30 Patient Record forms would be completed by each physician during the assigned reporting week. Physicians expecting 10 or fewer visits per day recorded data for all visits. Those physicians expecting more than 10 visits per day recorded data for every second, third, or fifth visit based on the predetermined sampling interal. These visit sampling procedures minimized the physician's data collection workload and maintained approximately equal reporting levels among sample physicians regardless of practice size. For physicians recording data for every second, third, or fifth patient visit, a random start was provided on the first page of the Patient Log so that the predesignated sample visits recorded on each succeeding page of the Patient Log provided a systematic random sample of patient visits during the reporting period.

Data processing

In addition to followups for missing and inconsistent data made by the field staff, numerous clerical edits were performed on data received for central data processing. These manual edit procedures proved quite efficient, reducing item nonresponse rates to 2 percent or less for data items.

Information contained in item 6 (Patient's problem or reason for visit) of the Patient Record form was coded according to A Reason for Visit Classification for Ambulatory Care (RVC).[12] Diagnostic information (item 9 of the Patient Record form) was coded according to the *International Classification*

of Diseases, 9th Revision, Clinical Modification (ICD–9–CM).[13] A maximum of three entries were coded from each of these items. Prior to coding, Patient Record forms were grouped into batches with approximately 650 forms per batch. Quality control for the medical coding operation involved a two-way 5-percent independent verification procedure. Error rates were defined as the number of incorrectly coded entries divided by the total number of coded entries. The estimated error rates for the 1980–81 medical coding operation were 1.7 percent for item 6 and 2.3 percent for item 9. Additionally, a dependent verification procedure was used to review and adjudicate all records in batches with excessive error rates. This procedure further reduced the estimated error rates to 1.6 percent for item 6 and 2.1 percent for item 9.

The NAMCS medication data (item 11 of the Patient Record form) was classified and coded according to a scheme developed at NCHS based on the American Society of Hospital Pharmacists' Drug Product Information File. A description of the new drug coding scheme and of the NAMCS drug data processing procedures is contained in *Vital and Health Statistics,* Series 2, No. 90.[19] A two-way 100–percent independent verification procedure was used to control the medication coding operation. As an additional quality control, all Patient Record forms with differences between drug coders or with illegible drug entires were reviewed and adjudicated at NCHS.

Information from the Induction Interview and Patient Record forms was keypunched with 100 percent verification and converted to computer tape. At this point, extensive computer consistency and edit checks were performed to ensure complete and accurate data. Incomplete data items were imputed by assigning a value from a randomly selected Patient Record form with similar characteristics; patient sex and age, physician specialty, and broad diagnostic categories were used as the basis for these imputations.

Estimation procedures

Statistics from NAMCS were derived by a multistage estimation procedure that produces essentially unbiased national estimates and has three basic components: (1) inflation by reciprocals of the probabilities of selection, (2) adjustment for nonresponse, and (3) a ratio adjustment to fixed totals. Each component is briefly described below.

Inflation by reciprocals of probabilities of selection

Because the survey utilized a three-stage sample design, three probabilities of selection existed: (1) the probability of selecting the PSU, (2) the probability of selecting the physician within the PSU, and (3) the probability of selecting an office visit within the physician's practice. The third probability was defined as the number of office visits during the physician's assigned reporting week divided by the number of Patient Record forms completed. All weekly estimates were inflated by a factor of 52 to derive annual estimates.

Adjustment for nonresponse

NAMCS data were adjusted to account for sample physicians who were in scope, but did not participate in the study. This adjustment was calculated in order to minimize the impact of response on final estimates by imputing to nonresponding physicians the practice characteristics of similiar responding physicians. For this purpose, physicians were judged similar if they had the same specialty designation and practiced in the same PSU.

Ratio adjustment

A poststratification adjustment was made within each of nine physician specialty groups. The ratio adjustment was a multiplication factor that had as its numerator the number of physicians in the universe in each physician specialty group and as its denominator the estimated number of physicians in that particular specialty group. The numerator was based on figures obtained from the AMA and AOA masterfiles, and the denominator was based on data from the sample.

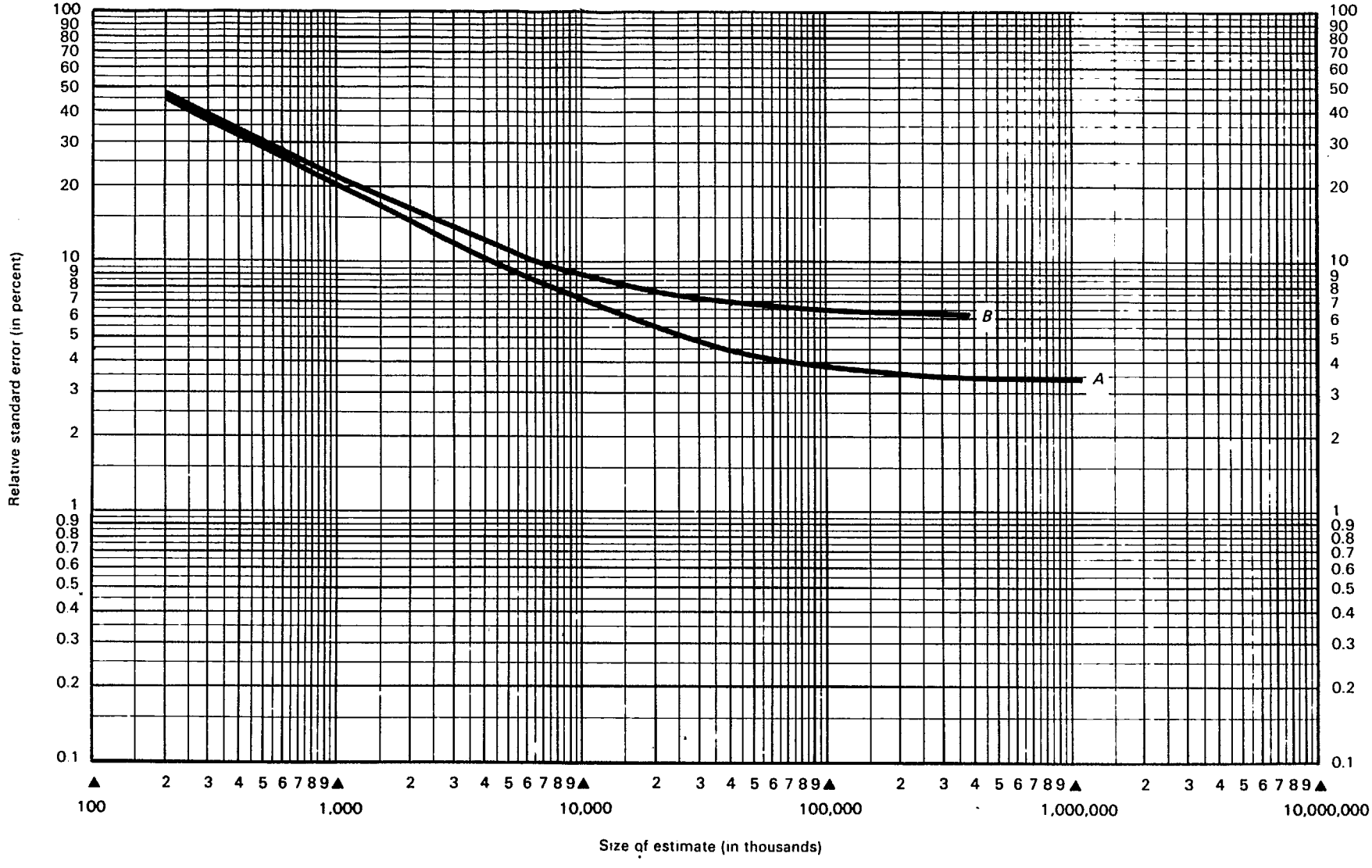
Reliability of estimates

As in any survey, results are subject to both sampling and nonsampling errors. Nonsampling errors include reporting and processing errors, as well as biases due to nonresponse and incomplete response. The magnitude of the nonsampling errors cannot be computed. However, these errors were kept to a minimum by procedures built into the survey's operation. To eliminate ambiguities and encourage uniform reporting, careful attention was given to the phrasing of questions, terms, and definitions. Also, extensive pretesting of most data items and survey procedures was performed. The steps taken to reduce bias in the data are discussed in the sections on field procedures and data collection. Quality control procedures and consistency and edit checks discussed in the data processing section reduced errors in data coding and processing. However, because survey results are subject to sampling and nonsampling errors, the total error will be larger than the error due to sampling variability alone.

Because the statistics presented in this report are based on a sample, they differ somewhat from the figures that would be obtained if a complete census had been taken using the same forms, definitions, instructions, and procedures. However, the probability design of NAMCS permits the calculation of sampling errors. The standard error is primarily a measure of sampling variability that occurs by chance because only a sample rather than the entire population is surveyed. The standard error, as calculated in this report, also reflects part of the variation that arises in the measurement process, but does not include estimates of any systematic biases that may be in the data. The chances are about 68 out of 100 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 95 out of 100 that the difference would be less than twice the standard error, and about 99 out of 100 that it would be less than 2½ times as large.

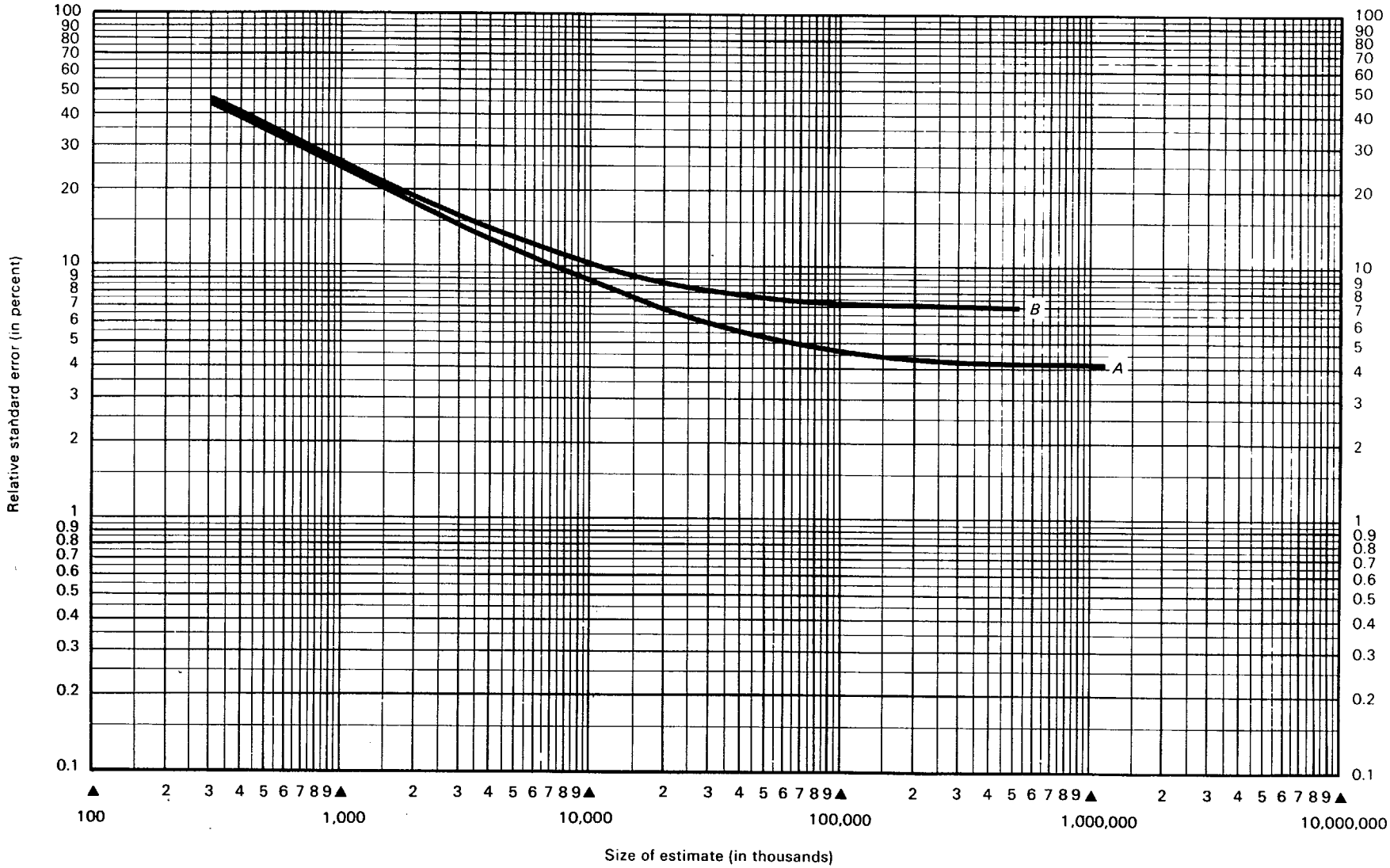
The relative standard error of an estimate is obtained

NOTE: A list of references follows the text.



EXAMPLE: An estimate of 20 million office visits to general surgeons (read from scale at bottom of chart) has a relative standard error of 7.7 percent (read from curve *B* on scale at left of chart) or a standard error of 1,540,000 office visits (7.7 percent of 20 million visits).

Figure I. Approximate relative standard errors for estimated numbers of office visits based on all physician specialties (*A*), and individual specialties (*B*), 1980–81 National Ambulatory Medical Care Survey



EXAMPLE: An estimate of 60 million drug mentions (read from scale at bottom of chart) has a relative standard error of 5.1 percent (read from curve *A* on scale at left of chart) or a standard error of 3,060,000 drug mentions (5.1 percent of 60 million drug mentions).

Figure II. Approximate relative standard errors for estimated numbers of drug mentions based on all physician specialties (*A*), and individual specialties (*B*), 1980–81 National Ambulatory Medical Care Survey

by dividing the standard error by the estimate itself and is expressed as a percent of the estimate. For this report, an asterisk (*) precedes any estimate with more than a 30 percent relative standard error.

Estimates of sampling variability were calculated using the method of half-sample replication. This method yields overall variability through observation of variability among random subsamples of the total sample. A description of the development and evaluation of the replication technique for error estimation has been published.[20,21] Approximate relative standard errors for aggregate estimates are presented in figures I and II. To derive error estimates that would be applicable to a wide variety of statistics and could be prepared at moderate cost, several approximations were required. As a result, the relative standard errors shown in figures I and II should be interpreted as approximate rather than exact for any specific estimate. Directions for determining approximate relative standard errors follow.

Estimates of aggregates

Approximate relative standard errors (in percent) for aggregate statistics are presented in figures I and II. The approximate relative standard errors for aggregate estimates of office visits are shown in figure I, and the approximate relative standard errors for aggregate estimates of drug mentions are shown in figure II. In each figure, curve *A* represents the relative standard errors appropriate for estimates based on all physician specialties, and curve *B* represents relative standard errors appropriate for estimates based on an individual physician specialty. For the specific case where the aggregate estimate of interest is the number of mentions of a specific drug, for example, the number of mentions of Dyazide, figure I, curve B should be used to obtain approximate relative standard errors.

Instead of using figures I and II, relative standard errors for aggregate estimates may be calculated directly using the following formulas where x is the aggregate estimate of interest in thousands. For visit estimates based on all physician specialties,

$$\mathrm{RSE}(x) = \sqrt{0.001111 + \frac{39.84195}{x}} \cdot 100.0$$

For visit estimates based on an individual physician specialty,

$$\mathrm{RSE}(x) = \sqrt{0.003757 + \frac{42.88175}{x}} \cdot 100.0$$

For drug mention estimates based on all physician specialties,

$$\mathrm{RSE}(x) = \sqrt{0.001647 + \frac{58.48328}{x}} \cdot 100.0$$

For drug mention estimates based on an individual physician specialty.

$$\mathrm{RSE}(x) = \sqrt{0.004696 + \frac{59.50164}{x}} \cdot 100.0$$

NOTE: A list of references follows the text.

Estimates of percents

Approximate relative standard errors (in percent) for estimates of percents may be calculated from figures I and II as follows. From the appropriate curve obtain the relative standard error of the numerator and denominator of the percents. Square each of the relative standard errors, subtract the resulting value for the denominator from the resulting value for the numerator, and extract the square root. This approximation is valid if the relative standard error of the denominator is less than 0.05, or if the relative standard errors of the numerator and denominator are both less than 0.10.

Alternatively, relative standard errors for percentages may be calculated directly using the following formulas where p is the percent of interest and x is the base of the percent in thousands. For visit percentages based on all physician specialties,

$$\mathrm{RSE}(p) = \sqrt{\frac{39.84195 \cdot (1 - p)}{p \cdot x}} \cdot 100.0$$

For visit percentages based on an individual physician specialty,

$$\mathrm{RSE}(p) = \sqrt{\frac{42.88175 \cdot (1 - p)}{p \cdot x}} \cdot 100.0$$

For drug mention percentages based on all physician specialties,

$$\mathrm{RSE}(p) = \sqrt{\frac{58.48328 \cdot (1 - p)}{p \cdot x}} \cdot 100.0$$

For drug mention percents based on an individual physician specialty,

$$\mathrm{RSE}(p) = \sqrt{\frac{59.50164 \cdot (1 - p)}{p \cdot x}} \cdot 100.0$$

Estimates of rates where the numerator is not a subclass of the denominator

Approximate relative standard errors for rates in which the denominator is the total United States population or one or more of the age-sex-race groups of the total population are equivalent to the relative standard error of the numerator that can be obtained from figure I or II.

Estimates of differences between two statistics

The relative standard errors shown in this appendix are not directly applicable to differences between two sample estimates. The standard error of a difference is approximately the square root of the sum of squares of each standard error considered separately. This formula represents the standard error quite accurately for the difference between separate and uncorrelated characteristics, although it is only a rough approximation in most other cases.

Table II. Estimates of the civilian noninstitutionalized population of the United States used in computing average annual rates in this report, by age and sex: 1980–81

Sex	All ages	Under 15 years	15–24 years	25–44 years	45–64 years	65 years and over
			Number in thousands			
Both sexes	222,674	50,832	40,710	62,658	43,963	24,512
Male	107,429	25,976	20,076	30,487	20,849	10,042
Female	115,244	24,856	20,634	32,171	23,114	14,470

NOTE: Excludes Alaska and Hawaii.

Figures may not add to total due to rounding.

Tests of significance

In this report, the determination of statistical inference is based on the Bonferroni test for multiple comparisons, a modification of the *t*-test. Terms relating to differences, such as "higher," and "less" indicate that the differences are statistically significant at the $p < .05$ level. Terms such as "similar" or "no difference" mean that no statistical significance exists between the estimates being compared. A lack of comment regarding the difference between any two estimates does not mean that the difference was tested and found to be not significant.

Population figures and rate computation

The population figures used in computing annual visit rates are presented in table II. The figures are based on an average of the July 1, 1980, and July 1, 1981, estimates of the civilian noninstitutionalized population of the United States provided by the U.S. Bureau of the Census. Because NAMCS includes data for only the conterminous United States, the original population estimates were modified to account for the exclusion of Alaska and Hawaii from the study. For this reason, the population estimates should not be considered official and are presented here solely to provide denominators for rate computations.

Estimates of numbers of visits and drug mentions in this report are for a 2-year period, but ratios and rates represent average annual estimates. For example, the average annual visit rates are calculated as follows. The numerator is obtained by dividing the estimated number of office visits for 1980–81 by 2 to obtain an average annual number of office visits. This number is then divided by the appropriate population figure to obtain an average annual visit rate. As previously discussed, estimates of reliability for average annual visit rates may be calculated from figures I and II.

Rounding of numbers

Estimates presented in this report are rounded to the nearest thousand. For this reason detailed figures within tables do not always add to totals. Rates and percents are calculated on the basis of the original, unrounded figures and may not necessarily agree precisely with percents calculated from rounded data.

Systematic bias

No formal attempt was undertaken to determine or measure systematic bias in the NAMCS data. But it should be noted that there are several factors affecting the data which indicate that these data underrepresent the total number of office visits. Some of these factors are briefly discussed below.

- Physicians who participated in NAMCS did a thorough and conscientious job in keeping the Patient Log; however, post survey interviews with participating physicians indicate that a small number of patient visits may have been accidentally omitted from the Patient Log; although this number is quite small, such omissions would result in an undercoverage of office visits.

  The same post survey interviews indicate that the inclusion of patient visits that did not actually occur was infrequent and would have a negligible effect on survey estimates.

- As previously stated, the physician universe for the 1980 and 1981 NAMCS included all nonfederal, office-based, patient-care physicians on the AMA and AOA masterfiles. NAMCS was designed to provide statistically unbiased estimates of office visits to this designated population. Not included in the universe were physicians who were classified as federally employed; or hospital-based; or who were principally engaged in research, teaching, administration, or other nonpatient care activity. Consequently, ambulatory patient visits to these physicians in an office setting would not be included in NAMCS estimates. In an attempt to measure the number of office visits to physicians not in the NAMCS universe, a NAMCS Complement Survey was conducted in 1980. This study involved a sample of approximately 2,000 physicians selected from among the 230,000 physicians in the AMA and AOA masterfiles who were not eligible (in scope) for the 1980 NAMCS. Results indicate that about 17 percent of the Complement Survey physicians saw some ambulatory patients in an office setting and that an estimated 69 million office visits were made to these physicians in 1980.[22]

NOTE: A list of references follows the text.

Appendix II
Definitions of certain terms used in this report

Terms relating to the survey

Office—Premises identified by physicians as locations for their ambulatory practices. The responsibility over time for patient care and professional services rendered there generally resides with the individual physician rather than with any institution.

Ambulatory patient—An individual seeking personal health services who is neither bedridden nor currently admitted to any health care institution on the premises.

Physician—Classified as either

- *In scope*—All duly licensed doctors of medicine or doctors of osteopathy currently in practice who spend some time caring for ambulatory patients at an office location.
- *Out of scope*—Those physicians who treat patients only indirectly, including physicians in the specialties of anesthesiology, pathology, forensic pathology, radiology, therapeutic radiology, and diagnostic radiology, and the following physicians:
  - Physicians who are federally employed, including those physicians in military service.
  - Physicians who treat patients only in an institutional setting, for example, patients in nursing homes and hospitals.
  - Physicians employed full time in industry or by an institution and having no private practice, for example, physicians who work for the Veterans' Administration or the Ford Motor Company.
  - Physicians who spend no time seeing ambulatory patients, for example, physicians who only teach, are engaged in research, or are retired.

Patients—Classified as either

- *In scope*—All patients seen by the physician or a staff member in the office of the physician.
- *Out of scope*—Patients seen by the physician in a hospital, nursing home, or other extended care institution, or in the patient's home. (Note: If the physician has a private office, meeting the definition of "office," located in a hospital, the ambulatory patients seen there are considered in scope.) The following types of patients are considered out of scope:
  - Patients seen by the physician in an institution, including outpatient clinics of hospitals, for whom the institution has primary responsibility over time.
  - Patients who contact and receive advice from the physician via telephone.
  - Patients who come to the office only to leave a specimen, to pick up insurance forms, or to pay a bill.
  - Patients who come to the office only to pick up medications previously prescribed by the physician.

Visit—A direct, personal exchange between an ambulatory patient and a physician or a staff member for the purpose of seeking care and rendering health services.

Physician specialty—Principal specialty, including general practice, as designated by the physician at the time of the survey. Those physicians for whom a specialty was not obtained were assigned the principal specialty recorded in the physician master files maintained by the American Medical Association or the American Osteopathic Association.

Region of practice location—The four geographic regions, excluding Alaska and Hawaii, that correspond to those used by the U.S. Bureau of the Census:

Region	*States included*
Northeast	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont
North Central	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin
South	Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia
West	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming

Metropolitan status of practice location—A physician's practice is classified by its location in a metropolitan or nonmetropolitan area. Metropolitan areas are standard metropolitan statistical areas (SMSA's) as defined by the U.S. Office of Management and Budget. The definition of an individual SMSA involves two considerations: first, a city or cities of specified population that constitute the central city and identify the county in which it is located as the central county; second, economic and social relationships with "contiguous" counties that are metropolitan in character so that the periphery of the specific metropolitan area may be determined. SMSA's may cross State lines. In New England, SMSA's consist of cities and towns rather than counties.

Terms relating to the Patient Record form

Age—The age calculated from date of birth was the age at last birthday on the date of visit.

Race—White, Black, Asian or Pacific Islander, or American Indian or Alaskan Native. Physicians were instructed to mark the category they judged to be the most appropriate for each patient based on observation or prior knowledge. The following definitions were provided to the physician.

- *White*—A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.
- *Black*—A person having origins in any of the black racial groups of Africa.
- *Asian or Pacific Islander*—A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands, including, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa.
- *American Indian or Alaskan Native*—A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

Ethnicity—Category judged by the physician to be the most appropriate. The following definitions were provided:

- *Hispanic origin*—A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
- *Not Hispanic*—Any person not of Hispanic origin.

Patient's complaint(s), symptom(s), or other reason(s) for this visit (in patient's own words)—The patient's principal problem, complaint, symptom, or other reason for this visit as expressed by the patient. Physicians were instructed to record key words or phrases verbatim to the extent possible, listing that problem first which, in the physician's judgment, was most responsible for the patient's visit.

Major reason for this visit—The one major reason (selected from the following list) for the patient's visit as judged by the physician:

- *Acute problem*—A visit primarily for a condition or illness having a relatively sudden or recent onset (within 3 months of the visit).
- *Chronic problem, routine*—A visit primarily to receive regular care or examination for a preexisting chronic condition or illness (onset of condition was 3 months or more before the visit).
- *Chronic problem, flareup*—A visit primarily to receive care for a sudden exacerbation of a preexisting chronic condition or illness.
- *Postsurgery or postinjury*—A visit primarily for followup care of injuries or for care required following surgery, for example, removal of sutures or cast.
- *Nonillness care (routine prenatal, general exam, well-baby)*—General health maintenance examinations and routine periodic examinations of presumably healthy persons, both children and adults, including prenatal and postnatal care, annual physicals, well-child examinations, and insurance examinations.

Diagnostic services this visit—Physicians were instructed to check any of the following services that were ordered or provided during the current visit:

- *Limited history and/or examination*—History or physicial examination limited to a specific body site or system or concerned primarily with the patient's chief complaint, for example, pelvic examination or eye examination.
- *General history and/or examination*—History or physical examination of a comprehensive nature, including all or most body systems.
- *Pap test*—Papanicolaou test.
- *Clinical lab test*—One or more laboratory procedures or tests, including examination of blood, urine, sputum, smears, exudates, transudates, feces, and gastric content, and including chemistry, serology, bacteriology, and pregnancy test; excludes Pap test.
- *X ray*—Any single or multiple x ray examination for diagnostic or screening purposes; excludes radiation therapy.
- *Blood pressure check.*
- *EKG*—Electrocardiogram.
- *Vision test*—Visual acuity test.
- *Endoscopy*—Examination of the interior of any body cavity except ear, nose, and throat by means of an endoscope.
- *Mental status exam*—Any formal, clinical evaluation designed to assess the mental or emotional status of the patient.
- *Other*—All other diagnostic services ordered or provided that are not included in the preceding categories.

Principal diagnosis—The physician's diagnoses of the patient's principal problem, complaint, or symptom. In the event of multiple diagnoses, the physician was instructed to list them in order of decreasing importance. The term "principal" refers to the first-listed diagnosis. The diagnosis represents the physician's best judgement at the time of the visit and may be tentative, provisional, or definitive.

Other significant current diagnoses—The diagnoses of any other condition known to exist for the patient at the time of the visit. Other diagnoses may or may not be related to the patient's reason for visit.

Have you seen patient before?—"Seen before" means provided care for at any time in the past. Item 10*b* refers to the patient's current episode of illness.

Medication therapy this visit—The physician was instructed to list, using brand or generic names, all medications, including drugs, vitamins, hormones, ointments, and suppositories ordered, injected, administered, or provided this visit including prescription and nonprescription drugs, vaccinations, immunization, and desensitization agents. Also included are drugs and medications ordered or provided prior to the visit that the physician instructed or expected the patient to continue taking. Medications for the principal diagnosis are listed in item 11*a*; all other drugs are listed in item 11*b*.

Nonmedication therapy—Physicians were instructed to

check any of the following services that were ordered or provided during the current visit:

- *Physiotherapy*—Any form of physical therapy ordered or provided, including any treatment using heat, light, sound, or physical pressure or movement; for example, ultrasonic, ultraviolet, infrared, whirlpool, diathermy, cold, and manipulative therapy.
- *Office surgery*—Any surgical procedure performed in the office this visit, including suture of wounds, reduction of fractures, application or removal of casts, incision and draining of abscesses, application of supportive materials for fractures and sprains, irrigations, aspirations, dilations, and excisions.
- *Family planning*—Services, counseling, or advice that might enable patients to determine the number and spacing of their children, including both contraception and infertility services.
- *Psychotherapy or therapeutic listening*—All treatments designed to produce a mental or emotional response through suggestion, persuasion, reeducation, reassurance, or support, including psychological counseling, hypnosis, psychoanalysis, and transactional therapy.
- *Diet conseling*—Instructions, recommendations, or advice regarding diet or dietary habits.
- *Family or social counseling*—Advice regarding problems of family relationships, including marital or parent-child problems, or social problems, including economic, educational, occupational, legal, or social adjustment difficulties.
- *Medical counseling*—Instructions and recommendations regarding any health problem, including advice or counsel about a change of habit or behavior. Physicians were instructed to check this category only if medical counseling was a significant part of the treatment. Family planning, diet counseling, and family or social counseling are excluded.
- *Other*—Treatments or nonmedication therapies ordered or provided that are not listed or included in the preceding categories.

Was patient referred for this visit by another physician?—Referrals are any visits that are made at the advice or direction of a physician other than the one being visited. The interest is in referrals for the current visit and not in referrals for any prior visit.

Disposition this visit—Eight categories are provided to describe the physician's disposition of the case. The physician was instructed to check as many of the categories as apply:

- *No followup planned*—No return visit or telephone contact was scheduled for the patient's problem.
- *Return at specified time*—Patient was told to schedule an appointment or was instructed to return at a particular time.
- *Return if needed, P.R.N.*—No future appointment was made, but the patient was instructed to make an appointment with the physician if the patient considered it necessary.
- *Telephone followup planned*—Patient was instructed to telephone the physician on a particular day to report either on progress, or if the need arose.
- *Referred to other physician*—Patient was instructed to consult or seek care from another physician. The patient may or may not return to this physician at a later date.
- *Returned to referring physician*—Patient was instructed to consult again with the referring physician.
- *Admit to hospital*—Patient was instructed that further care or treatment would be provided in a hospital. No further office visits were expected prior to hospital admission.
- *Other*—Any other disposition of the case not included in the preceding categories.

Duration of this visit—Time the physician spent with the patient, not including time the patient spent waiting to see the physician, time the patient spent receiving care from someone other than the physician without the presence of the physician, and time the physician spent in reviewing such things as records and test results. If the patient was provided care by a member of the physician's staff but did not see the physician during the visit, the duration of visit was recorded as 0 minutes.

Appendix III
Patient Log and Patient Record form

B № 382826

PATIENT LOG

As each patient arrives, record name and time of visit on the log below. For the patient entered on line #2, also complete the patient record to the right.

	PATIENT'S NAME	TIME OF VISIT
1		a.m. / p.m.
2		a.m. / p.m.

Record items 1-15 for this patient.

CONTINUE LISTING PATIENTS ON NEXT PAGE

ASSURANCE OF CONFIDENTIALITY—All information which would permit identification of an individual, a practice, or an establishment will be held confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to other persons or used for any other purpose

Department of Health and Human Services
Public Health Service
Office of Health Research, Statistics, and Technology
National Center for Health Statistics

B № 382826

PATIENT RECORD
NATIONAL AMBULATORY MEDICAL CARE SURVEY

1. DATE OF VISIT — Month / Day / Year

2. DATE OF BIRTH — Month / Day / Year

3. SEX
1 ☐ FEMALE
2 ☐ MALE

4. COLOR OR RACE
1 ☐ WHITE
2 ☐ BLACK
3 ☐ ASIAN/PACIFIC ISLANDER
4 ☐ AMERICAN INDIAN/ ALASKAN NATIVE

5. ETHNICITY
1 ☐ HISPANIC ORIGIN
2 ☐ NOT HISPANIC

6. PATIENT'S COMPLAINT(S), SYMPTOM(S), OR OTHER REASON(S) FOR THIS VISIT *[In patient's own words]*
a. MOST IMPORTANT
b. OTHER

7. MAJOR REASON FOR THIS VISIT *[Check one]*
1 ☐ ACUTE PROBLEM
2 ☐ CHRONIC PROBLEM, ROUTINE
3 ☐ CHRONIC PROBLEM, FLAREUP
4 ☐ POST SURGERY/POST INJURY
5 ☐ NON-ILLNESS CARE (ROUTINE PRENATAL, GENERAL EXAM., WELL BABY, ETC.)

8. DIAGNOSTIC SERVICES THIS VISIT *[Check all ordered or provided]*
1 ☐ NONE
2 ☐ LIMITED HISTORY/EXAM.
3 ☐ GENERAL HISTORY/EXAM.
4 ☐ PAP TEST
5 ☐ CLINICAL LAB TEST
6 ☐ X-RAY
7 ☐ BLOOD PRESSURE CHECK
8 ☐ EKG
9 ☐ VISION TEST
10 ☐ ENDOSCOPY
11 ☐ MENTAL STATUS EXAM.
12 ☐ OTHER *(Specify)* _____

9. PHYSICIAN'S DIAGNOSES
a. PRINCIPAL DIAGNOSIS/PROBLEM ASSOCIATED WITH ITEM 6a
b. OTHER SIGNIFICANT CURRENT DIAGNOSES

10. HAVE YOU SEEN PATIENT BEFORE?
1 ☐ YES 2 ☐ NO
IF YES, FOR THE CONDITION IN ITEM 9a?
1 ☐ YES 2 ☐ NO

11. MEDICATION THERAPY THIS VISIT ☐ NONE
[Using brand or generic names, record all new and continued medications ordered, injected, administered, or otherwise provided at this visit. Include immunizing and desensitizing agents]

a. FOR PRINCIPAL DIAGNOSES IN ITEM 9a.	b. FOR ALL OTHER REASONS.
1.	1.
2.	2.
3.	3.
4.	4.

12. NON-MEDICATION THERAPY *[Check all services ordered or provided this visit]*
1 ☐ NONE
2 ☐ PHYSIOTHERAPY
3 ☐ OFFICE SURGERY
4 ☐ FAMILY PLANNING
5 ☐ PSYCHOTHERAPY/ THERAPEUTIC LISTENING
6 ☐ DIET COUNSELING
7 ☐ FAMILY/SOCIAL COUNSELING
8 ☐ MEDICAL COUNSELING
9 ☐ OTHER *(Specify)* _____

13. WAS PATIENT REFERRED FOR THIS VISIT BY ANOTHER PHYSICIAN?
1 ☐ YES
2 ☐ NO

14. DISPOSITION THIS VISIT *[Check all that apply]*
1 ☐ NO FOLLOW-UP PLANNED
2 ☐ RETURN AT SPECIFIED TIME
3 ☐ RETURN IF NEEDED, P.R.N.
4 ☐ TELEPHONE FOLLOW-UP PLANNED
5 ☐ REFERRED TO OTHER PHYSICIAN
6 ☐ RETURNED TO REFERRING PHYSICIAN
7 ☐ ADMIT TO HOSPITAL
8 ☐ OTHER *(Specify)* _____

15. DURATION OF THIS VISIT *[Time actually spent with physician]*
_____ Minutes

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Appendix IV
American Hospital Formulary Service classification system and therapeutic category codes

AMERICAN HOSPITAL FORMULARY SERVICE CLASSIFICATION SYSTEM AND THERAPEUTIC CATEGORY CODES (AHFS#)

(Classifications in parentheses are provisional but may be used in DPIF)

AMERICAN
HOSPITAL
FORMULARY
SERVICE
CLASSIFICATION
SYSTEM

04:00 ANTIHISTAMINE DRUGS

08:00 ANTI-INFECTIVE AGENTS
08:04 Amebacides
08:08 Anthelmintics
08:12 Antibiotics
08:12.02 Aminoglycosides
08:12.04 Antifungal Antibiotics
08:12.06 Cephalosporins
08:12.08 Chloramphenicol
08:12.12 Erythromycins
08:12.16 Penicillins
08:12.24 Tetracyclines
08:12.24 Other Antibiotics
08:16 Antituberculosis Agents
08:18 Antivirals
08:20 Plasmodicides
08:24 Sulfonamides
08:26 Sulfones
08:28 Treponemicides
08:32 Trichomonacides
08:36 Urinary Germicides
08:40 Other Anti-Infective

10:00 ANTINEOPLASTIC AGENTS

12:00 AUTONOMIC DRUGS
12:04 Parasympathomimetic Agents
12:08 Parasympatholytic Agents
12:12 Sympathomimetic Agents
12:16 Sympatholytic Agents
12:20 Skeletal Muscle Relaxants

16:00 BLOOD DERIVATIVES

20:00 BLOOD FORMATION AND COAGULATION
20:04 Antianemia Drugs
20:04.04 Iron Preparations
20:04.08 Liver and Stomach Preparations
20:12 Coagulants and Anticoagulants
20:12.04 Anticoagulants
20:12.08 Antiheparin Agents
20:12.12 Coagulants
20:12.16 Hemostatics
20:40 Thrombolytic Agents

24:00 CARDIOVASCULAR DRUGS
24:04 Cardiac Drugs
24:06 Antilipemic Agents
24:08 Hypotensive Agents
24:12 Vasodilating Agents
24:16 Sclerosing Agents

28:00 CENTRAL NERVOUS SYSTEM DRUGS
28:04 General Anesthetics
28:08 Analgesics and Antipyretics
28:10 Narcotic Antagonists
28:12 Anticonvulsants
28:16 Psychotherapeutic Agents
28:16.04 Antidepressants
28:16.08 Tranquilizers
28:16.12 Other Psychotherapeutic Agents
28:20 Respiratory and Cerebral Stimulants
28:24 Sedatives and Hypnotics

36:00 DIAGNOSTIC AGENTS
36:04 Adrenocortical Insufficiency
36:08 Amyloidosis
36:12 Blood Volume
36:16 Brucellosis
36:18 Cardiac Function
36:24 Circulation Time
36:25 (Cystic Fibrosis)
36:26 Diabetes Mellitus
36:28 Diphtheria
36:30 Drug Hypersensitivity
36:32 Fungi
36:34 Gallbladder Function
36:36 Gastric Function
36:38 Intestinal Absorption
36:40 Kidney Function
36:44 Liver Function
36:48 Lymphogranuloma Venereum
36:52 Mumps
36:56 Myasthenia Gravis
36:60 Myxedema
36:61 Pancreatic Function
36:62 Phenylketonuria
36:64 Pheochromocytoma
36:66 Pituitary Function
36:68 Roentgenography
36:72 Scarlet Fever
36:76 Sweating
36:78 (Thyroid Function)
36:80 Trichinosis
36:84 Tuberculosis
36:88 Urine Contents

40:00 ELECTROLYTIC, CALORIC, AND WATER BALANCE
40:04 Acidifying Agents
40:08 Alkalinizing Agents
40:10 Ammonia Detoxicants
40:12 Replacement Solutions
40:16 Sodium-Removing Resins
40:18 Potassium-Removing Resins
40:20 Caloric Agents
40:24 Salt and Sugar Substitutes
40:28 Diuretics
40:36 Irrigating Solutions
40:40 Uricosuric Agents

44:00 ENZYMES

48:00 EXPECTORANTS AND COUGH PREPARATIONS

52:00 EYE, EAR, NOSE AND THROAT PREPARATIONS
52:04 Anti-Infectives
52:04.04 Antibiotics
52:04.06 Antivirals
52:04.08 Sulfonamides
52:04.12 Misc. Anti-Infectives
52:08 Anti-Inflammatory Agents
52:10 Carbonic Anhydrase Inhibitors
52:12 Contact Lens Solutions
52:16 Local Anesthetics
52:20 Miotics
52:24 Mydriatics
52:28 Mouth Washes and Gargles
52:32 Vasoconstrictors
52:36 Unclassified Agents

56:00 GASTROINTESTINAL DRUGS
56:04 Antacids and Adsorbents
56:08 Anti-Diarrhea Agents
56:10 Antiflatulents
56:12 Cathartics and Laxatives
56:16 Digestants
56:20 Emetics and Anti-Emetics
56:24 Lipotropic Agents
56:40 Misc. GI Drugs

60:00 GOLD COMPOUNDS

64:00 HEAVY METAL ANTAGONISTS

68:00 HORMONES AND SYNTHETIC SUBSTITUTES
68:04 Adrenals
68:08 Androgens
68:12 Contraceptives
68:16 Estrogens
68:18 Gonadotropins
68:20 Insulins and Anti-Diabetic Agents
68:20.08 Insulins
68:24 Parathyroid
68:28 Pituitary
68:32 Progestogens
68:34 Other Corpus Luteum Hormones
68:36 Thyroid and Antithyroid

72:00 LOCAL ANESTHETICS

76:00 OXYTOCICS

78:00 RADIOACTIVE AGENTS

80:00 SERUMS, TOXOIDS AND VACCINES
80:04 Serums
80:08 Toxoids
80:12 Vaccines

84:00 SKIN AND MUCOUS MEMBRANE PREPARATIONS
84:04 Anti-Infectives
84:04.04 Antibiotics
84:04.08 Fungicides
84:04.12 Scabicides and Pediculicides
84:04.16 Misc. Local Anti-Infectives
84:06 Anti-Inflammatory Agents
84:08 Antipruritics and Local Anesthetics
84:12 Astringents
84:16 Cell Stimulants and Proliferants
84:20 Detergents
84:24 Emollients, Demulcents and Protectants
84:24.04 Basic Lotions and Liniments
84:24.08 Basic Oils and Other Solvents
84:24.12 Basic Ointments and Protectants
84:24.16 Basic Powders and Demulcents
84:28 Keratolytic Agents
84:32 Keratoplastic Agents
84:36 Miscellaneous Agents
84:50 Pigmenting & Depigmenting Agents
84:50.04 Depigmenting Agents
84:50.06 Pigmenting Agents
84:80 Sunscreen Agents

86:00 SPASMOLYTIC AGENTS

88:00 VITAMINS
88:04 Vitamin A
88:08 Vitamin B Complex
88:12 Vitamin C
88:16 Vitamin D
88:20 Vitamin E
88:24 Vitamin K Activity
88:28 Multivitamin Preparations

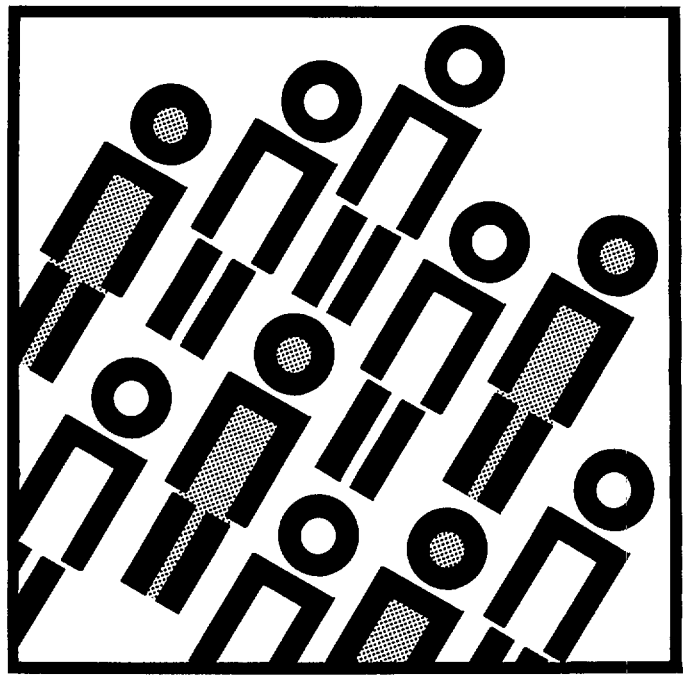
92:00 UNCLASSIFIED THERAPEUTIC AGENTS

94:00 (DEVICES)

96:00 (PHARMACEUTIC AIDS)

Health of the Low Income Child...

Report Profiles Health Care of Poor Children



Medicaid coverage does affect the health care of children from low-income families, according to *Insurance Coverage and Ambulatory Medical Care of Low-Income Children; United States, 1980.* The publication provides a profile of these children, their insurance coverage, use of health services, and expenditures for physician visits. The report also presents data on potential access to medical care, such as the presence and convenience of regular sources of care.

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