Adverse drug effects in hospitalized elderly: Data from the Healthcare Cost and Utilization Project

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Abstract: We aimed to analyze trends in hospital admissions due to adverse drug effects between the years 2000 to 2007 among the elderly using the National Inpatient Sample (NIS) of the Healthcare Cost and Utilization Project. We identified the discharges with the principal and all listed diagnoses related to adverse drug effects and associated hospital charges using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9) codes. Between 2000 and 2007, 321,057 patients over 65 years were discharged with a principal diagnosis related to an adverse drug effect. Hospital charges were $5,329,276,300 or $666,159,537 annual cost. The number of discharges and total hospital charges did not change over the examined years, while mean charge per discharge increased on average by $1064 ± 384 per year. Total hospital charges for drug-induced gastritis with hemorrhage increased the most by $11,206,555 per year among those 66–84 years old and by $8,646,456 per year among those older than 85 years. During 2007, 791,931 elderly had adverse treatment effects among all listed diagnoses with hospital charges of $937,795,690. Effective drug management interventions are needed to improve safety of treatments in the elderly.

Keywords: adverse drug reaction reporting systems, aged, hospitalization, international classification of diseases

Introduction
Adverse drug events result in hospital admissions, increased costs, and poor quality of health care.1 Prevention of adverse treatment effects is essential for improving patient safety and quality of care.2 With $2.5 trillion in annual spending for healthcare in the US, adverse treatment effects contribute to unnecessary and preventable cost.3 Hospital admissions due to adverse drug effects can be prevented with high quality care.4 Aging patients are most vulnerable to multimorbid conditions and polypharmacy.4 However, hospital admissions for adverse drug events among elderly have not been evaluated in relation to quality of care. We aimed to examine frequency and hospital charges of adverse treatment effects among elderly using the National Inpatient Sample (NIS) of the Healthcare Cost and Utilization Project.5

Methods
We analyzed total number of discharges with a principal diagnosis of adverse drug events in 2000–2007. We defined elderly inpatients in two age categories: 65–84 and ≥85 years of age. Principal diagnoses as the reasons for admission were identified using codes of the International Classification of Diseases, ninth Revision, Clinical Modification (ICD-9-CM), see Appendix Table 1).6,7 We defined adverse drug effects as
Table 1 Total number of discharges with ICD-9-CM principal diagnosis of adverse drug effects in elderly in the US in 2000–2007

| ICD-9-CM | Principal diagnosis                                                                 | Discharges | Total cost ($) |
|----------|-------------------------------------------------------------------------------------|------------|----------------|
| 535.40   | Specified gastritis without mention of hemorrhage                                   | 57786      | 860,998,714    |
| 535.41   | Specified gastritis with hemorrhage                                                 | 87807      | 1,572,983,700  |
| 962.3    | Poisoning by insulins and anti diabetic agents, aceto hexamide, biguanide derivatives, oral, chlorpropamide, glucagon, insulin, phenformin | 15319      | 188,311,752    |
| 962.7    | Poisoning by thyroid and thyroid derivatives, dextrothryoxin, levothyroxine sodium, iodothyronine, thyroglobulin | 255        | 2,413,273      |
| 963.0    | Poisoning by antiallergic and antiemetic drugs, antihistamines, chlorpheniramine, diphenhydramine, diphenylpyraline, thonzylamine, tripenamamine | 803        | 8,633,615      |
| 963.1    | Poisoning by antineoplastic and immunosuppressive drugs, azathioprine, busulfan, chlorambucil, cyclophosphamide, cytarbine, fluorouracil | 209        | 4,110,450      |
| 964.2    | Poisoning by anticoagulants, coumarin, heparin, phenindione, warfarin sodium         | 12358      | 177,192,573    |
| 965.00   | Poisoning by opium (alkaloids), unspecified                                         | 2888       | 56,110,222     |
| 965.02   | Poisoning by methadone                                                              | 1323       | 26,343,332     |
| 965.09   | Poisoning by opiates and related narcotics other, meperidine (pethidine), morphine   | 12583      | 217,660,115    |
| 965.1    | Poisoning by salicylates, acetylsalicylic acid (aspirin), salicylic acid salts      | 2950       | 49,525,273     |
| 965.4    | Poisoning by aromatic analgesics, not elsewhere classified, acenazilid, paracetamol (acetaminophen), phenacetin (acetophenetidin) | 5469       | 109,796,708    |
| 965.61   | Poisoning by propionic acid derivatives, fenoprofen, flurbiprofen, ibuprofen, ketoprofen, naproxen, oxaprozin | 229        | 2,148,674      |
| 965.8    | Poisoning by other specified analgesics and antipyretics, pentazocine               | 3443       | 59,098,750     |
| 965.9    | Poisoning by unspecified analgesic and antipyretic                                  | 586        | 6,430,193      |
| 966.1    | Poisoning by hydantoins derivatives, phenytoin                                      | 3778       | 47,403,049     |
| 966.3    | Poisoning by other and unspecified anticonvulsants                                 | 1969       | 22,563,220     |
| 966.4    | Poisoning by anti-Parkinsonism drugs, amantadine, ethopropazine, (profenamine), levodopa (L-dopa) | 522        | 4,671,189      |
| 967.0    | Poisoning by barbiturates, amobarbital (amylobarbitone), barbital (barbitone), butabarbital (butabarbitone), pentobarbital (pentobarbitone), phenobarbital (phenobarbitone) | 870        | 14,641,286     |
| 967.8    | Poisoning by other sedatives and hypnotics                                         | 6162       | 87,972,831     |
| 967.9    | Poisoning by unspecified sedative or hypnotic, sleeping, drug NOS, pill NOS, tablet NOS | 2191       | 33,068,947     |
| 968.0    | Poisoning by central nervous system muscle-tone depressants, chlorphenesin (carbamate), mephenesin, methocarbamol | 552        | 5,517,789      |
| 968.5    | Poisoning by surface (topical) and infiltration anesthetics, cocaine, lidocaine (lignocaine), procaine, tetracaine | 78         | 946,598        |
| 969.0    | Poisoning by antidepressants, amitriptyline, imipramine, monoamine oxidase (MAO) inhibitors | 5962       | 93,815,748     |
| 969.1    | Poisoning by phenothiazine-based tranquillizers, chlorpromazine, fluphenazine, proclorperazine, promazine | 53         | 235,756        |
| 969.3    | Poisoning by other antipsychotics, neuroleptics, and major tranquillizers           | 1482       | 22,016,443     |
| 969.4    | Poisoning by benzodiazepine-based tranquillizers, chlordiazepoxide, diazepam, flurazepam, lorazepam, medazepam, nitrazepam | 19446     | 328,528,129    |
| 969.5    | Poisoning by other tranquillizers, hydroxyzine, meprobamate                         | 301        | 1,910,136      |
| 969.8    | Poisoning by other specified psychotropic agents                                    | 1511       | 22,890,849     |
| 970.8    | Poisoning by other specified central nervous system stimulants                      | 660        | 12,158,791     |
| 971.3    | Poisoning by sympathetics (antidrenergics), phenoxybenzamine, tofazoline hydrochloride | 864        | 10,867,698     |
| 972.0    | Poisoning by cardiac rhythm regulators, practolol, procainamide, propranolol, quinidine | 1250       | 14,339,989     |

(Continued)
Table 1 (Continued)

| ICD-9-CM | Principal diagnosis                                                                 | Discharges | Total cost ($)   |
|----------|--------------------------------------------------------------------------------------|------------|-----------------|
| 972.1    | Poisoning by cardiotonic glycosides and drugs of similar action, digoxin, glycosides, digoxin, strophanthin | 8534       | 119,955,030     |
| 972.4    | Poisoning by coronary vasodilators, dipyridamole, nitrates (nitroglycerin), nitrates | 2313       | 33,649,395      |
| 972.6    | Poisoning by other antihypertensive agents, guanethidine, rauwolfia alkaloids, reserpine | 5705       | 69,053,555      |
| 972.9    | Poisoning by other and unspecified agents primarily affecting the cardiovascular system | 2138       | 27,653,973      |
| 974.3    | Poisoning by saluretics, benzothiadiazides, chlorothiazide group                     | 96         | 1,484,756       |
| 974.4    | Poisoning by other diuretics, ethacrynic acid, furosemide                           | 1922       | 18,037,222      |
| 975.2    | Poisoning by skeletal muscle relaxants                                              | 269        | 3,640,433       |
| 977.8    | Poisoning by other specified drugs and medicinal substances, diagnostic agents and kits | 3825       | 54,184,255      |
| Total    | All diagnoses                                                                        | 321,057    | 5,329,276,300   |

Notes: *HCUPhet, Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, Rockville, MD. (http://hcupnet.ahrq.gov/)

Abbreviation: NOS, not otherwise specified.

poisoning due to inappropriate uses or medication errors (eg, wrong medication, wrong patient, overdose) and as an adverse drug reaction.\(^8\) We did not analyze clinical side effects including drug-induced psychoses (ICD codes 10 292.0–292.9) or dermatitis (ICD codes 5 692.3, 692.9, 693.0, 693.8, 693.9).\(^8\) We identified all listed diagnoses of adverse treatment effects that coexisted at the time of admission, or that developed during the stay in 2007 using ICD-9-CM codes\(^6\) (Appendix Table 2). We analyzed mean hospital charges\(^7\) as the amount the hospital charged for the entire hospital stay for each ICD code. We multiplied the number of discharges by the mean hospital charge to calculate total hospital charges for each ICD code for each year and for the total time period from 2000 to 2007. We analyzed time trend in discharges and hospital charges with years as a continuous variable. We used restricted maximum likelihood (REML) estimation methods and –2 Res Log Likelihood Fit Statistics with mixed procedure\(^8\) in SAS. All calculations were performed at 95% confidence levels using a two-sided \(P\) value with SAS software.\(^9\)

**Results**

During the period between 2000 and 2007, 321,057 hospital admissions among the elderly had principal diagnoses of adverse drug effects (Table 1). Total hospital charges were $5,329,276,300 or $666,159,537 per year.

Drug-induced gastritis with hemorrhage (87,807 discharges) and without mention of hemorrhage (57,786 discharges) constituted 31% and 21% of all drug-induced hospitalizations, respectively. Poisoning by benzodiazepine-based tranquilizers, insulins, antidiabetic agents, and anticoagulants contributed to 5% or more of drug-induced hospitalizations in the elderly.

Hospital charges for gastritis with hemorrhage ($1,572,983,700 or 36% of all hospital charges), gastritis without mention of hemorrhage ($860,998,714 or 20% of all hospital charges), for poisoning by benzodiazepine-based tranquilizers ($328,528,129 or 8% of all hospital charges), and for poisoning by opiates ($217,660,115 or 5% of all hospital charges) were the largest drug-induced charges among elderly patients.

Total number of hospital admissions due to adverse drug effects increased from 36,199 in 2000 to 42,057 in 2007 (Figure 1). Total hospital charges increased from $393,618,776 in 2000 to $905,776,719 in 2007 (Figure 2).

Elderly patients constituted more than 50% of all admissions due to poisoning by anticoagulants and cardiotonics. Half of all hospital admissions with a principal diagnosis of poisoning by an anti-Parkinsonism drug or drug-induced gastritis with hemorrhage occurred in elderly patients.

The number of discharges and total hospital charges did not change over the examined years (\(P\) values for trend 0.61 and 0.11, respectively) while the mean charge per discharge increased on average by $1064 ± 384 per year (\(P\) value for trend 0.006).

Hospital admissions due to drug-induced gastritis and due to poisoning by glycosides decreased during 2000–2007 (Table 2). Hospital admissions due to poisoning by opiates
or insulin and antidiabetic agents increased in the examined time period (Table 2).

Mean hospital charges increased significantly for poisoning by methadone and salicylates. Hospital charges in elderly who were hospitalized for drug-induced gastritis with hemorrhage increased by $19,853,011 per year. Hospital charges for patients aged 65–84 who were hospitalized for insulin poisoning and antidiabetic agents increased by $4,600,443 per year (Table 2).

All listed diagnoses related to adverse treatment effects in elderly in 2007 constituted 791,931 discharges and $937,795,690 hospital charges (Table 3). Adverse effects

Figure 1 Trend in total number of elderly discharged with ICD-9-CM principal diagnosis of adverse drug effect in the US for 2000–2007.*

*HCUPnet, Healthcare Cost and Utilization Project. Agency for Healthcare Research and Quality, Rockville, MD. (http://hcupnet.ahrq.gov/)

Figure 2 Trend in total cost for discharged elderly with a ICD-9-CM principal diagnosis of adverse drug effects in the US for 2000–2007.*

*HCUPnet, Healthcare Cost and Utilization Project. Agency for Healthcare Research and Quality, Rockville, MD. (http://hcupnet.ahrq.gov/)
| Code                                                                 | Age        | Change per year | Lower 95% CI | Upper 95% CI |
|----------------------------------------------------------------------|------------|-----------------|--------------|--------------|
| Total number of discharges                                           |            |                 |              |              |
| Poisoning by opiates and related narcotics other; meperidine         | 65–84      | 131             | 55           | 207          |
| (pethidine), morphine                                               | 85+        | 109             | 38           | 181          |
| Specified gastritis with hemorrhage                                  | 85+        | –91             | –162         | –20          |
| Specified gastritis without mention of hemorrhage                    | 85+        | –86             | –157         | –15          |
| Poisoning by cardiotonic glycosides and drugs of similar action,    |            |                 |              |              |
| digitalsis glycosides, digoxin, strophanthins                        | 85+        | –86             | –157         | –15          |
| Poisoning by insulins and anti diabetic agents, cetohexamidine,     | 65–84      | 88              | 12           | 164          |
| biguanide derivatives, oral, chlorpropamide, glucagon, insulin,     |            |                 |              |              |
| phenformin                                                          |            |                 |              |              |
| Mean hospital charges, $                                             |            |                 |              |              |
| Poisoning by methadone                                              | 65–84      | $1,583          | $465         | $2,701       |
| Poisoning by salicylates, acetylsalicylic acid (aspirin), salicylic | 65–84      | $1,229          | $225         | $2,233       |
| acid salts                                                          | 85+        | $1,006          | $63          | $1,948       |
| Poisoning by opium (alkaloids), unspecified                          | 65–84      | $1,291          | $36          | $2,546       |
| Total hospital charges, $                                            |            |                 |              |              |
| Specified gastritis without mention of hemorrhage                    | 65–84      | $7,646,061      | $5,589,408   | $9,702,715   |
| 85+                                                                | $5,105,871 |                 | $3,183,223   | $7,028,519   |
| Specified gastritis with hemorrhage                                  | 65–84      | $4,600,443      | $2,543,790   | $6,657,096   |
| 85+                                                                | $3,035,785 |                 | $1,113,137   | $4,958,433   |
| Poisoning by insulins and anti diabetic agents, cetohexamidine,     |            |                 |              |              |
| biguanide derivatives, oral, chlorpropamide, glucagon, insulin,     | 65–84      | $6,502,314      | $4,422,840   | $8,581,789   |
| phenformin                                                          | 85+        | $3,990,380      | $2,035,223   | $5,945,538   |
| Poisoning by benzodiazepine-based tranquilizers, chlordiazepoxide,  | 65–84      | $5,551,331      | $3,494,877   | $7,608,184   |
| diazepam, flurazepam, lormazepam, medazepam, nitrazepam             | 85+        | $3,912,772      | $1,807,026   | $3,564,249   |
| Poisoning by medicinal agents, not specified                         | 65–84      | $2,498,657      | $1,910,589   | $3,086,724   |
| 85+                                                                | $2,890,757 |                 | $1,834,103   | $5,947,410   |
| Poisoning by aromatic analgesics, not elsewhere classified,         | 65–84      | $3,564,249      | $1,507,595   | $5,620,902   |
| acetaminilid, paracetamol (acetaminophen), phencetin (acetophenetidin) | 85+        | $3,354,306      | $1,297,653   | $5,410,959   |
| Poisoning by anticoagulants, coumarin, heparin, phenindione,         |            |                 |              |              |
| warfarin sodium                                                     | 65–84      | $2,753,695      | $533,314     | $4,954,075   |
| 85+                                                                | $2,649,658 |                 | $522,619     | $4,776,698   |
| Poisoning by other antihypertensive agents, guanethidine, rauwolfia |            |                 |              |              |
| alkaloids, reserpine                                                | 65–84      | $2,619,376      | $547,870     | $4,690,883   |
| Poisoning by benzodiazepine-based tranquilizers, chlordiazepoxide,  | 85+        | $3,035,785      | $1,113,137   | $4,958,433   |
| diazepam, flurazepam, lorazepam, medazepam, nitrazepam              |            |                 |              |              |
| Poisoning by opium (alkaloids), unspecified                          | 65–84      | $4,019,466      | $1,430,863   | $6,608,070   |
| Poisoning by unspecified sedative or hypnotic, sleeping drug NOS,   | 65–84      | $2,824,729      | $680,482     | $4,968,976   |
| pill NOS, tablet NOS                                                | 85+        | $2,619,376      | $547,870     | $4,690,883   |
| Poisoning by salicylates, acetylsalicylic acid (aspirin), salicylic | 65–84      | $2,753,695      | $533,314     | $4,954,075   |
| acid salts                                                          | 85–84      | $2,649,658      | $522,619     | $4,776,698   |
| Poisoning by other specified analgesics and antipyretics, pentazocine | 65–84      | $2,531,952      | $465,643     | $4,598,262   |
| Poisoning by hydantoin derivatives, phenytoin                       | 65–84      | $2,632,369      | $473,890     | $4,790,848   |

(Continued)
Table 2 (Continued)

| Code                                                                 | Age   | Change per year | Lower 95% CI  | Upper 95% CI  |
|----------------------------------------------------------------------|-------|-----------------|---------------|--------------|
| Poisoning by other diuretics, ethacrynic acid, furosemide            | 65–84 | $2,604,287      | $432,360      | $4,776,214   |
| Poisoning by other and unspecified agents primarily affecting the cardiovascular system | 65–84 | $2,615,983      | $426,308      | $4,805,659   |
| Poisoning by cardiotonic glycosides and drugs of similar action, digitals glycosides, digoxin, strophanthins | 65–84 | $2,372,342      | $315,689      | $4,428,996   |
| Poisoning by insulins and antidiabetic agents, acetohexamide, biguanide derivatives, oral, chlorpropamide, glucagon, insulin, phenformin | 85+  | $2,093,655      | $171,007      | $4,016,303   |
| Poisoning by coronary vasodilators, dipyrindamole, nitrates (nitroglycerin), nitrates | 65–84 | $2,282,972      | $177,226      | $4,388,718   |

Abbreviation: NOS, not otherwise specified.

*HCUPnet, Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, Rockville, MD. (http://hcupnet.ahrq.gov/)

of anticoagulants were experienced by 94,793 patients 65–84 years (55.65% of all discharged with this diagnosis) and 31,807 inpatients older than 85 years (19% of all discharged with this diagnosis). Total hospital charges for adverse effects of anticoagulants in 2007 in elderly were $404,165,145 and $47,642,222 in the two age categories, respectively. Adverse effects of diuretics in 2007 afflicted 29,655 elderly patients, with total hospital charges of $46,906,127. Adverse effects of corticosteroids afflicted 87,454 adults 65–84 years of age (41% of all discharged with this diagnosis) with a total hospital charge of $317,339,123. Much less expected was a large number of elderly with unspecified adverse drug effects. In 2007, 27,976 elderly experienced adverse drug effects with unknown definitive cause. Total hospital charges for such unspecified adverse drug effects were $35,520,572.

Discussion
Hospital admissions due to adverse drug effects are common. While the rate of admissions remained the same during the study period, costs continued to increase. Several pharmacologic groups including antidiabetic drugs, anticoagulants, cardiotonics, saluretics, and anti-inflammatory medications are responsible for the most common adverse events in the elderly. Hospital charges are substantial when all listed diagnoses related to adverse drug effects in the elderly are analyzed.

We did not analyze probable variability of adverse drug effects among geographical regions, types of hospitals, or patient income. Such variability may be associated with differences in hospital admission and charges but does not decrease the significance of the problem of very common and costly adverse drug events in the elderly. We could not judge the validity of hospital discharge codes in identifying drug-specific adverse effects. Previous studies have demonstrated poor predictive value of hospital discharge codes in identifying drug adverse effects.

Hospital admissions due to adverse drug effects may reflect inadequate drug management in outpatient settings that cannot be analyzed using the National Inpatient Sample. Outpatient clinical pharmacology services may reduce adverse drug events in elderly, but preventive effects on hospital admissions are not clear. Effective drug management interventions are needed to improve safety of treatments in elderly.

Table 3 Hospitalization with ICD9-CM all-listed diagnosis codes of adverse treatment effects in elderly, 2007*

| Principal diagnosis                                              | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|------------------------------------------------------------------|-------------|----------------------------|-----------------------------------|-------------------|-----------|
| Accidental poisoning by methadone                                | 65–84       | 271                        | 6.30%                             | 37                | 10,063    |
| Accidental poisoning by other opiates and related narcotics, morphine, opium (alkaloids) | 65–84       | 3,984                      | 21.80%                            | 196               | 781,447   |
| Accidental poisoning by salicylates, acetylsalicylic acid (aspirin), salicylic acid salts, amino derivatives of salicylic acid | 85+         | 546                        | 2.99%                             | 56                | 30,546    |
|                                                                   | 65–84       | 248                        | 13.72%                            | 37                | 9,149     |
|                                                                   | 85+         | 80                         | 4.43%                             | 21                | 1,698     |

(Continued)
### Table 3 (Continued)

| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|-------------------------------------------------------------------------------------|-------------|----------------------------|-----------------------------------|------------------|------------|
| Accidental poisoning by aromatic analgesics, not elsewhere classified, acetanilid,  |              |                            |                                    |                  |            |
| paracetamol (acetaminophen), phenacetin (acetophenetidin)                           | 65–84       | 631                        | 8.67                              | 60               | 38,183     |
|                                                                                     | 85+         | 78                         | 1.08                              | 20               | 1,531      |
| Accidental poisoning by anti-inflammatories (anti-infectives), gold salts, indomethacin, | 65–84       | 93                         | 10.08                             | 22               | 1,998      |
| Accidental poisoning by other specified analgesics and antipyretics, pentazocine   | 65–84       | 747                        | 26.65                             | 62               | 46,351     |
|                                                                                     | 85+         | 148                        | 5.27                              | 28               | 4,109      |
| Accidental poisoning by unspecified analgesic or antipyretic                        | 65–84       | 127                        | 25.19                             | 25               | 3,185      |
| Accidental poisoning by barbiturates                                               | 65–84       | 117                        | 11.22                             | 24               | 2,821      |
| Accidental poisoning by other specified sedatives and hypnotics                    | 65–84       | 810                        | 25.87                             | 92               | 55,549     |
|                                                                                     | 85+         | 174                        | 5.55                              | 31               | 5,316      |
| Accidental poisoning by unspecified sedative or hypnotic, sleeping drug NOS, pill NOS, | 65–84       | 853                        | 27.79                             | 70               | 59,915     |
| tablet NOS                                                                           | 85+         | 121                        | 3.94                              | 26               | 3,103      |
| Accidental poisoning by benzodiazepine-based tranquilizers, chlordiazepoxide, diazepam, | 65–84       | 2,378                      | 15.08                             | 123              | 293,373    |
| flurazepam, lorazepam, medazepam, nitrazepam                                        | 85+         | 336                        | 2.13                              | 40               | 13,516     |
| Accidental poisoning by other specified tranquilizers, hydroxyzine, meprobamate    | 65–84       | 308                        | 8.91                              | 42               | 12,890     |
|                                                                                     | 85+         | 68                         | 1.96                              | 19               | 1,253      |
| Accidental poisoning by antidepressants, amitriptyline, imipramine, monoamine oxidase | 65–84       | 542                        | 11.61                             | 55               | 29,870     |
| (MAO) inhibitors                                                                    | 85+         | 113                        | 2.42                              | 23               | 2,639      |
| Accidental poisoning by psychostimulants, caffeine                                  | 65–84       | 58                         | 2.21                              | 17               | 992        |
| Accidental poisoning by central nervous system stimulants, analeptics, opiate antagonists | 65–84       | 307                        | 2.75                              | 54               | 16,439     |
| Accidental poisoning by other psychotropic agents                                   | 65–84       | 145                        | 17.50                             | 30               | 4,278      |
| Accidental poisoning by anticonvulsant and anti-Parkinsonism drugs, amantadine, hydantoin | 65–84       | 998                        | 20.90                             | 84               | 83,967     |
| derivatives, oxazolidine derivatives (paramethadione, trimethadione)                | 85+         | 216                        | 4.52                              | 33               | 7,043      |
| Accidental poisoning by other central nervous system depressants, ether, gaseous    | 65–84       | 188                        | 6.59                              | 33               | 6,120      |
| anesthetics, halogenated hydrocarbon derivatives, intravenous anesthetics, thiobarbiturates |           |                            |                                    |                  |            |
| Accidental poisoning by parasympathomimetics (cholinergics), acetylcholine, pilocarpine, | 65–84       | 94                         | 60.57                             | 22               | 2,076      |
| anticholinesterase: organophosphorus, reversible                                    | 85+         | 250                        | 45.94                             | 37               | 9,184      |
|                                                                                     | 85+         | 70                         | 12.95                             | 19               | 1,317      |
| Accidental poisoning by sympathetics (antiadrenergics), phenoxybenzamine, tolzoline hydrochloride | 65–84       | 158                        | 28.60                             | 28               | 4,458      |
|                                                                                     | 85+         | 79                         | 28.19                             | 20               | 1,557      |
| Accidental poisoning by antibiotics                                                | 65–84       | 2,748                      | 39.98                             | 171              | 468,595    |
|                                                                                     | 85+         | 677                        | 9.86                              | 70               | 47,416     |
| Accidental poisoning by primarily systemic agents                                   | 65–84       | 403                        | 18.92                             | 52               | 20,871     |
| Accidental poisoning by agents primarily affecting blood constituents               | 65–84       | 1,656                      | 49.74                             | 110              | 182,285    |
|                                                                                     | 85+         | 509                        | 15.28                             | 56               | 28,301     |
| Accidental poisoning by agents primarily affecting cardiovascular system           | 65–84       | 2,658                      | 41.14                             | 139              | 370,247    |
|                                                                                     | 85+         | 874                        | 13.52                             | 76               | 66,654     |
|                                                                                     | 65–84       | 203                        | 35.52                             | 33               | 6,784      |
Table 3 (Continued)

| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|------------------------------------------------------------------------------------|-------------|----------------------------|-----------------------------------|------------------|------------|
| Accidental poisoning by agents primarily affecting gastrointestinal system          | 85+         | 63                         | 10.94                             | 17               | 1,086      |
| Accidental poisoning by water, mineral, and uric acid metabolism drugs              | 65–84       | 841                        | 44.72                             | 70               | 59,154     |
| Accidental poisoning by agents primarily acting on the smooth and skeletal muscles and respiratory system | 85+         | 246                        | 13.08                             | 37               | 9,144      |
| Accidental poisoning by agents primarily affecting skin and mucous membrane, ophthalmologic, otolaryngologic, and dental drugs | 65–84       | 348                        | 16.68                             | 45               | 15,792     |
| Accidental poisoning by other specified drugs, central appetite depressants         | 85+         | 152                        | 5.61                              | 26               | 4,033      |
| Accidental poisoning by unspecified drug                                           | 65–84       | 697                        | 25.78                             | 66               | 46,298     |
| Accidental cut, puncture, perforation, or hemorrhage during surgical operation     | 85+         | 1,318                      | 3.71                              | 111              | 146,408    |
| Accidental cut, puncture, perforation, or hemorrhage during endoscopic examination | 85+         | 1,551                      | 49.30                             | 132              | 203,951    |
| Accidental cut, puncture, perforation, or hemorrhage during aspiration of fluid or tissue, puncture, and catheterization, abdominal paracentesis, aspirating needle biopsy, blood sampling | 85+         | 354                        | 11.24                             | 46               | 16,191     |
| Accidental cut, puncture, perforation, or hemorrhage during unspecified medical care | 65–84       | 11,833                     | 33.28                             | 890              | 10,531,148 |
| Accidental cut, puncture, perforation, or hemorrhage during heart catheterization | 85+         | 2,840                      | 39.14                             | 238              | 675,262    |
| Accidental cut, puncture, perforation, or hemorrhage during other specified medical care | 85+         | 602                        | 8.30                              | 65               | 39,207     |
| Accidental cut, puncture, perforation, or hemorrhage during unspecified medical care | 65–84       | 155                        | 30.32                             | 39               | 6,053      |
| Foreign object left in body during surgical operation                              | 65–84       | 268                        | 30.35                             | 38               | 10,139     |
| Foreign object left in body during other specified procedures                      | 65–84       | 102                        | 29.11                             | 23               | 2,378      |
| Mechanical failure of instrument or apparatus during surgical operation            | 65–84       | 93                         | 34.75                             | 23               | 2,145      |
| Mechanical failure of instrument or apparatus during other specified procedures     | 65–84       | 59                         | 34.92                             | 17               | 1,037      |
| Other specified misadventures during medical care, performance of inappropriate treatment | 65–84       | 1,845                      | 42.30                             | 184              | 340,133    |
| Unscheduled misadventure during medical care                                       | 85+         | 348                        | 7.99                              | 54               | 18,783     |
| Causing adverse effects, penicillins, natural, synthetic, semisynthetic, such as ampicillin, cloxacillin, nafcillin, oxacillin | 65–84       | 4,670                      | 30.60                             | 252              | 1,175,580  |
| Causing adverse effects, antifungal antibiotics                                     | 85+         | 1,316                      | 8.62                              | 104              | 136,598    |
| Causing adverse effects, tetracycline group, doxycycline, minocycline, oxytetracycline | 65–84       | 590                        | 7.92                              | 17               | 1,037      |
| Causing adverse effects, erythromycin and other macrolides, oleandomycin, spiramycin | 85+         | 1,340                      | 20.23                             | 53               | 24,351     |
| Causing adverse effects, tetracycline group, doxycycline, minocycline, oxytetracycline | 85+         | 86                         | 3.79                              | 20               | 1,722      |
| Causing adverse effects, erythromycin and other macrolides, oleandomycin, spiramycin | 85+         | 349                        | 9.35                              | 44               | 15,323     |
| Causing adverse effects, tetracycline group, doxycycline, minocycline, oxytetracycline | 85+         | 590                        | 20.23                             | 53               | 24,351     |
Table 3 (Continued)

| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|-------------------------------------------------------------------------------------|-------------|----------------------------|-----------------------------------|------------------|------------|
| Causing adverse effects, cephalosporin group, cepha-lexin, cephaloglycin, cephaloridine, cephalothin | 65–84       | 4,062                      | 32.11                             | 9.23             | 895,948    |
| Causing adverse effects, antituberculous anti-infectives, rifampicin, isoniazid, ethambutol, para-aminosalicylic acid derivatives | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, other and unspecified anti-infectives, flucytosine, nitrofurantoin derivatives | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, adrenal cortical steroids, cortisone derivatives, desoxycorticosterone derivatives, fluorinated corticosteroids | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, anterior pituitary hormones, corticotropin, gonadotropin, somatotropin (growth hormone) | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, posterior pituitary hormones, vasopressin, oxytocin derivatives | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, parathyroid and parathyroid derivatives | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, myasthenia gravis | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |
| Causing adverse effects, dystrophy and myopathy, rhabdomyolysis, myoglobinuria, myophagia | 65–84       | 3,406                      | 31.48                             | 11.26            | 669,035    |

(Continued)
| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|------------------------------------------------------------------------------------|-------------|-----------------------------|----------------------------------|------------------|------------|
| Causing adverse effects, antithyroid agents, iodides, thiouracil, thiourea        | 65–84       | 258                         | 29.95                            | 40               | 10,356     |
| Causing adverse effects, other and unspecified hormones and synthetic substitutes   | 65–84       | 67                          | 29.93                            | 18               | 1,205      |
| Causing adverse effects, antiallergic and antiemetic drugs, antihistamines,       | 65–84       | 3,152                       | 39.07                            | 190              | 600,190    |
| 85+                                                                               | 784         | 9.72                        | 72                               | 56,309           |
| Causing adverse effects, antineoplastic and immunosuppressive drugs, azathioprine,| 65–84       | 66,481                      | 39.53                            | 3,155            | 209,744,458|
| busulfan, chlorambucil, cyclophosphamide, cytarabine, fluouracil, mercaptopurine  | 85+         | 4,265                       | 784                              | 9.72             | 1,066,938  |
| Causing adverse effects, vitamins, not elsewhere classified, vitamin A, vitamin D,| 65–84       | 273                         | 41.89                            | 40               | 10,804     |
| 85+                                                                               | 69          | 10.57                       | 18                               | 1,253            |
| Causing adverse effects, iron and its compounds, ferric salts, ferrous sulphate,  | 65–84       | 591                         | 42.25                            | 61               | 36,204     |
| and other ferrous salts                                                           | 85+         | 178                         | 12.71                            | 30               | 5,321      |
| Causing adverse effects, liver preparations and other antianemic agents, folic acid| 65–84       | 131                         | 44.62                            | 34               | 4,392      |
| Causing adverse effects, anticoagulants, coumarin, heparin, phenindione, prothrom| 65–84       | 94,793                      | 55.65                            | 4,264            | 404,165,145|
| bininhibitor, warfarin sodium                                                      | 85+         | 31,807                      | 18.67                            | 1,498            | 47,642,222 |
| Causing adverse effects, fibrinolysis-affecting drugs, aminocaproic acid, strep| 65–84       | 557                         | 49.39                            | 65               | 36,211     |
| totinase, urokinase                                                              | 85+         | 122                         | 10.84                            | 25               | 3,102      |
| Causing adverse effects, anticoagulant antagonists and other coagulants, hexadim| 65–84       | 337                         | 48.37                            | 44               | 14,978     |
| ethrine bromide, protamine sulfate                                                | 85+         | 79                          | 11.38                            | 19               | 1,523      |
| Causing adverse effects, gamma globulin                                            | 65–84       | 257                         | 21.86                            | 42               | 10,677     |
| Causing adverse effects, natural blood and blood products, blood plasma, human   | 65–84       | 1,169                       | 33.15                            | 93               | 108,702    |
| fibrinogen                                                                        | 85+         | 247                         | 7.02                             | 39               | 9,713      |
| Causing adverse effects, other agents affecting blood constituents, macromolecu| 65–84       | 6,532                       | 52.09                            | 343              | 2,238,266  |
| lar blood substitutes                                                             | 85+         | 1,442                       | 11.50                            | 103              | 149,039    |
| Causing adverse effects, methadone                                                | 65–84       | 654                         | 26.60                            | 63               | 40,926     |
| 85+                                                                               | 95           | 3.86                        | 23                               | 2,157            |
| Causing adverse effects, other opiates and related narcotics                      | 65–84       | 31,794                      | 38.12                            | 1,619            | 51,469,617 |
| 85+                                                                               | 8,214       | 9.85                        | 481                              | 3,947,291        |
| Causing adverse effects, salicylates, acetylsalicylic acid (aspirin), amino deriv| 65–84       | 8,014                       | 49.30                            | 406              | 3,249,970  |
| 85+                                                                               | 2,560       | 15.75                       | 164                              | 418,634          |
| Causing adverse effects, aromatic analgesics, not elsewhere classified, acetanil| 65–84       | 2,970                       | 34.78                            | 177              | 525,204    |
| id, paracetamol (acetaminophen), phenacetin (acetophenetidin)                     | 85+         | 959                         | 11.24                            | 80               | 76,953     |
| Causing adverse effects, antirheumatics (antiphlogistics), gold salts, indometha| 65–84       | 5,638                       | 36.43                            | 325              | 1,833,789  |
| cin                                                | 85+         | 1,671                       | 10.80                            | 113              | 188,112    |
| Causing adverse effects, other non-narcotic analgesics, pyrabital                   | 65–84       | 992                         | 38.49                            | 87               | 85,998     |
| 85+                                                                               | 245          | 9.49                        | 38                               | 9,182            |
| Causing adverse effects, other specified analgesics and antipyretics, pentazocin| 65–84       | 10,507                      | 42.20                            | 588              | 6,177,953  |
| 85+                                                                               | 2,971        | 11.93                       | 200                              | 595,413          |

(Continued)
| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|------------------------------------------------------------------------------------|-------------|---------------------------|----------------------------------|------------------|------------|
| Causing adverse effects, unspecified analgesic and antipyretic                      | 65–84       | 13,539                    | 41.33                            | 645              | 8,728,366  |
|                                                                                     | 85+         | 3,513                     | 10.72                            | 206              | 725,273    |
| Causing adverse effects, hydantoin derivatives, phenytoin                          | 65–84       | 8,344                     | 35.40                            | 372              | 3,108,179  |
|                                                                                     | 85+         | 1,909                     | 8.10                             | 119              | 227,128    |
| Causing adverse effects, other and unspecified anticonvulsants, beclamide, primidone| 65–84       | 5,435                     | 29.28                            | 260              | 1,413,490  |
|                                                                                     | 85+         | 1,164                     | 6.27                             | 92               | 107,227    |
| Causing adverse effects, anti-Parkinsonism drugs, amantadine, ethopropazine (profenamine), Levodopa (L-dopa) | 65–84       | 2,458                     | 65.31                            | 149              | 365,998    |
|                                                                                     | 85+         | 632                       | 16.80                            | 71               | 44,735     |
| Causing adverse effects, barbiturates                                             | 65–84       | 202                       | 16.94                            | 30               | 6,161      |
|                                                                                     | 85+         | 57                        | 4.76                             | 16               | 933        |
| Causing adverse effects, other sedatives and hypnotics                             | 65–84       | 6,696                     | 47.87                            | 358              | 2,399,603  |
|                                                                                     | 85+         | 1,859                     | 13.29                            | 126              | 234,199    |
| Causing adverse effects, sedatives and hypnotics unspecified, sleeping drug NOS, pill NOS, tablet NOS | 65–84       | 11,534                    | 41.84                            | 149              | 6,924,117  |
| Causing adverse effects, central nervous system muscle-tone depressants, chlorphenesin (carbamate), mephenesin, methocarbamol | 65–84       | 336                       | 39.60                            | 48               | 16,070     |
|                                                                                     | 85+         | 53                        | 6.24                             | 18               | 838        |
| Causing adverse effects, other gaseous anesthetics, ether, nitrous oxide, halogenated hydrocarbon derivatives, except halothane | 65–84       | 322                       | 37.25                            | 48               | 15,465     |
|                                                                                     | 85+         | 72                        | 8.37                             | 18               | 1,336      |
| Causing adverse effects, intravenous anesthetics, ketamine, methohexital (methohexitoline), thiobarbiturates, such as thiopental sodium | 65–84       | 905                       | 39.12                            | 86               | 78,077     |
|                                                                                     | 85+         | 138                       | 5.96                             | 27               | 3,735      |
| Causing adverse effects, other and unspecified general anesthetics                 | 65–84       | 2,947                     | 42.54                            | 202              | 594,890    |
|                                                                                     | 85+         | 509                       | 7.35                             | 60               | 30,586     |
| Causing adverse effects, surface and infiltration anesthetics, cocaine, lidocaine (lignocaine), procaine, tetracaine | 65–84       | 319                       | 31.19                            | 43               | 13,717     |
|                                                                                     | 85+         | 114                       | 11.15                            | 25               | 2,904      |
| Causing adverse effects, peripheral nerve- and plexus-blocking anesthetics         | 65–84       | 341                       | 37.40                            | 46               | 15,595     |
| Causing adverse effects, spinal anesthetics                                        | 65–84       | 662                       | 25.95                            | 84               | 55,451     |
|                                                                                     | 85+         | 85                        | 3.31                             | 21               | 1,734      |
| Causing adverse effects, antidepressants, amitriptyline, imipramine, monoamine oxidase (MAO) inhibitors | 65–84       | 5,471                     | 38.92                            | 281              | 1,538,923  |
|                                                                                     | 85+         | 1,985                     | 14.12                            | 132              | 261,560    |
| Causing adverse effects, phenothiazine-based tranquilizers, chlorpromazine, fluphenazine, phenothiazine, prochlorperazine, promazine | 65–84       | 757                       | 34.31                            | 73               | 55,158     |
|                                                                                     | 85+         | 133                       | 6.04                             | 27               | 3,632      |
| Causing adverse effects, butyrophenone-based tranquilizers, haloperidol, siperone, trifluperidol | 65–84       | 1,142                     | 35.43                            | 87               | 99,298     |
|                                                                                     | 85+         | 509                       | 15.81                            | 57               | 29,253     |
| Causing adverse effects, other antipsychotics, neuroleptics, and major tranquilizers | 65–84       | 4,745                     | 31.01                            | 243              | 1,154,744  |
|                                                                                     | 85+         | 1,666                     | 10.89                            | 122              | 203,698    |
| Causing adverse effects, benzodiazepine-based tranquilizers, chloridiazepoxide, diazepam, flurazepam, lorazepam, medazepam, nitrazepam | 65–84       | 7,887                     | 43.37                            | 411              | 3,239,868  |
|                                                                                     | 85+         | 2,624                     | 14.43                            | 170              | 445,823    |
| Causing adverse effects, other tranquilizers, hydroxyzine, meprobamate             | 65–84       | 275                       | 38.39                            | 40               | 10,973     |
|                                                                                     | 85+         | 96                        | 13.37                            | 22               | 2,120      |
| Causing adverse effects, psychostimulants, amphetamine, caffeine                  | 65–84       | 286                       | 20.50                            | 40               | 11,507     |

(Continued)
### Table 3 (Continued)

| Principal diagnosis                                                                 | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|--------------------------------------------------------------------------------------|-------------|-----------------------------|-----------------------------------|------------------|------------|
| Causing adverse effects, other psychotropic agents                                    | 65–84       | 2,134                       | 25.49                             | 138              | 293,880    |
|                                                                                       | 85+         | 261                         | 3.11                              | 39               | 10,134     |
| Causing adverse effects, unspecified psychotropic agent                               | 65–84       | 398                         | 34.60                             | 47               | 18,666     |
|                                                                                       | 85+         | 84                          | 7.32                              | 23               | 1,918      |
| Causing adverse effects, opiate antagonists, levallophan, nalorphine, naloxone        | 65–84       | 688                         | 38.88                             | 91               | 62,649     |
|                                                                                       | 85+         | 151                         | 8.55                              | 32               | 4,836      |
| Causing adverse effects, parasympathomimetics (cholinergics), acetylcholine, pilocarpine, anticholinesterase: organophosphorus, reversible | 65–84       | 1,185                       | 31.74                             | 66               | 44,481     |
| Causing adverse effects, parasympathetics (anticholinergics and antimuscarinics) and spasmyotics, atropine, homatropine, hyoscine (scopolamine), quaternary ammonium derivatives | 85+         | 671                         |                                    |                  |            |
| Causing adverse effects, sympathomimetics (adrenergics), epinephrine (adrenalin), levarterenol (noradrenalin) | 65–84       | 6,924                       | 57.95                             | 366              | 2,532,698  |
|                                                                                       | 85+         | 2,307                       | 19.31                             | 161              | 372,178    |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 2,985                       | 43.47                             | 524              | 5,378,051  |
|                                                                                       | 85+         | 799                         | 11.63                             | 74               | 59,397     |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 10,267                      | 60.63                             | 524              | 5,378,051  |
|                                                                                       | 85+         | 2,634                       | 15.55                             | 160              | 422,553    |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 19,375                      | 56.72                             | 723              | 14,004,365 |
|                                                                                       | 85+         | 11,179                      | 32.73                             | 467              | 5,217,237  |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 5,398                       | 51.21                             | 284              | 1,534,558  |
| Causing adverse effects, sympathetic nervous system                                    | 85+         | 899                         | 8.52                              | 83               | 748,858    |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 6,480                       | 44.93                             | 337              | 2,183,971  |
|                                                                                       | 85+         | 2,136                       | 14.81                             | 140              | 298,336    |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 494                         | 39.18                             | 61               | 29,933     |
|                                                                                       | 85+         | 1,111                       | 8.77                              | 23               | 2,592      |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 20,725                      | 49.78                             | 1,036             | 21,467,546 |
|                                                                                       | 85+         | 7,486                       | 17.98                             | 406              | 3,041,078  |
| Causing adverse effects, unspecified agents primarily affecting the cardiovascular system | 65–84       | 17,374                      | 50.10                             | 836              | 14,524,755 |
|                                                                                       | 85+         | 5,989                       | 17.27                             | 348              | 2,086,797  |
| Causing adverse effects, unspecified agents primarily affecting the cardiovascular system | 65–84       | 1,079                       | 39.79                             | 91               | 98,075     |
|                                                                                       | 85+         | 338                         | 12.46                             | 49               | 16,579     |
| Causing adverse effects, unspecified agents primarily affecting the cardiovascular system | 65–84       | 168                         | 47.51                             | 31               | 5,242      |
|                                                                                       | 85+         | 80                          | 22.62                             | 21               | 1,678      |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 150                         | 42.17                             | 28               | 4,259      |
|                                                                                       | 85+         | 86                          | 24.20                             | 21               | 1,788      |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 1,016                        | 43.38                             | 92               | 93,400     |
|                                                                                       | 85+         | 403                         | 17.22                             | 46               | 18,356     |
| Causing adverse effects, sympathetic nervous system                                    | 65–84       | 332                         | 49.75                             | 40               | 13,180     |
|                                                                                       | 85+         | 100                         | 14.92                             | 23               | 2,320      |
Table 3 (Continued)

| Principal diagnosis | Year of age | Total number of discharges | % of all discharges with ICD code | Charges, $ (mean) | Total cost |
|---------------------|-------------|----------------------------|----------------------------------|------------------|------------|
| Causing adverse effects, other specified agents primarily affecting the gastrointestinal system | 65–84 | 406 | 39.70 | 52 | 21,122 |
| | 85+ | 101 | 9.84 | 24 | 2,366 |
| Causing adverse effects, purine derivative diuretics, theobromine, theophylline | 65–84 | 915 | 62.67 | 82 | 74,956 |
| | 85+ | 116 | 7.96 | 24 | 2,732 |
| Causing adverse effects, carbonic acid anhydrase inhibitors, acetazolamide | 65–84 | 188 | 37.90 | 639 | 7,473,166 |
| | 85+ | 77 | 15.58 | 20 | 1,571 |
| Causing adverse effects, saluretics, benzothiadiazides, chlorothiazide group | 65–84 | 11,695 | 52.12 | 639 | 7,473,166 |
| | 85+ | 4,086 | 18.21 | 258 | 1,053,977 |
| Causing adverse effects, other specified drugs acting on muscles | 65–84 | 29,655 | 50.65 | 1,582 | 46,906,127 |
| | 85+ | 12,883 | 22.00 | 763 | 9,836,264 |
| Causing adverse effects, electrolytic, caloric, and water-balance agents | 65–84 | 1,482 | 39.99 | 110 | 162,501 |
| | 85+ | 500 | 13.49 | 63 | 31,367 |
| Causing adverse effects, uric acid metabolism drugs, phenoquin, probenecid | 65–84 | 1,793 | 53.53 | 122 | 218,118 |
| | 85+ | 493 | 14.70 | 39 | 10,634 |
| Causing adverse effects, smooth muscle relaxants, adiphenine, metaproterenol (orciрrenalinе) | 65–84 | 647 | 53.92 | 63 | 41,025 |
| | 85+ | 274 | 22.83 | 39 | 10,634 |
| Causing adverse effects, skeletal muscle relaxants, alcuronium chloride, uxaмethonium chloride | 65–84 | 1,041 | 38.85 | 78 | 81,130 |
| | 85+ | 261 | 9.74 | 37 | 9,721 |
| Causing adverse effects, other drugs and medicinal substances, contrast media used for diagnostic x-ray procedures, diagnostic agents and kits | 65–84 | 27,976 | 44.77 | 1,270 | 35,520,572 |
| | 85+ | 6,268 | 10.03 | 345 | 2,160,531 |
| Causing adverse effects, unspecified drug or medicinal substance | 65–84 | 18,682 | 41.54 | 810 | 15,133,675 |
| | 85+ | 4,891 | 10.88 | 282 | 1,379,955 |
| Causing adverse effects, BCG vaccine | 65–84 | 96 | 33.83 | 24 | 2,319 |
| Causing adverse effects, other and unspecified bacterial vaccines | 65–84 | 108 | 28.15 | 22 | 2,411 |
| Causing adverse effects, other and unspecified viral and rickettsial vaccines, mumps vaccine | 65–84 | 194 | 38.33 | 33 | 6,300 |
| Causing adverse effects, other and unspecified vaccines and biologic substances | 65–84 | 138 | 22.62 | 27 | 3,729 |

Total 791,931 937,795,690

Abbreviations: NOS, not otherwise specified; BCG, Bacillus Calmette-Guérin.
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## Appendix

Table 1 The International Classification of Diseases, 9 Revision, Clinical Modification (ICD-9-CM) codes related to adverse drug effects, principal diagnosis

| ICD code | Principal diagnosis |
|----------|---------------------|
| 535.40   | Oth Spf Gstrt W/O Hmrhg specified gastritis; without mention of hemorrhage |
| 535.41   | Oth Spf Gstrt W Hmrhg specified gastritis; with hemorrhage |
| 962.3    | Poison-Insulin/Antidiab Poisoning by; insulins and antidiabetic agents, Acetohexamide, Biguanide derivatives, oral, Chlorpropamide, Glucagon, Insulin, Phenformin |
| 962.7    | Poisoning-Thyroid/Deriv Poisoning by; thyroid and thyroid derivatives, Dextrothyroxin, Levothyroxine sodium, Liothyronine, Thyroglobulin |
| 963.0    | Pois-Antiallrg/Antiemet Poisoning by; antiallergic and antiemetic drugs, Antihistamines, Chlorpheniramine, Diphenhydramine, Diphenylpyraline, Thonzylamine, Tripelemamine |
| 963.1    | Pois-Antineopl/Immunosup Poisoning by; antineoplastic and immunosuppressive drugs, Azathioprine, Busulfan, Chlorambucil, Cyclophosphamide, Cytarabine, Fluorouracil |
| 964.2    | Poisoning-Anticoagulants Poisoning by; anticoagulants, Coumarin, Heparin, Phenindione, Warfarin sodium |
| 965.00   | Poisoning-Opium Nos Poisoning by; opium (alkaloids), unspecified |
| 965.02   | Poisoning-Methadone Poisoning by; methadone |
| 965.09   | Poisoning-Opiates Nec Poisoning by opiates and related narcotics; other, Meperidine [pethidine], Morphine |
| 965.1    | Poisoning-Salicylates Poisoning by; salicylates, Acetylsalicylic acid [aspirin], Salicylic acid salts |
| 965.4    | Pois-Arom Analgesics Nec Poisoning by; aromatic analgesics, not elsewhere classified, Acetanilid, Paracetamol [acetaminophen], Phenacetin [acetophenetidin] |
| 965.61   | Pois-Propionic Acid Deriv Poisoning by; propionic acid derivatives, Fenoprofen, Flurbiprofen, Ibuprofen, Ketoprofen, Naproxen, Oxaprozin |
| 965.8    | Pois-Analoges/Antipyr Nec Poisoning by; other specified analgesics and antipyretics; Pentazocine |
| 965.9    | Pois-Analoges/Antipyr Nos Poisoning by; unspecified analgesic and antipyretic |
| 966.1    | Poison-Hydantoin Deriv Poisoning by; hydantoin derivatives, Phenytoin |
| 966.3    | Pois-Anticonvul Nec/Nos Poisoning by; other and unspecified anticonvulsants |
| 966.4    | Pois-Anti-Parkinson Drug Poisoning by; anti-Parkinsonism drugs, Amantadine, Ethopropazine [profenamine], Levodopa [L-dopa] |
| 967.0    | Poisoning-Barbiturates Poisoning by; barbiturates, Amobarbital [amylbarbitone], Barbital [barbitone], Butabarbital [butabarbitone], Pentobarbital [pentobarbitone], Phenobarbital [phenobarbitone] |
| 967.8    | Pois-Sedative/Hypnot Nec Poisoning by; other sedatives and hypnotics |
| 967.9    | Pois-Sedative/Hypnot Nos Poisoning by; unspecified sedative or hypnotic, Sleeping; drug NOS, pill NOS, tablet NOS |
| 968.0    | Pois-Cns Muscle Depress Poisoning by; central nervous system muscle-tone depressants, Chlorphenesin (carbamate), Mephenesin, Methocarbamol |
| 968.5    | Pois-Topic/Infiltr Anesth Poisoning by; surface [topical] and infiltration anesthetics, Cocaine, Lidocaine [ lignocaine], Procaine, Tetracaine |
| 969.0    | Poisoning-Antidepressant Poisoning by; antidepressants, Amitriptyline, Imipramine, Monoamine oxidase [MAO] inhibitors |
| 969.1    | Pois-Phenothiaze Tranq Poisoning by; phenothiazine-based tranquilizers, Chlorpromazine, Fluphenazine, Prochlorperazine, Promazine |
| 969.3    | Pois-Antipsychotic Nec Poisoning by; other antipsychotics, neuroleptics, and major tranquilizers |
| 969.4    | Pois-Benzodiazepine Tran Poisoning by; benzodiazepine-based tranquilizers, Chlordiazepoxide, Diazepam, Flurazepam, Lorazepam, Medazepam, Nitrazepam |
| 969.5    | Poison-Tranquilizer Nec Poisoning by; other tranquilizers, Hydroxyzine, Meprobamate |
| 969.8    | Poison-Psychotropic Nec Poisoning by; other specified psychotropic agents |
| 970.8    | Pois-Cns Stimulants Nec Poisoning by; other specified central nervous system stimulants |
| 971.3    | Poisoning-Sympatholytics Poisoning by; sympatholytics [antiarhythmic], Phenoxybenzamine, Tolazoline hydrochloride |
| 972.0    | Pois-Card Rhythm Regulat Poisoning by; cardiac rhythm regulators, Practolol, Procainamide, Propranolol, Quinidine |
| 972.1    | Poisoning-Cardiotonics Poisoning by; cardiotonic glycosides and drugs of similar action, Digitalis glycosides, Digoxin, Strophanthins |

(Continued)
### Table 1 (Continued)

| ICD code | Principal diagnosis |
|----------|---------------------|
| 972.4 Pois-Coronary Vasodilat | Poisoning by; coronary vasodilators, Dipyridamole, Nitrates [nitroglycerin], Nitrites |
| 972.6 Pois-Antihypertens Agent | Poisoning by; other antihypertensive agents, Guanethidine, Rauwolfia alkaloids, Reserpine |
| 972.9 Pois-Cardiovasc Agt Nec | Poisoning by; other and unspecified agents primarily affecting the cardiovascular system |
| 974.3 Poisoning-Saluretics | Poisoning by; saluretics, Benzothiadiazides, Chlorothiazide group |
| 974.4 Poisoning-Diuretics Nec | Poisoning by; other diuretics, Ethacrynic acid, Furosemide |
| 975.2 Pois-Skelet Muscle Relax | Poisoning by; skeletal muscle relaxants |
| 977.8 Poison-Medicinal Agt nec | Poisoning by; other specified drugs and medicinal substances, Diagnostic agents and kits |

### Table 2

The International Classification of Diseases, 9 Revision, Clinical Modification (ICD-9-CM) codes related to adverse treatment effects, all listed diagnoses

| ICD code | Diagnoses |
|----------|-----------|
| E850.1 Acc Poison-Methadone | Accidental poisoning by; methadone |
| E850.2 Acc Poison-Opiates Nec | Accidental poisoning by; other opiates and related narcotics, Morphine, Opium (alkaloids) |
| E850.2 Acc Poison-Opiates Nec | Accidental poisoning by; other opiates and related narcotics, Morphine, Opium (alkaloids) |
| E850.3 Acc Poison-Salicylates | Accidental poisoning by; salicylates, Acetylsalicylic acid [aspirin], Salicylic acid salts, Amino derivatives of salicylic acid |
| E850.3 Acc Poison-Salicylates | Accidental poisoning by; salicylates, Acetylsalicylic acid [aspirin], Salicylic acid salts, Amino derivatives of salicylic acid |
| E850.4 Acc Poison-Arom Analgesc | Accidental poisoning by; aromatic analgesics, not elsewhere classified, Acetanilid, Paracetamol [acetaminophen], Phenacetin [acetophenetidin] |
| E850.4 Acc Poison-Arom Analgesc | Accidental poisoning by; aromatic analgesics, not elsewhere classified, Acetanilid, Paracetamol [acetaminophen], Phenacetin [acetophenetidin] |
| E850.6 Acc Poison-Antirheumatic | Accidental poisoning by; antirheumatics [antiphlogistics], Gold salts, Indomethacin |
| E850.8 Acc Poison-Analgesic Nec | Accidental poisoning by; other specified analgesics and antipyretics, Pentazocine |
| E850.8 Acc Poison-Analgesic Nec | Accidental poisoning by; other specified analgesics and antipyretics, Pentazocine |
| E850.9 Acc Poison-Analgesic Nos | Accidental poisoning by; unspecified analgesic or antipyretic |
| E851 Acc Poison-Barbiturates | Accidental poisoning by barbiturates |
| E852.8 Acc Poison-Sedatives Nec | Accidental poisoning by; other specified sedatives and hypnotics |
| E852.8 Acc Poison-Sedatives Nec | Accidental poisoning by; other specified sedatives and hypnotics |
| E852.9 Acc Poison-Sedatives Nos | Accidental poisoning by; unspecified sedative or hypnotic, Sleeping; drug NOS, pill NOS, tablet NOS |
| E852.9 Acc Poison-Sedatives Nos | Accidental poisoning by; unspecified sedative or hypnotic, Sleeping; drug NOS, pill NOS, tablet NOS |
| E853.2 Acc Poisn-Benzdiaz Tranq | Accidental poisoning by; benzodiazepine-based tranquillizers, Chlordiazepoxide, Diazepam, Flurazepam, Lorazepam, Medazepam, Nitrazepam |
| E853.2 Acc Poisn-Benzdiaz Tranq | Accidental poisoning by; benzodiazepine-based tranquillizers, Chlordiazepoxide, Diazepam, Flurazepam, Lorazepam, Medazepam, Nitrazepam |
| E853.8 Acc Poisn-Transclitzr Nec | Accidental poisoning by; other specified tranquillizers, Hydroxyzine, Meprobamate |
| E853.8 Acc Poisn-Transclitzr Nec | Accidental poisoning by; other specified tranquillizers, Hydroxyzine, Meprobamate |
| E854.0 Acc Poison-Antidepressnt | Accidental poisoning by; antidepressants, Amitriptyline, Imipramine, Monoamine oxidase [MAO] inhibitors |
| E854.0 Acc Poison-Antidepressnt | Accidental poisoning by; antidepressants, Amitriptyline, Imipramine, Monoamine oxidase [MAO] inhibitors |
| E854.2 Acc Poisn-Psychstimulant | Accidental poisoning by; psychostimulants, Amphetamine, Caffeine |
| E854.3 Acc Poison-Cns Stimulant | Accidental poisoning by; central nervous system stimulants, Analeptics, Opiate antagonists |
| E854.8 Acc Poisn-Psychotrop Nec | Accidental poisoning by; other psychotropic agents |
| E855.0 Acc Poisn-Anticonvulsant | Accidental poisoning by; anticonvulsant and anti-Parkinsonism drugs, Amantadine, Hydantoin derivatives, Oxazolidine derivatives [paramethadione] [trimethadione] |
| E855.0 Acc Poisn-Anticonvulsant | Accidental poisoning by; anticonvulsant and anti-Parkinsonism drugs, Amantadine, Hydantoin derivatives, Oxazolidine derivatives [paramethadione] [trimethadione] |
| E855.1 Acc Poisn-Cns Depres Nec | Accidental poisoning by; other central nervous system depressants, Ether, Gaseous anesthetics, Halogenated hydrocarbon derivatives, Intravenous anesthetics, Thiobarbiturates |
| ICD code          | Diagnoses                                                                 |
|------------------|---------------------------------------------------------------------------|
| E855.3 Acc Poison-Cholinergics | Accidental poisoning by; parasympathomimetics [cholinergics], Acetylcholine, Pilocarpine, Anticholinesterase: organophosphorus, reversible |
| E855.6 Acc Poiin-Sympatholytics | Accidental poisoning by; sympatholytics [antiadrenergics], Phenoxybenzamine, Tolazoline hydrochloride |
| E855.6 Acc Poiin-Sympatholytics | Accidental poisoning by; sympatholytics [antiadrenergics], Phenoxybenzamine, Tolazoline hydrochloride |
| E856 Acc Poison-Antibiotics     | Accidental poisoning by antibiotics                                         |
| E857 Acc Poiin-Oth Anti-Infect  | Accidental poisoning by other anti-infectives                                |
| E858 Acc Poison-Hormones        | Accidental poisoning by; hormones and synthetic substitutes                  |
| E858 Acc Poison-Hormones        | Accidental poisoning by; hormones and synthetic substitutes                  |
| E858.1 Acc Poiin-Systemic Agent | Accidental poisoning by; primarily systemic agents                           |
| E858.2 Acc Poison-Blood Agent   | Accidental poisoning by; agents primarily affecting blood constituents       |
| E858.2 Acc Poison-Blood Agent   | Accidental poisoning by; agents primarily affecting blood constituents       |
| E858.3 Acc Poiin-Cardiovasc Agt | Accidental poisoning by; agents primarily affecting cardiovascular system    |
| E858.4 Acc Poiin-Gi Agent       | Accidental poisoning by; agents primarily affecting gastrointestinal system  |
| E858.5 Acc Poiin-Metabol Agnt   | Accidental poisoning by; water, mineral, and uric acid metabolism drugs      |
| E858.5 Acc Poiin-Metabol Agnt   | Accidental poisoning by; water, mineral, and uric acid metabolism drugs      |
| E858.6 Acc Poiin-Muscl/resp Agt | Accidental poisoning by; agents primarily acting on the smooth and skeletal muscles and respiratory system |
| E858.7 Acc Poiin-Skin/Eent Agnt | Accidental poisoning by; agents primarily affecting skin and mucous membrane, ophthalmological, otorhinolaryngological, and dental drugs |
| E858.8 Acc Poisoning-Drug Nec   | Accidental poisoning by; other specified drugs, Central appetite depressants |
| E858.8 Acc Poisoning-Drug Nec   | Accidental poisoning by; other specified drugs, Central appetite depressants |
| E858.9 Acc Poisoning-Drug Nos   | Accidental poisoning by; unspecified drug                                   |
| E858.9 Acc Poisoning-Drug Nos   | Accidental poisoning by; unspecified drug                                   |
| E870.0 Acc Cut/Hem In Surgery   | Accidental cut, puncture, perforation, or hemorrhage during; surgical operation |
| E870.0 Acc Cut/Hem In Surgery   | Accidental cut, puncture, perforation, or hemorrhage during; surgical operation |
| E870.4 Acc Cut/Hem W Scope Exam | Accidental cut, puncture, perforation, or hemorrhage during; endoscopic examination |
| E870.4 Acc Cut/Hem W Scope Exam | Accidental cut, puncture, perforation, or hemorrhage during; endoscopic examination |
| E870.5 Acc Cut/Hem W Catheteriz | Accidental cut, puncture, perforation, or hemorrhage during; aspiration of fluid or tissue, puncture, and catheterization, Abdominal paracentesis, Aspirating needle biopsy, Blood sampl |
| E870.6 Acc Cut/Hem W Heart Cath | Accidental cut, puncture, perforation, or hemorrhage during; heart catheterization |
| E870.6 Acc Cut/Hem W Heart Cath | Accidental cut, puncture, perforation, or hemorrhage during; heart catheterization |
| E870.8 Acc Cut In Med Care Nec  | Accidental cut, puncture, perforation, or hemorrhage during; other specified medical care |
| E870.8 Acc Cut In Med Care Nec  | Accidental cut, puncture, perforation, or hemorrhage during; other specified medical care |
| E870.9 Acc Cut In Med Care Nos  | Accidental cut, puncture, perforation, or hemorrhage during; unspecified medical care |
| E871.0 Post-Surgical Forgn Body | Foreign object left in body during; surgical operation                       |
| E871.8 Post-Op Foreign Body Nec | Foreign object left in body during; other specified procedures               |
| E874.0 Instrmnt Fail In Surgery | Mechanical failure of instrument or apparatus during; surgical operation     |
| E874.8 Instrmnt Fail-Proced Nec | Mechanical failure of instrument or apparatus during; other specified procedures |
| E876.8 Medical Misadventure Nec | Other specified misadventures during medical care, Performance of inappropriate treatment NEC |
| E876.8 Medical Misadventure Nec | Other specified misadventures during medical care, Performance of inappropriate treatment NEC |
| E876.9 Medical Misadventure Nos | Unspecified misadventure during medical care                                 |
| E876.9 Medical Misadventure Nos | Unspecified misadventure during medical care                                 |
| E930.0 Adv Eff Penicillins      | Causing adverse effects; penicillins, Natural, Synthetic, Semisynthetic, such as: ampicillin, cloxacillin, nafcillin, oxacillin |
| E930.0 Adv Eff Penicillins      | Causing adverse effects; penicillins, Natural, Synthetic, Semisynthetic, such as: ampicillin, cloxacillin, nafcillin, oxacillin |

(Continued)
| ICD code          | Diagnoses                                                                 |
|-------------------|---------------------------------------------------------------------------|
| E930.1 Adv Eff Antifung Antibiot | Causing adverse effects; antifungal antibiotics                            |
| E930.1 Adv Eff Antifung Antibiot | Causing adverse effects; antifungal antibiotics                            |
| E930.3 Adv Eff Erythromycin      | Causing adverse effects; erythromycin and other macrolides, Oleandomycin, Spiramycin |
| E930.3 Adv Eff Erythromycin      | Causing adverse effects; erythromycin and other macrolides, Oleandomycin, Spiramycin |
| E930.4 Adv Eff Tetracycline      | Causing adverse effects; tetracycline group, Doxycycline, Minocycline, Oxytetracycline |
| E930.4 Adv Eff Tetracycline      | Causing adverse effects; tetracycline group, Doxycycline, Minocycline, Oxytetracycline |
| E930.5 Adv Eff Cephalosporin     | Causing adverse effects; cephalosporin group, Cephalexin, Cephaloglycin, Cephaloridine, Cephalothin |
| E930.5 Adv Eff Cephalosporin     | Causing adverse effects; cephalosporin group, Cephalexin, Cephaloglycin, Cephaloridine, Cephalothin |
| E930.6 Adv Eff Antimycob Antibiot | Causing adverse effects; antimycobacterial antibiotics, Cycloserine, Kanamycin, Rifampin, Streptomycin |
| E930.6 Adv Eff Antimycob Antibiot | Causing adverse effects; antimycobacterial antibiotics, Cycloserine, Kanamycin, Rifampin, Streptomycin |
| E930.7 Adv Eff Antineop Antibiot  | Causing adverse effects; antineoplastic antibiotics, Actinomycins, such as: Bleomycin, Cactinomycin, Dactinomycin, Daunorubicin, Mitomycin |
| E930.8 Adv Eff Antibiotics Nec    | Causing adverse effects; other specified antibiotics                      |
| E930.8 Adv Eff Antibiotics Nec    | Causing adverse effects; other specified antibiotics                      |
| E930.9 Adv Eff Antibiotic Nos     | Causing adverse effects; unspecified antibiotic                           |
| E930.9 Adv Eff Antibiotic Nos     | Causing adverse effects; unspecified antibiotic                           |
| E931.0 Adv Eff Sulfonamides      | Causing adverse effects; sulfonamides, Sulfadiazine, Sulfafurazole, Sulfamethoxazole |
| E931.0 Adv Eff Sulfonamides      | Causing adverse effects; sulfonamides, Sulfadiazine, Sulfafurazole, Sulfamethoxazole |
| E931.3 Adv Eff Quinoline         | Causing adverse effects; quinoline and hydroxyquinoline derivatives, Chiniofon, Diiodohydroxyquin |
| E931.3 Adv Eff Quinoline         | Causing adverse effects; quinoline and hydroxyquinoline derivatives, Chiniofon, Diiodohydroxyquin |
| E931.4 Adv Eff Antimalariais      | Causing adverse effects; antimalariais and drugs acting on other blood protozoa, Chloroquine phosphate, Cycloguanil, Primaquine, Proguanil [chloroguanide], Pyrimethamine |
| E931.4 Adv Eff Antimalariais      | Causing adverse effects; antimalariais and drugs acting on other blood protozoa, Chloroquine phosphate, Cycloguanil, Primaquine, Proguanil [chloroguanide], Pyrimethamine |
| E931.5 Adv Eff Antiprotozoal Nec  | Causing adverse effects; other antiprotozoal drugs, Emetine               |
| E931.5 Adv Eff Antiprotozoal Nec  | Causing adverse effects; other antiprotozoal drugs, Emetine               |
| E931.7 Adv Eff Antiviral Drugs    | Causing adverse effects; antiviral drugs, Methisazone                      |
| E931.7 Adv Eff Antiviral Drugs    | Causing adverse effects; antiviral drugs, Methisazone                      |
| E931.8 Adv Eff Antimycobac Nec    | Causing adverse effects; other antimycobacterial drugs, Ethambutol, Ethionamide, Isoniazid, Sulfones, Para-aminosalicylic acid derivatives |
| E931.9 Adv Eff Antinfct Nec/Nos   | Causing adverse effects; other and unspecified anti-infectives, Flucytosine, Nitrofuran derivatives |
| E931.9 Adv Eff Antinfct Nec/Nos   | Causing adverse effects; other and unspecified anti-infectives, Flucytosine, Nitrofuran derivatives |
| E932.0 Adv Eff Corticosteroids    | Causing adverse effects; adrenal cortical steroids, Cortisone derivatives, Desoxycorticosterone derivatives, Fluorinated corticosteroids |
| E932.0 Adv Eff Corticosteroids    | Causing adverse effects; adrenal cortical steroids, Cortisone derivatives, Desoxycorticosterone derivatives, Fluorinated corticosteroids |
| E932.1 Adv Eff Androgens         | Causing adverse effects; androgens and anabolic congeners, Nandrolone phenpropionate, Oxymetholone, Testosterone and preparations |
| E932.2 Adv Eff Ovarian Hormones   | Causing adverse effects; ovarian hormones and synthetic substitutes, Contraceptives, oral, Estrogens, Estrogens and progesterone combined, Progestogens |
| E932.2 Adv Eff Ovarian Hormones   | Causing adverse effects; ovarian hormones and synthetic substitutes, Contraceptives, oral, Estrogens, Estrogens and progesterone combined, Progestogens |
| E932.3 Adv Eff Insulin/Antidiab   | Causing adverse effects; insulins and antidiabetic agents, Acetoheamidine, Biguanide derivatives, oral, Chlorpropamide, Glucagon, Insulin, Phenformin |
| E932.3 Adv Eff Insulin/Antidiab   | Causing adverse effects; insulins and antidiabetic agents, Acetoheamidine, Biguanide derivatives, oral, Chlorpropamide, Glucagon, Insulin, Phenformin |
| E932.4 Adv Eff Ant Pituitary      | Causing adverse effects; anterior pituitary hormones, Corticotropin, Gonadotropin, Somatotropin [growth hormone] |
| E932.5 Adv Eff Post Pituitary     | Causing adverse effects; posterior pituitary hormones, Vasopressin         |
Table 2 (Continued)

| ICD code     | Diagnoses                                                                 |
|--------------|---------------------------------------------------------------------------|
| E932.5 Adv Eff Post Pituitary | Causing adverse effects; posterior pituitary hormones, Vasopressin |
| E932.6 Adv Eff Parathyroid   | Causing adverse effects; parathyroid and parathyroid derivatives          |
| E932.7 Adv Eff Thyroid Deriv | Causing adverse effects; thyroid and thyroid derivatives, Dextrothyroxine, Levothyroxine sodium, Liothyronine, Thyroglobulin |
| E932.7 Adv Eff Thyroid Deriv | Causing adverse effects; thyroid and thyroid derivatives, Dextrothyroxine, Levothyroxine sodium, Liothyronine, Thyroglobulin |
| E932.8 Adv Eff Antithyroid Agnt | Causing adverse effects; antithyroid agents, Iodides, Thiouacil, Thiourea |
| E932.9 Adv Eff Hormones Nec/Nos | Causing adverse effects; other and unspecified hormones and synthetic substitutes |
| E933.0 Adv Eff Analrg/Antemet | Causing adverse effects; antihistamines, Chlorpheniramine, Diphenhydramine, Diphenylpyraline, Thonzylamine, Tripelennami |
| E933.0 Adv Eff Analrg/Antemet | Causing adverse effects; antihistamines, Chlorpheniramine, Diphenhydramine, Diphenylpyraline, Thonzylamine, Tripelennami |
| E933.1 Adv Eff Antineoplastic | Causing adverse effects; antineoplastic and immunosuppressive drugs, Azathioprine, Busulfan, Chlorambucil, Cyclophosphamide, Cytarabine, Fluorouracil, Mercaptopurine |
| E933.1 Adv Eff Antineoplastic | Causing adverse effects; antineoplastic and immunosuppressive drugs, Azathioprine, Busulfan, Chlorambucil, Cyclophosphamide, Cytarabine, Fluorouracil, Mercaptopurine |
| E933.5 Adv Eff Vitamins Nec  | Causing adverse effects; vitamins, not elsewhere classified, Vitamin A, Vitamin D |
| E933.5 Adv Eff Vitamins Nec  | Causing adverse effects; vitamins, not elsewhere classified, Vitamin A, Vitamin D |
| E934.0 Adv Eff Iron Compounds | Causing adverse effects; iron and its compounds, Ferric salts, Ferrous sulphate and other ferrous salts |
| E934.0 Adv Eff Iron Compounds | Causing adverse effects; iron and its compounds, Ferric salts, Ferrous sulphate and other ferrous salts |
| E934.1 Adv Eff Liver/Antianemic | Causing adverse effects; liver preparations and other antianemic agents, Folic acid |
| E934.2 Adv Eff Anticoagulants | Causing adverse effects; anticoagulants, Coumarin, Heparin, Phenindione, Prothrombin synthesis inhibitor, Warfarin sodium |
| E934.2 Adv Eff Anticoagulants | Causing adverse effects; anticoagulants, Coumarin, Heparin, Phenindione, Prothrombin synthesis inhibitor, Warfarin sodium |
| E934.4 Adv Eff Fibrinolysis Agt | Causing adverse effects; fibrinolysis-affecting drugs, Aminocaproic acid, Streptodornase, Streptokinase, Urokinase |
| E934.4 Adv Eff Fibrinolysis Agt | Causing adverse effects; fibrinolysis-affecting drugs, Aminocaproic acid, Streptodornase, Streptokinase, Urokinase |
| E934.5 Adv Eff Coagulants | Causing adverse effects; anticoagulant antagonists and other coagulants, Hexadimethrine bromide, Protamine sulfate |
| E934.5 Adv Eff Coagulants | Causing adverse effects; anticoagulant antagonists and other coagulants, Hexadimethrine bromide, Protamine sulfate |
| E934.6 Adv Eff Gamma Globulin | Causing adverse effects; gamma globulin |
| E934.7 Adv Eff Blood Products | Causing adverse effects; natural blood and blood products, Blood plasma, Human fibrinogen |
| E934.7 Adv Eff Blood Products | Causing adverse effects; natural blood and blood products, Blood plasma, Human fibrinogen |
| E934.8 Adv Eff Blood Agent Nec | Causing adverse effects; other agents affecting blood constituents, Macromolecular blood substitutes |
| E934.8 Adv Eff Blood Agent Nec | Causing adverse effects; other agents affecting blood constituents, Macromolecular blood substitutes |
| E935.1 Adv Eff Methadone | Causing adverse effects; methadone |
| E935.1 Adv Eff Methadone | Causing adverse effects; methadone |
| E935.2 Adv Eff Opiates | Causing adverse effects; other opiates and related narcotics |
| E935.2 Adv Eff Opiates | Causing adverse effects; other opiates and related narcotics |
| E935.3 Adv Eff Salicylates | Causing adverse effects; salicylates, Acetylsalicylic acid [aspirin], Amino derivatives of salicylic acid, Salicylic acid salts |
| E935.3 Adv Eff Salicylates | Causing adverse effects; salicylates, Acetylsalicylic acid [aspirin], Amino derivatives of salicylic acid, Salicylic acid salts |
| E935.4 Adv Eff Arom Analgsc Nec | Causing adverse effects; aromatic analgesics, not elsewhere classified, Acetanilid, Paracetamol [acetaminophen], Phenacetin [acetophenetidin] |
| E935.4 Adv Eff Arom Analgsc Nec | Causing adverse effects; aromatic analgesics, not elsewhere classified, Acetanilid, Paracetamol [acetaminophen], Phenacetin [acetophenetidin] |
| ICD code | Diagnoses |
|----------|-----------|
| E935.6 Adv Eff Antirheumatics | Causing adverse effects; antirheumatics [antiphlogistics], Gold salts, Indomethacin |
| E935.6 Adv Eff Antirheumatics | Causing adverse effects; antirheumatics [antiphlogistics], Gold salts, Indomethacin |
| E935.7 Adv Eff Non-Narc Analges | Causing adverse effects; other non-narcotic analgesics, Pyrabital |
| E935.7 Adv Eff Non-Narc Analges | Causing adverse effects; other non-narcotic analgesics, Pyrabital |
| E935.8 Adv Eff Analgesics Nec | Causing adverse effects; other specified analgesics and antipyretics, Pentazocine |
| E935.8 Adv Eff Analgesics Nec | Causing adverse effects; other specified analgesics and antipyretics, Pentazocine |
| E935.9 Adv Eff Analgesic Nos | Causing adverse effects; unspecified analgesic and antipyretic |
| E935.9 Adv Eff Analgesic Nos | Causing adverse effects; unspecified analgesic and antipyretic |
| E926.1 Adv Eff Hydantoin Deriv | Causing adverse effects; hydantoin derivatives, Phenytoin |
| E926.1 Adv Eff Hydantoin Deriv | Causing adverse effects; hydantoin derivatives, Phenytoin |
| E926.3 Adv Eff Anticonvuls Nec/Nos | Causing adverse effects; other and unspecified anticonvulsants, Beclamide, Primidone |
| E926.3 Adv Eff Anticonvuls Nec/Nos | Causing adverse effects; other and unspecified anticonvulsants, Beclamide, Primidone |
| E926.4 Adv Eff Anti-Parkinson | Causing adverse effects; anti-Parkinsonism drugs, Amantadine, Ethopropazine [profenamine], Levodopa [L-dopa] |
| E926.4 Adv Eff Anti-Parkinson | Causing adverse effects; anti-Parkinsonism drugs, Amantadine, Ethopropazine [profenamine], Levodopa [L-dopa] |
| E927.0 Adv Eff Barbiturates | Causing adverse effects; barbiturates |
| E927.0 Adv Eff Barbiturates | Causing adverse effects; barbiturates |
| E927.8 Adv Eff Sedat/Hypnot Nec | Causing adverse effects; other sedatives and hypnotics |
| E927.8 Adv Eff Sedat/Hypnot Nec | Causing adverse effects; other sedatives and hypnotics |
| E927.9 Adv Eff Sedat/Hypnot Nos | Causing adverse effects; sedatives and hypnotics; unspecified, Sleeping: drug NOS, pill NOS, tablet NOS |
| E927.9 Adv Eff Sedat/Hypnot Nos | Causing adverse effects; sedatives and hypnotics; unspecified, Sleeping: drug NOS, pill NOS, tablet NOS |
| E928.0 Adv Eff CNS Muscle Depress | Causing adverse effects; central nervous system muscle-tone depressants, Chlorphenesin (carbamate), Mephenesin, Methocarbamol |
| E928.0 Adv Eff CNS Muscle Depress | Causing adverse effects; central nervous system muscle-tone depressants, Chlorphenesin (carbamate), Mephenesin, Methocarbamol |
| E928.2 Adv Eff Gas Anesthesia Nec | Causing adverse effects; other gaseous anesthetics, Ether, Nitrous oxide, Halogenated hydrocarbon derivatives, except halothane |
| E928.2 Adv Eff Gas Anesthesia Nec | Causing adverse effects; other gaseous anesthetics, Ether, Nitrous oxide, Halogenated hydrocarbon derivatives, except halothane |
| E928.3 Adv Eff Intravenous Anesthesia | Causing adverse effects; intravenous anesthetics, Ketamine, Methohexitol [methohexitone], Thiobarbiturates, such as thiopental sodium |
| E928.3 Adv Eff Intravenous Anesthesia | Causing adverse effects; intravenous anesthetics, Ketamine, Methohexitol [methohexitone], Thiobarbiturates, such as thiopental sodium |
| E928.4 Adv Eff General Anesthesia Nec/Nos | Causing adverse effects; other and unspecified general anesthetics |
| E928.4 Adv Eff General Anesthesia Nec/Nos | Causing adverse effects; other and unspecified general anesthetics |
| E928.5 Adv Eff Topical/Infusion Anesthesia | Causing adverse effects; surface and infiltration anesthetics, Cocaine, Lidocaine [lignocaine], Procaine, Tetraaine |
| E928.5 Adv Eff Topical/Infusion Anesthesia | Causing adverse effects; surface and infiltration anesthetics, Cocaine, Lidocaine [lignocaine], Procaine, Tetraaine |
| E928.6 Adv Eff Nerve-Block Anesthesia | Causing adverse effects; peripheral nerve- and plexus-blocking anesthetics |
| E928.7 Adv Eff Spinal Anesthesia | Causing adverse effects; spinal anesthetics |
| E928.7 Adv Eff Spinal Anesthesia | Causing adverse effects; spinal anesthetics |
| E929.0 Adv Eff Antidepressants | Causing adverse effects; antidepressants, Amitriptyline, Imipramine, Monoamine oxidase [MAO] inhibitors |
| E929.0 Adv Eff Antidepressants | Causing adverse effects; antidepressants, Amitriptyline, Imipramine, Monoamine oxidase [MAO] inhibitors |
| E929.1 Adv Eff Phenothiazine Tranq | Causing adverse effects; phenothiazine-based tranquilizers, Chlorpromazine, Fluphenazine, Phenothiazine, Prochlorperazine, Promazine |
| E929.1 Adv Eff Phenothiazine Tranq | Causing adverse effects; phenothiazine-based tranquilizers, Chlorpromazine, Fluphenazine, Phenothiazine, Prochlorperazine, Promazine |

(Continued)
| ICD code       | Diagnoses                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| E939.2 Adv Ef Byrophen Tranq | Causing adverse effects; butyrophenone-based tranquilizers, Haloperidol, Spiperone, Trifluperidol                                          |
| E939.2 Adv Ef Butyrophen Tranq | Causing adverse effects; butyrophenone-based tranquilizers, Haloperidol, Spiperone, Trifluperidol                                          |
| E939.3 Adv Ef Antipsychotic Nec | Causing adverse effects; other antipsychotics, neuroleptics, and major tranquilizers                                                    |
| E939.3 Adv Ef Antipsychotic Nec | Causing adverse effects; other antipsychotics, neuroleptics, and major tranquilizers                                                    |
| E939.4 Adv Ef Benzodiaz Tranq | Causing adverse effects; benzodiazepine-based tranquilizers, Chlordiazepoxide, Diazepam, Flurazepam, Lorazepam, Medazepam, Nitracepam |
| E939.4 Adv Ef Benzodiaz Tranq | Causing adverse effects; benzodiazepine-based tranquilizers, Chlordiazepoxide, Diazepam, Flurazepam, Lorazepam, Medazepam, Nitracepam |
| E939.5 Adv Ef Tranquiler Nec | Causing adverse effects; other tranquilizers, Hydroxyzine, Meprobamate                                                                       |
| E939.5 Adv Ef Tranquiler Nec | Causing adverse effects; other tranquilizers, Hydroxyzine, Meprobamate                                                                       |
| E939.7 Adv Ef Psychostimulants | Causing adverse effects; psychostimulants, Amphetamine, Caffeine                                                                        |
| E939.8 Adv Ef Psychotropic Nec | Causing adverse effects; other psychotropic agents                                                                                     |
| E939.8 Adv Ef Psychotropic Nec | Causing adverse effects; other psychotropic agents                                                                                     |
| E939.9 Adv Ef Psychotropic Nos | Causing adverse effects; unspecified psychotropic agent                                                                                 |
| E939.9 Adv Ef Psychotropic Nos | Causing adverse effects; unspecified psychotropic agent                                                                                 |
| E940.1 Adv Ef Opiat Antagonist | Causing adverse effects; opiate antagonists, Levallophan, Nalorphine, Naloxone                                                           |
| E940.1 Adv Ef Opiat Antagonist | Causing adverse effects; opiate antagonists, Levallophan, Nalorphine, Naloxone                                                           |
| E941.0 Adv Ef Cholinerics | Causing adverse effects; parasympathomimetics [cholinergics], Acetylcholine, Pilocarpine, Anticholinesterase: organophosphorus, reversible |
| E941.0 Adv Ef Cholinerics | Causing adverse effects; parasympathomimetics [cholinergics], Acetylcholine, Pilocarpine, Anticholinesterase: organophosphorus, reversible |
| E941.1 Adv Ef Parasympatholytz | Causing adverse effects; parasympatholytics [anticholinergics and antimuscarinics] and spasmyotics, Atropine, Homatropine, Hyoscine [scopolamine], Quaternary ammonium derivatives |
| E941.1 Adv Ef Parasympatholytz | Causing adverse effects; parasympatholytics [anticholinergics and antimuscarinics] and spasmyotics, Atropine, Homatropine, Hyoscine [scopolamine], Quaternary ammonium derivatives |
| E941.2 Adv Ef Sympathomimetics | Causing adverse effects; sympathomimetics [adrenergics], Epinephrine [adrenalin], Levarterenol [noradrenalin]                                 |
| E941.2 Adv Ef Sympathomimetics | Causing adverse effects; sympathomimetics [adrenergics], Epinephrine [adrenalin], Levarterenol [noradrenalin]                                 |
| E941.3 Adv Ef Sympatholytics | Causing adverse effects; sympatholytics [antiaadrenergics], Phenoxybenzamine, Tolazoline hydrochloride                                      |
| E941.3 Adv Ef Sympatholytics | Causing adverse effects; sympatholytics [antiaadrenergics], Phenoxybenzamine, Tolazoline hydrochloride                                      |
| E941.9 Adv Ef Autonom Agnt Nos | Causing adverse effects; unspecified drug primarily affecting the autonomic nervous system                                                |
| E942.0 Adv Ef Card Rhyth Regul | Causing adverse effects; cardiac rhythm regulators, Practolol, Procainamide, Propranolol, Quinidine                                           |
| E942.0 Adv Ef Card Rhyth Regul | Causing adverse effects; cardiac rhythm regulators, Practolol, Procainamide, Propranolol, Quinidine                                           |
| E942.1 Adv Ef Cardiotonics | Causing adverse effects; cardiotonic glycosides and drugs of similar action, Digitalis glycosides, Digoxin, Strophanshins             |
| E942.1 Adv Ef Cardiotonics | Causing adverse effects; cardiotonic glycosides and drugs of similar action, Digitalis glycosides, Digoxin, Strophanshins             |
| E942.2 Adv Ef Antilipemics | Causing adverse effects; antilipemic and antitateriosclerotic drugs, Cholestyramine, Clofibrate                                             |
| E942.2 Adv Ef Antilipemics | Causing adverse effects; antilipemic and antitateriosclerotic drugs, Cholestyramine, Clofibrate                                             |
| E942.4 Adv Ef Coronary Vasodil | Causing adverse effects; coronary vasodilators, Dipyradomole, Nitrates [nitroglycerin], Nitrites, Prenylamine                          |
| E942.4 Adv Ef Coronary Vasodil | Causing adverse effects; coronary vasodilators, Dipyradomole, Nitrates [nitroglycerin], Nitrites, Prenylamine                          |
| E942.5 Adv Ef Vasodilators Nec | Causing adverse effects; other vasodilators, Cyclandelate, Diazoxide, Hydralazine, Papaverine                                             |
| E942.5 Adv Ef Vasodilators Nec | Causing adverse effects; other vasodilators, Cyclandelate, Diazoxide, Hydralazine, Papaverine                                             |
| E942.6 Adv Ef Antihyperten Agt | Causing adverse effects; other antihypertensive agents, Clonidin, Guanethidin, Rauwolfia alkaloids, Reserpine                          |
| E942.6 Adv Ef Antihyperten Agt | Causing adverse effects; other antihypertensive agents, Clonidin, Guanethidin, Rauwolfia alkaloids, Reserpine                          |
| E942.9 Adv Ef Cardiovas Nec | Causing adverse effects; other and unspecified agents primarily affecting the cardiovascular system                                     |
| E942.9 Adv Ef Cardiovas Nec | Causing adverse effects; other and unspecified agents primarily affecting the cardiovascular system                                     |
| E943.0 Adv Ef Antacids | Causing adverse effects; antacids and antigastric secretion drugs, Aluminum hydroxide, Magnesium trisilicate                          |
| E943.0 Adv Ef Antacids | Causing adverse effects; antacids and antigastric secretion drugs, Aluminum hydroxide, Magnesium trisilicate                          |

(Continued)
| ICD code          | Diagnoses                                                                 |
|-------------------|---------------------------------------------------------------------------|
| E943.1            | Causing adverse effects; irritant cathartics, Bisacodyl, Castor oil, Phenolphthalein |
| E943.1            | Causing adverse effects; irritant cathartics, Bisacodyl, Castor oil, Phenolphthalein |
| E943.2            | Causing adverse effects; emollient cathartics, Sodium dioctyl sulfosuccinate |
| E943.2            | Causing adverse effects; emollient cathartics, Sodium dioctyl sulfosuccinate |
| E943.3            | Causing adverse effects; other cathartics, including intestinal atonia drugs, Magnesium sulfate |
| E943.3            | Causing adverse effects; other cathartics, including intestinal atonia drugs, Magnesium sulfate |
| E943.5            | Causing adverse effects; antidiarrheal drugs, Bismuth subcarbonate, Kaolin, Pectin |
| E943.5            | Causing adverse effects; antidiarrheal drugs, Bismuth subcarbonate, Kaolin, Pectin |
| E943.8            | Causing adverse effects; other specified agents primarily affecting the gastrointestinal system |
| E943.8            | Causing adverse effects; other specified agents primarily affecting the gastrointestinal system |
| E944.1            | Causing adverse effects; purine derivative diuretics, Theobromine, Theophylline |
| E944.1            | Causing adverse effects; purine derivative diuretics, Theobromine, Theophylline |
| E944.2            | Causing adverse effects; carbonic acid anhydrase inhibitors, Acetazolamide |
| E944.2            | Causing adverse effects; carbonic acid anhydrase inhibitors, Acetazolamide |
| E944.3            | Causing adverse effects; saluretics, Benzothiadiazides, Chlorothiazide group |
| E944.3            | Causing adverse effects; saluretics, Benzothiadiazides, Chlorothiazide group |
| E944.4            | Causing adverse effects; other diuretics, Ethacrynic acid, Furosemide |
| E944.4            | Causing adverse effects; other diuretics, Ethacrynic acid, Furosemide |
| E944.5            | Causing adverse effects; electrolytic, caloric, and water-balance agents |
| E944.5            | Causing adverse effects; electrolytic, caloric, and water-balance agents |
| E944.7            | Causing adverse effects; uric acid metabolism drugs, Phenoquin, Probencid |
| E944.7            | Causing adverse effects; uric acid metabolism drugs, Phenoquin, Probencid |
| E945.1            | Causing adverse effects; smooth muscle relaxants, Adiphenine, Metaproterenol [or ciprenaline] |
| E945.1            | Causing adverse effects; smooth muscle relaxants, Adiphenine, Metaproterenol [or ciprenaline] |
| E945.2            | Causing adverse effects; skeletal muscle relaxants, Alcuronium chloride, Suxamethonium chloride |
| E945.2            | Causing adverse effects; skeletal muscle relaxants, Alcuronium chloride, Suxamethonium chloride |
| E945.3            | Causing adverse effects; other and unspecified drugs acting on muscles |
| E945.4            | Causing adverse effects; antitussives, Dextromethorphan, Pipazethate hydrochloride |
| E945.5            | Causing adverse effects; expectorants, Acetylcysteine, Cocillana, Terpin hydrate |
| E945.7            | Causing adverse effects; antiasthmatics, Aminophylline [theophylline ethylenediamine] |
| E945.7            | Causing adverse effects; antiasthmatics, Aminophylline [theophylline ethylenediamine] |
| E945.8            | Causing adverse effects; other and unspecified respiratory drugs |
| E946.0            | Causing adverse effects; local anti-infectives and anti-inflammatory drugs |
| E946.0            | Causing adverse effects; local anti-infectives and anti-inflammatory drugs |
| E946.1            | Causing adverse effects; antipruritics |
| E946.3            | Causing adverse effects; emollients, demulcents, and protectants |
| E946.5            | Causing adverse effects; eye anti-infectives and other eye drugs, Idoxuridine |
| E946.5            | Causing adverse effects; eye anti-infectives and other eye drugs, Idoxuridine |
| E946.6            | Causing adverse effects; anti-infectives and other drugs and preparations for ear, nose, and throat |
| E947.8            | Causing adverse effects; other drugs and medicinal substances, Contrast media used for diagnostic x-ray procedures, Diagnostic agents and kits |

(Continued)
| ICD code                  | Diagnoses                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------|
| E947.8 Adv Eff Medicinal Nec | Causing adverse effects; other drugs and medicinal substances, Contrast media used for diagnostic x-ray procedures, Diagnostic agents and kits |
| E947.9 Adv Eff Medicinal Nos | Causing adverse effects; unspecified drug or medicinal substance                             |
| E947.9 Adv Eff Medicinal Nos | Causing adverse effects; unspecified drug or medicinal substance                             |
| E948.0 Adv Eff Bcg Vaccine | Causing adverse effects; BCG vaccine                                                          |
| E948.8 Adv Eff Bact Vac Nec/Nos | Causing adverse effects; other and unspecified bacterial vaccines                             |
| E949.6 Adv Eff Viral Vacc Nec | Causing adverse effects; other and unspecified viral and rickettsial vaccines, Mumps vaccine |
| E949.9 Adv Eff Biologic Nec/Nos | Causing adverse effects; other and unspecified vaccines and biological substances          |