## ANALYZING PRESCRIPTION DRUGS AS CAUSES OF DEATH ON DEATH CERTIFICATES

The Office of Drug Safety of the Food and Drug Administration (FDA) in collaboration with the Consumer Product Safety Commission (CPSC) conducted a pilot study to collect and analyze death certificates for deaths attributed to drugs used therapeutically. As an extension of its ongoing surveillance activities, the CPSC collected death certificates from state health departments for the year 1999 with any of four International Classification of Diseases, Tenth Revision (ICD- $10)^1$  codes listed as causes of death. The four ICD codes selected for study were the following: adverse effects during therapeutic use of x-ray contrast media (code Y57.5); adverse effects during therapeutic use of androgens and anabolic congeners (Y42.7); anaphylactic shock due to adverse effect of drug properly administered (T88.6); and unspecified adverse (allergic, hypersensitivity, idiosyncratic) effect of drug properly administered (T88.7). Three of the four codes (Y57.5, T88.6, and T88.7) were chosen to include deaths attributed to contrast agents and to specify the names of the contrast agent drugs. The fourth code (Y42.7) was selected because of an increase between 1998 and 1999 in deaths with this code, and to determine if this increase was due to anabolic steroids.

The CPSC collected 604 (76.5%) of the predicted 790 U.S. death certificates<sup>2</sup> with any of the four ICD-10 codes listed as the underlying or other cause (immediate, contributing to underlying, and other significant contributing conditions). Six were excluded due to apparent miscoding, leaving 598 for analysis.

### X-ray contrast media (Y57.5)

Forty-eight certificates with contrast media mentioned as a cause were analyzed. Only two specified the name of the contrast agent. Twenty-eight (58%) of the 48 deaths were associated with renal failure, nine (19%) with anaphylactic shock/allergic reactions, five (10%) with cardiopulmonary arrest, four (8%) with respiratory failure, and two (4%) with stroke/cerebral hypoxia. Twenty-nine (60%) of these deaths were in women, and 45 (94%) were in individuals identified as white. The median age was 73 years.

#### Androgens and anabolic congeners (Y42.7)

"Steroids" or "corticosteroids" were listed as causes in 305 of 311 certificates in this category, and testosterone or anabolic steroids were listed in two; no drug was named in four. Steroid drugs (and their effects) were mentioned mostly as contributing causes or as other significant conditions contributing to death but not resulting in the underlying cause. Drug-associated effects included immunosuppression and infections, hyperglycemia and diabetes mellitus, gastrointestinal bleeding and perforation, and myopathy. The one patient with anabolic steroid use died from a dilated cardiomy-opathy. One hundred seventy-five (56%) deaths were in females, and 281 (90%) were in individuals identified as white. The median age was 74 years.

## Anaphylactic shock due to drugs (T88.6)

Twenty-five certificates were analyzed in this category. Anaphylactic shock was listed most frequently as the immediate cause of death. In four, drugs were not named; in three, anaphylactic shock was attributed to protamine sulfate; and in the remaining 18, death was attributed to a variety of drugs, of which eight were antibiotics. Fourteen (56%) deaths were in females, 22 (88%) were in individuals identified as white, and three (12%) in individuals identified as black. The median age was 60 years.

# Unspecified adverse (allergic, hypersensitivity, idiosyncratic) effect of drug (T88.7)

We analyzed 214 certificates in this category. The conditions specified were primarily allergic/hypersensitivity reactions. In 73, no name was specified other than "drug" or the ICD-10 code. For those with drugs specified, the leading drugs were insulin and protamine sulfate, 15 deaths each; penicillin, six; phenytoin, three; and amiodarone, three. The leading drug categories were antibiotics, 30; chemotherapeutic agents, 19; anticoagulant antagonists (protamine), 15; and insulin, 15. Most deaths were in females (53%) and people identified as white (82%), but black individuals accounted for 14%, disproportionate to their U.S. representation in the U.S. population. The median age was 66 years.

This data analysis indicates that death certificates can be collected and analyzed to provide information on deaths attributed to drugs. However, the names of the contrast agents listed as causes of death often were not specified. Also, we found that the increase in the number of deaths for androgens and anabolic congeners was not due to an increase in deaths attributed to anabolic steroids but rather to a change between the Ninth and Tenth Revisions of the ICD; in the Tenth Revision, deaths attributed to "steroids" (mostly corticosteroids) were coded to the androgens and anabolic congeners category.

The number of certificates without specific drug names was a methodological limitation. To make analyses of the contribution of drugs as causes of death on death certificates more worthwhile, physicians should be encouraged to write the specific names of drugs attributed as causes on death certificates.

Note: The views expressed are those of the authors and do not necessarily represent the official position of the FDA.

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