

CHAPTER 1

All Digestive Diseases

James E. Everhart, M.D., M.P.H.

For systematic coding, mortality and health care statistics rely on disease classification systems, of which the International Classification of Diseases (ICD) is the world standard. The diagnostic codes traditionally used for digestive diseases primarily code for chronic conditions that are neither infectious nor malignant. In the current ICD edition (ICD-10), these include K20 through K93 in chapter “K” (Appendix 1). Other digestive diseases of public health significance and of particular interest to practitioners and researchers are coded in other chapters: Intestinal Infectious and Parasitic Diseases (A00–A09); Viral Hepatitis (B15–B19); Malignant Neoplasms of Digestive Organs (C15–C26); Hemorrhoids (I84); Esophageal and Gastric Varices (I85, I86.4); Maternal Disorders (Digestive) Related to Pregnancy (O21–O22); Conditions (Digestive) Originating in the Perinatal Period (P53, P54, P57, and P59); Digestive System Disorders of Fetus and Newborn (P75–P78, P92); and Congenital Malformations, Deformations, and Chromosomal Abnormalities (Q39–Q45). For some of these groups of conditions, there were enough national data for individual sections in this report. For others, they and many other digestive system disorders were grouped under “other digestive diseases,” so that a more complete impact of the total burden of digestive diseases could be estimated.

ICD-9 codes were used for mortality 1979–1998, and ICD-10 codes have been used subsequently, which has been noted on figures of mortality trends. As of the publication of this report, the United States had yet to switch from ICD-9-CM (Clinical Modification) to ICD-10 codes for coding morbidity, despite the publication of the newer edition in 1992. Therefore, all morbidity information from 1979 through 2005 was from ICD-9-CM.

In 2004, there were an estimated 72 million ambulatory care visits with a first-listed diagnosis of a digestive disease and more than 104 million visits with an all-listed diagnoses, which equated to a rate of 35,684

visits per 100,000 U.S. population (Table 1). In other words, for every 100 U.S. residents, there were 35 ambulatory care visits at which a digestive disease diagnosis was noted. Visits were common for all age groups, with the highest rate among persons age 65 years and older. Age-adjusted rates were comparable for blacks and whites and were 20 percent higher for females than for males.

Digestive diseases were common all-listed diagnoses at hospital discharge in 2004 as well as first-listed diagnosis (Table 1). There were approximately 4.6 million discharges of patients with digestive disease as first-listed diagnosis and 13.5 million discharges as all-listed diagnoses. With a rate of all-listed diagnoses of 4,608 per 100,000, there were nearly five overnight hospital stays per 100 U.S. residents that included a discharge diagnosis of at least one digestive disease. These rates were nearly as high among children as among middle-aged adults and were higher in these two age groups than among younger adults. The highest rate was among persons age 65 years and older. In contrast to their ambulatory care visits, blacks had higher rates of hospitalization than did whites. Comparable or lower age-adjusted rates of ambulatory care visits among blacks, yet higher rates of hospitalization, were a common finding for a number of digestive diseases. Women had a 10 percent higher age-adjusted rate than men.

The rate of ambulatory care visits over time (age-adjusted to the 2000 U.S. population) is shown in Figure 1 by 3-year periods (except for the first period, which is 2 years), between 1992 and 2005 (beginning with 1992–1993 and ending with 2003–2005). Age-adjusted rates increased during this period by one-third, from 26.4 per 100 population to 35.3 per 100 population. This trend in increased rates of ambulatory care visits started at least as early as 1985, when there were 22.4 digestive disease diagnoses per 100 population.¹ Rates of all-listed hospitalization with a digestive disease diagnosis fell between 1983 and

1988, a pattern that occurred for all hospitalizations in the United States. Hospitalization rates were stable for the next 10 years before rising to a rate in 2004 equal to the previous peak rate in 1982. The age-adjusted percent increase between 1998 and 2004 was 35 percent. This overall increase was the net of diagnoses whose rates increased and diagnoses whose rates decreased. The largest contributor to the increase was “other digestive diseases”—those conditions that do not have separate chapters in this report. The largest individual disease contributions to the increase were made by gastroesophageal reflux disease (GERD), with an increase over this period of 376 per 100,000 population; viral hepatitis C, with 79 per 100,000; chronic constipation, with 62 per 100,000; intestinal infections, with 41 per 100,000; and pancreatitis, with 23 per 100,000. Except for pancreatitis, each of these diagnoses was more likely to be listed as a secondary discharge diagnosis than as the first-listed diagnosis.

The recent increase in overnight hospital stays with a diagnosis of digestive disease is surprising for two reasons. A few common conditions were known to have declined as reasons for overnight hospitalizations, notably peptic ulcer disease (due to decreased frequency) and gallstones (due to shift to same-day surgery). Of greater significance was the modest rate of increase of hospital discharges for all diseases (from 11,569 per 100,000 in 1998 to 13,104 per 100,000 in 2004, a 13.3 percent increase) relative to the larger increase for digestive diseases. In 1998, 25.3 percent of all hospital discharges had a diagnosis of digestive diseases; this increased to 30.1 percent in 2004. Thus, rates of hospitalizations with digestive disease diagnoses increased both absolutely and as a proportion of all hospitalizations.

In 2004, there were more than 236,000 deaths in the United States with a digestive disease as the underlying cause (Table 2), which represented 9.8 percent of all deaths. A disproportionately lower proportion of deaths from digestive diseases occurred among children (4.1 percent) and a higher proportion occurred among middle-aged adults (15.1 percent). There was no major variation in the distribution of deaths from digestive disease as a proportion of all deaths by race or sex. However, blacks had a 29 percent higher death rate

than whites, and men had a 53 percent higher rate than women.

There were 2 million years of potential life lost (YPLL) prior to age 75 years due to digestive diseases, representing 8.5 years per death with digestive disease as an underlying cause. Digestive diseases were more frequently listed as underlying cause than as contributing cause, mainly due to the large effect of deaths from cancer, which was usually listed as underlying cause. There was a gradual decline in digestive disease mortality between 1979 and 2004, both as underlying (18.2 percent) and as underlying or other cause (20.3 percent) (Figure 2). There have been many contributions to this decline, but the greatest determinant was the decrease in digestive disease cancer mortality by 19.8 percent as underlying cause and 24.0 percent as underlying or other cause.

The 10 costliest prescription drugs from retail pharmacies for digestive diseases, according to the 2004 Verispan database (Appendix 2), are shown in Table 3. Dominating the prescription market at 50.7 percent of total number of prescriptions and 77.3 percent of total cost were five proton pump inhibitors, which were mainly prescribed for GERD. The other costliest medications were mesalamine (for inflammatory bowel disease), ranitidine (another anti-acid agent), tegaserod [for irritable bowel syndrome (IBS) and constipation], and ribavirin and peginterferon alfa_2a (for hepatitis C). A deficiency of the drug data is lack of information on nonprescription medications, complementary and alternative medications, infusions, and drugs administered in the hospital.

Summary data for individual digestive diseases are shown in Table 4, ordered by underlying cause of death and type of disease. Five diseases each caused more than 10,000 deaths. These were liver disease and four cancers, led by colorectal cancer. Two common causes of death were transmissible infectious diseases: gastrointestinal (GI) infections and viral hepatitis C. Chronic viral hepatitis is also believed to be a significant contributor to liver and bile duct cancers, which accounted for more than 11,000 deaths.

The YPLL prior to age 75 years is the addition of the number of years prior to age 75 at which deaths occur.

A death at age 55 years, for example, contributes 20 YPLL, while a death at age 75 years contributes none. Malignancies were responsible for 6 of the top 10 digestive diseases that contributed the most to YPLL (Table 4). Liver disease was the second leading cause of death (after colorectal cancer), but contributed the greatest number of YPLL. Also among the 10 leading causes of YPLL were hepatitis C and pancreatitis.

The distribution of burden of medical care for digestive diseases is notably different from mortality from digestive diseases. The six leading diseases with diagnosis noted at ambulatory care visits were GERD, chronic constipation, abdominal wall hernia, hemorrhoids, diverticular disease, and IBS. At least three of these (GERD, constipation, and IBS) are largely caused by disordered function of the GI tract, and diverticular disease also may be in part a consequence of dysfunction. The six most common digestive diseases diagnoses on hospital discharge

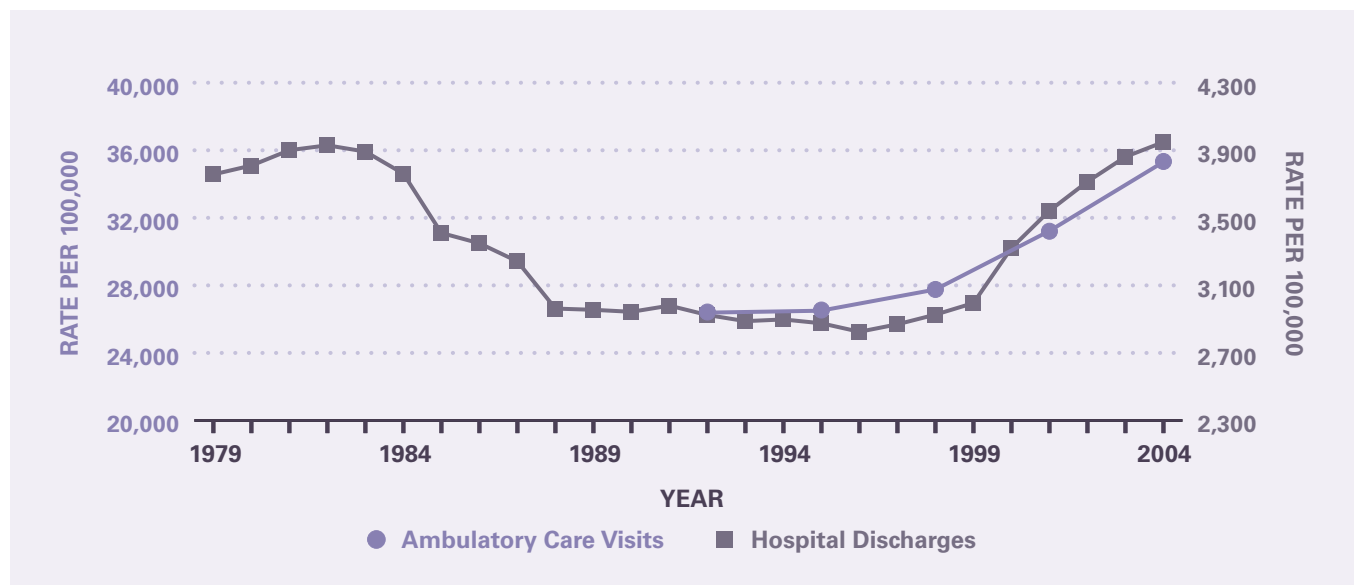
records were GERD, diverticular disease, liver disease, constipation, gallstones, and peptic ulcer disease. The main difference between the records for hospital discharge diagnoses and ambulatory care diagnoses was the high numbers of diagnoses with liver disease and peptic ulcer disease, which can be life-threatening, and gallstones, which are a common reason for surgery. Because GERD and constipation should rarely lead to hospitalization, it must be assumed that when listed on discharge, they either contributed to the reason for hospitalization or were listed in thousands of discharges simply because they were so common.

¹Everhart JE. Overview. In: Everhart JE, editor. *Digestive diseases in the United States: epidemiology and impact*. US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Washington, DC: US Government Printing Office, 1994; NIH Publication No. 94-1447 pp. 1–53.

Table 1. All Digestive Diseases: Number and Age-Adjusted Rates of Ambulatory Care Visits and Hospital Discharges With First-Listed and All-Listed Diagnoses by Age, Race, and Sex in the United States, 2004

DEMOGRAPHIC CHARACTERISTICS	AMBULATORY CARE VISITS				HOSPITAL DISCHARGES				
	First-Listed Diagnosis		All-Listed Diagnoses		First-Listed Diagnosis		All-Listed Diagnoses		
	Number in Thousands	Rate per 100,000	Number in Thousands	Rate per 100,000	Number in Thousands	Rate per 100,000	Number in Thousands	Rate per 100,000	
AGE (Years)	Under 15	10,951	18,010	15,170	24,948	331	544	2,321	3,817
	15–44	21,348	16,967	28,749	22,848	1,112	884	2,401	1,908
	45–64	21,430	30,314	32,434	45,880	1,362	1,926	3,489	4,935
	65+	18,342	50,483	28,437	78,268	1,779	4,897	5,313	14,622
RACE	White	59,506	24,317	85,798	34,953	3,526	1,412	10,242	4,108
	Black	8,733	24,076	13,339	37,784	531	1,655	1,702	5,142
SEX	Female	39,531	25,827	59,553	38,648	2,545	1,592	7,593	4,753
	Male	32,540	23,017	45,236	32,159	2,023	1,483	5,909	4,335
TOTAL		72,071	24,543	104,790	35,684	4,591	1,563	13,533	4,608

SOURCE: National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) (3-year average, 2003–2005), and Healthcare Cost and Utilization Project Nationwide Inpatient Sample (HCUP NIS)

Figure 1. All Digestive Diseases: Age-Adjusted Rates of Ambulatory Care Visits and Hospital Discharges With All-Listed Diagnoses in the United States, 1979–2004

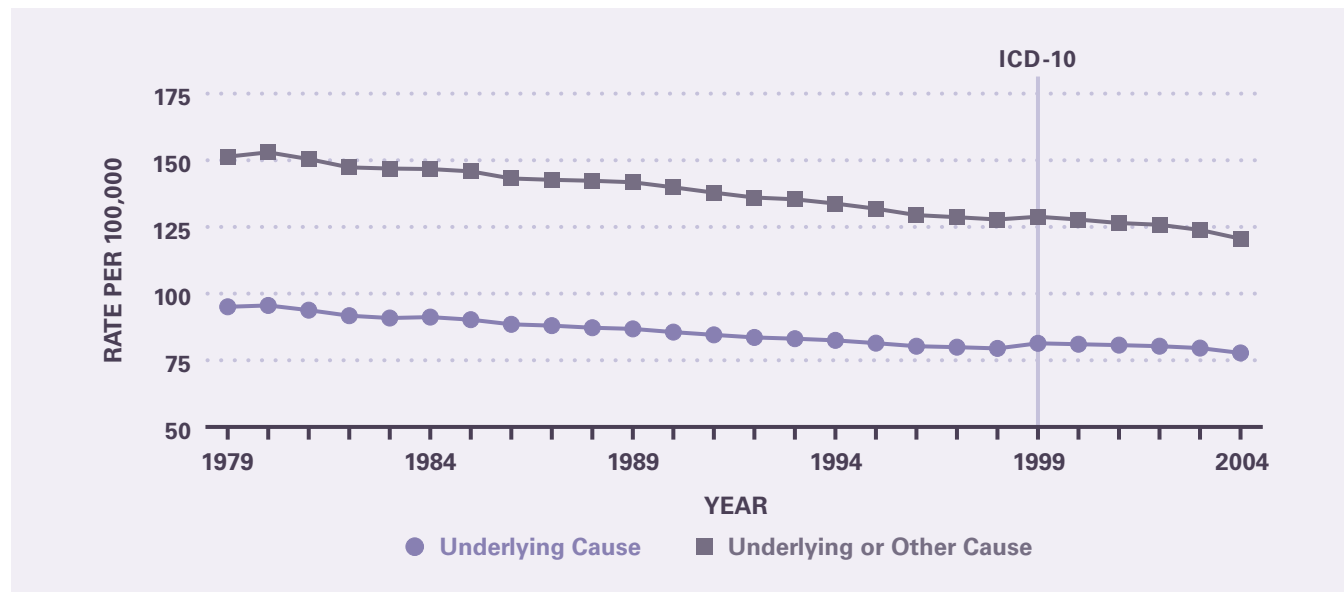
SOURCE: National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) (averages 1992–1993, 1994–1996, 1997–1999, 2000–2002, 2003–2005), and National Hospital Discharge Survey (NHDS)

Table 2. All Digestive Diseases: Number and Age-Adjusted Rates of Deaths, Years of Potential Life Lost (to Age 75), and Digestive Disease as a Percentage of All Deaths by Age, Race, and Sex in the United States, 2004

DEMOGRAPHIC CHARACTERISTICS	UNDERLYING CAUSE				UNDERLYING OR OTHER CAUSE		
	Number of Deaths	Rate per 100,000	Years of Potential Life Lost in Thousands	Digestive Disease as a Percentage of All Deaths	Number of Deaths	Rate per 100,000	
AGE (Years)	Under 15	1,612	2.7	118.2	4.1	2,908	4.8
	15–44	11,036	8.8	397.3	6.9	17,915	14.2
	45–64	66,806	94.5	1,263.8	15.1	92,862	131.4
	65+	156,706	431.3	228.2	8.9	252,709	695.5
RACE	White	200,834	77.0	1,579.4	9.8	313,055	119.7
	Black	27,812	99.5	340.2	9.7	42,514	152.7
SEX	Female	111,264	63.6	723.3	9.2	177,811	100.7
	Male	124,900	97.1	1,284.2	10.6	188,596	149.1
TOTAL		236,164	80.4	2,007.5	9.8	366,407	124.8

SOURCE: Vital Statistics of the United States

Figure 2. All Digestive Diseases: Age-Adjusted Rates of Death in the United States, 1979–2004



SOURCE: Vital Statistics of the United States

Table 3. All Digestive Diseases: Costliest Prescriptions

DRUG	Prescription (#)	Prescription	Retail Cost	Cost
Lansoprazole	20,989,993	15.5%	\$3,104,963,208	25.2%
Esomeprazole	19,458,740	14.3	2,845,665,944	23.1
Pantoprazole	11,716,033	8.6	1,408,222,345	11.4
Rabeprazole	8,019,431	5.9	1,135,819,908	9.2
Omeprazole	8,582,644	6.3	1,038,622,087	8.4
Mesalamine	2,448,971	1.8	468,426,719	3.8
Ranitidine	13,171,338	9.7	319,418,374	2.6
Tegaserod	1,618,699	1.2	238,030,688	1.9
Ribavirin	221,035	0.2	229,351,616	1.9
Peginterferon alfa-2a	131,001	0.1	191,754,177	1.6
Other	49,378,593	36.4	1,351,443,116	11.0
TOTAL	135,736,478	100.0%	\$12,331,718,182	100.0%

SOURCE: Verispan

Table 4. Burden of Selected Digestive Diseases in the United States, 2004

DIGESTIVE DISEASE	Deaths, Underlying Cause ^a	Years of Potential Life Lost to Age 75 Years ^a	Ambulatory Care Visits, All-Listed Diagnoses ^b	Hospital Discharges, All-Listed Diagnoses ^c
All Digestive Diseases	236,164	2,007,500	104,790,000	13,533,000
All Digestive Cancers	135,107	945,200	4,198,000	726,000
Colorectal Cancer	53,226	333,000	2,589,000	255,000
Pancreatic Cancer	31,800	206,800	415,000	68,000
Esophageal Cancer	13,667	113,800	372,000	44,000
Gastric Cancer	11,253	84,200	141,000	31,000
Primary Liver Cancer	6,323	72,400	63,000	33,000
Bile Duct Cancer	4,954	32,900	—	17,000
Gallbladder Cancer	1,939	10,900	—	6,000
Cancer of the Small Intestine	1,115	9,300	—	9,000
Liver Disease	36,090	559,100	2,398,000	759,000

Table 4. Burden of Selected Digestive Diseases in the United States, 2004 (continued)

DIGESTIVE DISEASE	Deaths, Underlying Cause ^a	Years of Potential Life Lost to Age 75 Years ^a	Ambulatory Care Visits, All-Listed Diagnoses ^b	Hospital Discharges, All-Listed Diagnoses ^c
All Viral Hepatitis	5,393	101,800	3,510,000	475,000
Hepatitis C	4,595	87,500	2,747,000	419,000
Hepatitis B	645	11,800	729,000	69,000
Hepatitis A	58	800	—	10,000
Gastrointestinal Infections	4,396	12,800	2,365,000	450,000
Peptic Ulcer Disease	3,692	19,700	1,473,000	489,000
Pancreatitis	3,480	42,800	881,000	454,000
Diverticular Disease	3,372	8,600	3,269,000	815,000
Abdominal Wall Hernia	1,172	6,900	4,787,000	372,000
Gastroesophageal Reflux Disease	1,150	6,000	18,342,000	3,189,000
Gallstones	1,092	4,400	1,836,000	622,000
All Inflammatory Bowel Disease	933	9,100	1,892,000	221,000
Crohn's Disease	622	7,000	1,176,000	141,000
Ulcerative Colitis	311	2,000	716,000	82,000
Appendicitis	453	5,000	782,000	325,000
All Functional Intestinal Disorders	423	2,500	11,648,000	1,241,000
Chronic Constipation	137	900	6,306,000	700,000
Irritable Bowel Syndrome	20	0	3,054,000	212,000
Hemorrhoids	14	200	3,275,000	306,000

SOURCE:^a Vital Statistics of the United States^b National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS)^c Healthcare Cost and Utilization Project Nationwide Inpatient Sample (HCUP NIS)