Characteristics of Diverticulitis-Related Emergency Department Visits in the United States

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BACKGROUND

- Diverticulitis (DV) is a digestive disease that develops from diverticulosis, a usually asymptomatic condition that involves the formation of pouches (diverticula) on the outside of the small intestine or, most commonly, the colon[1]
  - DV results when a diverticular pouch becomes inflamed or infected, resulting in symptoms ranging from asymptomatic inflammation to life-threatening complications
- DV is common among the elderly, and these patients frequently present with complicated disease (e.g., peritonitis [life-threatening infection of the stomach lining], fistula or abscess, gastrointestinal [GI] hemorrhage, bowel perforation or obstruction)[2,3]
- Because DV often requires intensive medical management, the direct cost of the disease per case to payers is high[4]
- As the United States (US) population ages and the number of elderly people increases, DV may become a larger problem with increasing morbidity, mortality, and cost burden to payers[5]
- While previous studies have demonstrated that DV is costly to payers, most research has focused on total costs, while the burden attributable to different care settings has not been well documented
  - Although DV is often first diagnosed as an emergent condition in emergency department (ED) settings, few details on characteristics of DV-related encounters in this setting exist

OBJECTIVE

- This study evaluated the demographics and charges associated with ED visits among patients with DV in the US

METHODS

Data Source

- Data were abstracted from the Healthcare Cost and Utilization Project's 2007 Nationwide Emergency Department Sample (NEDS)
- NEDS is a US-based, nationally representative, all-payer ED database
- The database contains almost 26 million (unweighted) records, representing over 122 million weighted encounters for ED visits in more than 950 hospitals in the US
  - Observations are at the visit level
  - Patients with ED visits that result in hospitalization also are included in the database
- NEDS contains information on patient, visit, and facility characteristics and the reason for the visit
  - Charge information is available for approximately 75% of patients, regardless of payer

Inclusion Criterion

- Patients were selected for inclusion if they had a primary diagnosis of DV (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] codes 562.11 or 562.13)

Study Measures

- The study assessed the following measures:
  - Patient demographics (age, sex, primary expected payer)
  - Facility characteristics (type, region, location, teaching status)
  - Visit characteristics (disposition, mortality, diagnosis-related group [DRG])
  - Total charges

Data Analyses

- Descriptive statistics of all study measures were reported overall, and by those with and without a primary diagnosis for DV
- Sampling weights were used to generalize results to the entire US population
- All analyses were conducted using SAS version 9.3

RESULTS

- Of 122.3 million ED visits in the US in 2007, 284,853 involved a primary DV diagnosis
- Among visits with a primary DV diagnosis code, mean patient age was 58.3 years, approximately 20 years older than non–DV-related patients (Table 1)
- 55.4% of visits were for female patients (Table 1)
- Private health insurance was the most frequent payer for these visits (45.6%) (Table 1)
- Nearly 60% of DV-related ED visits resulted in a subsequent inpatient admission (Table 1)
- DV-related visits most often occurred in the southern US (38.1%) (Table 2)
- The most frequently observed DRG was 182 (esophagitis, gastroenteritis, and miscellaneous disorders; age > 17 with complication/comorbidity), observed in nearly one-third of DV-related ED visits (Table 3)
- The mean charge per DV-related ED visit (2011 US dollars) was $3,211, nearly double that for non–DV-related visits ($1,677) (Table 4)
- Total charges (in 2011 US dollars) across all DV-related ED visits in 2007 were approximately $1 billion ($3,211 per visit X 284,853 visits)

LIMITATIONS

- Medical charts and other detailed clinical information were not available to confirm DV
  - ED visits were identified based on diagnosis codes, which if recorded incorrectly, may cause misidentification of patients and events of interest
- Because charges were not recorded for approximately 25% of records in the NEDS, estimates of the ED care-related economic burden of DV drawn from these data may be conservative

CONCLUSIONS

- This nationally representative study presents novel information on DV-related ED visits in the US
- This study suggests that patients admitted to an ED with DV accrue substantial costs during their visit
- Adding to the body of knowledge regarding DV-related care may help providers and decision makers optimize allocation of resources to treat all DV patients
- Further research is needed to more fully assess the total economic burden of the disease (e.g., beyond the ED setting)

Table 1. Patient-Level Characteristics of ED Visits in the US in 2007, Overall and by DV Status

	DV Diagnosis				*P* Value	Total	
	Yes		No				
	Weighted N	Weighted %	Weighted N	Weighted %		Weighted N	Weighted %
Age, years							
< 20	544	0.19	31,050,359	25.44	< 0.0001	31,050,903	25.38
20-29	8,294	2.91	20,503,279	16.80		20,511,573	16.77
30-39	28,454	9.99	16,320,660	13.37		16,349,114	13.36
40-49	57,153	20.06	16,452,147	13.48		16,509,300	13.50
50-59	61,282	21.51	12,643,886	10.36		12,705,168	10.39
60-69	50,798	17.83	8,752,915	7.17		8,803,713	7.20
70+	78,322	27.50	16,312,061	13.37		16,390,383	13.40
Unknown	7	0.00	11,577	0.01		11,585	0.01
Mean (SD)	58.3 (16.4)		37.8 (24.5)		< 0.0001	37.9 (24.5)	
Median	57.0		35.0			35.0	
Range	4-108		0-124			0-124	
Sex							
Missing	20	0.01	8,181	0.01	0.0009	8,201	0.01
Invalid	0	0.00	574	0.00		574	0.00
Inconsistent	10	0.00	24,013	0.02		24,023	0.02
Male	127,000	44.58	55,440,780	45.43		55,567,781	45.42
Female	157,823	55.41	66,573,337	54.55		66,731,160	54.55
Primary expected payer							
Missing	211	0.07	257,965	0.21	< 0.0001	258,175	0.21
Invalid	354	0.12	281,953	0.23		282,307	0.23
Medicare	102,910	36.13	24,152,822	19.79		24,255,732	19.83
Medicaid	17,537	6.16	26,316,311	21.56		26,333,848	21.53
Private insurance	129,813	45.57	42,744,241	35.02		42,874,054	35.05
Self-pay	24,837	8.72	21,613,124	17.71		21,637,961	17.69
No charge	2,008	0.71	900,332	0.74		902,340	0.74
Other	7,184	2.52	5,780,137	4.74		5,787,321	4.73
Mortality							
Missing	2,836	1.00	2,199,580	1.80	< 0.0001	2,202,416	1.80
Did not die	280,683	98.54	119,099,049	97.58		119,379,732	97.59
Died in ED	23	0.01	190,283	0.16		190,306	0.16
Died in the hospital	1,311	0.46	557,974	0.46		559,285	0.46
Discharge disposition of patient from ED							
Routine	116,650	40.95	95,774,744	78.47	< 0.0001	95,891,394	78.39
Transfer to short-term hospital	2,340	0.82	1,381,589	1.13		1,383,929	1.13
Transfer other	912	0.32	1,422,368	1.17		1,423,280	1.16
Home health care	120	0.04	606,894	0.50		607,014	0.50
Against medical advice	847	0.30	1,626,593	1.33		1,627,440	1.33
Admitted as an inpatient to this hospital	161,399	56.66	18,862,607	15.46		19,024,006	15.55
Died in ED	23	0.01	190,283	0.16		190,306	0.16
Not admitted to this hospital, destination unknown	2,557	0.90	2,171,531	1.78		2,174,088	1.78
Not admitted to this hospital, discharged alive, destination unknown	5	0.00	10,278	0.01		10,283	0.01
Total	**284,853**	**100.00**	**122,046,886**	**100.00**		**122,331,739**	**100.00**

SD = standard deviation

Table 2. Facility-Level Characteristics of ED Visits in the US in 2007, Overall and by DV Status

	DV Diagnosis				*P* Value	Total	
	Yes		No				
	Weighted N	Weighted %	Weighted N	Weighted %		Weighted N	Weighted %
Region of hospital							
Northeast	65,536	23.01	23,922,894	19.60	0.0001	23,988,430	19.61
Midwest	63,174	22.18	28,645,091	23.47		28,708,265	23.47
South	108,388	38.05	47,930,820	39.27		48,039,208	39.27
West	47,755	16.76	21,548,081	17.66		21,595,836	17.65
Control/ownership of hospital							
Government or private (collapsed category)	175,601	61.65	75,605,544	61.95	0.0397	75,781,145	61.95
Government, nonfederal (public)	19,391	6.81	9,230,046	7.56		9,249,437	7.56
Private, not for profit (voluntary)	49,260	17.29	19,970,147	16.36		20,019,407	16.36
Private, investor owned (proprietary)	27,197	9.55	10,894,098	8.93		10,921,295	8.93
Private (collapsed category)	13,405	4.71	6,347,050	5.20		6,360,455	5.20
Teaching status of hospital							
Metropolitan nonteaching	144,560	50.75	53,562,691	43.89	< 0.0001	53,707,251	43.90
Metropolitan teaching	93,244	32.73	45,283,353	37.10		45,376,597	37.09
Nonmetropolitan hospital	47,049	16.52	23,200,842	19.01		23,247,891	19.00
Hospital urban-rural designation							
Large metropolitan areas with ≥ 1 million residents	131,583	46.19	52,439,521	42.97	< 0.0001	52,571,104	42.97
Small metropolitan areas with < 1 million residents	76,613	26.90	32,319,768	26.48		32,396,381	26.48
Micropolitan areas	29,231	10.26	13,528,386	11.08		13,557,617	11.08
Not metropolitan or micropolitan (nonurban residual)	14,204	4.99	7,832,874	6.42		7,847,078	6.41
Metropolitan, collapsed category of large and small metropolitan	29,608	10.39	14,086,755	11.54		14,116,363	11.54
Nonmetropolitan, collapsed category of micropolitan and nonurban	3,614	1.27	1,839,582	1.51		1,843,196	1.51
Total	**284,853**	**100.00**	**122,046,886**	**100.00**		**122,331,739**	**100.00**

Table 3. The Top-10 Most Frequently Observed DRGs Among DV-Related ED Visits in the US in 2007

DRG	Description	Weighted N	Weighted %
182	Esophagitis, gastroenteritis, and miscellaneous disorders; age > 17 with complication/comorbidity	52,388	32.46
183	Esophagitis, gastroenteritis, and miscellaneous disorders; age > 17 without complication/comorbidity	44,599	27.63
392	Splenectomy; age > 17	28,021	17.36
569	Major small and large bowel procedures with complication/comorbidity with major GI diagnosis	11,512	7.13
174	GI hemorrhage with complication/comorbidity	5,780	3.58
570	Major small and large bowel procedures with complication/comorbidity without major GI diagnosis	2,852	1.77
391	Normal newborn	2,622	1.62
329	Urethral stricture; age > 17 without complication/comorbidity	2,522	1.56
175	GI hemorrhage without complication/comorbidity	2,021	1.25
330	Urethral stricture; age 0-17	1,664	1.03

Table 4. Incurred Charges for ED Visits in the US in 2007, Overall and by DV Status

Total Charges	DV Diagnosis		*P* Value	Total
	Yes	No		
Mean (SD)	$3,211 ($3,069)	$1,677 ($2,422)	< 0.0001	$1,680 ($2,425)
Median	$1,936	$942		$943
Range	$114-$56,238	$114-$85,436		$114-$85,436

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