# Clinical Characteristics, Treatment Patterns, and Resource Utilization in a Real-World European Population With Diverticulitis

**Keith L Davis,[1] Debanjali Mitra,[1] Linnette Yen[2]**

*[1]RTI Health Solutions, Research Triangle Park, NC, United States; [2]Shire Development LLC, Wayne, PA, United States*

## BACKGROUND

- Diverticulitis is a condition that involves the formation of pouches (diverticula) on the outside of the small intestine or the colon.[1-3]
- Prevalence of diverticulitis in Western Europe is between 8 and 12 per million population and increases progressively with age, affecting 67% of western Europeans by the eighth decade of their lives.[4,5]
- Most patients have uncomplicated disease with symptoms such as acute appendicitis, irritable bowel syndrome, or colitis. Treatment for these patients includes bowel rest and broad spectrum antibiotics.[6]
- Approximately one-third of patients with diverticulitis develop complications[7] such as abscess, fistula, or potentially fatal peritonitis with high mortality rates.
- Patients experiencing repeated episodes of complications may need surgery, but such surgeries are associated with significant postoperative morbidity and mortality.[8] Therefore, diverticulitis can impose considerable burden on patients and payers.
- Diverticulitis has not been widely investigated in large, population-based data sources.

## OBJECTIVE

- This study aims to fill important literature gaps regarding the disease landscape and the resource use associated with diverticulitis. Specifically, the study documents patient and clinical characteristics, treatment patterns, and resource utilization associated with diverticulitis in a real-world European population.

## METHODS

- Retrospective abstraction of patient medical records by physicians in five countries in Western Europe: United Kingdom (UK), France, Germany, Netherlands, and Spain.

### Physician Selection Criteria

- A total of 503 physicians (~100 in each of the 5 countries) were recruited for medical record abstraction. Because patients with diverticulitis were treated in both outpatient and inpatient settings—and to ensure that detailed "in-hospital" data were captured in addition to events that took place in an outpatient setting—50% of physicians were recruited from outpatient offices and 50% were hospital-based physicians.
- All physicians had to meet the following eligibility criteria:
  - Case load of at least 5 patients with diverticulitis in the past 12 months
  - In clinical practice for 2 to 40 years
  - Medical specialty of general practitioner (GP) for office-based physicians
  - Medical specialty of GP (for the UK only), gastroenterologist, gastroenterology surgeon, other surgeon, or internist for hospital-based physicians

### Patient Selection Criteria

- Medical records were abstracted for patients who met the following criteria:
  - Diagnosed with diverticulitis from 1 January 2007 through 30 September 2010 (for patients treated in office-based settings) and full discharge records for at least one diverticulitis-related inpatient stay (day case or overnight admission) from 1 January 2007 through 30 September 2010 (for patients treated in hospital settings)
  - Diagnosis of diverticulitis confirmed by any of the following:
    - Computed tomography (CT) scan
    - Colonoscopy (after resolution of active infection)
    - Presence of abdominal pain, discomfort, or tenderness, and the use of antibiotics to treat these symptoms[9]
  - Aged at least 18 years on the date of confirmed diagnosis of diverticulitis
  - No documented evidence of colon cancer, as confirmed by a histology report
  - Not enrolled in any clinical trial for diverticulitis involving investigational drugs between date of first confirmed diagnosis or date of first diverticulitis-related inpatient admission and the end of the available chart data period
  - At least 12 months of medical records after the first confirmed diagnosis of diverticulitis (for office-based records) and full discharge records for at least one diverticulitis-related inpatient stay (for hospital-based records)

### Data Collection Process

- Data collection was performed by A+A Research, a global market research agency with operations in Europe and the United States.
- A+A Research recruited study physicians based on predetermined criteria.
- Data were gathered using a secure online Web-based portal with the electronic data collection form (translated into local languages) filled out directly by the selected physicians.

## STUDY MEASURES

- Data gathered at baseline included physician characteristics, patient demographics, medical history, and comorbidities. Disease-related complications, pharmacotherapy use, and resource utilization were evaluated over all available postindex follow-up.

## RESULTS

### Physician Characteristics (data not shown)

- Approximately half of the physicians were GPs (by design), while the other half were gastroenterologists. Fewer than 3% were gastroenterology surgeons or internists.
- The average (standard deviation [SD]) annual case load of physicians was 38.5 (59.7), with 17% of physicians treating more than 50 patients per year.
- Physicians were in practice for an average (SD) of 15.4 (7.6) years.

### Patient Characteristics (Table 1)

- The study included 1,509 patients: 753 treated in office-based settings and 756 treated in hospital settings.
- Mean (SD) age at index was 61.7 (11.2) years.
- Fifty-six percent of patients were male (range, 46% in UK to 66% in Spain), and over 90% were white (data not shown).
- Over 60% of patients were married or living with a partner.

**Table 1. Patient Characteristics**

| | All Patients | | Country | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | UK | | France | | Germany | | Netherlands | | Spain | |
| **N, row %** | 1,509 | 100.0 | 300 | 19.9 | 300 | 19.9 | 300 | 19.9 | 306 | 20.3 | 303 | 20.1 |
| **Age at diagnosis in years** | | | | | | | | | | | | |
| Mean, SD | 61.65 | 11.2 | 63.70 | 12.6 | 59.84 | 11.3 | 65.17 | 8.4 | 59.65 | 11.5 | 59.95 | 10.7 |
| Median | 62 | | 65 | | 60 | | 65 | | 59 | | 60 | |
| Range (minimum, maximum) | 20 | 91.0 | 26 | 91.0 | 27 | 91.0 | 40 | 88.0 | 20 | 88.0 | 28 | 84.0 |
| **Distribution in years (n, %)** | | | | | | | | | | | | |
| 18-44 | 112 | 7.4 | 26 | 8.7 | 30 | 10.0 | 2 | 0.7 | 29 | 9.5 | 25 | 8.3 |
| 45-64 | 771 | 51.1 | 123 | 41.0 | 171 | 57.0 | 140 | 46.7 | 168 | 54.9 | 169 | 55.8 |
| 65+ | 626 | 41.5 | 151 | 50.3 | 99 | 33.0 | 158 | 52.7 | 109 | 35.6 | 109 | 36.0 |
| **Gender (n, %)** | | | | | | | | | | | | |
| Male | 838 | 55.5 | 137 | 45.7 | 164 | 54.7 | 182 | 60.7 | 154 | 50.3 | 201 | 66.3 |
| Female | 671 | 44.5 | 163 | 54.3 | 136 | 45.3 | 118 | 39.3 | 152 | 49.7 | 102 | 33.7 |
| **Marital status (n, %)** | | | | | | | | | | | | |
| Single, never married | 104 | 6.9 | 21 | 7.0 | 20 | 6.7 | 15 | 5.0 | 24 | 7.8 | 24 | 7.9 |
| Married/ living with partner | 931 | 61.7 | 174 | 58.0 | 194 | 64.7 | 153 | 51.0 | 210 | 68.6 | 200 | 66.0 |
| Divorced/ separated | 101 | 6.7 | 24 | 8.0 | 24 | 8.0 | 23 | 7.7 | 21 | 6.9 | 9 | 3.0 |
| Widowed | 206 | 13.7 | 45 | 15.0 | 40 | 13.3 | 52 | 17.3 | 27 | 8.8 | 42 | 13.9 |
| Don't know | 167 | 11.1 | 36 | 12.0 | 22 | 7.3 | 57 | 19.0 | 24 | 7.8 | 28 | 9.2 |

### Medical History, Diagnostics, and Comorbidities (Table 2)

- Diagnosis setting was evenly distributed by GP (29%), specialist (24%), emergency department (ED) (24%), and hospital (22%).
- Diagnostic tests most commonly used to detect diverticulitis were physician examination (74%), complete blood counts (61%), CT scans (60%), and colonoscopies (46%).
- Diverticulosis was the most common comorbidity (33%), followed by chronic constipation (23%); 20% of patients were considered obese (data not shown).

**Table 2. Medical History and Diagnosis**

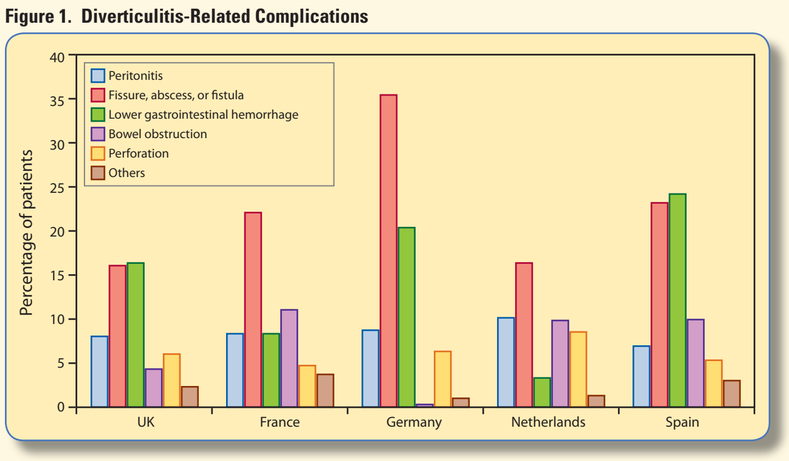
| | All Patients | | Country | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | UK | | France | | Germany | | Netherlands | | Spain | |
| **N, row %** | 1,509 | 100.0 | 300 | 19.9 | 300 | 19.9 | 300 | 19.9 | 306 | 20.3 | 303 | 20.1 |
| **Place where diverticulitis was diagnosed (n, %)** | | | | | | | | | | | | |
| GP's office | 438 | 29.0 | 80 | 26.7 | 100 | 33.3 | 97 | 32.3 | 133 | 43.5 | 28 | 9.2 |
| Specialist's office | 363 | 24.1 | 34 | 11.3 | 55 | 18.3 | 115 | 38.3 | 55 | 18.0 | 104 | 34.3 |
| ED | 361 | 23.9 | 39 | 13.0 | 80 | 26.7 | 24 | 8.0 | 91 | 29.7 | 127 | 41.9 |
| Hospital | 338 | 22.4 | 145 | 48.3 | 61 | 20.3 | 64 | 21.3 | 25 | 8.2 | 43 | 14.2 |
| Other | 5 | 0.3 | 0 | 0.0 | 4 | 1.3 | 0 | 0.0 | 1 | 0.3 | 0 | 0.0 |
| Don't know | 4 | 0.3 | 2 | 0.7 | 0 | 0.0 | 0 | 0.0 | 1 | 0.3 | 1 | 0.3 |
| **Diagnostic test used to confirm diverticulitis (n, %)[a]** | | | | | | | | | | | | |
| Physical examination | 1,121 | 74.3 | 193 | 64.3 | 205 | 68.3 | 274 | 91.3 | 247 | 80.7 | 202 | 66.7 |
| Colonoscopy | 693 | 45.9 | 147 | 49.0 | 126 | 42.0 | 123 | 41.0 | 151 | 49.4 | 146 | 48.2 |
| Contrast enema X-ray | 169 | 11.2 | 19 | 6.3 | 3 | 1.0 | 114 | 38.0 | 5 | 1.6 | 28 | 9.2 |
| Ultrasound | 443 | 29.4 | 16 | 5.3 | 51 | 17.0 | 195 | 65.0 | 99 | 32.4 | 82 | 27.1 |
| CT scan | 906 | 60.0 | 151 | 50.3 | 227 | 75.7 | 149 | 49.7 | 177 | 57.8 | 202 | 66.7 |
| Endoscopy | 79 | 5.2 | 10 | 3.3 | 17 | 5.7 | 21 | 7.0 | 16 | 5.2 | 15 | 5.0 |
| Complete blood count | 921 | 61.0 | 122 | 40.7 | 181 | 60.3 | 228 | 76.0 | 212 | 69.3 | 178 | 58.8 |
| Urinalysis | 247 | 16.4 | 19 | 6.3 | 22 | 7.3 | 74 | 24.7 | 58 | 19.0 | 74 | 24.4 |
| Other | 37 | 2.5 | 11 | 3.7 | 19 | 6.3 | 1 | 0.3 | 3 | 1.0 | 3 | 1.0 |

[a] Categories are not mutually exclusive.

### Complications (Figure 1)

- More than half of patients presented with or subsequently developed diverticulitis-related complications; 23% developed fissure, abscess, or fistula, and 14% developed lower gastrointestinal hemorrhage.
- Fissure, abscess, or fistula was seen most frequently among patients in Germany (35%) and least among patients in the UK and Netherlands (16% each).
- Peritonitis, a life-threatening infection, was seen in 8% of patients (range, 7% in Spain to 10% in the Netherlands).

**Figure 1. Diverticulitis-Related Complications**




### Pharmacotherapy Use (Figure 2)

- One-fifth of patients did not receive antibiotics or other pharmacotherapies (i.e., aminosalicylates, analgesics, other gastrointestinal drugs) used to manage diverticulitis and its symptoms.
- Among patients treated in office-based settings, oral antibiotics and aminosalicylates (88% and 85% of patients receiving pharmacotherapy, respectively) were the common treatments.
- Among those treated in hospital settings, aminosalicylates were prescribed for 14% of patients receiving pharmacotherapy, and intravenous antibiotics were preferred over oral (83% and 45%, respectively).

### Resource Utilization (Table 3)

- Among patients managed by office-based physicians:
  - 26% had at least one ED visit, ranging from 8% in Germany to 39% in Spain.
  - Nearly 33% had at least one overnight or day hospitalization with an average of one admission per patient.
- Among patients treated by hospital-based physicians:
  - Approximately 30% of patients had an ED visit.
  - Patients had one hospitalization on average.
  - Median length of stay for hospitalizations was 8 days.
  - More than 50% of patients were admitted through the ED.

**Table 3. Resource Utilization**

| | All Patients | | Country | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | UK | | France | | Germany | | Netherlands | | Spain | |
| **Office-based settings, N, row %** | **753** | **100.0** | **150** | **19.9** | **150** | **19.9** | **150** | **19.9** | **150** | **19.9** | **153** | **20.3** |
| Office visit | 753 | 100.0 | 150 | 100.0 | 150 | 100.0 | 150 | 100.0 | 150 | 100.0 | 153 | 100.0 |
| Hospital admission[a] | 245 | 32.5 | 45 | 30.0 | 50 | 33.3 | 44 | 29.3 | 53 | 35.3 | 53 | 34.6 |
| ED visit | 192 | 25.5 | 44 | 29.3 | 24 | 16.0 | 12 | 8.0 | 53 | 35.3 | 59 | 38.6 |
| **Hospital-based settings, N, row %** | **756** | **100.0** | **150** | **19.8** | **150** | **19.8** | **150** | **19.8** | **156** | **20.6** | **150** | **19.8** |
| Hospital admission[a] | 756 | 100.0 | 150 | 100.0 | 150 | 100.0 | 150 | 100.0 | 156 | 100.0 | 150 | 100.0 |
| Number of hospital admissions[b] | | | | | | | | | | | | |
| Mean, SD | 1.2 | 0.6 | 1.2 | 0.5 | 1.4 | 0.8 | 1.3 | 0.5 | 1.2 | 0.4 | 1.2 | 0.5 |
| Median | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Range (minimum, maximum) | 1 | 8 | 1 | 3 | 1 | 8 | 1 | 3 | 1 | 3 | 1 | 4 |
| Length of stay in days (per stay)[b] | | | | | | | | | | | | |
| Mean, SD | 12.6 | 31.8 | 14.0 | 40.2 | 9.4 | 10.1 | 13.5 | 31.3 | 9.5 | 7.6 | 18.0 | 53.0 |
| Median | 8 | | 7 | | 7 | | 10 | | 7 | | 9 | |
| Range (minimum, maximum) | 0 | 416 | 0 | 372 | 0 | 82 | 2.5 | 371 | 1 | 49.5 | 1 | 416 |
| Total nights in hospital[b] | | | | | | | | | | | | |
| Mean, SD | 14.6 | 32.3 | 15.3 | 40.6 | 11.8 | 11.4 | 16.2 | 31.8 | 11.2 | 11.0 | 20.0 | 53.1 |
| Median | 9 | | 8 | | 9 | | 11 | | 8 | | 10 | |
| Range (minimum, maximum) | 0 | 416 | 0 | 372 | 0 | 82 | 3 | 371 | 1 | 99 | 1 | 416 |
| Had ED visit | 229 | 30.3 | 35 | 23.3 | 47 | 31.3 | 41 | 27.3 | 56 | 35.9 | 50 | 33.3 |
| Number of ED visits | | | | | | | | | | | | |
| Mean, SD | 1.4 | 0.7 | 1.6 | 0.8 | 1.2 | 0.5 | 1.2 | 0.5 | 1.4 | 0.7 | 1.4 | 0.9 |
| Median | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Range (minimum, maximum) | 1 | 5 | 1 | 4 | 1 | 3 | 1 | 3 | 1 | 4 | 1 | 5 |

[a] Includes overnight or day cases, excluding ED visits.

[b] Among those patients with at least one hospitalization; details on number of admissions, length of stay, and nights in hospital not collected for patients treated in office-based settings.

## CONCLUSIONS

- Diverticulitis presents a significant disease burden to health care systems and patients in Europe.
- Pharmacotherapy use varies greatly between patients treated in office-based settings and those treated in hospitals.
- Many patients with diverticulitis present with or develop serious complications, leading to frequent ED visits and hospitalizations and long hospital stays.

## REFERENCES

1. Painter NS, Burkitt DP. Diverticular disease of the colon, a 20th century problem. Clin Gastroenterol. 1975;4(1):3-21.
2. Ferzoco LB, Raptopoulos V, Silen W. Acute diverticulitis. N Engl J Med.1998;338(21):1521-6.
3. Herzog T, Janot M, Belyaev O, Sülberg D, Chromik AM, Bergmann U, et al. Complicated sigmoid diverticulitis—Hartmann's procedure or primary anastomosis?. Acta Chir Belg. 2011 Nov-Dec;111(6):378-83.
4. Delvaux M. Diverticular disease of the colon in Europe: epidemiology, impact on citizen health and prevention. Aliment Pharmacol Ther. 2003;18(suppl 3):71-4.
5. Stollman N, Raskin JB. Diverticular disease of the colon. Lancet. 2004;363(9409):631-9.
6. Weizman AV, Nguyen GC. Diverticular disease: epidemiology and management. Can J Gastroenterol. 2011 Jul;25(7):385-9.
7. Young-Fadok TM, Roberts PL, Spencer MP, Wolff BG. Colonic diverticular disease. Curr Probl Surg. 2000;37(7):457-514.
8. Mueller MH, Karpitschka M, Renz B, Kleespies A, Kasparek MS, Jauch KW, et al. Co-morbidity and postsurgical outcome in patients with perforated sigmoid diverticulitis. Int J Colorectal Dis. 2011 Feb;26(2):227-34.
9. Yen L, Davis KL, Hodgkins P, Loftus EV Jr, Erder MH. Direct medical costs of diverticulitis in a US managed care population. Am J Pharm Benefits. 2012 Sept/Oct;4(5):e118-29.

## CONTACT INFORMATION

**Keith L. Davis, MA**
Senior Director, Health Economics

RTI Health Solutions
200 Park Offices Drive
Research Triangle Park, NC 27709

Phone: +1.919.541.1273
Fax: +1.919.541.7222
E-mail: kldavis@rti.org

Presented at: ISPOR 15th Annual European Congress
3-7 November 2012
Berlin, Germany

## DISCLOSURE

Research was funded by Shire Development LLC.

**Figure 2. Pharmacotherapy Use (Treated in Office-Based vs. Hospital-Based Settings)**