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Age-Related Differences in Outcomes and Etiologies of Acute Abdominal Pain Based on a National Administrative Database

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Acute abdominal pain is one of the most frequent causes of admission to emergency departments. However, there is a shortage of detail information showing the difference of outcomes or etiology of acute abdominal pain according to age. We therefore conducted an epidemiological analysis to reveal the difference between age on outcomes and etiology of acute abdominal pain using an administrative database associated with the Diagnosis Procedure Combination (DPC) system. We obtained discharge data relating to 12,209 patients with acute abdominal pain from 931 DPC participation hospitals between 2009 and 2011 in Japan. We compared length of hospital stay (LOS), in-hospital mortality, and etiology of acute abdominal pain between age categories. Patients were divided into five age groups as follows: < 20 (n = 1,106), 20-39 (n = 3,353), 40-59 (n = 2,925), 60-79 (n = 3,144), and ≥ 80 years (n = 1,681). Longer LOS and higher in-hospital mortality were observed in patients aged ≥ 80 years ($p < 0.001$). Regarding etiologies of acute abdominal pain, intestinal infection or acute appendicitis were more frequent in patients aged < 20 or 20-39 years, while ileus or cholelithiasis were more frequent in patients aged 60-79 or ≥ 80 years in both male and female patients ($p < 0.001$). This study demonstrated the significant differences between age with regard to the patient outcomes and etiology of acute abdominal pain. The current findings highlight the importance of improving the quality of medical care for patients with acute abdominal pain.

Keywords: acute abdominal pain; administrative database; age; Diagnosis Procedure Combination; epidemiology
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Introduction

Acute abdominal pain is defined as severe pain arising in the abdominal area requiring immediate care (Macaluso and McNamara 2012). The wide variety in presentation of symptoms and the broad spectrum of associated diseases complicates the isolation of the cause of abdominal pain, which may vary from life-threatening diseases requiring emergency surgery to mild self-limiting causes (Laméris et al. 2009). The prevalence of patients with acute abdominal pain has been increasing over the years (Pitts et al. 2008; van Randen et al. 2011). Hastings and Powers (2011) conducted a retrospective study in patients with acute abdominal pain at three different time points over a period of 35 years, and reported that there was an increased tendency in the proportion of patients presenting with acute abdominal pain as a chief complaint. According to the National Health Statistics report in the USA, approximately eight million patients visited an emergency department in 2006 for acute abdominal pain (Pitts et al. 2008). Thus, acute abdominal pain has been one of the most frequent causes of admission to emergency departments globally.

However, little information is available on the epidemiology of acute abdominal pain using patient-based data in Japan. In addition, there have been no studies showing the difference in outcomes or etiology of acute abdominal pain according to age based on a national administrative database. This type of information could contribute to studies on the quality of patient medical care for acute abdominal pain, which could have significant implications for healthcare policy decision making. In this study, we investigated the difference in outcomes and etiology of acute abdominal pain according to age. This was achieved using the national administrative database developed in a Japanese case-mix system project named the Diagnosis Procedure Combination (DPC).

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Methods

The DPC system was introduced into 82 academic hospitals in 2003 (Murata et al. 2010, 2011, 2012). Insurance reimbursements using the DPC system are widespread in Japan, and the administrative database of the DPC system has increased the representation of acute care hospitals over time. As of 2007, data from approximately 450,000 inpatients have been compiled, representing approximately 90% of all acute care inpatient hospitalizations in Japan (Murata et al. 2010, 2011, 2012). The DPC administrative database includes each patient's discharge summary and claim information, including principal diagnosis (disease which triggered admission or main disease on discharge), comorbidities at the time of admission, and complications during hospitalization (Kubo et al. 2011). These data are coded using the International Classification of Diseases and Injuries 10th Revision (ICD-10th) code. This administrative database also contains detailed medical information, such as all interventional or surgical procedures, medications, and devices that are indexed in the original Japanese code. These codes are determined by the Ministry of Health, Labour and Welfare of Japan. The DPC database also includes the quantity and date of all care delivered on a daily basis during hospitalization (Murata et al. 2010, 2011, 2012).

Study setting

We selected 12,209 patients admitted for acute abdominal pain in 931 DPC participation hospitals (83 academic and 848 community hospitals) between 2009 and 2011. These hospitals are situated throughout Japan and play leading roles in providing acute care medicine, advancing medical research, and educating students and medical residents (Murata et al. 2010, 2011, 2012). The principal diagnosis of acute abdominal pain was recorded using the ICD-10th code. In the present analysis, acute abdominal pain was defined as code R100. For clarification of the difference of outcomes and etiology of acute abdominal pain according to age, patients were divided into five age groups as follows: < 20 years (n = 1,106), 20-39 years (n = 3,353), 40-59 years (n = 2,925), 60-79 years (n = 3,144), and ≥ 80 years (n = 1,681).

The use of DPC data was permitted by all institutions and hospitals that provided detailed data. The research protocol of the study was approved by the ethics committee of medical care and research of the University of Occupational and Environmental Health, Kitakyushu, Japan.

Study variables

We collected data in the administrative database on the clinical characteristics of patients and hospitals as follows: the etiology of acute abdominal pain, age, sex, use of ambulance or intensive care unit (ICU), presence of chronic comorbid conditions and surgical treatments, the proportion of hospitals with emergency centers, hospital type and size, length of stay (LOS), and in-hospital mortality. Regarding the etiology of acute abdominal pain, we defined the main disease on discharge as the etiology of acute abdominal pain in this study. To assess the severity of chronic comorbid conditions, we used the Charlson Comorbidity Index (CCI), the most widely used index of comorbidity, which has been validated in various studies. The CCI was expressed as the score of comorbid conditions and initially evaluated as a continuous variable. The categorical variables of CCI defining four categories for the severity of the comorbid conditions were created to simplify the presentation of the results: 0 and 1, mild; 2, moderate; and 3 or more, severe (Murata et al. 2010, 2011, 2012). The presence of surgical treatments for patients was determined by the data of the operation code. Hospital type was classified as academic or community. Hospital size was categorized into three groups according to the number of hospital beds: small (< 200 beds), medium (200-600 beds), and large (> 600 beds) (Murata et al. 2010, 2011, 2012). Hospitals with emergency centers were confirmed by the Japanese Association for Acute Medicine homepage.

Statistical analysis

For tests of statistical significance, we used the Chi-squared test for categorical data, and one-way factorial analysis of variance for continuous variables. In addition, we performed the Scheffe's or Tukey's multiple-comparison test to demonstrate the difference between each age group. Analyses of outcomes such as LOS and in-hospital mortality were performed separately according to the presence of surgical treatments while analyses of etiology of acute abdominal pain were performed for each sex in this study.

A value of $p < 0.05$ was considered significant. All statistical analysis was performed using the STATA statistical software package version 11.0 (Stata Corporation, College Station, TX, USA).

Results

12,209 patients were identified for this study: 5,268 male and 6,941 female patients. The mean LOS was 11.1 days while the in-hospital mortality was 2.3% between 2009 and 2011. One hundred and fifty-eight etiologies of acute abdominal pain were observed in this study.

Characteristics of patients and hospitals are shown in Table 1. Use of ambulance and ICU, and the proportion of patients with severe comorbid conditions significantly increased according to age categories ($p < 0.001$). Surgical treatments were significantly more likely to be performed in patients aged 60-79 years or in those aged ≥ 80 years ($p < 0.001$). Regarding hospital characteristics, patients aged < 20 years were more likely to be admitted to hospitals with emergency centers or academic hospitals (29.4% and 13.6%; $p < 0.001$, respectively). A significant variation in mean LOS was observed between age categories in both patients with and without surgical treatments ($p < 0.001$), except for comparison between patients aged less than 20 years and those aged 20-39 years by the Scheffe's multiple-comparison test (5.0 days and 5.6 days: $p = 0.755$, 8.9 days and 11.9 days: $p = 0.660$, respectively). In addition, in-hospital mortality was significantly higher in patients aged 80 years who required surgical treatment ($p < 0.001$).

Etiology of acute abdominal pain by sex is shown in Table 2. Intestinal infection was the most frequent etiology of acute abdominal pain in both male and female patients (11.5% and 11.0%, respectively). Acute appendicitis was the second most frequent etiology in male patients whereas the ileus was the second most frequent in female patients (9.2% and 8.0%, respectively). Digestive diseases such as peritonitis, cholelithiasis, or gastric ulcer were frequent in male patients while gynecological diseases such as neoplasms or inflammatory and non-inflammatory diseases of the uterus or ovary were frequent in female patients.

Table 1. Clinical characteristics and presentations of patients sorted by age categories.

	Less than 20 years (n = 1,106)	20-39 years (n = 3,353)	40-59 years (n = 2,925)	60-79 years (n = 3,144)	80 years or more (n = 1,681)	p value
Patient characteristics						
Mean age (year)	13.3*	30.1*	49.0*	69.8*	85.7*	< 0.001[1)]
Male patients (%)	45.4	29.6*	47.6	55.5*	37.6*	< 0.001[2)]
Use of ambulance (%)	19.0*	31.1	33.6	34.8	40.9*	< 0.001[2)]
Use of intensive care unit (%)	0.8	1.1	1.9	4.5*	6.0*	< 0.001[2)]
Comorbid conditions (%)						
None (CCI:0)	90.0*	83.2*	67.3*	50.1	48.6	< 0.001[2)]
Mild (CCI:1)	7.6	11.1	18.3	22.4	25.6	
Moderate (CCI:2)	2.0	4.4	8.4	16.1	14.4	
Severe (CCI:3 or more)	0.4	1.3	6.0	11.4	11.4	
Surgical treatments (%)	18.7	18.4	22.0	28.8	26.1	< 0.001[2)]
Hospital characteristics						
Hospitals with emergency center (%)	29.4	29.1	23.7	21.0	19.9	< 0.001[2)]
Academic hospitals (%)	13.6*	9.0*	6.6	6.0	4.4	< 0.001[2)]
Hospital size (%)						
Small sized (less than 200 beds)	9.6	10.6	12.7	14.5	15.3	< 0.001[2)]
Medium sized (200-600 beds)	66.5	67.0	68.7	69.3	70.2	
Large sized (more than 600 beds)	23.9	22.4	18.6	16.2	14.5	
Patient outcomes						
Mean length of hospital stay (days)						
Patients without surgical treatments	5.0	5.6	7.5*	10.6*	13.0*	< 0.001[1)]
Patients with surgical treatments	8.9	11.9	17.8*	25.5*	31.9*	< 0.001[1)]
In-hospital mortality (%)						
Patients without surgical treatments	0.0	0.04	0.4	2.7*	7.7*	< 0.001[2)]
Patients with surgical treatments	0.0	0.3	1.5	5.3*	11.6*	< 0.001[2)]

P value was derived from analysis of variance [(1)] and the Chi-square test [(2)].

*Statistically significant difference against all other age groups by the Scheffe's or Tukey's multiple-comparison test ($p < 0.05$. For example, mean age of patients aged less than 20 years (13.3 years) is statistically different from those aged 20-39 years (30.1 years, $p < 0.001$), 40-59 years (49.0 years, $p < 0.001$), 60-79 years (69.8 years, $p < 0.001$) and 80 years or more (85.7 years, $p < 0.001$)).

CCI, Charlson Comorbidity Index.

Intestinal infection or acute appendicitis became frequent in accordance with lower age ($p < 0.001$), and the Tukey's multiple-comparison test showed the statistically difference for less than 20 years, 20-39 years and 40-59 years group. Conversely, ileus or cholelithiasis was more frequent in patients aged 60-79 years or in those aged 80 years or more ($p < 0.001$). Gastrointestinal disease such as diverticular intestinal disease, gastric ulcer, gastritis, and duodenitis were significantly more frequent in patients aged 40-59 years ($p < 0.001$; Table 3).

As with male patients, intestinal infection or acute appendicitis was more common in female patients aged less than 20 years or in those aged 20-39 years, while ileus was more common in patients aged 60-79 or ≥ 80 years ($p < 0.001$). However, gynecological diseases such as uterine or ovarian neoplasms or inflammatory and non-inflammatory diseases of the uterus or ovary were significantly more common in patients aged 20-39 years ($p < 0.001$), and the Tukey's multiple-comparison test showed the statistically difference between those aged 20-39 years and all other age groups. Gastrointestinal disease such as gastritis and duodenitis, diverticular disease of the intestine, or gastric ulcer were significantly more common in patients aged 40-59 years ($p < 0.001$; Table 4).

Discussion

We investigated the difference in outcomes and etiology of acute abdominal pain between age categories using a national administrative database. Our study revealed a significant effect of age on outcome and etiology of acute abdominal pain in Japanese patients.

In this study, patients aged 80 years or more were significantly associated with a longer LOS and higher in-hospital mortality, particularly after surgical treatments. Our current results have been consistent with those of several previous studies (van Geloven et al. 2000; Hustey et al. 2005; Lewis et al. 2005). In a retrospective study focusing on elderly patients in the early 2000s, van Geloven et al.

Table 2. Etiology of acute abdominal pain by sex categories (top 20 diseases).

Male patients (n = 5,268)		Female patients (n = 6,941)	
Etiology	Number of case (Rate)	Etiology	Number of case (Rate)
Intestinal infection	606 (11.5%)	Intestinal infection	765 (11.0%)
Acute appendicitis	483 (9.2%)	Ileus	557 (8.0%)
Ileus	481 (9.1%)	Neoplasm of uterus or ovary	548 (7.9%)
Peritonitis	335 (6.4%)	Acute appendicitis	498 (7.2%)
Cholelithiasis	328 (6.2%)	Inflammatory disease of uterus or ovary	459 (6.6%)
Diverticular disease of intestine	213 (4.0%)	Peritonitis	330 (4.8%)
Gastric ulcer	208 (4.0%)	Non-inflammatory disease of uterus or ovary	275 (4.0%)
Calculus of urinary tract	157 (3.0%)	Diseases associated with pregnancy	238 (3.4%)
Gastritis and duodenitis	146 (2.8%)	Cholelithiasis	227 (3.3%)
Acute pancreatitis	134 (2.5%)	Constipation	226 (3.3%)
Constipation	121 (2.3%)	Gastritis and duodenitis	192 (2.8%)
Acute cholecystitis	112 (2.1%)	Diverticular disease of intestine	186 (2.7%)
Duodenal ulcer	112 (2.1%)	Vascular disorders of intestine	167 (2.4%)
Postprocedural disorders of digestive system	110 (2.1%)	Gastric ulcer	147 (2.1%)
Vascular disorders of intestine	103 (2.0%)	Postprocedural disorders of digestive system	118 (1.7%)
Colorectal cancer	81 (1.5%)	Calculus of urinary tract	111 (1.6%)
Dyspepsia	68 (1.3%)	Endometriosis	92 (1.3%)
Perforation of intestine	59 (1.1%)	Acute cholecystitis	91 (1.3%)
Acute cholangitis	56 (1.1%)	Acute pancreatitis	86 (1.2%)
Hernia	48 (0.9%)	Colorectal cancer	67 (1.0%)

Table 3. Etiology of acute abdominal pain in male patients (top 20 diseases; %).

	Less than 20 years (n = 503)	20-39 years (n = 994)	40-59 years (n = 1,394)	60-79 years (n = 1,745)	80 years or more (n = 632)	p value
Intestinal infection	26.4*	18.2*	10.9*	5.7	6.1	< 0.001
Acute appendicitis	29.6*	16.4*	7.0*	3.6	1.5	< 0.001
Ileus	7.9	5.9	6.8	11.6	13.1	< 0.001
Peritonitis	4.5	7.3	6.7	5.9	6.4	0.273
Cholelithiasis	0.2	2.9	6.1	9.0	8.7	< 0.001
Diverticular disease of intestine	0.9	4.4	6.1	3.5	2.8	< 0.001
Gastric ulcer	0.9	4.7	5.7	3.2	3.1	< 0.001
Calculus of urinary tract	0.6	4.7	4.3	2.5	0.3	< 0.001
Gastritis and duodenitis	0.9	3.7	4.5	1.8	1.2	< 0.001
Acute pancreatitis	0.6	2.2	3.6	2.8	1.4	0.001
Constipation	5.5	1.0	1.1	2.1	4.5	< 0.001
Acute cholecystitis	0.2	1.1	2.0	3.1	2.5	< 0.001
Duodenal ulcer	0.4	3.4	3.3	1.4	0.4	< 0.001
Postprocedural disorders of digestive system	0.4	0.8	1.1	3.5	3.4	< 0.001
Vascular disorders of intestine	0.4	0.4	1.4	2.9	4.1	< 0.001
Colorectal cancer	0.0	0.2	1.4	2.4	2.5	< 0.001
Dyspepsia	1.5	2.3	1.6	0.6	0.4	0.001
Perforation of intestine	0.2	0.1	0.8	1.8	1.9	< 0.001
Acute cholangitis	0.0	0.3	1.0	1.6	1.5	0.001
Hernia	0.9	0.7	1.0	0.9	0.9	0.957

All p values were derived from the Chi-square test.
*Statistically significant difference against all other age groups by the Tukey's multiple-comparison test ($p < 0.05$).

Table 4. Etiology of acute abdominal pain in female patients (top 20 diseases; %).

	Less than 20 years (n = 603)	20-39 years (n = 2,359)	40-59 years (n = 1,531)	60-79 years (n = 1,399)	80 years or more (n = 1,049)	p value
Intestinal infection	25.0*	13.7	10.2	6.8	7.1	< 0.001
Ileus	4.9	4.6	8.5	11.3	13.0	< 0.001
Neoplasm of uterus or ovary	3.6	7.8	5.9	1.6	1.1	< 0.001
Acute appendicitis	24.8*	11.0*	6.2	3.9	1.9	< 0.001
Inflammatory disease of uterus or ovary	3.0	8.4*	4.4	0.3	0.1	< 0.001
Peritonitis	3.4	5.2	5.7	5.8	5.8	0.028
Non-inflammatory disease of uterus or ovary	2.9*	5.9*	1.3*	0.1	0.1	< 0.001
Diseases associated with pregnancy	1.5	6.3*	0.2	0.0	0.0	< 0.001
Cholelithiasis	0.1	1.8	5.0	7.3	6.7	< 0.001
Constipation	5.2	1.7	1.7	2.8	5.3	< 0.001
Gastritis and duodenitis	1.3	3.2	3.5	2.1	2.5	< 0.001
Diverticular disease of intestine	0.5	3.2	4.9	3.1	2.4	< 0.001
Vascular disorders of intestine	0.3	0.5	1.8	3.7	4.5	< 0.001
Gastric ulcer	1.2	2.3	4.2	2.8	2.9	< 0.001
Postprocedural disorders of digestive system	0.3	0.6	1.6	3.3	3.0	< 0.001
Calculus of urinary tract	0.5	2.6	3.3	2.0	0.7	< 0.001
Endometriosis	0.0	1.7	1.0	0.0	0.0	< 0.001
Acute cholecystitis	0.2	0.6	1.4	2.9	2.8	< 0.001
Acute pancreatitis	0.4	1.2	2.4	2.3	1.4	< 0.001
Colorectal cancer	0.0	0.2	1.1	2.3	1.9	< 0.001

All p values were derived from the Chi-square test.
*Statistically significant difference against all other age groups by the Tukey's multiple-comparison test ($p < 0.05$).

(2000) reported that the mortality of admitted patients aged over 80 years with acute abdominal complaints was 17% while that of patients with urgent surgery reached 34%. Some previous studies also reported that elderly patients had a greater risk of mortality or morbidity compared with younger patients (Hustey et al. 2005; Lewis et al. 2005). In addition, severe comorbid conditions were significantly observed in patients aged 80 years or more. Some previous studies suggest that comorbid conditions can influence the prognosis or outcomes of patients with acute surgical treatments (Oomen et al. 2006; Bo et al. 2007). Despite recent advances in the management of acute abdominal pain including surgical or intensive care treatments, these results indicate that the mortality of elderly patients with acute abdominal pain has remained high over the past decade. Therefore, our results still support the difficulty of managing elderly patients with acute abdominal pain.

However, there was a slight difference with regards to etiology of acute abdominal pain between our study and previous studies. For example, calculus of urinary tract was less frequently observed in elderly patients in this study whereas some studies reported that kidney or urinary tract diseases were presented in many elderly patients as etiologies of acute abdominal pain in the United States (Hustey et al. 2005; Lewis et al. 2005). We assumed that this discrepancy may be related to the racial or regional differences. Therefore, further investigations should be required to reveal the etiology of acute abdominal pain of elderly patients in various countries.

This study also provided some epidemiological information on acute abdominal pain in other age categories. For example, intestinal infection and acute appendicitis were more common in younger male and female patients such as those aged < 20 or 20-39 years, while gynecological diseases such as neoplasms or inflammatory and non-inflammatory diseases of the uterus or ovaries were significantly more common in patients aged 20-39 years. To our knowledge, there have been no reports on the etiology of acute abdominal pain by age or sex in a study sample, although some studies have focused on each etiology of acute abdominal pain in pediatrics, elderly patients, or female patients (Leung and Sigalet 2003; Cartwright and Knudson 2008; Kruszka and Kruszka 2010). In addition, the proportion of younger patients treated in hospitals with emergency center or academic hospitals was significantly higher in this study, and the in-hospital mortality of these patients was very low. Furthermore, there was no significant difference with regard to LOS between patients aged less than 20 years and those aged 20-39 years. These results suggest that the centralization of younger patients with acute abdominal pain to these specific hospitals was achieved favorably compared with elderly patients. Thus, this study shows some aspects such as the difference in etiology or treatment situation of acute abdominal pain in

Japan.

The clinical data used represent a major strength of the current study. Although some studies regarding the outcome and etiology of acute abdominal pain have been published, these reports come from some single-center studies (van Geloven et al. 2000; Gajic et al. 2002; Gardner et al. 2010). One of the benefits of the national database is that it enables evaluation of a large number of hospitals, and our investigation involved a nationally representative sample of patients with acute abdominal pain in a community setting (Murata et al. 2011, 2012). Therefore, using a national administrative database reveals the present circumstances of patients with acute abdominal pain for the nation as a whole. In addition, detailed medical data such as patients or hospital characteristics have been recorded in an unbiased manner (Murata et al. 2010, 2011, 2012). Therefore, this administrative database enables interested parties to evaluate the outcomes or etiology of acute abdominal pain with individual detailed medical data.

Some potential limitations of this study also warrant mention. First, the data were obtained from DPC participating hospitals. Therefore, data in non-DPC participating hospitals should be analyzed to confirm the influence of the DPC system in the future. Second, we could not investigate the severity of diseases as etiology of acute abdominal pain in this study. It is plausible that the severity of diseases significantly influences in-hospital mortality or LOS. Third, we defined the main disease on discharge as the etiology of acute abdominal pain using ICD-10th code and peritonitis was appeared as main disease on discharge in many cases. However, peritonitis is not primary etiology of acute abdominal pain because this condition emerges from various diseases such as gastrointestinal perforation or abdominal trauma (Samuel et al. 2011). Third, our data also do not include the detailed clinical information such as computed tomography before admission to hospitals or the rate of emergency operation in this study. Fourth, because we only had the discharge data of patients with acute abdominal pain in this study, we could not assume the number of patients discharged without hospitalization. Therefore, further clinical studies evaluating the outcomes or etiology of acute abdominal pain may be required, taking into account detailed clinical data or data of patients who were not hospitalized in the future.

Despite these limitations, the current study has implications for healthcare policy decision making. It may be insufficient to only specify the rate of surgical cases for acute abdominal pain. We only obtained the data for patients as determined by the ICD-10th code (R100), whereas many patients presenting with acute abdominal pain may be included in each diagnosis as the principal diagnosis (e.g. acute appendicitis or ileus) on our administrative database. However, our study may show an important difference in the rate of surgical cases or outcomes between age categories. Although this study is not so meaningful for comprehending the real rate of surgical cases for acute abdominal pain, it does reveal the difference in circumstances between age categories. Our study may therefore highlight the importance of improving the quality of medical care for patients with acute abdominal pain. The current findings provide good evidence on the present circumstances of patients with acute abdominal pain, and may be useful in assisting future epidemiological investigations in Japan. In addition, increasing life expectancy and an aging population will inevitably lead to a growing number of elderly patients with abdominal pain in Japan and other developed countries (Murata et al. 2013). Therefore, consecutive monitoring of outcomes in elderly patients should be conducted in the future. The monitoring of LOS and in-hospital mortality via an administrative database in elderly patients may be a promising policy initiative, allowing the improvement of the quality of medical care for elderly patients. If an improvement in quality of care is achieved in elderly patients, it could be useful for many other countries that have also been facing problems in the quality of medical care for this population. Further studies of successive monitoring of LOS and in-hospital mortality of elderly patients should be conducted. In addition, the differences in etiology of acute abdominal pain should be investigated in the near future.

In conclusion, this study demonstrated significant differences between age categories in outcomes and etiology of acute abdominal pain using a national administrative database. We hope that this study will provide useful information and assist future epidemiological investigations in Japan.

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Conflict of Interest

The authors declare no conflict of interest.

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