



## Determinants of appendicitis outcomes in Canadian children



Li Hsia Alicia Cheong, Sherif Emil \*

Division of Pediatric General and Thoracic Surgery, The Montreal Children's Hospital, McGill University Health Centre

### ARTICLE INFO

#### Article history:

Received 9 February 2014

Accepted 13 February 2014

#### Key words:

Appendicitis  
Outcomes  
Determinants  
Children  
Pediatric  
Canada

### ABSTRACT

**Background:** Outcomes of appendicitis may be influenced by access to healthcare. We investigated the determinants of pediatric appendicitis outcomes in the single-payer Canadian healthcare system.

**Methods:** Children coded for urgent appendectomy by the Canadian Institute of Health Information during the period 2004–2010 were analyzed. Misdiagnosis rate, perforated appendicitis rate, and hospital stay were the outcomes studied. Analyzed variables included age, gender, domicile, socioeconomic status, surgeon's specialty, hospital type, region, and operative approach. Logistic regression analysis was used to examine associations, and a quintile regression model examined the effect on median hospital stay.

**Results:** 41,702 patients were studied. A higher rate of perforated appendicitis was associated with lower age [OR 2.66], male gender [OR 1.18], pediatric surgeon [OR 1.25], and treatment outside the Maritimes. A higher rate of misdiagnosis was associated with lower age [OR 1.53], female gender [OR 2.29], non-children's hospital [OR 1.33], and western Canada [OR 1.22]. A significantly longer hospital stay was associated with open appendectomy, pediatric surgeon, and the Territories for simple appendicitis, and open appendectomy, pediatric surgeon, children's hospital, and the Maritimes for perforated appendicitis.

**Conclusions:** In Canada, outcomes of pediatric appendicitis are associated with regional and treatment-level factors. Rural domicile and socioeconomic status do not affect outcomes.

© 2014 Elsevier Inc. All rights reserved.

Appendicitis is the most common pediatric surgical emergency, and appendectomy is the most common urgent pediatric surgical operation. The post-operative outcomes of appendicitis are largely dependent on the severity of the disease at presentation. Perforated appendicitis is associated with prolonged hospital stay and higher rates of post-operative complications [1,2]. In addition, perforation and misdiagnosis rates in appendicitis are considered outcomes that reflect access to appropriate level healthcare. Previous studies from the United States have shown that patient-level factors, such as socioeconomic status, insurance status, and race, influence the outcomes of children with appendicitis [3,4]. The effects of race and socioeconomic status vanish when equal access to care is provided [5,6]. In Canada, all children are insured under a single-payer system which theoretically provides equal access. In a recent comparison of pediatric appendicitis outcomes between the United States and Canada, we showed that the outcomes of Canadian children generally fell in between US children with public, and those with private, insurance [7]. In the present study, we analyzed a large national Canadian database to elucidate what determinants, within the context of a universal health care system, influence the outcomes of pediatric appendicitis.

### 1. Methods

#### 1.1. Data source

Canadian data for the years 2004–2010 were obtained from the Discharge Abstract Database (DAD), managed by the Canadian Institute for Health Information (CIHI). DAD contains mandatory discharge data from all hospitals in Canada, except those in Quebec. Data were coded using ICD-10-CA. The database includes diagnoses, patient demographics, treating physician information, and hospital characteristics. The study was approved by the McGill University Faculty of Medicine Institutional Review Board (A06-E53-13A).

#### 1.2. Study population

All patients less than 18 years old with a valid procedure code for appendectomy were candidates for the study population. Patients had to have one of the following three procedure codes: (i) Appendectomy (1.NV.89.DA, 1.NV.89.LA), (ii) Drainage of appendiceal abscess (1.NV.52) AND secondary code of (i), or (iii) Abdominal or pelvic drainage (1.OT.52, 1.SQ.52) AND secondary code of (i) or (ii). Patients with no primary or secondary procedure code of appendectomy, patients who had incidental appendectomy, and patients with an elective admission, or unrelated primary diagnostic code were excluded. Demographic data gathered for all patients included age, gender, patient's domicile, socioeconomic status, and geographic

\* Corresponding author at: Division of Pediatric General and Thoracic Surgery, The Montreal Children's Hospital, 2300 Tupper, C-818, Montreal, Quebec H3H 1P3, Canada. Tel.: +1 514 412 4497; fax: +1 514 412 4289.

E-mail address: [Sherif.Emil@McGill.ca](mailto:Sherif.Emil@McGill.ca) (S. Emil).

region (excluding Quebec). Data on surgical approach, treating surgeon's specialty, and type of treating hospital were also obtained.

### 1.3. Outcomes

Three main outcomes of interest were analyzed: normal appendix rate, perforated appendicitis rate, and the total length of hospital stay. Normal appendix was defined as an appendectomy procedure code in combination with a diagnostic code other than appendicitis. Perforated appendicitis was defined as a procedure code of appendectomy and a primary diagnostic code of acute appendicitis with peritonitis or abscess. Hospital stay was recorded in days. There was no reliable information on post-operative complications such as abscess, phlegmon, wound infection, or readmission. Secondary procedures (e.g. abscess drainage) were recorded without specification of whether they occurred at the same time or subsequent to the primary procedure. Eight potential determinants of outcomes were studied: gender, age group ( $\leq 5$ , 6–11 and 12–17 years), socioeconomic status (5 categories from lowest to highest using median income for postal code), domicile (rural vs urban), Canadian region (Maritimes, Ontario, Western Canada, Territories), hospital type (children's versus non-children's), surgeon's specialty (pediatric versus general), and operative approach (laparoscopic versus open).

### 1.4. Statistical analysis

Database files were downloaded to an SPSS 20.0 for Windows file (SPSS, Chicago, IL). A multivariate analysis of the eight potential outcome determinants was performed. A Chi-square test was used for comparing nominal responses, a Cochran–Armitage Trend Test was used to test for trend when the feature was ordinal (e.g., age category), and the Wilcoxon Rank Sum Test was used for numerical responses. All analyses were carried out using a two-sided test at an alpha level of 5% unless otherwise specified. No formal adjustments were made for the multiplicity of inferences for multiple outcomes. Statistical analyses including descriptive statistics and logistic regression were performed with SAS (Version 9.2, SAS Institute, Cary, NC, USA). Quantile regression was used in the analysis of length of hospital stay to account for the leftward skew in this outcome.

## 2. Results

During the study period, 47,840 patients were considered potential subjects for the study. Of those, 41,405 met the inclusion criteria (Fig. 1). Age, gender, region, and hospital type were available for all patients. Several subsets of patients were removed from specific analyses: 5.1% received treatment from neither a pediatric nor a general surgeon; 16.2% did not have a clearly identified domicile status; 1.9% had a non-valid socioeconomic status. The demographics of the study population are shown in Table 1. In the entire cohort, the rates of normal appendix, non-perforated appendicitis, and perforated appendicitis were 6.2%, 66.6%, and 27.2%, respectively. Table 2 outlines the distribution of the various patient-level and treatment-level factors studied by category of appendicitis.

Multivariate logistic regression analysis of determinants of the misdiagnosis rate (Table 3) showed that children were more likely to be misdiagnosed if they were females (OR 2.33,  $p < 0.0001$ ), in the youngest age group (OR 1.51,  $p < 0.0001$ ), received treatment at non-children's hospitals (OR 1.42,  $p = 0.01$ ), or were from western Canada (OR 1.21,  $p < 0.02$ ). Domicile, socioeconomic status, and surgeon's specialty did not significantly influence the likelihood of misdiagnosis.

Multivariate logistic regression analysis of determinants of the perforation rate (Table 4) showed that children were more likely to have perforated appendicitis if they were males (OR 1.09,  $p < 0.0001$ ), younger [ $\leq 5$  years: OR 2.91,  $p < 0.0001$ ], (6–11: OR 1.19,  $p < .0001$ ), resided outside maritime Canada, and treated by pediatric surgeons

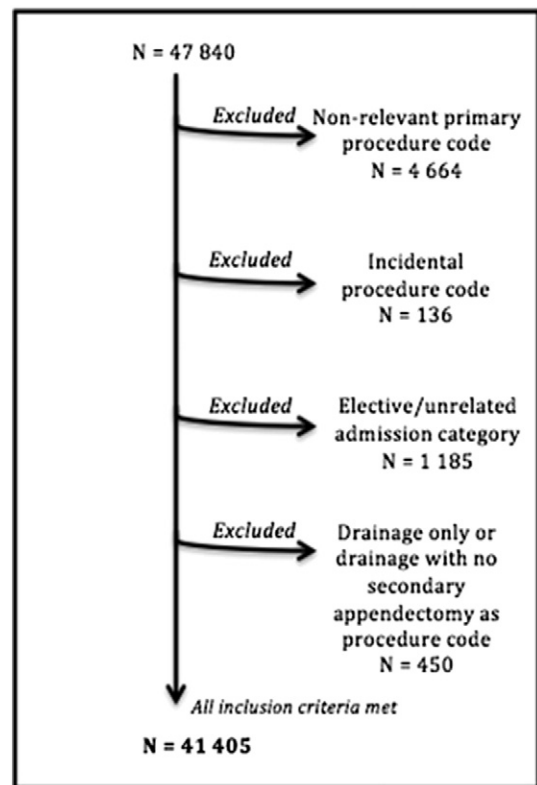


Fig. 1. Flowchart outlining how study cohort was chosen.

(OR 1.25,  $p = 0.0003$ ). Domicile, socioeconomic status, and type of treating hospital did not significantly influence the likelihood of perforated appendicitis.

**Table 1**  
Characteristics of study population.

Gender	
Male	59.0
Female	41.0
Age (years)	
0–5	4.3
6–11	35.2
12–17	60.5
Geographic region	
Ontario	47.6
West	43.0
Maritime	8.7
Territories	0.7
Socioeconomic Status	
Lowest	18.9
2nd lowest	18.5
Middle	20.0
2nd highest	20.1
Highest	20.5
Domicile	
Rural	13.7
Urban	70.1
Not available	16.2
Type of treating hospital	
Non-children's	75.0
Children's	25.0
Specialty of treating surgeon	
General surgeon	72.5
Pediatric surgeon	22.4
Other	5.1
Surgical appendectomy approach	
Open	52.7
Laparoscopic	47.3

Values reported in %.

Download English Version:

<https://daneshyari.com/en/article/4155739>

Download Persian Version:

<https://daneshyari.com/article/4155739>

[Daneshyari.com](https://daneshyari.com)