

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

Journal of Hospital Infection

journal homepage: [www.elsevierhealth.com/journals/jhin](http://www.elsevierhealth.com/journals/jhin)

# Patient-related risk factors for surgical site infection following eight types of gastrointestinal surgery

H. Fukuda\*

Department of Health Care Administration and Management, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan

## ARTICLE INFO

### Article history:

Received 1 February 2016

Accepted 11 April 2016

Available online xxx

### Keywords:

Surgical site infection  
Gastrointestinal surgery  
Surveillance  
Intra-operative blood  
transfusion  
Diabetes  
Steroids

## SUMMARY

**Objective:** To identify patient-related risk factors for surgical site infection (SSI) following eight types of gastrointestinal surgery that could be collected as part of infection surveillance efforts.

**Design:** Record linkage from existing datasets comprising the Japan Nosocomial Infections Surveillance (JANIS) and Diagnosis Procedure Combination (DPC) programmes.

**Methods:** Patient data from 35 hospitals were retrieved using JANIS and DPC from 2007 to 2011. Patient-related factors and the incidence of SSI were recorded and analysed. Risk factors associated with SSI were examined using multi-level mixed-effects logistic regression models.

**Results:** In total, 2074 appendectomies; 2084 bile duct, liver or pancreatic procedures; 3460 cholecystectomies; 7273 colonic procedures, 482 oesophageal procedures, 4748 gastric procedures, 2762 rectal procedures and 1202 small bowel procedures were analysed. Using multi-variate analyses, intra-operative blood transfusion was found to be a risk factor for SSI following all types of gastrointestinal surgery, except appendectomy and small bowel surgery. In addition, diabetes was found to be a risk factor for SSI following colon surgery [odds ratio (OR) 1.23,  $P=0.028$ ] and gastric surgery (OR 1.70,  $P<0.001$ ). Use of steroids was significantly associated with a higher incidence of SSI following cholecystectomy (OR 2.83,  $P=0.003$ ) and colon surgery (OR 1.27,  $P=0.040$ ).

**Conclusions:** Intra-operative blood transfusion, diabetes and use of steroids are risk factors for SSI following gastrointestinal surgery, and should be included as part of SSI surveillance for these procedures.

© 2016 Published by Elsevier Ltd on behalf of The Healthcare Infection Society.

## Introduction

Surgical site infections (SSI) represent a major threat to patient safety due to the consequences of high infection rates, attributable mortality and additional costs. Reported incidence

rates for SSI following gastrointestinal surgery range from 0.8% to 17.0%.<sup>1</sup> A previous study estimated SSI-attributable mortality to be as high as 38%, indicating the severe clinical burden placed on patients.<sup>2</sup> Furthermore, the additional costs incurred by SSI increase the economic burden of patients and billpayers substantially, which necessitates the development of infection control and cost-containment measures.<sup>3–6</sup>

Accurate prediction of the incidence of SSI may support infection control for two main reasons. First, conducting SSI surveillance and providing feedback to surgeons have been

\* Corresponding author. Address: Graduate School of Medical Sciences, Kyushu University, 3-1-1 Maidashi Higashi-ku, Fukuoka 812-8582, Japan. Tel.: +81 92 642 6956; fax: +81 92 642 6961.

E-mail address: [h\\_fukuda@hcam.med.kyushu-u.ac.jp](mailto:h_fukuda@hcam.med.kyushu-u.ac.jp).

<http://dx.doi.org/10.1016/j.jhin.2016.04.005>

0195-6701/© 2016 Published by Elsevier Ltd on behalf of The Healthcare Infection Society.

shown to reduce infection rates.<sup>7–10</sup> Second, if patients at high risk of SSI can be identified during the peri-operative period, it may be possible to implement infection prevention measures pre-emptively for these patients. Despite the development of risk adjustment models for predicting SSI in countries such as the USA and Japan, current models may still lack adequate predictive power.<sup>1,11,12</sup>

The high incidence of SSI following gastrointestinal surgery is an issue that requires urgent attention to achieve improvements in various aspects of care. In order to further increase the accuracy of risk adjustment models, there is a need to identify patient-related risk factors for SSI that can be collected during infection surveillance.<sup>13</sup> Based on findings from previous studies and with consideration of the feasibility and ease of data collection, this study selected several candidate risk factors for analysis. In particular, the analysis focused on blood transfusion,<sup>14–25</sup> diabetes<sup>11,14,16,21,26–28</sup> and use of steroids.<sup>11,17,29</sup> This study also included laparoscopic procedures, as these have been shown to be associated with lower incidence of SSI.<sup>30–33</sup>

While existing studies have generally analysed single institutions or single procedures, there is a need to investigate standardized candidate factors across multiple institutions and procedures. A search of the current literature showed a lack of such studies; as such, the objective of the present study was to identify patient-related risk factors for SSI following eight types of gastrointestinal surgery that could be collected as part of infection surveillance efforts. The surgical types analysed in this study were appendectomy; bile duct, liver or pancreatic surgery; cholecystectomy; colon surgery; oesophageal surgery; gastric surgery; rectal surgery and small bowel surgery.

## Methods

### Data source and study population

This study was conducted as part of a research programme to investigate the risk factors for SSI and their economic impact. Healthcare institutions throughout Japan were requested to participate and provide data for analysis. This study was a retrospective record-linkage cohort study using secondary analysis of national SSI surveillance data from the Japan Nosocomial Infections Surveillance (JANIS) and Diagnosis Procedure Combination (DPC) programmes. The data were analysed after merging the two datasets into a single database by matching patient ID. Therefore, only patients that could provide both JANIS data and DPC data were included in the analysis. The data were stripped of personally identifiable information by the hospitals before submission. This study was approved by the institutional ethics board of the Institute for Health Economics and Policy, Japan.

JANIS is a national infection surveillance programme that was established and is managed by Japan's Ministry of Health, Labour and Welfare. JANIS was initiated in Japan in 2002, and conducts surveillance based on the variables and definitions used by the National Nosocomial Infections Surveillance system in the USA. Under this programme, participating hospitals submit prospectively collected SSI surveillance data in accordance with JANIS-stipulated criteria. Participation in JANIS is voluntary, and each participating hospital is given discretion in selecting the target surgeries for inclusion in SSI surveillance.

This results in interhospital variations in the surveillance periods and surgical types available in JANIS data.

The DPC case-mix system is part of the per-diem comprehensive payment system used by the majority of Japan's acute care hospitals. Hospitals that use the DPC payment system are required to submit administrative claims data (i.e. DPC data) in specific formats and standardized variables. DPC data include information on specific medical procedures and drugs administered on a daily basis. This study used DPC data to analyse intra-operative blood transfusion, and use of antidiabetic drugs, steroids and immunosuppressive drugs.

The study subjects were patients who underwent any of the eight types of surgery at the participating hospitals from July 2007 to December 2011.

### Outcome measure

The outcome measure for this analysis was the incidence of SSI during hospitalization. SSI were categorized into superficial, deep and organ/space. SSI are recorded in JANIS based on the guidelines stipulated by the National Nosocomial Infections Surveillance system.<sup>10</sup>

### Statistical analyses

Statistical associations were first examined between the incidence of SSI and each of the candidate patient-related risk factors using  $\chi^2$  tests and the *t*-test for categorical variables and continuous variables, respectively.

To identify patient-related risk factors for SSI for each type of surgery, multi-level mixed-effects logistic regression models were developed using patient-related risk factors as fixed effects and healthcare institutions as random effects. Patient-related risk factors included intra-operative blood transfusion, use of antidiabetic drugs, use of steroids, use of immunosuppressive drugs, wound classification, American Society of Anesthesiologists' (ASA) classification, operation duration, laparoscopy, emergency surgery, general anaesthesia, trauma, implant, colostomy, patient age and sex. Intra-operative blood transfusion was analysed as a dichotomous variable, with values indicating either the use or non-use of blood transfusion. The presence or absence of diabetes was analysed using a proxy variable: use of antidiabetic drugs. Similarly, patients were identified as using steroids or immunosuppressant drugs if the data indicated the administration of these drugs during hospitalization. Wound classification was analysed as a dichotomous variable, with one category comprising clean (Class 1) and clean-contaminated (Class 2) wounds, and the other category comprising contaminated (Class 3) and dirty infected (Class 4) wounds. ASA classification was also analysed as a dichotomous variable, with one category comprising ASA Classes 1 and 2 and the other category comprising ASA Classes 3–6.

Database construction and statistical analyses were conducted using Stata Version 13.1 (StataCorp, College Station, TX, USA). Statistical significance was set at  $P < 0.05$ .

## Results

The number of participating hospitals ranged from 13 to 35, depending on type of surgery. There were 2074 appendectomies;

Download English Version:

<https://daneshyari.com/en/article/6121926>

Download Persian Version:

<https://daneshyari.com/article/6121926>

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