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Pediatric surgeon–directed wound classification improves accuracy



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ABSTRACT

Background: Surgical wound classification (SWC) communicates the degree of contamination in the surgical field and is used to stratify risk of surgical site infection and compare outcomes among centers. We hypothesized that by changing from nurse-directed to surgeon-directed SWC during a structured operative debrief, we will improve accuracy of documentation.

Methods: An institutional review board–approved retrospective chart review was performed. Two time periods were defined: initially, SWC was determined and recorded by the circulating nurse (before debrief, June 2012–May 2013) and allowing 6 mo for adoption and education, we implemented a structured operative debriefing including surgeon-directed SWC (after debrief, January 2014–August 2014). Accuracy of SWC was determined for four commonly performed pediatric general surgery operations: inguinal hernia repair (clean), gastrostomy ± Nissen fundoplication (clean contaminated), appendectomy without perforation (contaminated), and appendectomy with perforation (dirty).

Results: One hundred eighty-three cases before debrief and 142 cases after debrief met inclusion criteria. No differences between time periods were noted in regard to patient demographics, ASA class, or case mix. Accuracy of wound classification improved before debrief (42% versus 58.5%, $P = 0.003$). Before debrief, 26.8% of cases were overestimated or underestimated by more than one wound class, versus 3.5% of cases after debrief ($P < 0.001$). Interestingly, most after debrief contaminated cases were incorrectly classified as clean contaminated.

Conclusions: Implementation of a structured operative debrief including surgeon-directed SWC improves the percentage of correctly classified wounds and decreases the degree of inaccuracy in incorrectly classified cases. However, after implementation of the debriefing, we still observed a 41.5% rate of incorrect documentation, most notably in contaminated cases, indicating further education and process improvement is needed.

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1. Background

Surgeons communicate the degree of intraoperative contamination in a detailed operative report and by assigning a surgical wound classification (SWC). SWC is a universal system established in 1964 that divides operative cases into one of four categories: clean, clean contaminated, contaminated, or dirty and/or infected (Table 1) [1]. Although the process of documentation varies among institutions, SWC is typically recorded by either the circulating nurse, resident physician, or surgeon based on his or her clinical decision making. The literature demonstrates a clear correlation between surgical wound class and postoperative complications [1–5]. Traditionally, the rate of surgical site infections (SSI) by wound class has been documented as 1%–5% (clean), 3%–11% (clean and/or contaminated), 10%–17% (contaminated), and over 27% (dirty and/or infected) [1]. More recent data from the American College of Surgeons National Surgical Quality Improvement Program continue to support a relationship between increasing wound class and increasing rates of SSI; however, recent studies have shown lower SSI rates across the wound classes [6]. Given the consistent correlation between SWC and outcomes, researchers, hospitals, quality improvement organizations, and third party payers often use SWC as a method of risk stratification for SSI and postoperative complications [7–9]. Despite this fact, the current literature demonstrates significant inaccuracies in the reporting of wound classification, especially in pediatric cases [1,10,11].

To date, little data exist on interventions to improve the accuracy of reporting SWC. Because the operative surgeon has primary knowledge of the conditions and degree of bacterial contamination in the operative field and there is ample literature demonstrating the utility of checklists in decreasing errors, we hypothesized that by changing from a nurse-directed to a surgeon-directed SWC system through implementation of a structured operative debriefing summarizing the important operative findings, including wound class, we would improve accuracy of documentation. We show here

that implementation of a structured operative debrief, including surgeon-directed SWC, improved the percentage of correctly classified wounds for common pediatric surgical procedures. Additionally, for those cases that remained incorrectly classified, the degree of inaccuracy was decreased.

2. Methods

2.1. Subjects

The preintervention and postintervention patients were children aged <18 years undergoing common pediatric surgery procedures. The following procedures were chosen to represent each surgical wound class: inguinal hernia repair (clean), gastrostomy tube placement with or without Nissen fundoplication (clean contaminated), appendectomy without perforation (contaminated), and appendectomy with perforation (dirty and/or infected). All operations were performed by a small group (n = 4) of general pediatric surgeons.

2.2. Intervention

A formal surgeon-directed debriefing, modeled after World Health Organization recommendations [12], was instituted at the completion of each operative case before closure of skin (Table 2). This debriefing included clarification of correct counts and specimens, operation completed, preoperative antibiotic administration and re-dosing, surgeon concerns, anesthesia concerns, patient disposition, and SWC. Completion of the debriefing process was then documented in the anesthesia record by the anesthesia resident, certified registered nurse anesthetist, or attending. The surgical wound class was recorded in the medical record by the surgical resident assistant after completion of the surgery.

Before instituting the structured debriefing, the surgeons and anesthesiologists were educated about the process during two consecutive monthly meetings of the operating room

Table 1 – Surgical wound classification.

Wound class	Definition
Class I (clean)	An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.
Class II (clean contaminated)	An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.
Class III (contaminated)	Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the GI tract and incisions in which acute, nonpurulent inflammation is encountered are included in this category.
Class IV (dirty/infected)	Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

GI = gastrointestinal.

SWC guide from the University of Wisconsin Hospital and Clinics UWHC Infection Control Department.

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