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A prospective same day discharge protocol for pediatric appendicitis: Adding value to a common surgical condition[☆]

Yangyang R. Yu^{a,*}, Carolyn M. Smith^b, Kimberly K. Ceyanes^a, Bindi J. Naik-Mathuria^a, Sohail R. Shah^a, Adam M. Vogel^a, Kathleen E. Carberry^c, Jed G. Nuchtern^a, Monica E. Lopez^a

^a Division of Pediatric Surgery, Texas Children's Hospital and Michael E. DeBakey Department of Surgery, Baylor College of Medicine

^b Decision Support, Texas Children's Hospital Outcomes and Impact Service, Texas Children's Hospital

^c Outcomes and Impact Service, Texas Children's Hospital

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ABSTRACT

Purpose: Standardized clinical pathways for simple appendicitis decrease length of stay and result in cost savings. We performed a prospective cohort study to assess a same day discharge (SDD) protocol for children with simple appendicitis.

Methods: All children undergoing laparoscopic appendectomy for simple appendicitis after protocol implementation (February 2016 to January 2017) were assessed. Length of stay (LOS), 30-day resource utilization (ED visits and hospital readmissions), patient satisfaction, and hospital accounting costs for SDD were compared to non-SDD patients.

Results: Of 602 children treated at our institution, 185 (31%) were successfully discharged per protocol. SDD patients had longer median PACU duration (3.0 vs. 1.0 h, $p < 0.001$), but postoperative LOS (4.4 vs. 17.4 h, $p < 0.001$) and overall LOS (17.1 vs. 31.2 h, $p < 0.001$) were significantly shorter. Complication rates (1.6% vs. 3.1%), ED visits (4.3% vs. 6.0%), and readmissions (0.5% vs. 2.4%) were not significantly different for SDD compared to non-SDD patients. However, SDD decreases total cost of an appendectomy episode (\$8073 vs \$8424, $p = 0.002$), and patients report high satisfaction with their hospital experience (mean 9.4 out of 10).

Conclusions: Safe and satisfactory outpatient management of pediatric simple appendicitis is achievable with appropriate patient selection. An SDD protocol can lead to significant generation of value to the healthcare system.
Level of Evidence: Prognosis study, Level II.

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Acute appendicitis is the most common gastrointestinal condition requiring urgent surgical intervention in the pediatric population [1]. Laparoscopic appendectomy has been shown to decrease length of hospitalization and lower morbidity [2,3], and has become the standard

surgical technique for treating appendicitis. Current practice for managing children with simple appendicitis (nongangrenous, nonperforated) includes laparoscopic appendectomy followed by an overnight admission for observation [4,5].

Appendectomy in children accounts for 254,000 hospital days and more than \$680 million in total charges annually [6]. This finding along with rising healthcare expenditures [7] has led to quality improvement endeavors aimed at increasing the value of care we provide to our patients. Value is achieved by seeking ways to decrease costs while improving the quality and efficiency of clinical care [8,9]. Recent studies demonstrate the safety and patient satisfaction with a same day discharge protocol for acute appendicitis in children [10–12]. In February 2016 we implemented a standardized same day discharge (SDD) protocol at our institution. This study describes our experience developing a protocol through a multidisciplinary team approach. Additionally, we provide a one year assessment of our protocol over a 30 day episode of care with respect to resource utilization, patient satisfaction, and economic value generated.

☆ Author contributions:

Study Conception and Design: Yangyang R. Yu, Kathleen E. Carberry, Bindi J. Naik-Mathuria, Sohail R. Shah, Kim Ceyanes, Jed Nuchtern, Monica E. Lopez.

Acquisition of Data: Yangyang R. Yu, Carolyn M. Smith, Kimberly K. Ceyanes.

Analysis and Interpretation of Data: Yangyang R. Yu, Carolyn M. Smith, Monica E. Lopez.

Drafting of Manuscript: Yangyang R. Yu, Monica E. Lopez.

Critical Revision of Manuscript: Yangyang R. Yu, Bindi Naik-Mathuria, Carolyn Smith, Adam Vogel, Sohail R. Shah, Kimberly Ceyanes, Kathleen Carberry, Jed Nuchtern, Monica E. Lopez.

* Corresponding author at: Texas Children's Hospital / Baylor College of Medicine, One Baylor Place, Suite 404D, Houston, TX 77030. Tel.: +1 305 742 3838; fax: +1 832 825 3141.

E-mail address: xyangya@texaschildrens.org (Y.R. Yu).

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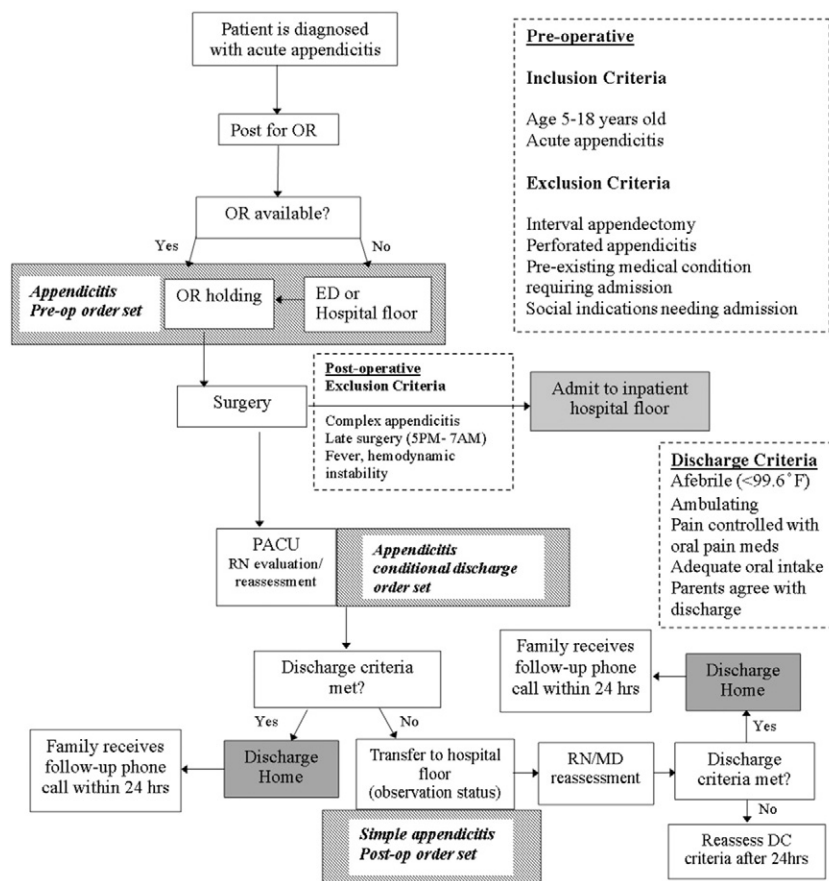


Fig. 1. Same day discharge protocol for simple appendicitis.

We hypothesize the implementation of a standardized same day discharge protocol for simple appendicitis will generate value to the healthcare system by decreasing hospital length of stay and costs while demonstrating safety and promoting patients' satisfaction.

1. Materials and methods

1.1. Multidisciplinary approach to protocol design and provider education

Care providers in all stages of a patient's care were invited to participate in the development of a SDD protocol [Fig. 1]. Focus groups held in 2015 identified barriers to implementation and devised strategies to overcome these barriers. We identified a need to address family expectations regarding their hospital course early on. Our institutional age-appropriate educational pamphlets describing the diagnosis of appendicitis were revised to incorporate information on a same day discharge pathway. These handouts are distributed by emergency room providers at the time of diagnosis.

Anesthesia staff were consulted to assist in achieving adequate pain control and minimizing postoperative nausea and vomiting to help patients meet discharge criteria. Postanesthesia care unit (PACU) leadership agreed to discharge of patients from PACU Monday through Friday between 7 am and 5 pm. Monitoring in the PACU occurs for up to 4 hours with discharge criteria assessments performed at 2 hour intervals. A clinical decision support tool within the electronic medical record (EMR) in the form of a conditional order set was created. The order set allows for an opt-out discharge procedure whereby PACU staff can discharge the patient without an additional discharge order from the physician if patient meets discharge criteria. As PACU staffing is limited in the evenings and during the weekends, patients continue their recovery after surgery on the hospital floor but remain eligible

for same day discharge. Floor nurses conduct reassessments for discharge criteria and notify providers when these are met.

With regard to provider education, information was disseminated to attending surgeons and advanced practice providers (APP) during faculty meetings. Nursing leadership on the hospital floor were educated on the protocol by means of a PowerPoint module. Additionally, residents were educated on the protocol during their monthly prerotation orientation. To educate patients on postsurgical recovery, an instruction pamphlet was distributed at the time of discharge detailing what to expect after leaving the hospital, including return precautions and contact information.

1.2. Patients

Following institutional review board approval (H-37142), our protocol was implemented in February 2016. All children ages 5–18 years old with acute appendicitis undergoing laparoscopic appendectomy were eligible. Preoperative exclusion from the protocol included perforated appendicitis, preexisting medical conditions requiring inpatient admission, and social indications (i.e. extensive travel, lack of resources to provide acute care after surgery). Patients with complex appendicitis (gangrenous or perforated) identified intraoperatively were also excluded.

We defined same day discharge as surgery performed after 7 am with discharge occurring prior to midnight the same day of the operation. All patients with surgery performed between midnight and 7 am were not considered SDD even if they were discharged on the same calendar-day. These patients were admitted to the hospital floor and received the standard evaluation including having the surgical team round on the patient in the morning.

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