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# Utility of routine postoperative visit after appendectomy and cholecystectomy with evaluation of mobile technology access in an urban safety net population



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## ABSTRACT

**Background:** The value of routine postoperative visits after general surgery remains unclear. The objective of this study was to evaluate the utility of routine postoperative visits after appendectomy and cholecystectomy and to determine access to mobile technology as an alternative platform for follow-up.

**Methods:** Retrospective review of 219 appendectomies and 200 cholecystectomies performed at a safety net hospital. One patient underwent both surgeries. Patient demographics, duration of clinic visit, and need for additional imaging, tests or readmissions were recorded. Access to mobile technology was surveyed by a validated questionnaire.

**Results:** Of 418 patients, 84% percent completed a postoperative visit. At follow-up, 58 patients (14%) required 70 interventions, including staple removal (16, 23%), suture removal (4, 6%), drain removal (8, 11%), additional follow-up (20, 28%), medication action (16, 21%), additional imaging (3, 4%), and readmission (1, 1%). Occupational paperwork (62) and nonsurgical clinic referrals (28) were also performed. Average check-in to check-out time was  $100 \pm 54$  min per patient. One intervention was performed for every 7.8 h of time in the clinic. Additionally, 88% of the surveyed population reported access to cell phone technology, and 69% of patients <40 y had smartphone access.

**Conclusions:** Routine in-person follow-up after surgery consumes significant time and resources for patients and healthcare systems but has little impact on patient care. Most of the work done in the clinic is administrative and could be completed using mobile technology, which is pervasive in our population.

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## 1. Introduction

Routine clinic visits after an operation are an established practice pattern in surgery, but the value remains largely undefined. The main purpose of postoperative appointments focuses on managing late-onset wound complications or advancing care of the patient. However, mandatory postoperative visits after comparatively low-risk surgeries such as appendectomy and cholecystectomy may consume substantial healthcare resources without significant benefit to the patient. Patients must cover the cost of travel and missed work time to complete clinic visits, and providers lose the ability to assess new patients when spending time evaluating postoperative cases [1,2]. The utility of postsurgical appointments should justify the cost burden associated with its frequency by its impact on subsequent management of the patient.

Recently, alternative methods for follow-up appointments after surgical procedures have been explored. Routine clinic review of patients who underwent arthroplastic procedures have been performed remotely using web-based assessment and a central imaging database with no notable worsening of care [3]. Other studies have demonstrated follow-up with general practitioners or omitted follow-up entirely and observed comparable complications rates [2,4–6]. Mobile-based follow-up has been implemented in postoperative settings for general and head and neck surgery and was found to be a safe and cost-effective method of care [7–11]. Despite these promising studies, the heterogeneity in methods and reporting of clinical outcomes make results difficult to interpret [12].

To date, there has been no study on the clinical value of routine in-person visits after surgery. Our study investigates the utility of postoperative clinic appointments after appendectomy and cholecystectomy. Furthermore, access to mobile technology was surveyed to gauge feasibility of an electronic-based screening system to replace routine in-person postoperative visits.

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## 2. Methods

### 2.1. Data collection and analysis

A retrospective review of charts of patients who underwent appendectomy or cholecystectomy from December 2011–March 2013 at a public safety net hospital was performed. Institutional review board approval was obtained before this study. All cases were after admission from the emergency center. A routine follow-up appointment was defined as a clinic appointment scheduled within 90 d of surgery. Variables recorded included patient demographics, type of surgery, pathology, duration of follow-up clinic visit, need for additional imaging, tests or readmissions, and administrative actions such as occupational paperwork and primary care referrals. A clinical intervention was defined as procedure (suture, staple, or drain removal), medication action, additional laboratory test or imaging, readmission, or scheduling of an additional surgical follow-up visit. Total clinic time was calculated using check-in and check-out times. Time

per intervention was defined as total clinic time divided by the total number of interventions. Unplanned visits within 30 d of surgery for pain, gastrointestinal disturbances, and wound-related complications were recorded. Complications after the first postoperative visit were assessed using emergency room visits. Patients who had exploratory laparotomy from abdominal trauma with an incidental appendectomy or cholecystectomy were excluded.

### 2.2. Mobile technology survey

Access to mobile technology was surveyed by a validated questionnaire in the general surgery clinic patient population during the study time frame. There was a 47% participation rate. Survey variables included demographics, access to smart or feature phone, access to land based or mobile internet, email use, access to computer at home or work, educational level, perceived ease of use, and perceived usefulness. Categorical variables were analyzed with chi square.

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## 3. Results

There were 219 patients (68% male) who underwent appendectomy and 200 patients (23% male) who underwent cholecystectomy. One patient underwent both a laparoscopic appendectomy and cholecystectomy. Mean age of the populations was  $35 \pm 11$  y and  $38 \pm 14$  y, respectively. Laparoscopic procedures accounted for 93% of cases, respectively, with the remaining cases being open or converted to open. Simple appendicitis accounted for 80% of cases and all pathology was benign. Of the cholecystectomy patients, pathology was positive for adenocarcinoma in two patients and one additional patient was identified as having porcelain gallbladder. One of the adenocarcinoma patients had no follow-up appointment scheduled and was discharged on hospice, whereas the other never completed the visit due to inpatient admission for ascites and management of gastric cancer.

### 3.1. Collective follow-up data

Completion of a postoperative clinic visit was 84% for all postsurgical patients. Average time from surgery to follow-up was  $17 \pm 6$  d. Before clinic, 20 (5%) patients visited the emergency center with pain being the most common reason and eight patients (2%) were readmitted. At clinic follow-up, 58 patients (14%) required 70 interventions. There were 28 drain, staple, or suture removals (39% of interventions), 16 medication actions (23%), three imaging orders (4%), two laboratory orders (3%), 20 additional follow-up appointments (28%), and one readmission (1%). Occupational paperwork (62) and referrals to primary care clinic (28) accounted for most of the events at the clinic follow-up (Table 2). Average patient time spent in the clinic was  $100 \pm 54$  min. Time per intervention was 7.8 h. Regarding unplanned visits, 6% of patients went to the Emergency Department (ER) with a mean time of  $20 \pm 14$  d from surgery. Five of the 24 patients (21%) who had an ER visit did so after their follow-up.

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