



## Clinical and Economic Value of Routine Pathological Examination of Hernia Sacs and Scheduled Clinic Follow-Ups After Inguinal Hernia and Hydrocele Repair in a Canadian Tertiary Care Children's Hospital☆☆☆☆☆☆

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### ABSTRACT

**Background:** The clinical and economical value of routine submission of hernia sacs for pathological examination and scheduled clinic follow-ups after inguinal hernia and hydrocele repair has been questioned. Herein, we assessed the institutional variability in these routine practices.

**Methods:** We retrospectively reviewed patients who underwent unilateral or bilateral inguinal hernia and/or hydrocele repair, open or laparoscopically, at our institution from 2015 to 2018.

**Results:** 1181 patients were included (1074 inguinal hernias and 157 hydroceles). Of 531 specimens obtained from 446 (38%) patients, 515 (97%) were normal. 16 (3%) abnormal pathological findings included 7 with mesothelial hyperplasia, 5 with nonfunctional genital ductal remnants, 3 with ectopic adrenal cortical tissues, and 1 epididymal structure which was not recognized at the time of surgery. 418 (35%) patients had scheduled clinic follow-ups 65 (IQR 46–94) days postoperatively. 44 (4%) patients with unexpected postoperative Emergency Department visits within 30 days of surgery were identified. Only one patient required inpatient treatment, and the rest did not require intervention or admission. The total direct cost of analyzing specimens during the study period was \$30,798 CAD (\$10,266/year). The average cost to detect a potentially significant finding was \$1924.88/specimen and \$2053.20/patient.

**Conclusions:** Routine pathological examination of hernia sacs and scheduled clinic follow-ups were associated with significant costs and predominantly nonsignificant findings. They should therefore be reserved for patients with a high clinical suspicion of injuries/abnormalities or risk factors for potential complications.

**Level of Evidence:** This is a level III evidence study.

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Inguinal hernias and hydroceles are among the most common pediatric conditions that are surgically managed by both pediatric surgeons and pediatric urologists. These two conditions in children often share a

similar etiology, pathophysiology, and surgical approach to treatment [1]. Inguinal hernias occur in 0.8%–4.4% of children and their incidence is associated with numerous factors, including age, sex, side, and family history [2]. While pediatric inguinal hernias will not typically close spontaneously, hydroceles may spontaneously resolve, and thus patients with hydroceles are often observed one or two years after birth before considering surgery [3,4].

A major component of inguinal hernia and communicating hydrocele repair involves the excision of the hernia sac or patent processus vaginalis. The decision to submit the hernia sac for routine pathological examination may be determined by governmental or institutional mandate, or may be based on culture and surgical training. While

**Abbreviations:** CEA, Cost-effective analysis; ED, Emergency department; ASA, American Society of Anesthesiologists; IQR, Interquartile range.

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unexpected conditions (i.e., neoplasms, structural damages) may be encountered, numerous studies challenge the medical necessity of this routine practice of submitting hernia sac specimens, especially with increased costs that may be associated with pathological examination [5–13].

With a few exceptions, patients who undergo hernia and hydrocele repair are discharged as day-surgery patients [2]. Given the universally high success rate and low morbidity associated with the repair, the value of scheduled clinic follow-ups after inguinal hernia and hydrocele repair has also been questioned [14–17].

As value, which is related to quality and expenditures, becomes a primary driver in modern healthcare, it becomes increasingly important to standardize approaches to certain conditions when possible. Currently, no evidence-based guidelines exist pertaining to routine pathological examination of hernia sacs or scheduled clinic follow-ups after pediatric inguinal hernia and hydrocele repair. Herein, our primary aim was to perform a cost-effective analysis (CEA) of routine pathological examination of hernia sacs following inguinal hernia and hydrocele repair. We secondarily assessed the value of our institutional approach for scheduled clinic follow-ups after the repair.

## 1. Materials and methods

### 1.1. Study design

Following approval from our institutional Quality Improvement Committee, a retrospective chart review was performed to assess the value of routine pathological examination of hernia sacs and scheduled clinic follow-ups after pediatric inguinal hernia and hydrocele repair. The patient (case) population included those 0 to 18 years of age, who underwent unilateral or bilateral inguinal hernia and/or hydrocele repair, either open or laparoscopically, from January 2015 to January 2018 at the Hospital for Sick Children in Toronto, Canada. The list of cases was obtained from the institutional surgical informatics specialist database by the operative diagnosis codes of “inguinal hernia” and “hydrocele.”

### 1.2. Data collection

Patient data were obtained from electronic medical records. Personal information was deidentified, and each patient was assigned a study ID. For each patient, we collected information regarding age at the time of the first consultation and surgery, surgical approach (open vs. laparoscopic), type of admission (urgent vs. elective), American Society of Anesthesiologists (ASA) score, documentation of hernia sac submission for pathology and, if available, microscopic findings of the hernia sac, date of the first follow-up visit, discharge instructions to the primary care physician, and presence of a postoperative emergency department (ED) visit. A postoperative ED visit was defined as a visit within 30 days associated with the repair. The ASA score (range: 0–6) measures the fitness of patients before surgery, with a higher number indicating worse conditions.

### 1.3. Cost-effectiveness analysis (CEA)

Cost-effective analysis (CEA), a form of economic analysis, was used to evaluate the relative costs and effective outcomes for routine pathological examination of hernia sacs.

A workflow diagram was generated to determine the associated costs involved in the pathological examination of hernia sacs (Fig. 1). The workflow diagram was developed through structured interviews with laboratory staff. Each step identified in the workflow process was documented along with a description of the task, person(s) engaged, time elapsed and materials used. Costs were calculated based on the sum of the labor costs and direct material costs allocated to each step. Labor costs were calculated as a product of the estimated wage rate

for the person(s) involved and the approximate time elapsed for each step. The average direct cost of processing and analyzing a hernia sac specimen was \$58 CAD per specimen.

In determining the CEA, an effective outcome was defined as any abnormal finding, irrespective of whether that finding changed the course of treatment or clinical outcome for the patient. First, the cost-effectiveness of routine hernia sac examination was calculated as the average direct cost per specimen ( $CEA_{\text{specimen}}$ ) required to find an effective outcome (i.e., abnormal finding) over the study period using the equation below:

$$CEA_{\text{specimen}} = \frac{\text{average direct cost per hernia sac examination} \times \text{number of specimens examined}}{\text{number of effective outcomes observed}}$$

Second, the cost-effectiveness was evaluated as the average cost per person ( $CEA_{\text{person}}$ ) who had a specimen sent for pathological examination using the equation below:

$$CEA_{\text{person}} = \frac{\text{number of specimens per patient case} \times 58/\text{specimen} \times \text{number of patients who had a specimen examined}}{\text{number of patients who had effective outcomes}}$$

### 1.4. Statistical analysis

Descriptive statistics were performed for all study variables. Continuous, nonparametric data were analyzed using the Mann–Whitney U test and categorical variables using Chi-square or Fisher’s Exact test to compare differences between patients who underwent inguinal hernia and hydrocele repair. All analyses were performed using GraphPad Prism Version 7.0 (La Jolla, CA) and a two-sided  $p$  value of  $<0.05$  was considered statistically significant.

## 2. Results

Between January 2015 to January 2018, 1181 patients underwent inguinal hernia and/or hydrocele repair by 16 surgeons. A total of 1074 inguinal hernia and 157 hydrocele cases were identified.

Baseline characteristics of inguinal hernia and hydrocele cases are summarized in Table 1. Patients who underwent inguinal hernia repairs were younger compared to patients who underwent hydrocele repairs (21 [IQR 5–65] months vs. 44 [IQR 25–71] months,  $p < 0.001$ ) and there was an association between gender and type of repair ( $p < 0.001$ ). Inguinal hernia cases had a higher ASA score and a higher number of laparoscopic procedure than hydrocele cases (ASA score: 1 [IQR 1–2] vs. 1 [IQR 1],  $p < 0.001$ ) and (laparoscopic cases 8% vs. 3%,  $p = 0.03$ ). There were no differences in the number of reoperation cases or types of admission (elective vs. urgent).

446 (38%) of 1181 patients had 531 hernia sacs submitted for pathological examination (Table 2). There was an apparent decrease in the number of hernia sacs collected for pathological examination over time from 57% of total patients in 2015 to 27% in 2017 (Table 3). The decision for the pathological examination of hernia sacs was not associated with patient age at surgery, type of admission, or ASA score (Table 4). 515 (97%) of the tissues analyzed had normal microscopic findings. Of the remaining 16 with abnormal findings [7 (1%) mesothelial hyperplasia, 5 (0.9%) nonfunctional genital ductal remnants, 3 (0.6%) ectopic adrenal cortical tissue], 1 (0.2%) indeed had an unrecognized surgical complication, rather than a pathological variant of significance. In this patient, a normal epididymal structure was identified. None of the abnormal findings modified the subsequent treatment received by the patient.

Approach to perioperative care is summarized in Table 5. Following the repair, 418 patients (35%) had scheduled clinic follow-ups. The median time from operation to first follow-up was 65 (IQR

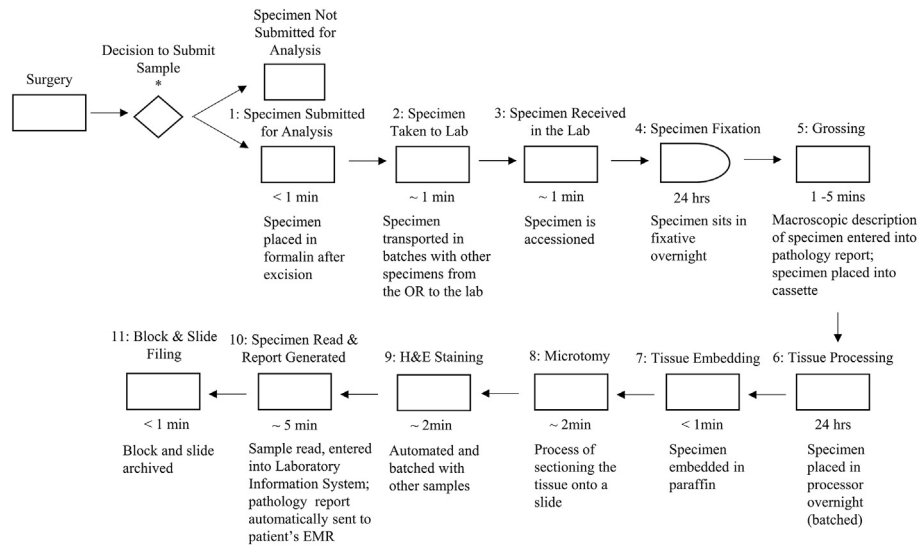


Fig. 1. Workflow of hernia sac submission for pathological examination.

46–94) days. 381 (32%) patients were directly discharged to their primary care physicians. The decision for direct discharge to primary care physicians was not associated with patient age at surgery, wait-time to surgery, type of admission, surgical approach, or ASA score (Table 6). Those with postoperative emergency department visits (44 [4%]) tended to be younger than those who did not and came for wound incision check and infection, postoperative pain and fever, scrotal swelling, pain, and hematoma (Table 7 and Table 8). One patient with infected hematoma was admitted for intravenous antibiotic therapy. The rest did not require secondary intervention, modification of treatment, or hospital admission.

The total cost of analyzing 531 specimens from 446 patients during the study period was estimated to be \$30,798 CAD with an average annual cost of \$10,266 CAD. Abnormal findings were reported in 16 specimens among 15 patients. On average, 1.2 specimens were sent by each patient who underwent pathological examination. The average cost to detect a potentially significant finding was found to be \$1924.88 CAD per specimen (CEA<sub>specimen</sub>) and \$2053.20 CAD per patient (CEA<sub>person</sub>).

The distribution of rate of submission for pathological evaluation of hernia sacs and scheduled clinic follow-ups is summarized in Fig. 2.

Table 1

Baseline characteristics of the study population.

	Inguinal Hernia	Hydrocele	p
Number of cases, n (%)	1074	157	-
Sex, n (%)			
Male	826 (77)	155 (99)	<0.001
Female	248 (23)	2 (1)	
Median age at first consultation, months (IQR)	18 (4–61)	41 (21–65)	<0.001
Median age at surgery, months (IQR)	21 (5–65)	44 (25–71)	<0.001
Median lag-time to surgery, days (IQR)	49 (16–89)	74 (40–159)	<0.001
Number of reoperation cases, n (%)	23 (2)	3 (2)	0.85
Type of admission, n (%)			
Elective	1016 (95)	152 (97)	0.24
Urgent	58 (5)	5 (3)	
Surgical approach, n (%)			
Laparoscopic	85 (8)	5 (3)	0.03
Open	989 (92)	152 (97)	
Median ASA Score (IQR)	1 (1–2)	1 (1–1)	<0.001

ASA Score, American Society of Anesthesiologists Score; IQR, Interquartile Range.

### 3. Discussion

The overall aim of this study was to assess the institutional variability in routine submission for hernia sacs for pathological examination and scheduled clinic follow-ups after inguinal hernia and hydrocele repair. Previous studies have challenged the value of these routine practices given the universally high success rate and low morbidity associated with the procedure [7–13,18,19]. In a resource-limited and publicly funded healthcare system like Canada's, it is imperative to identify and standardize care to effectively utilize healthcare resources. Our results corroborated the findings of previous studies and showed that routine pathological examination of hernia sacs was associated with significant costs and predominantly nonsignificant findings. Furthermore, the 35% of patients scheduled to return for routine clinic visits had no concerns identified. All patients, except one, who returned to our emergency department within 30 days were seen for parental concerns with no interventions, surgical or nonsurgical, indicated.

Currently there are no evidence-based clinical guidelines available regarding routine hernia sac submission for pathological examination following inguinal hernia and hydrocele repair. Our findings showcase that up to 38% of patients who underwent inguinal hernia and hydrocele repair within the most recent three years had their hernia sacs examined, and the number of hernia sacs examined decreased over time as surgeons modified their practice to submit fewer tissues, with the

Table 2

Summary of pathological evaluation of hernia sac specimens.

	Total
Number of patients, n	1181
Number of patients with specimens, Total n (% of total)	446 (38)
Total number of specimens, n	531
Total pathology types, n (%)	
Inguinal herniorrhaphy sac	505 (95)
Hydrocelectomy sac	21 (4)
Both	5 (1)
Pathological findings, <sup>a</sup> n (%)	
Normal	515 (97)
Mesothelial hyperplasia	7 (1)
Nonfunctional genital duct remnants	5 (1)
Ectopic adrenal cortical tissue	3 (1)
Epididymal structure	1 (0)
Total number of patients with abnormal findings <sup>b</sup>	15

<sup>a</sup> No neoplasm, torsional injuries, or other abnormal findings.

<sup>b</sup> 16 abnormal tissues were submitted from 15 patients.

**Table 3**  
Patterns of hernia sac evaluation over the study period.

	2015	2016	2017
Number of patients, n	412	400	369
Total patients with specimens, n (%)	234 (57)	113 (28)	99 (27)
Total specimens, n	285	133	113
Pathological findings, n (%)			
Normal	275 (96)	131 (98)	109 (96)
Mesothelial hyperplasia	4 (1)	0 (0)	3 (3)
Nonfunctional genital duct remnants	3 (1)	2 (2)	0 (0)
Ectopic adrenal cortical tissue	2 (1)	0 (0)	1 (1)
Epididymal structure	1 (1)	0 (0)	0 (0)

percentage of normal findings remaining consistent. This was not related to the changes in the number of laparoscopic cases over time, which remained consistently between 6 to 9% of total cases in each year. Furthermore, only one tissue was submitted after laparoscopic procedures, indicating that a skewed patient population was being examined. The decision to submit hernia sacs to pathology was not associated with patient age at surgery, types of admission (elective vs. urgent), or ASA score. Collectively, our data suggest that there was no clear pattern of submission based on patient characteristics.

All specimens sent for pathological assessment were microscopically examined. 97% of these had normal findings. The remaining pathological findings ultimately did not alter the course of clinical management. It has been well-established that while the previously described conditions are of abnormal pathology, they are generally considered to have little to no clinical significance and do not typically change clinical practice [5,20,21]. Similarly, the vast majority of our “abnormal pathology” were of little significance, except for a functional epididymis that was identified on a single pathology specimen. This tissue was removed during the surgery for a 15-year-old male with noncommunicating hydrocele, as it appeared grossly abnormal on examination by the surgical team. Nowhere in the operation note was there a suggestion that injury has occurred. Although functional tissue was found, this pathological finding ultimately did not change the patient's postoperative clinical management. Overall, 1 in 515 tissues (0.2%) yielded a pathology result with potential implications in our investigation. The breakdown of pathology findings was similar to that of Kim et al., which showed 6% mesothelial hyperplasia, 1% genital duct structures, 0% neoplasm, and 0% ectopic tissue [10]. In addition to a low chance of detecting structural damage, cancerous tissue in the hernia sac is found in approximately 0.1% of adults and even less in children, challenging the necessity of sending hernia sacs for routine pathological assessment [5].

In Ontario, clinicians are required to submit hernia sacs for pathological examination under the Ontario Ministry of Health Public Hospital Act [22]. This is largely to identify potential cases where inadvertent injury was attributable to the surgeon. However, not all provinces within Canada or the United States require routine hernia sac submission [11,12,23]. Furthermore, while pathological examination can show injuries to a certain extent (e.g., vas deferens or epididymis resection), other

**Table 5**  
Summary of perioperative care and complications.

	Total
Number of patients, n	1181
Total patients with clinic follow-up, n (%)	418 (35)
Total clinic follow-up, n	450
Median time to first follow-up, days (IQR)	65 (46–94)
Discharge to primary care, n (%)	381 (32)
Total complication, n (%)	18 (2)
Intraoperative	2 (0)
Postoperative	16 (1)
Total postoperative ED visit, n (%)	44 (4)
Telecommunication, n (%)	104 (9)

ED, emergency department.

injuries may not be captured by such examination (e.g., electrocautery damage). Taking into consideration that 97% of cases were shown to be normal and the direct cost per year was \$10,266 CAD, it would be mutually beneficial from a healthcare utilization resource standpoint and medicolegal standpoint to perform pathological examination of hernia sacs when there is a high suspicion of abnormality or damage to functional tissues is anticipated. Our study and that of Kim et al., both conducted in Ontario, suggest that there is little to no benefit to perform pathological examination of hernia sacs. It may be beneficial to conduct a national survey to investigate the value of evaluating hernia sacs among pediatric surgeons, urologists, and pathologists. The result of this survey may help further advising a change in our current provincial healthcare policy, making hernia sacs an exemption from required tissue submissions.

Similar to routine pathological assessment of hernia sacs, there are no evidence-based, clinical guidelines available for scheduled clinic follow-up after inguinal hernia and hydrocele repair. Although postoperative follow-up visits for pediatric patients are critical for many pediatric surgical procedures, they may not be necessary for procedures such as inguinal hernia and hydrocele repair that have low complication rates. In our study, approximately 4% of patients presented to the ED within 30 days postoperatively owing to complications described in the literature (e.g., fever, pain, scrotal edema and hematoma, and wound infection) [2,14,15,17,24]. One patient, who was afebrile and vitally stable, was admitted to the hospital to manage an infected hematoma, which responded to intravenous Cefazolin and warm compresses in two days. The rest seen in the ED were under conservative management and did not require surgical reintervention or hospitalization. As such, the value of scheduled clinic follow-ups from the healthcare and resource utilization point is questionable. Despite small numbers, younger patients tended to visit ED more often. Additionally, wait time to surgery and other risk measurements (i.e., types of admission, ASA scores) were not significantly associated with ED visits. Further identifying common characteristics among patients with ED visits may help us appropriately allocate follow-up care.

In this study, we introduced the concept of CEA to grossly evaluate the economic value of the routine pathological evaluation of hernia

**Table 4**  
Patients stratified by hernia sac examination.

	Total (n = 1181)	Hernia Sac (n = 446)	No Hernia Sac (n = 735)	p
Median age at surgery, months (IQR)	24 (0–60)	24 (0–60)	24 (12–72)	0.43
Type of admission, n				
Elective	1120	417	703	0.10
Urgent	61	29	32	
Surgical approach, n				
Laparoscopic	87	1	86	<0.001
Open	1094	445	649	
Median ASA Score (IQR)	1 (1–2)	1 (1–2)	1 (1–2)	0.16

ASA Score, American Society of Anesthesiologists Score; IQR, Interquartile Range.



**Table 6**

Patients stratified by direct discharge to primary care physicians.

	Inguinal Hernia			Hydrocele		
	Discharge (n = 359)	No discharge (n = 715)	p	Discharge (n = 29)	No discharge (n = 128)	p
Median age at operation, months (IQR)	20 (5–66)	22 (5–63)	0.82	54 (34–72)	44 (25–72)	0.29
Median wait time to operation, days (IQR)	56 (15–96)	45 (17–85)	0.09	107 (46–138)	70 (38–168)	0.60
Type of admission, % Urgent	4	6	0.15	0	4	0.59
Surgical approach, % Open	90	93	0.10	100	96	0.59
Median ASA Score (IQR)	1 (1–2)	1 (1–2)	0.84	1 (1–1)	1 (1–1)	0.27

ASA, American Society of Anesthesiologists.

sacs. CEA relates the benefit of a process to the cost (i.e., cost per benefit). The benefit of having a pathological evaluation is detecting a potentially significant finding – such as neoplasms or structural injuries – that yields additional information altering the treatment plan. Although most of our abnormal findings did not have a significant implication, we assumed that any abnormal finding is significant for our CEA, thus overestimating the benefit associated with pathological evaluation. The CEA of sending a hernia sac was calculated to be \$1924.88 CAD per specimen and \$2053.20 CAD per patient that had a specimen submitted. Our data collectively suggest that routine pathological examination of the hernia sac has limited clinical and economic value.

The clinical and economic value of scheduled clinic follow-up visits should also be questioned. The direct billing of surgical clinic is set at \$31 CAD in our province. However, the overall burden to the hospital, patients, and their families must be considered. Although most of these clinic visits involve a quick assessment of wound healing and recurrence, it often burdens patients and families as there are many steps involved in returning to a surgical clinic. These steps include but are not limited to absence from professional duties (e.g., time off from work for parents, school disruption for patients), extensive travel or round-trip and associated cost, and payments for parking or accommodation. Similarly, clinic spots reserved for these follow-ups still involve substantial human resources (e.g., nurses, receptionists, surgeons, etc.) that may be better utilized for other urgent needs. Collectively, there are significant losses with respect to the routine clinic visits on top of the direct billing of surgical clinic.

We can maximize the value in health care by improving inefficiencies in our current practice. In this study, we show that scheduled clinic follow-ups were inefficient for aforementioned reasons. We thus propose more efficient alternatives through which postoperative care can be administered. Initial follow-ups should be considered an opportunity for primary care physicians to identify abnormalities or medical emergencies requiring surgical evaluation. Our findings demonstrate that there was no association between patients' surgical risk profile and the likelihood of being discharged to primary care physician. This indicates that there is no effective system in place to determine which patient groups should be discharged to primary care physicians and

which patient groups may benefit from postoperative surgical clinic follow-up visits. As our study demonstrates low likelihood of perioperative complications, return to ED or other significant postoperative negative outcomes in the vast majority of patients undergoing hernia repair, it may be beneficial from both the patient and healthcare point of view to appropriately discharge low-risk patients to primary care physicians who may also provide equally adequate postoperative care in a timely manner before surgical evaluation is considered. Furthermore, including clear postoperative instructions, open access follow-up arrangements and telecommunication can also be effective alternatives to in-person care for many pediatric operations [18,19,25–27]. Owing to limited resources at our institution, telecommunication had not been utilized as an effective opportunity in lieu of face-to-face clinic interaction, and was mostly used to provide and reinforce discharge instructions. Recently, postoperative virtual clinics have been implemented in multiple institutions using platforms where physicians and patients can communicate remotely [28–30]. Since data accrual, a uniform electronic health record, EPIC, has been introduced to our facility, which likely will allow more standardized telecommunication with clinical teams and patients. This may involve establishing a standardized postoperative questionnaire that can flag someone who might need to be seen in person either by operating surgeons or primary care physicians. If we appropriately utilize the above alternatives, especially for low-risk patients, we may be able to allocate in-person follow-up visits for those who most require them.

In addition to improving care by identifying inefficiencies in our practice, managing variability in healthcare delivery can optimize the value in our health care. The results of our institutional assessment suggest significant individual surgeon variability in submitting hernia sacs for routine pathological evaluation and/or scheduled clinic follow-up visits. A lack of evidence-based guidelines implies that surgeons' experience may influence their clinical management. Since examining hernia sacs or clinic follow-ups after the repair may not have significant clinical, medicolegal, and economic value, surgeons should consider an appropriate balance between their routine procedure and resource stewardship, striving for standardization of practice. In accordance

**Table 7**

Reasons for emergency department (ED) visits.

Reason	Number (%)
General pain	10 (23%)
Wound incision check	10 (23%)
Scrotal swelling and pain	7 (16%)
Postoperative fever	5 (11%)
Scrotal hematoma	3 (7%)
Incision site infection	3 (7%)
Other	6 (14%)
Total number of patients with ED visits	44

**Table 8**

Patients stratified by emergency department (ED) visits.

	ED visits (n = 44)	No ED visits (n = 1136)	p
Median age at operation, months (IQR)	0 (0–45)	24 (0–72)	<0.001
Median wait time to operation, days (IQR)	36 (12–64)	51 (18–94)	0.16
Type of admission, % Urgent	11	5	0.08
Surgical approach, % Open	95	92	0.57
Median ASA Score (IQR)	1 (1–2)	1 (1–2)	0.08

ED, emergency department; ASA, American Society of Anesthesiologists.

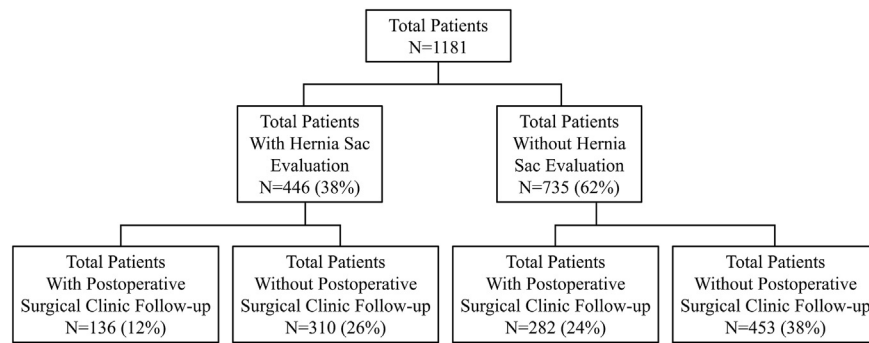


Fig. 2. Distribution of pathological examination of hernia sacs and postoperative surgical clinic visits.

with the Institute for Healthcare Improvement endeavor, maximizing the value of care by improving patient experience and health of population overall while reducing associated expenditures is critical. It is plausible that such individual surgeon variability exists in other children's hospitals which, when identified, may result in institutional standardization of care.

Furthermore, for us to propose an evidence-based guideline for routine pathological evaluation of hernia sacs and scheduled clinic follow-ups, we still need to determine whether our findings are consistently observed in other institutions. Our study is a critical first step in arguing that routine pathological evaluations of hernia sacs and scheduled clinic follow-ups have limited clinical and economic value.

As with any retrospective study, the potential for sampling bias and confounders represents possible limitations to interpreting study results. To minimize these, we included all the patients who underwent inguinal hernia and/or hydrocele repair without having undergone additional procedures (i.e., orchidopexy, treatment for other congenital disorders) within the same operation setting. 390 patients (33%) had neither scheduled clinic follow-ups or documented discharge to their primary care physicians. We also limited information on prematurity, congenital conditions, or other risk factors, and thus could not adjust for or find associations between hernia sac submissions and these variables. Since our study includes a sample of pediatric patients from the most recent three years, we were unable to follow up with these patients prospectively to examine if any abnormal findings or perioperative complications were associated with infertility, malignancy, or other clinically significant problems. Finally, CEA of scheduled clinic follow-ups and ED visits was not feasible, as the cost breakdown of Canada's publicly funded health care system was not as apparent as that of the United States.

#### 4. Conclusions

Our investigation confirms that routine pathological evaluations of hernia sac and scheduled clinic follow-up visits rarely result in significant findings and have limited clinical and economic value. Surgical disciplines involved in inguinal hernia and hydrocele management should aim to standardize care and reserve these for situations with a high clinical suspicion of intraoperative injuries or abnormalities or for patients with risk factors for potential complications.

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