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Differentiating abdominal procedures in pediatric surgery: The inadequacy of current procedural terminology codes

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ABSTRACT

Introduction: The ability to use detailed, accurate current procedural terminology (CPT) codes is a key component of effective research. We examined the effectiveness of CPT codes to accurately reflect care in patients undergoing surgery for necrotizing enterocolitis (NEC).
Methods: A multicenter retrospective analysis of operations on patients with NEC was conducted across 4 institutions between 2011 and 2016. Correlation between operative dictation and CPT coding was analyzed.
Results: A total of 124 patients with NEC diagnosis undergoing exploratory abdominal operations were identified. NEC was improperly diagnosed in 25 patients, who were excluded from further analysis. Of the 99 patients reviewed, the initial exploratory abdominal operation was coded inaccurately in 58 cases (59%). Within these, 15 (26%) had multiple coding errors such that the nature of the original operation was not discernable from the applied codes. Inaccurate codes often did not describe the presence of a mucous fistula (n = 27, 44%), ostomy (n = 24, 39%), or extra segments of bowel resected (n = 9, 16%). The length of bowel resected is not currently described by any CPT codes.
Conclusion: CPT coding for abdominal operations does not sufficiently reflect complexity of pediatric surgeries. This study highlights the significance of this inadequacy and its implications in future database studies in the era of electronic medical records.
Level of evidence: Level IV.
Type of study: Clinical research study.

Medical documentation has evolved from scribbles in paper charts into complex electronic medical record systems. These systems rely on a universal language that changes constantly not only to reflect new diagnoses and practices but also to document service for payers and providers. Throughout this transformation, the development of detailed and accurate current procedural terminology (CPT) codes is critical.

Historically, CPT codes sought to standardize language for physician reimbursement, but its use today has broadened to include systems research in quality and outcome measures [1].

To be accurate, these database searches must rely on appropriate description of diagnoses and subsequent interventions in any population of interest. For example, the National Surgical Quality Improvement Program-Pediatrics (NSQIP-P) collects data based on CPT coding for institutional quality benchmarking [2,3].

Within pediatric surgery, current CPT codes may be inadequate to accurately describe the extent and complexity of intervention, especially in many abdominal operations. The currently available codes most often reflect procedures and operations for the adult population, which do not always translate comprehensively for pediatric patients. These limitations are particularly evident in patients undergoing surgery after being diagnosed with necrotizing enterocolitis (NEC). In such cases, interventions may vary from exploratory laparotomy to any combination of complex bowel resections, anastomoses, second look procedures, and ostomies. Very little has been written about this subject in the pediatric surgery literature. We explore various shortcomings in CPT coding in NEC patients and discuss the broader implications for pediatric abdominal surgery.

1. Methods

This study was approved by the Institutional Review Board at Kaiser Permanente in Los Angeles, California. A multicenter retrospective analysis of operations on patients with NEC was conducted across 4 institutions between 2011 and 2016. Billing codes based on clinician documentation are routinely entered by the Kaiser Permanente Coding Department as part of normal hospital operations. A database query for NEC per both the 9th and 10th editions of the International

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Classification of Diseases (ICD-9/ICD-10) identified all patients with a diagnosis of NEC who underwent abdominal surgery during the study period.

The database query resulted in 124 identified cases of NEC treated surgically within one year of diagnosis. Operative notes from these electronic medical records (EMR) were manually reviewed by the research team to extract the following procedural elements: bowel resection(s), ileostomy or colostomy or mucous fistula formation, and bowel anastomoses. All dictations were entered by attending pediatric surgeons using electronic templates which could be expanded to reflect relevant findings.

All cases were reviewed independently by two surgeons. Those cases identified by one or both surgeons that showed discrepancies between operative dictation and CPT coding were then reviewed in consultation with hospital coders. Errors were defined as between listed code and described procedure, whether this resulted from error in the coding process or lack of appropriate existing code. The accuracy of the coding was assessed as the percentage correct among all cases identified. These discrepancies were then parsed into several categories of the most common codes. Among these cases, the number of cases of each category of error was delineated after review of the data.

Table 1
Sample of CPT codes that were extracted.

CPT Code	Description
44125	with enterostomy (enterectomy, resection of small intestine; single resection and anastomosis)
44140	colectomy, partial; with anastomosis
44144	with resection, with colostomy or ileostomy and creation of mucofistula (colectomy, partial; with anastomosis)
44310	ileostomy or jejunostomy, nontube
44320	colostomy or skin level cecostomy
44625	with resection and anastomosis other than colorectal (closure of enterostomy, large or small intestine)
49000	exploratory laparotomy, exploratory celiotomy with or without biopsy (separate procedure)

2. Results

Out of 124 charts which underwent manual review, 25 were excluded from further analysis owing to improperly diagnosed NEC (n = 11), inaccessible charts (n = 7), or improperly identified abdominal operations (n = 7) (see Fig. 1). Table 1 lists sample CPT codes listed most often.

Of the 99 patients reviewed, the initial exploratory abdominal operation was coded inaccurately in 58 cases (59%) when the CPT code was compared to the pediatric surgeon's dictation. Among these 58, the reasons for error could be parsed into general categories. Fifteen cases had multiple coding errors such that the nature of the original operation was not discernable from the applied codes. No code existed to describe the presence of a mucous fistula (n = 27). Inaccurate description of ostomy was common (n = 24). Extra segments of bowel resected (n = 9) were often not reflected in the coding. Of the patients who had bowel resections, the length of bowel resected was reported by the operating surgeon in 44 out of 82 cases (54%) but this clinically relevant information is not described by any CPT codes. The reported resection length roughly correlated with described pathology specimen after accounting for shrinkage during fixation process.

3. Discussion

The evolution of CPT coding in its modern form relies on a rigorous evaluation process by a committee of the American Medical Association to ensure no redundancy or conflict. Such regulation limits appropriate code formation especially in the case of low volume procedures, for example, operations for necrotizing enterocolitis (NEC) compared with more common adult operations.

The complexity of operating on a neonatal abdomen is lost in the generic codes of abdominal surgery. Abdominal surgery in the neonatal and pediatric population presents different challenges from those of adult surgery, a distinction that is not widely recognized in CPT coding. In fact, only a few subsets of current codes reflect patient age group — hernia repair, tracheostomy, central line placements, to name a few. In

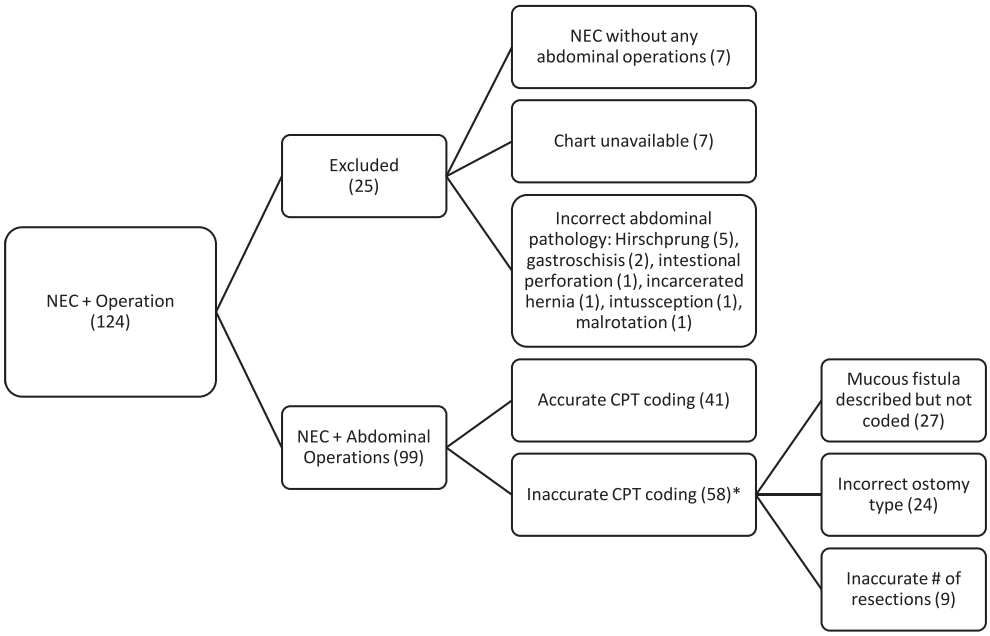

Fig. 1. Study group showing distribution of coding errors in both NEC diagnosis and CPT coding. *Of the inaccurately coded operations, 15 operations included multiple mistakes including those described above.

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