

Back Pain in a Pediatric Emergency Department: Etiology and Evaluation

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Objectives: Back pain is an uncommon chief complaint in the pediatric emergency department (ED). However, there are serious underlying conditions requiring prompt diagnosis and treatment. While the etiology is usually benign, variation exists in the evaluation. The study purpose was to describe pediatric patients who presented to the ED with back pain and evaluate for associations with laboratory and radiologic abnormalities indicative of underlying musculoskeletal pathology.

Methods: A retrospective review was conducted of patients aged birth to 18 years who presented to a pediatric ED with a chief complaint of back pain during a 1-year period. Primary outcome was discharge diagnosis, categorized as nonpathologic back pain, pathologic back pain, and other etiologies. Descriptive statistics were used.

Results: Two-hundred thirty-two patient encounters were reviewed, with 177 included in data analysis. A nonpathologic diagnosis of back pain was found in 76.8% of visits. Back pain and back or muscle strain were the most common diagnoses. Pathologic back pain diagnoses represented 2.3% of visits. Radiologic imaging was performed in 37.9%. Positive findings were noted in 16.9% of radiographs; no abnormalities were noted on computed tomography scan or magnetic resonance imaging. Laboratory studies were conducted in 35%. Abnormal plain radiographs were associated with a pathologic diagnosis of back pain ($P < 0.001$).

Conclusions: Most pediatric patients presenting to the ED with back pain were found to have a nonpathologic etiology and were discharged. Among those with a pathologic back pain diagnosis, abnormal radiograph findings were the only statistically significant factor, whereas laboratory studies, computed tomography scans, and magnetic resonance imaging scans were less indicative.

Key Words: back pain, laboratory testing, radiologic imaging

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Historically, back pain in children and adolescents has been regarded as a potentially significant complaint that must be thoroughly investigated to rule out major pathology and arrive at a diagnosis. Earlier studies cited a prevalence of diagnosable pathology as high as 84%.^{1–3} Hence, the general approach has been to evaluate for “red flag” symptoms and physical examination findings such as young age, fever, weight loss, nocturnal pain, lower extremity weakness or numbness, bowel or bladder incontinence, or abnormal reflexes to help guide further investigation with laboratory studies and radiologic imaging. A standard management protocol is still not well defined.^{4–8}

A definitive etiology for back pain is often not identified in children and adolescents. In a retrospective study of 100 children with low back pain by Auerbach et al,⁹ plain radiography, magnetic resonance imaging (MRI), and single photon emission computed tomography (CT) did not reveal an organic diagnosis in 57 children. These results were similar to a larger study conducted by Combs and Caskey¹⁰ in which back pain with no organic cause was the assigned diagnosis in 57% of 648 pediatric patients with complaints related to spinal pain. This trend toward low rates of pathology was also noted by Bhatia et al¹¹ in which only 18% (13/73) of children with back pain had a definitive diagnosis after diagnostic evaluation or a minimum of 2 years of follow-up. Seventy-eight percent of children (170/217) undergoing single photon emission CT for a chief complaint of back pain also had no identifiable etiology for their symptoms.¹² In sharp contrast, a recent prospective study by Feldman et al¹³ found plain radiography to be highly diagnostic, with 68% (21/31) of pathology diagnosed.

Most of the studies that have been conducted thus far focus on children seen in primary care or subspecialty practices creating a paucity of data describing pediatric patients who present to the emergency department (ED) with back pain. In a large Australian study of 22,655 pediatric and adult ED patients, Lovegrove et al¹⁴ noted that 99 of 107 children younger than 5 years and 431 of 623 patients aged 5 to 15 years had a diagnosis other than muscular for their back pain. To date, Selbst et al¹⁵ was the only study found that examined the presentation of back pain in the pediatric ED; the most common diagnoses identified were direct trauma, muscle strain, sickle cell crisis, and idiopathic. While back pain was identified as an uncommon chief complaint accounting for only 0.4% of children who presented to an urban pediatric ED over a 1-year period, more recent prevalence data suggest that back pain is a more common problem in the pediatric age group. The prevalence of back pain in children and adolescents has been reported anywhere from 12% to 50%. Burton et al¹⁶ found that the annual incidence of low back pain increased from 11.8% at age 12+ years to 21.5% at age 15+ years with lifetime prevalence rising from 11.6% at age 11+ years to 50.4% at age 15+ years. Jones et al¹⁷ noted a 40.2% lifetime prevalence in children between the ages of 10 and 16 years, whereas another study by Watson et al¹⁸ estimated prevalence at 24% in children ages 11 to 14 years.

Clinical decision guidelines have been developed for adult patients with low back pain as it is a common and costly problem in this population.^{19–24} Such strides have yet to be made within the pediatric literature, particularly within the setting of the pediatric ED. The algorithm developed and validated by Feldman et al¹³ was based on a pediatric orthopedic referral population and had a considerably high diagnostic yield for plain radiography compared with other research studies. While this strategy of history, physical examination, plain radiographs, and MRI when indicated may be considered as cost-effective and limiting unnecessary radiation exposure in this particular outpatient setting, such benefits may not be generalizable to a pediatric ED population.

Hence, the purpose of this study was to describe pediatric patients who presented to the ED with back pain and evaluate for any

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association with laboratory and radiologic abnormalities indicative of underlying musculoskeletal pathology. Our study hypothesis was that most patients presenting to a pediatric ED with a chief complaint of back pain receive a nonspecific diagnosis of back pain and lack significant laboratory and radiologic findings to identify underlying musculoskeletal pathology. The study population was also evaluated for clinical variables associated with the presence of positive radiologic and/or laboratory results consistent with pathologic causes of back pain.

METHODS

A retrospective review was conducted of electronic medical records for all children age birth to 18 years who presented to an urban pediatric ED from January 1, 2012, to December 31, 2012, with a chief complaint of back pain either by self-report or parental report in the younger children. The following exclusion criteria were applied to the study population: older than age 18 years, level I or II trauma alert, history of previous spinal surgery or injury, preexisting back diagnosis, history of malignancy, or chronic disease associated with pain (polycystic kidney disease, sickle cell disease, Crohn disease, ulcerative colitis, etc). Children who were triaged at our institution as an activated or nonactivated trauma patient (ie, level I or II trauma alert) based on mechanism, readily apparent injuries, respiratory compromise, and/or hemodynamic instability were excluded as such children are more likely to receive an evaluation consisting of imaging and laboratory studies due to high suspicion for injuries. Similarly, children with chronic diseases associated with pain or those at increased risk for injury and/or pathology due to malignancy history, previous spinal surgery or injury, or preexisting back diagnosis were also excluded due to presumed differences in clinicians' threshold for pursuing radiologic and laboratory investigations in these special populations. Children with incomplete chart information due to ED elopement were also excluded. Chart auditing was performed by the principal investigator (PI; T.M.B.) and with support from undergraduate research assistants using a standardized data collection tool to record demographics, associated history, physical examination findings, laboratory and radiology results, disposition, discharge diagnosis, and outpatient follow-up recommendations. Data abstractors were trained and monitored to ensure that chart review was performed accurately and consistently. Training included review of variables, procedure manual, and data collection tool; in addition, several patient records were coded for practice. Data abstractors were encouraged to discuss or clarify any process issues immediately with the PI. While intrarater and interrater reliability calculations were not performed, at the conclusion of data abstraction, all data were reviewed and edited, as necessary, by the PI. All coding of data for statistical analysis were performed by authors T.M.B. and R.M.S.

The following demographic data were recorded from the electronic medical record: age, sex, weight, and race. Clinical data recorded included the following: triage pain score, temperature at triage, duration of pain (categorized as acute lasting less than or equal to 2 days, subacute lasting more than 2 days but less than 4 weeks, or chronic lasting more than 4 weeks), history of minor trauma- or athletic-related injury, ambulatory status (walking, limping, or nonambulatory), symptoms (fever, numbness, weakness, bowel and/or bladder incontinence, location of pain), and physical examination findings (location of tenderness, abnormal neurologic findings [numbness, weakness, abnormal rectal tone, abnormal deep tendon reflexes]). Other clinical data obtained from the chart included radiologic imaging, laboratory testing, consultations, disposition, length of stay, discharge diagnosis, and recommended outpatient follow-up.

Primary outcome was discharge diagnosis, which was based on primary diagnosis made in the ED by the pediatric emergency medicine attending physician. For the purposes of this study, "nonpathologic back pain" is defined as nonspecific diagnoses of back pain, back or muscle strain, back contusion, and back muscle spasm/pain. Diagnoses related to specific musculoskeletal problems of the spine were categorized as pathologic back pain. "Emergent" was defined as necessitating further evaluation with admission and/or urgent or emergent operative management and "nonemergent" as necessitating outpatient follow-up with orthopedics for findings that are likely causative of the patient's pain. Emergent causes included, but were not limited to, compression fracture with spinal cord involvement, spinal tumor, epidural abscess, transverse myelitis, discitis, and osteomyelitis. Nonemergent causes included, but were not limited to, compression fracture without spinal cord involvement, spondylolysis/spondylolisthesis, Scheuermann disease, scoliosis, ankylosing spondylitis, and osteoid osteoma. Children who did not receive a musculoskeletal diagnosis related to the spine and/or back but rather were assigned alternative diagnoses for their chief complaint of back pain such as pneumonia, pyelonephritis/urinary tract infection, extremity pain, abdominal pain, and so on were classified as "other infectious" or "other noninfectious" etiologies.

Descriptive statistics were used to show the percentage of patients with normal and abnormal physical examination findings as well as normal and abnormal laboratory studies and radiologic studies. The relationship between normal and abnormal findings and test results as well as diagnoses were also described. Associations were evaluated for statistical significance using exact tests and a 0.05 significance level.

RESULTS

During the study period, there were approximately 56,200 annual visits to our ED. Two hundred thirty-two medical records were identified as having a chief complaint of back pain and subsequently reviewed with 177 included in data analysis based on eligibility criteria. Figure 1 captures study flow.

Tables 1 and 2 characterize the study population. More than half of the patients who presented with a chief complaint of back

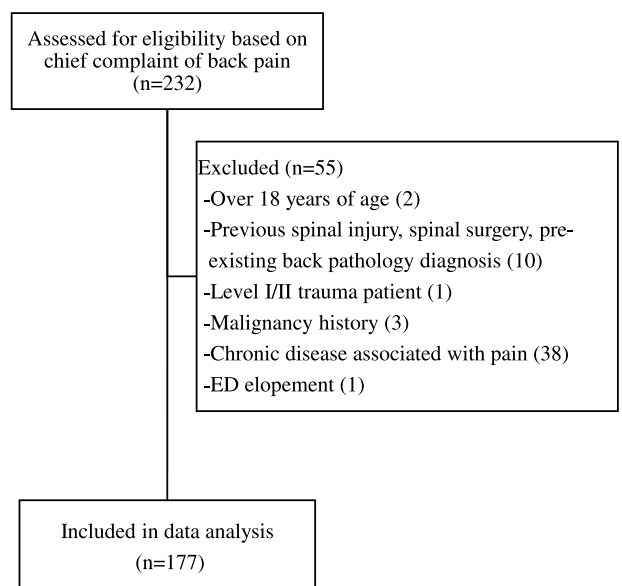


FIGURE 1. Study flow. Patients with a chief complaint of back pain were screened for eligibility in the study and subsequently included or excluded based on study criteria.

TABLE 1. Study Population Characteristics

Characteristics (n = 177)	n (%)
Sex	
Male	74 (41.8)
Female	103 (58.2)
Race/ethnicity	
White	45 (25.4)
African American	33 (18.6)
Hispanic	78 (44.1)
Other/not provided	21 (11.9)
Age	
<4 y	5 (2.8)
4–12 y	67 (37.9)
>12 y	105 (59.3)
Duration of pain	
Acute (≤2 d)	80 (45.2)
Subacute (>2 d to 4 wk)	75 (42.4)
Chronic (>4 wk)	22 (12.4)
History of minor trauma	48 (27.1)
History of injury related to athletics	21 (11.9)
Disposition	
Discharged	172 (97.2)
Admitted	5 (2.8)

pain were female. Nearly 60% of visits were made by children older than the age of 12 years. Nearly all patients (97.2%) were discharged home. Most patients did not describe their back pain as occurring in the context of athletics or as secondary to a minor trauma. Children with acute onset of pain lasting less than or equal to 2 days presented at similar rates to those with more subacute onset whose pain lasted more than 2 days but less than 4 weeks. Among the 177 visits included, 174 were unique patient encounters as there were only 3 patients who had a second visit for the same chief complaint of back pain during the study period.

Most final diagnoses were identified as nonpathologic etiologies versus pathologic. A nonpathologic diagnosis of back pain was found in 76.8% of visits, with back pain (57.1%) and back or muscle strain (10.7%) as the most common diagnoses. Pathologic back pain diagnoses accounted for only 2.3% of visits, represented by 4 diagnoses, namely, compression fracture without spinal cord involvement, spondylolysis with spondylolisthesis, scoliosis, and Schmorl's nodes. None of these pathologic diagnoses were regarded as emergent in nature in that patients did not require further evaluation with hospital admission and/or operative management, rather they were discharged home with orthopedic follow-up. Other infectious etiologies accounted for 8.5% of visits, and other noninfectious etiologies accounted for 12.4%. The specific discharge diagnoses identified in the study population are listed in Table 3.

The presence of symptoms such as fever and neurologic complaints of weakness, numbness, and bowel or bladder incontinence were also examined in the study population. With the exception of 1 patient, all others were afebrile at triage and only 5.6% of visits reported any fever history. Patients experienced neurologic symptoms at extremely low rates with 4.5% of visits reporting numbness and 2.3% of visits reporting weakness. No patient disclosed any symptoms of bowel or bladder incontinence as part of his/her history of present illness. Among the few patients who reported abnormal neurologic symptoms, there was only 1 visit in which abnormal neurologic findings were noted on

physical examination consisting of numbness of fingertips of both hands and mild right hand weakness. This patient was subsequently discharged home with a diagnosis of muscle spasm, after a negative cervical spine MRI.

Radiologic imaging that included plain radiographs, CT scans, MRIs, and/or ultrasound was performed in 67 (37.9%) visits with lumbosacral spine films accounting for the majority of studies obtained. Among the 59 visits in which radiographs were obtained, positive findings were noted in 10, accounting for 16.9% of total radiographs obtained. Abnormal findings were as follows: pneumonia, possible trace pleural effusion, L5 spondylolysis with grade 1 spondylolisthesis, compression fracture, scoliosis, Schmorl's nodes, ureteral stone, right flank calculus, and abnormal spinal curvature (2) not meeting criteria for scoliosis. There were only 2 CT scans performed in the study population, an abdomen/pelvis CT and head CT, both of which were normal. The lone MRI study performed was a normal cervical spine MRI in the previously mentioned patient with symptoms and physical examination findings of fingertip numbness and decreased grip strength. Ultrasound was also used as an imaging modality in 13 (7.3%) visits with renal and appendix findings noted in 5 of those studies.

In approximately 35% (62) of visits, diagnostic testing of blood and/or urine specimens was conducted with urinalysis being

TABLE 2. Clinical Features of the Study Population

Clinical Features (n = 177)	n (%)
Ambulatory status	
Fully ambulatory	168 (94.9)
Limping/requiring assistance	7 (4)
Unable/refuses	2 (1.1)
Triage pain score, median	7 (0–10)
History of fever*	10 (5.6)
Afebrile at triage	176 (99.4)
Neurologic symptoms*	
Numbness	8 (4.5)
Weakness	4 (2.3)
Bowel/bladder incontinence	0
Reported pain location	
Thoracic	41 (23.2)
Thoracolumbar	21 (11.9)
Lumbosacral	66 (37.3)
Thoracolumbar, sacral	7 (4)
Sacral/coccygeal	4 (2.3)
Flank	15 (8.5)
Physical examination, location of tenderness	
Thoracic	35 (19.8)
Thoracolumbar	10 (5.6)
Lumbar	26 (14.7)
Lumbosacral	33 (18.6)
Sacral	4 (2.3)
Coccygeal	3 (1.7)
Physical examination, neurologic findings*	
Numbness	1 (0.6)
Weakness	1 (0.6)
Abnormal rectal tone	0
Abnormal deep tendon reflexes	0

*Assumed to be absent if otherwise not recorded in medical record.

TABLE 3. Etiologies of Back Pain

Discharge Diagnosis (n = 177)	n (%)
Pathologic back pain	4 (2.3)
Compression fracture	1 (0.6)
Spondylolysis with spondylolisthesis	1 (0.6)
Schmorl's nodes	1 (0.6)
Scoliosis	1 (0.6)
Nonpathologic back pain	136 (76.8)
Back pain	101 (57.1)
Back or muscle strain	19 (10.7)
Back contusion	10 (5.6)
Spasm of back muscle/muscle pain	6 (3.4)
Other noninfectious etiologies	22 (12.4)
Extremity pain or swelling	5 (2.8)
Flank pain	4 (2.3)
Costochondritis	2 (1.1)
Asthma	2 (1.1)
Abdominal pain	2 (1.1)
Pregnancy	2 (1.1)
Vomiting	2 (1.1)
Other: adverse drug reaction, headache, constipation	3 (1.7)
Other infectious etiologies	15 (8.5)
Acute pyelonephritis/urinary tract infection	10 (5.6)
Fever	2 (1.1)
Other: pneumonia, streptococcal pharyngitis, sepsis	3 (1.7)

performed most commonly in 31% (55) of visits. Abnormal laboratory results were found in 40.3% (25/62) of visits in which testing was conducted. Approximately 2/3 of the abnormal laboratory results were identified in patients who were found to have other infectious (11/25) and other noninfectious (6/25) etiologies for their back pain. No abnormal laboratory findings were noted in those with pathologic back pain diagnoses.

All 4 of the patients with a pathologic diagnosis of back pain had abnormal radiograph findings compared with 3 of the 40 patients (7.5%) with a diagnosis of nonpathologic back pain ($P < 0.001$). We were unable to demonstrate statistically significant relationships between pathologic diagnoses and presenting complaints, physical examination findings, laboratory studies, CT scans, or MRIs due to the small numbers. While data analysis was based on the primary diagnosis, no statistically significant differences were found when accounting for secondary diagnoses as well.

DISCUSSION

As mentioned previously, the evaluation of back pain in children can be quite variable.^{6-8,25,26} Greater than one third of children who presented to our ED with a chief complaint of back pain underwent additional workup consisting of laboratory testing and/or radiologic imaging, with 18% of visits having both laboratory and imaging evaluations performed. While a nonuniform rate of diagnostic testing and imaging of the study population was observed, the indications for pursuing such studies in those patients was unknown to study investigators. Perhaps, the frequency of radiologic imaging and laboratory testing may have been influenced by patient or parental report of prior studies. While the presence of fever and neurologic findings are thought to serve as red flags to warrant additional evaluation, these signs and symptoms were noted at particularly low rates in the study population.^{4,5,27} It is interesting to note that while the chief

complaint for those included in the study was back pain, midline and/or paraspinal tenderness was demonstrated on physical examination in only 62.7%.

In our study, only 4 patients had pathologic back pain diagnoses identified. The only statistically significant association found with those diagnoses were abnormal plain radiograph results. While radiographs were diagnostic in those 4 patients with pathologic diagnoses of back pain, the results of radiographs were unremarkable in the majority of patients overall. Moreover, for those with pathologic diagnoses of back pain, there was nothing particularly unique regarding those patients' presentations that would serve to identify them as being more likely to have radiographic findings indicating underlying pathology.

No abnormal laboratory findings were reported in those with pathologic back pain diagnoses; however, only 2 patients with pathologic diagnoses had laboratory studies performed, namely, urinalyses. Given the pathologic back pain diagnoses identified in this study population, one would expect laboratory studies to be of limited utility. For other conditions such as osteomyelitis, for example, laboratory studies such as complete blood cell count and inflammatory markers may be of greater diagnostic aid. Among the 8 patients with nonpathologic back pain who were found to have abnormal laboratory results, those isolated abnormalities did not lead to patients being diagnosed with other conditions. However, for those patients diagnosed with other infectious etiologies for their complaints, laboratory testing was quite helpful with 73.3% of such patients having abnormal results.

None of the patients with pathologic diagnoses were admitted to the hospital. Almost all of the children in the study, 97.2%, were discharged home. The 5 study patients who were hospitalized were admitted for pain management of extremity pain, pain management of abdominal pain, asthma exacerbation, sepsis, and further imaging evaluation for esophageal perforation due to recent history of upper endoscopy. Furthermore, this high rate of discharge home was not subsequently reflected by increased rate of recidivism to the ED for this chief complaint. There were only 3 patients, all teenagers, who presented again to our ED for this chief complaint over the 1-year study period. One patient returned 2 months later with continued back pain since initial ED visit. At the subsequent visit, additional evaluation was performed consisting of lumbosacral radiographs, which were unremarkable. Once again, the patient was discharged home with a nonpathologic diagnosis of low back pain. Another patient presented for evaluation of 2 discrete episodes of acute back pain that were 10 months apart. No radiologic imaging or laboratory testing was performed during either visit; a diagnosis of coccyx pain was made for the first ED visit and back spasms at time of second visit. The third patient who had a return visit presented for continued pain since initial visit 4 days prior, which had not included radiologic or laboratory testing. No additional evaluation was pursued at the subsequent visit, and the initial diagnosis of low back pain remained unchanged.

As we identified only 4 patients as having pathologic back pain diagnoses, our data support previous studies' findings that in children who have back pain, an identifiable source of pathology for their complaint is often not found.^{9-12,28} Comparisons to the study of Selbst et al¹⁵ are particularly significant as this was the only other study we found that looked exclusively at children who presented to a pediatric ED with a chief complaint of back pain. In addition to having similar clinical settings, the frequency of this chief complaint was similar despite a more than 10-year time difference between the studies. Selbst et al cited musculoskeletal etiologies as the most common etiology with direct trauma and muscle strain occurring most often. However, that study's categorization of musculoskeletal etiologies differed from ours in

that trauma, muscle strain, and fracture were grouped similarly. Nonetheless, despite differences in how diagnoses were classified, much like our study, radiographs were found to be rarely helpful. Among the small subset of patients receiving spine radiographs (16.4%) in that study, only 2 patients were considered as having clinically significant abnormalities, namely, a patient with scoliosis with broken rod and another patient with a compression fracture. Selbst et al did find more abnormalities in patients who received specialized imaging studies, such as abdominal ultrasound, bone scan, CT, or MRI, although such findings and subsequent diagnoses were not specifically mentioned in the publication.

However, when compared with referral settings such as outpatient pediatric orthopedic clinics, the prevalence of pathology found in our ED was significantly lower. The diagnostic yield in such specialized settings using history, physical examination, and radiographs as the initial steps has been reported from 8.8% to 22%.^{11,13,29} Moreover, Ramirez et al²⁹ found that 34% of pediatric patients presenting to an outpatient orthopedic clinic will be diagnosed with pathology when utilizing a systematic imaging approach that obtains plain radiographs in all patients, and MRIs in patients with constant pain, night pain, radicular pain, or abnormal neurologic findings after initial history, physical examination, and negative radiographs. In addition, in a retrospective review of 142 patients by Sanpera et al,³⁰ a definitive diagnosis was established in approximately 53% of patients following evaluations that included radiograph, bone scan, laboratory testing, CT scan, and/or MRI. It is not surprising that specialists would identify higher rates of pathology due to referral bias and evaluations that are likely more extensive.

Limitations

Given the retrospective nature of this study, data abstraction were limited to content documented in the electronic medical record. For the purpose of data analysis, physical examination findings and symptoms of study interest that were not explicitly documented as being present were assumed to be absent. The rationale for this was based on physician propensity to document red flag symptoms and examination findings. Patient follow-up was also unknown regarding further evaluation or subsequent diagnoses unless patients returned to our ED within the study period with a chief complaint of back pain. As laboratory testing and imaging modalities were not applied uniformly, patients may have been misdiagnosed due to either inadequate or inappropriate evaluation; optimal imaging techniques vary based on clinical entity in question as made evident by some of the literature regarding diagnosing spondylolysis for instance.³¹⁻³³ However, if such patients were to have an emergent issue requiring immediate care, it is likely that they would ultimately receive care in our ED due to its large catchment area as it is one of 2 pediatric EDs in the entire state.

Another potential limitation of the study relates to the constructs of how the discharge diagnoses were classified. The classification schematic utilized in this study was developed by study investigators based on clinical practice in the ED. Moreover, among the 4 patients with pathologic diagnoses, there was variation between the billing diagnosis recorded at time of discharge by the pediatric emergency medicine attending physician and pathology diagnosed during the ED visit. Two patients (compression fracture without spinal cord involvement and spondylolysis with spondylolisthesis) received a diagnosis code for a nonspecific diagnosis of back pain during their ED visit despite finding pathology on radiologic imaging that identified the underlying etiology of their symptoms. The potential clinical significance of such diagnostic findings was clearly known at time of the ED visit as reflected in the documentation of the pediatric emergency

medicine attending physician and orthopedic consultant recommendations. In addition, while this study considered the diagnosis of Schmorl's nodes to be a pathologic entity, there is considerable debate regarding their pathogenesis and clinical significance in patients with back pain. Schmorl's nodes have been described as a herniation of the nucleus pulposus through the cartilaginous and bony end plate into the adjacent vertebral body. While they are commonly considered as incidental findings, they have been cited as potentially playing a role in chronic axial pain and pathological osteoporotic fractures due to the inflammatory and end plate (Modic) changes they elicit. Hence, there is a small subset of patients with sizeable Schmorl's nodes who may benefit from options such as medical management, vertebroplasty, or surgical fusion.^{34,35} In light of these reports, the study authors regarded Schmorl's nodes as a pathologic finding that at the very least necessitated specialist expertise and follow-up. Similarly, there was the potential for other radiographic findings, such as scoliosis and spondylolysis with spondylolisthesis, to have perhaps been incidental in nature and not related to the child's back pain. Nonetheless, these entities were considered pathologic for the purposes of this study as management and disposition decisions made in the ED were based on such findings. All 4 patients were referred to orthopedics for outpatient follow-up at which time the clinical significance and management could be further addressed as necessary.

Finally, as only charts with a chief complaint of back pain were queried for inclusion in this study, patients with pathologic back pain diagnoses who presented with other symptoms as their chief complaint were not captured. Similarly, patients who may have reported back pain as a symptom in their history of present illness or review of systems, but not as their chief complaint, were not screened for study inclusion due to limits of the electronic medical record platform. Moreover, there may have been patients included in the study whose chief complaint of back pain did not accurately reflect the symptoms, physical examination findings, and/or diagnoses ultimately identified upon their presentation to the ED. Despite the small size of the assembled study population based on reported chief complaint, its size does reflect the low prevalence of back pain as a chief complaint in a pediatric ED. The youngest subset of patients (age younger than 4 years) was particularly small consisting of 5 children only. While data for these children, ages 2 to 3 years old, heavily relied on parental report and perception of back pain, given the small number of such patients, study results were unchanged by the inclusion of these children.

CONCLUSIONS

The majority of pediatric patients presenting to the ED with a chief complaint of back pain had a nonpathologic etiology for their back pain and were discharged home. Among the few patients with a pathologic diagnosis of the spine and related structures, abnormal radiograph findings were the only statistically significant association. Laboratory studies, CT scans, and MRIs were less indicative. In addition, no statistically significant relationships were identified between pathologic back pain diagnoses and presenting symptoms and/or physical examination findings. Larger, prospective investigations are needed to determine whether pediatric patients with a chief complaint of back pain may be safely discharged home from the ED without laboratory and imaging studies.

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