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Issues With Big Data: Variability in Reported Demographics and Complications Associated With Posterior Spinal Fusion in Pediatric Patients

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Background: Clinical and administrative registries provide large volumes of data that can be used for clinical research. However, there are several limitations relating to the quality, consistency, and generalizability of big data. In this study, we aim to compare reported demographics and certain outcomes in patients undergoing posterior spinal fusion (PSF) for adolescent idiopathic scoliosis (AIS), neuromuscular scoliosis (NS), and Scheuermann kyphosis (SK) between 3 commonly utilized databases in pediatric orthopaedic research.

Methods: We used International Classification of Diseases, Ninth Revision (ICD-9), International Classification of Diseases, 10th Revision (ICD-10), and Current Procedural Terminology (CPT) codes to identify patients in the National Surgical Quality Improvement Program (NSQIP), Healthcare Cost and Utilization Project (HCUP), and Pediatric Health Information System (PHIS) between the ages of 10 to 18 that underwent PSF for AIS, SK, and NS from 2012 to 2015. We compared various demographic factors, such as sex, race/ethnicity, age, and rates of postsurgical infection and 30-day readmissions. Data was analyzed with descriptive and univariate statistics.

Results: We identified 9891 patients that underwent PSF in NSQIP, 10,771 patients in PHIS, and 4335 patients in HCUP over the study period. There were significant differences in patient demographics, readmission rates, and infection rates between all patients that underwent PSF across the databases ($P < 0.01$), as well as specifically in patients with AIS ($P < 0.01$). HCUP had the highest proportion of Hispanic patients that underwent PSF (13.5%), as well as patients who had AIS (13.3%) or NS (17.9%). The PHIS database had the highest proportion of patients undergoing PSF for SK. Among patients with NS, there were significant differences in race across the databases ($P < 0.01$), but no significant differences in sex, ethnicity, or readmission ($P > 0.05$). In addition, there were significant differences in race ($P = 0.04$) and readmission ($P = 0.01$) across databases for patients with SK, but no differences in sex or ethnicity ($P > 0.05$). NSQIP reported the highest rate of 30-day readmissions for patients undergoing PSF (17.9%) compared with other databases (HCUP 4.1%, PHIS 12.1%).

Conclusions: There are significant differences in patient demographics, sample sizes, and rates of complications for pediatric patients undergoing PSF across 3 commonly utilized US administrative databases. Given the variability in reported outcomes and demographics, generalizability is difficult to extrapolate from these large data sources. In addition, certain databases should be selected to appropriately power studies focusing on particular patient populations or outcomes.

Key Words: database, pediatric orthopaedics, adolescent idiopathic scoliosis, neuromuscular scoliosis, Scheuermann kyphosis

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Over the last decade, the use of claims-based databases and clinical registries has increased in the field of orthopaedic surgery.[1–3] The utility of these administrative US-based databases lies with the large cohorts of patients that are publically available for researchers to allow for analyses on disease epidemiology, management, outcomes, complications, variations in practice, and patient access.[1–5] However, there have been several questions raised about the quality, consistency, and generalizability of the data available in these registries. Studies across multiple surgical specialties have begun to suggest that intrinsic differences between these large databases lead to different results and affect the generalizability of the findings.[4–12] Many of these observed differences can be attributed to the unique patient populations included in each database, as well as unique methods of synthesizing and collecting the data.

The availability of data for pediatric patients is more limited since pediatric patients are often treated at specialized centers and commonly have public insurance.[1,2] The most commonly used databases in pediatric orthopaedic research include the National Surgical Quality Improvement Program (NSQIP), the Healthcare Cost and Utilization Project (HCUP), and the Pediatric Health Information System (PHIS).[13–19] However, their patient populations and procedures for data collection and validation are distinct and slightly different.[3,20]

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NSQIP is a clinical registry, while HCUP and PHIS are claims-based databases. NSQIP is maintained by the American College of Surgeons (ACS) and gathers data from over 500 different participating sites. All participating sites have access to the NSQIP database. NSQIP uses strict variable definitions in conjunction with auditing processes on over 250 variables to ensure consistency in their data.[2] Patient demographics, diagnoses, complications, and billing codes are recorded by trained data abstractors. Some information is automatically populated through validated software at participating locations. Procedures and diagnoses are logged in as Current Procedural Terminology (CPT) codes and International Classification of Diseases, Ninth/10th Revision (ICD-9/10) codes, respectively. In addition, it tracks patients up to 30 days after discharge. However, due to its sampling process (ie, does not collect data from every case), it cannot reliably estimate disease prevalence and therefore may not be a good choice in examining trends.

HCUP includes the National Inpatient Sample (NIS), Kids' Inpatient Database (KID), and State Inpatient Database (SID), which can be accessed for a fee of $50 to $500 per year.[1] HCUP randomly samples 20% of all discharges from over 4000 hospitals in 44 states. On those sampled, discharge summaries are recorded, and patient demographics, billing codes, procedural codes, and complications are recorded. HCUP is ideally suited for investigating trends over time for conditions and procedures. Its primary limitation lies in its reliance on ICD-9/10 billing codes for diagnoses, procedures, and reported postoperative outcomes. In addition, it only notes in-hospital events, making it a poor resource when looking into postoperative adverse events that may not have required inpatient readmission.[4,5,21]

The PHIS database is another administrative database containing inpatient, emergency department, ambulatory, surgery, and observation encounter data from ~50 pediatric hospitals throughout the United States.[22] These hospitals are affiliated with the Children's Hospital Association, which assures data reliability among participating hospitals. However, variations in reporting still exist among participating institutions as the way they report CPT and ICD-9/10 codes for particular procedures or diagnoses may vary. The PHIS database gathers data from large tertiary care referral pediatric hospitals, so the patient population it represents may not be generalizable to the community or nonspecialty hospitals.[13,23]

Each database has its strengths and weaknesses, and by exploring their differences, we may be able to identify which databases are more suitable in answering certain research questions. To our knowledge, there are no studies assessing differences in patients, data, and outcomes between these 3 commonly used databases. The purpose of this study was to compare the reported demographics and certain outcomes in patients undergoing posterior spinal fusion (PSF) for adolescent idiopathic scoliosis (AIS), neuromuscular scoliosis (NS), and Scheuermann kyphosis (SK) between these commonly utilized databases in pediatric orthopaedic research. Specifically, we aimed to assess the variability in patient volume, race, ethnicity, age, sex, 30-day readmission, and postoperative infection rates for these diagnoses across the NSQIP, HCUP, and PHIS databases. We hypothesize that there will be significant differences in demographics and outcomes for the same conditions across these 3 commonly used databases.

METHODS

This study included patients between the ages of 10 to 18 with CPT and ICD-9/10 procedure code corresponding with a PSF (Appendix 1, Supplemental Digital Content 1, http://links.lww.com/BPO/A478) and associated ICD-9/10 diagnosis code between the years 2012 and 2015. We utilized the NSQIP, HCUP, and PHIS databases for this study.

Demographic data such as race, ethnicity, sex, and age were identified from each database. The results were then recoded as needed for statistical analysis. Race was standardized to white, black, Asian, or other. Ethnicity was made a binary variable for Hispanic or non-Hispanic. Age was analyzed as a continuous variable. Outcome measures were also identified, which included postoperative infection and a 30-day readmission rate. These outcomes were presented as a binary variable in all 3 of the databases as "flags." Infections were defined as any patient flagged for infection, including both deep and superficial surgical site infections, within 30 days of their surgery.

TABLE 1. Demographic and Outcome Measures for Posterior Spinal Fusion Patients in NSQIP, PHIS, and HCUP Between 2012 and 2015

	n (%)			
	NSQIP	**PHIS**	**HCUP**	***P***
n (%)	9891 (39.6)	10,771 (43.1)	4335 (17.3)	
Race				<0.01
White	7064 (79.7)	7293 (71.5)	2791 (64.7)	
Black	1540 (17.4)	1723 (16.9)	845 (19.6)	
Asian	221 (2.5)	209 (2.1)	98 (2.3)	
Other	38 (0.4)	980 (9.6)	579 (13.4)	
Ethnicity				<0.01
Hispanic	835 (9.1)	1128 (11.4)	583 (13.5)	
Not Hispanic	8339 (90.9)	8779 (88.6)	3730 (86.5)	
30-d readmission				<0.01
Yes	1766 (17.8)	1304 (12.1)	179 (4.1)	
No	8125 (82.2)	9467 (87.9)	4156 (95.9)	
Year				<0.01
2012	1858 (18.8)	2599 (24.1)	981 (22.6)	
2013	2200 (22.2)	2706 (25.1)	1108 (25.6)	
2014	2686 (27.2)	3059 (28.4)	1146 (26.4)	
2015	3147 (31.8)	2407 (22.4)	1100 (25.4)	
Sex				<0.01
Male	2952 (29.8)	2705 (25.1)	1266 (29.2)	
Female	6939 (70.2)	8066 (74.9)	3069 (70.8)	
Infection				<0.01
Yes	173 (1.8)	312 (2.9)	1 (0.0)	
No	9718 (98.2)	10,459 (97.1)	4334 (100.0)	
Age [mean (SD)]	13.82 (1.9)	14.05 (1.9)	14.26 (2.0)	<0.01
Age [median (IQR)]	14 (12, 15)	14 (13, 15)	14 (13, 16)	<0.01

HCUP indicates Healthcare Cost and Utilization Project; IQR, interquartile range; NSQIP, National Surgical Quality Improvement Program; PHIS, Pediatric Health Information System.

Descriptive statistics were used to summarize the data contained in all 3 of the databases. The *t* test, χ^2 test, Mann-Whitney *U* test, and Fisher exact test were used to determine statistically significant differences between the 3 databases, as appropriate. Descriptive statistics and tests of significance were stratified by diagnoses of AIS, NS, and KS, as well. Statistically significant differences was defined as *P*-value <0.05.

RESULTS

A total of 24,997 patients were identified as having a PSF procedure between the years 2012 and 2015. Of those patients, 9891 were identified in NSQIP, 10,771 in PHIS, and 4335 in HCUP (Table 1). There were statistically significant differences in each demographic and outcome measure when comparing patients that underwent PSF between all 3 databases ($P < 0.01$). The distributions of the diagnoses associated with the procedure in all 3 databases varied widely among the databases. Of note, AIS was the most common diagnosis associated with PSF in all databases. Specifically, AIS patients comprised 62.6% of PSF patients in NSQIP, 91.6% in PHIS, and 91.8% in HCUP (Table 2). Among the 3 databases, the majority of patients were white, and HCUP had the highest proportion of black and Hispanic (Table 2). The average age at the time of surgery was similar across databases (Table 1). There were significant differences in 30-day readmission and infection rates across all databases ($P < 0.05$).

AIS

This study included 6194 patients from NSIP, 9862 from PHIS, and 3980 from HCUP that underwent PSF for AIS over the study period (Table 3). There were significant differences for each of the demographic and outcome measures when comparing patients between all 3 databases ($P < 0.01$, Table 3). HCUP had the largest proportion of black and Hispanic patients with AIS at 20.5% and 13.3%, respectively (Table 3).

NS

This study included 335 patients from NSQIP, 44 from PHIS, and 175 patients from HCUP that underwent PSF for NS over the study period (Table 4). NSQIP had the highest proportion of black (16.9%) and Asian (5.0%) patients ($P < 0.01$), while HCUP had the highest proportion of Hispanic (17.9%) patients ($P = 0.48$). There was no significant difference in average age ($P = 0.05$) or sex ($P = 0.76$) across the databases (Table 4).

SK

This study included 115 patients from NSQIP, 276 patients from PHIS, and 4 patients from HCUP that underwent PSF for SK over the study period (Table 5). The PHIS database had the largest proportion of Hispanic patients

TABLE 2. Diagnoses of Patients Receiving Posterior Spinal Fusion in NSQIP, PHIS, and HCUP Between 2012 and 2015

Posterior Spinal Fusion 2012-2015					
NSQIP		**PHIS**		**HCUP**	
Diagnosis	**n (%)**	**Diagnosis**	**n (%)**	**Diagnosis**	**n (%)**
AIS	6194 (62.6)	AIS	9862 (91.6)	AIS	3980 (91.8)
Missing	950 (9.6)	Scheremans kyphosis	276 (2.6)	Neuromuscular scoliosis	175 (4.0)
Other forms of scoliosis	412 (4.2)	Missing	286 (2.7)	Kyphosis (acquired) (postural)	140 (3.2)
Infantile idiopathic scoliosis	387 (3.9)	Other kyphoscoliosis and scoliosis	75 (0.7)	Progressive infantile idiopathic scoliosis	18 (0.4)
Neuromuscular scoliosis	336 (3.4)	Kyphosis (acquired) (postural)	54 (0.5)	Kyphosis, postlaminectomy	8 (0.2)
Congenital musculoskeletal deformities of spine	276 (2.8)	Dorsalgia, unspecified	39 (0.4)	Adolescent postural kyphosis	8 (0.2)
Juvenile osteochondrosis of spine	115 (1.2)	Neuromuscular scoliosis	44 (0.4)	Schereuman kyphosis	4 (0.1)
Kyphosis, acquired, postural	106 (1.1)	Progressive infantile idiopathic scoliosis	13 (0.1)	Kyphosis due to radiation	2 (0.1)
Congenital quadriplegia	103 (1.0)	Congenital musculoskeletal deformities of spine	13 (0.1)		
Other idiopathic scoliosis	93 (0.9)	Other	109 (1.0)		
Myoneural disorder unspecified	63 (0.6)				
Thoracogenic scholiosis	59 (0.6)				
Congenital sponylolisthesis	50 (0.5)				
Juvenile idiopathic scoliosis	47 (0.5)				
Other congenital anomalies of spine	41 (0.4)				
Infantile cerebral palsy	35 (0.3)				
Hereditary progressive muscular dystrophy	33 (0.3)				
Marfan syndrome	32 (0.3)				
Adolescent postural kyphosis	30 (0.3)				
Acquired sponylolisthesis	29 (0.3)				
Other	500 (5.1)				
Total	9891		10,771		4335

AIS indicates adolescent idiopathic scoliosis; HCUP, Healthcare Cost and Utilization Project; NSQIP, National Surgical Quality Improvement Program; PHIS, Pediatric Health Information System.

TABLE 3. Demographics and Outcomes for Posterior Spinal Fusion Patients With Adolescent Idiopathic Scoliosis in NSQIP, PHIS, and HCUP Between 2012 and 2015

	n (%)			
	NSQIP	PHIS	HCUP	*P*
n (%)	6194 (30.9)	9862 (49.2)	3980 (19.9)	
Race				< 0.01
White	4409 (78.4)	6596 (70.8)	2523 (63.6)	
Black	1058 (18.8)	1619 (17.4)	814 (20.5)	
Asian	137 (2.4)	198 (2.1)	93 (2.4)	
Other	19 (0.3)	902 (9.7)	534 (13.5)	
Ethnicity				< 0.01
Hispanic	514 (8.9)	1042 (11.5)	527 (13.3)	
Not Hispanic	5251 (91.1)	8010 (88.5)	3437 (86.7)	
30-d readmission				< 0.01
Yes	520 (8.4)	1191 (12.1)	146 (3.7)	
No	5674 (91.6)	8671 (87.9)	3834 (96.3)	
Year				< 0.01
2012	1168 (18.9)	2323 (23.6)	908 (22.8)	
2013	928 (15.0)	2525 (25.6)	1020 (25.6)	
2014	1980 (32.0)	2822 (28.6)	1058 (26.6)	
2015	2118 (34.2)	2192 (22.2)	994 (25.0)	
Sex				< 0.01
Male	1460 (23.6)	2318 (23.5)	1071 (26.9)	
Female	4734 (76.4)	7544 (76.5)	2909 (73.1)	
Infection				< 0.01
Yes	84 (1.4)	272 (2.8)	1 (0.0)	
No	6110 (98.6)	9590 (97.2)	3979 (100.0)	
Age [mean (SD)]	13.89 (1.8)	14.00 (1.9)	14.25 (2.0)	< 0.01
Age [median (IQR)]	14 (13, 15)	14 (13, 15)	14 (13, 16)	< 0.01

HCUP indicates Healthcare Cost and Utilization Project; IQR, interquartile range; NSQIP, National Surgical Quality Improvement Program; PHIS, Pediatric Health Information System.

TABLE 4. Demographic and Outcome Measures for Posterior Spinal Fusion Patients With Neuromuscular Scoliosis in NSQIP, PHIS, and HCUP Between 2012 and 2015

	n (%)			
	NSQIP	PHIS	HCUP	*P*
n (%)	335 (60.5)	44 (7.9)	175 (31.6)	
Race				< 0.01
White	218 (78.1)	35 (79.6)	128 (74.0)	
Black	47 (16.9)	2 (4.5)	21 (12.1)	
Asian	14 (5.0)	1 (2.3)	4 (2.3)	
Other	0 (0.0)	6 (13.6)	20 (11.6)	
Ethnicity				0.48
Hispanic	42 (13.9)	7 (16.3)	31 (17.9)	
Not Hispanic	260 (86.1)	36 (83.7)	142 (82.1)	
30-d readmission				0.41
Yes	35 (10.4)	4 (9.1)	25 (14.3)	
No	300 (89.6)	40 (90.9)	150 (85.7)	
Year				< 0.01
2012	70 (20.9)	6 (13.6)	31 (17.7)	
2013	17 (5.1)	12 (27.3)	43 (24.6)	
2014	67 (20.0)	8 (18.2)	41 (23.4)	
2015	181 (54.0)	18 (40.9)	60 (34.3)	
Sex				0.76
Male	174 (51.9)	23 (52.3)	85 (48.6)	
Female	161 (48.1)	21 (47.7)	90 (51.4)	
Infection				0.01
Yes	14 (4.2)	4 (9.1)	0 (0.0)	
No	321 (95.8)	40 (90.9)	175 (100.0)	
Age [mean (SD)]	13.29 (2.2)	14.00 (2.4)	13.64 (2.2)	0.05
Age [median (IQR)]	13 (11, 15)	14 (12, 15.5)	13 (12, 15)	0.11

HCUP indicates Healthcare Cost and Utilization Project; IQR, interquartile range; NSQIP, National Surgical Quality Improvement Program; PHIS, Pediatric Health Information System.

(11.3%, $P = 0.70$). The distributions of sex among the 3 databases were similar and were not statistically significant ($P = 0.92$, Table 5). On average, HCUP had a slightly older patient population averaging at 16.3 (SD: 1.0), while NSQIP had a younger population (mean: 15.3, SD: 1.3) relative to the 3 databases ($P = 0.05$). NSQIP had the highest rate of postoperative infections at 4.4%, but the difference was not statistically significant ($P = 0.21$). PHIS had the highest rate of 30-day readmissions at 17.8% ($P = 0.01$).

Outcome Measures

Among the 3 databases, NSQIP had the highest rate of 30-day readmissions for patients undergoing PSF (17.9%) compared with other databases (HCUP 4.1%, PHIS 12.1%), and PHIS reported the greatest number of postoperative infections (Table 1). When stratified by diagnosis, PHIS had the highest rate of postoperative infection (2.8%, $P < 0.01$) and the highest rate of 30-day readmission (12.1%, $P < 0.01$) for patients with AIS. For patients with NS, rates of postoperative infections were highest in the PHIS database (9.1%, $P < 0.001$), while the highest rates of 30-day readmission were observed in the HCUP database, although the difference was not significantly different (14.3%, $P = 0.41$). Last, among patients with SK, NSQIP had the highest rate of postoperative infections for patients at 4.4%, but the difference was not statistically significant ($P = 0.21$); and PHIS had the highest rate of 30-day readmissions at 17.8% ($P = 0.01$).

DISCUSSION

As the use of large databases becomes more prevalent in the field of orthopaedic surgery, the need for reliable and validated data collection procedures is crucially important. This study demonstrates that there is significant variability in the demographics and outcome measures of patients undergoing PSF for AIS, NS, and SK between these 3 commonly used US-based databases. This highlights the discrepancies that exists in the data collection procedures between the 3 databases, as well as disparities in the type of patients that each database records information on.

The results from this study suggest that results from database studies should be interpreted and generalized based on the characteristics of each database. Each database should provide composite data on its population so that researchers and surgeons may appropriately interpret study results for external validity. Furthermore, certain databases may be more appropriate to answer specific research questions or studies focusing on certain patient populations. For instance, studies focusing on pediatric spinal deformity that require large sample sizes would be most likely powered if they used NSQIP or PHIS. Moreover, there are considerably more patients with AIS and SK in the PHIS database. Studies focusing on health equity or care of minority patients undergoing PSF may be best suited for databases such as HCUP which include

TABLE 5. Demographic and Outcome Measures for Posterior Spinal Fusion Patients With Scheuermann kyphosis in NSQIP, PHIS, and HCUP Between 2012 and 2015

	n (%)			
	NSQIP	PHIS	HCUP	*P*
n (%)	115 (29.1)	276 (69.9)	4 (1.0)	
Race				0.04
White	106 (98.2)	236 (89.4)	3 (100.0)	
Black	0 (0.0)	2 (0.8)	0 (0.0)	
Asian	0 (0.0)	0 (0.0)	0 (0.0)	
Other	2 (1.8)	26 (9.8)	0 (0.0)	
Ethnicity				0.70
Hispanic	10 (9.3)	30 (11.3)	0 (0.0)	
Not Hispanic	98 (90.7)	235 (88.7)	3 (100.0)	
30-d readmission				0.01
Yes	7 (6.1)	49 (17.8)	0 (0.0)	
No	108 (93.9)	227 (82.2)	4 (100.0)	
Year				< 0.01
2012	21 (18.3)	60 (21.7)	0 (0.0)	
2013	14 (12.2)	79 (28.6)	0 (0.0)	
2014	44 (38.3)	76 (27.5)	0 (0.0)	
2015	36 (31.3)	61 (22.1)	4 (100.0)	
Sex				0.92
Male	75 (65.2)	180 (65.2)	3 (75.0)	
Female	40 (34.8)	96 (34.8)	1 (25.0)	
Infection				0.21
Yes	5 (4.4)	4 (1.4)	0 (0.00)	
No	110 (95.6)	272 (98.6)	4 (100.0)	
Age [mean (SD)]	15.29 (1.3)	15.64 (1.5)	16.25 (1.0)	0.05
Age [median (IQR)]	15 (14, 16)	16 (15, 17)	16.5 (15.5, 17)	0.06

HCUP indicates Healthcare Cost and Utilization Project; IQR, interquartile range; NSQIP, National Surgical Quality Improvement Program; PHIS, Pediatric Health Information System.

a higher percentage of black and Hispanic patients compared with other databases. Last, studies focusing on readmission or postoperative infection after PSF would be best suited for NSQIP and PHIS, respectively.

Previous studies have looked at database variations for a variety of conditions which similarly showed that variations exist, but studies focusing on pediatric populations remain limited. For example, Bedard et al[11] investigated differences in comorbidities and demographics of patients undergoing total hip arthroplasty among 4 commonly used databases which included NSQIP, NIS (a branch of the HCUP database), Medicare Standard Analytic Files, and Humana administrative claims database. There was considerable database variation in comorbidities in this study and highlighted the lack of standardization for data collection procedures in this patient population. As a result of studies such as this, the suggestion that administrative claims databases are less accurate than clinical registries has recently emerged.[4–11] This is not to say that administrative claims databases are not without some merit, as they do allow patients to be followed for a longer period of time, which is helpful in determining trends in procedures or complications. In addition, these types of databases, such as HCUP and PHIS, are well suited for financial analyses, as they include claims-based data and the costs associated with procedures. Clinical registries such as NSQIP are useful in assessing comorbidities and postoperative complications within 30 days of a procedure, as they have strict definitions they adhere to when assigning values to a variable, therefore giving some standardization procedure among different hospitals. However, the validation of this standardization procedure may need to be verified in a later study to assure that data collection and processing is being done correctly among participating institutions.

This study has several limitations. We are unable to control for patients being included in multiple databases since these databases only include deidentified data. However, each database draws from various settings and represents inherent differences in the underlying populations. In addition, we analyzed data from 2012 to 2015, and it is possible that results may differ with more recent data. We decided to use this study period since we noted discrepancies in the volume of patients and the corresponding diagnoses associated with the procedure. These discrepancies improved as the years continued on, suggesting that the mandatory reporting transitions from ICD-9 to ICD-10 codes may have initially caused problems in reliable data reporting. All 3 databases were required to transition to solely ICD-10 codes by October 2015. Some participating hospitals in these databases utilized ICD-10 codes earlier, which additionally contributed to variability between hospitals in regards to documentation as well as verification processes by each of the utilized databases. As such, we decided to use the years 2012-2015 as a means to control for variations in data processing when utilizing a new classification scheme since it can take years for an institution to create a well-developed standardized process of recording billing and procedural information.

Last, we noted that some diagnoses were underrepresented in databases which may represent concentration at specialized centers or potential underreporting due to coding issues. These findings could be contributed to certain databases capturing diagnoses better and coding diagnoses differently. Regardless, the study still provides samples for comparison across databases using systematic definitions and research methods that are utilized through each of the databases, making the results still valid. In general, we feel that the available data provides a representative sample of patients from each database which allows us to draw preliminary conclusions regarding variability in demographics and outcomes.

In conclusion, this study suggests that there is significant variation in reported demographics, postoperative infection rates, and 30-day readmission after PSF for AIS, NS, and SK across 3 commonly used databases in pediatric orthopaedics. Certain databases may be better suited for particular diagnoses, patient populations, epidemiology, readmission, and economic analyses. As such, having detailed information on the means of data derivation for a database is critical in determining which databases are most useful for specific studies. There is a role for database studies in pediatric orthopaedic surgery; however, it is important to consider these differences when interpreting study results, generalizing data to other populations, and selecting databases for future research.

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