



# From imaging to reimbursement: what the pediatric radiologist needs to know about health care payers, documentation, coding and billing

Chul Y. Chung<sup>1</sup> · Mark D. Alson<sup>2</sup> · Richard Duszak Jr<sup>3</sup> · Andrew J. Degnan<sup>4,5</sup>

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## Abstract

Medical coding and billing processes in the United States are complex, cumbersome and poorly understood by radiologists. Despite the direct implications of radiology documentation on reimbursement, trainees and practicing radiologists typically receive limited relevant training. This article summarizes the payer structure including the state-based Children's Health Insurance Programs, discusses the essential processes by which radiologists request and receive reimbursement, details the mechanisms of coding diagnoses using International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes and imaging services using Current Procedural Terminology (CPT) and Healthcare Common Procedure Coding System (HCPCS) codes, and explores reimbursement and coding-related issues specific to pediatric radiology. Appropriate documentation, informed by knowledge of coding, billing and reimbursement fundamentals, facilitates appropriate payment for clinically relevant services provided by pediatric radiologists.

**Keywords** Billing · Coding · Current Procedural Terminology · Health insurance · Pediatric radiology · Reimbursement

## Abbreviations

APMs Alternative payment models  
CHIP Children's Health Insurance Program  
CMS Centers for Medicare and Medicaid Services

CPT Current Procedural Terminology  
HCPCS Healthcare Common Procedure Coding System  
ICD-10-CM International Classification of Diseases, Tenth Revision, Clinical Modification  
MUE Medically Unlikely Edits  
NCCI National Correct Coding Initiative  
PTP Procedure-to-Procedure  
RVU Relative value unit

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✉ Andrew J. Degnan  
degnana@email.chop.edu

<sup>1</sup> Department of Radiology,  
University of Pittsburgh Medical Center,  
Pittsburgh, PA, USA

<sup>2</sup> Sierra Imaging Associates,  
Clovis, CA, USA

<sup>3</sup> Department of Radiology and Imaging Sciences,  
Emory University School of Medicine,  
Atlanta, GA, USA

<sup>4</sup> Department of Radiology,  
Perelman School of Medicine at the University of Pennsylvania,  
Philadelphia, PA, USA

<sup>5</sup> Department of Radiology,  
Children's Hospital of Philadelphia,  
3401 Civic Center Blvd., Philadelphia, PA 19104, USA

## Introduction

Understanding coding and billing practices is increasingly important to practice medicine in the United States. Inadvertent billing errors and intentional upcoding of medical visits, studies and procedures costs in excess of \$1 billion per year for Medicare beneficiaries [1]. More importantly, improper documentation and coding may result in patients' families receiving unexpected and unnecessary bills. In addition, fraudulent billing practices carry significant penalties with some fines reaching \$10,000 per incident under the False Claims Act [2]. Conversely, inadequate documentation and erroneous coding may result in insufficient reimbursement for services

provided [3]. While most billing errors and upcoding occur in clinical evaluation and management codes that are less frequently utilized by radiologists, coding and billing practices nonetheless have serious compliance implications for the pediatric radiologist [4, 5].

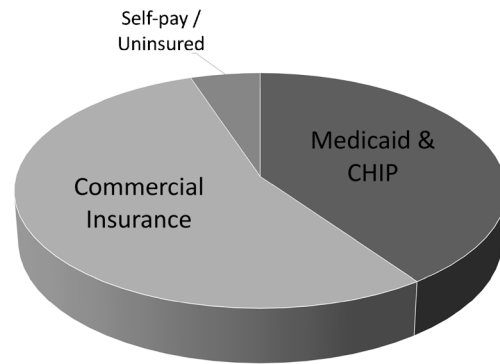
Despite the regulatory and ethical importance of teaching reimbursement procedures to physicians, most clinicians in a variety of disciplines including internal medicine, pediatrics and surgery report needing additional formal training in billing and coding [6–8]. No formal assessment of the billing educational needs of radiology trainees and practicing diagnostic radiologists has been undertaken, but one study observed common errors in coding by interventional radiologists [9]. There is evidence that practical didactics that incorporate active participation may increase physician proficiency in basic coding and billing skills [10]. Some works have provided information relevant to general and adult subspecialty radiologists [11–13], but no focused review of billing practices in pediatric radiology has been reported. Pediatric radiology encompasses a broad range of studies and the payer structure differs substantially from that of adult diagnostic imaging. This article seeks to address deficiencies in pediatric radiologist education in reimbursement mechanisms and the role that documentation plays in ensuring fair reimbursement.

## Payers of pediatric radiology services in the United States

With a diverse collection of health care providers, payment models and payers, American health care reimbursement is an inordinately complex topic that is beyond the scope of any single article. Nevertheless, it is vital for pediatric radiologists to be familiar with the fundamental structure of payers involved in reimbursing health care services for children.

Pediatric health care is uniquely bolstered by governmental insurance programs that provide health insurance for a substantial proportion of children (Fig. 1). The rise of proactive governmental policies in the past two decades has resulted in the lowest rates of uninsured children at 5% in 2016 [15].

Medicaid is a state-administered, federally subsidized governmental insurance program for low-income and disabled individuals, including children. While administered by states with flexibility in terms of expanding eligibility and the implementation of managed care organizations, the Centers for Medicare and Medicaid Services (CMS) and federal government set basic eligibility criteria including coverage of families making less than 133% of the *federal poverty level* (\$32,718 USD for a family of four in 2017) and establish essential benefits [16–18]. States may choose to provide coverage to families with higher incomes and expand services beyond those outlined by the federal government. Medicaid is responsible for providing the widest safety net coverage for



**Fig. 1** Distribution of pediatric health care payers in the United States. Governmental programs provide a substantial share of pediatric health care coverage in the United States (42%), just behind parental commercial insurance plans (53%) [14]. *CHIP* Children's Health Insurance Program

pediatric medical care including children in low-income households, disabled children and other medically needy children as codified in federal regulations [15, 19].

For pediatric patients whose parents' income exceeds the Medicaid thresholds, the Children's Health Insurance Program (CHIP) was established to provide low-cost coverage to address gaps in pediatric health insurance coverage. As a more flexible state-administered insurance program, CHIP enrollment, implementation and spending vary greatly among states [20]. Regardless, CHIP has dramatically improved pediatric health care coverage in the United States [20]. Notably, the provision of CHIP as a secondary insurance policy in paying benefits for services that remain unpaid by any commercial insurance plan can be particularly helpful in shielding families of medically complex children from unexpected bills and medical debt. The total number of children covered by CHIP nationwide is more than 8 million [20]; combined, Medicaid and CHIP programs include almost 40% of American children. As of September 2017, the number of children covered by Medicaid and CHIP was 35.6 million [21]. Despite its significant contributions to increasing pediatric access to medical care, CHIP is a governmental program that requires congressional budget authorization and has been subject to recent political issues regarding reauthorization that is beyond the scope of this article [22].

It is worth noting regarding pediatric radiology reimbursement that both Medicaid and CHIP operate with physician fee schedules determined at the state level, with regional heterogeneity of fees paid to physicians. Typically, provider payments under Medicaid are substantially lower than Medicare or commercial insurance with the average *Medicaid-to-Medicare physician fee ratio* being 0.72 nationwide, although many densely populated states have substantially lower ratios (e.g., RI: 0.38, NJ: 0.42, CA: 0.52, FL: 0.56, NY: 0.56) [23]. Therefore, pediatric providers including radiologists who care for many children enrolled in Medicaid and CHIP programs in certain states may experience especially

disproportionate reimbursement compared to their non-pediatric radiologist counterparts.

Commercial insurance plans mostly follow similar reimbursement policies that generally mirror Medicare regulations and usually set higher physician reimbursement fees compared to Medicaid. These commercial insurance policies vary greatly among carriers, plan type and tier with granular details that defy summarization. Importantly, some insurers have begun to implement utilization review measures that retroactively deny provider reimbursement based on appropriateness by clinical indication or practice setting (i.e. advanced imaging examinations performed in the hospital outpatient setting) [24, 25]. In addition, while physician reimbursement rates are less for patients enrolled in governmental programs, both Medicaid and CHIP may provide advantages over commercial plans for children and their families with more inclusive benefits and stricter cost protections [15, 20].

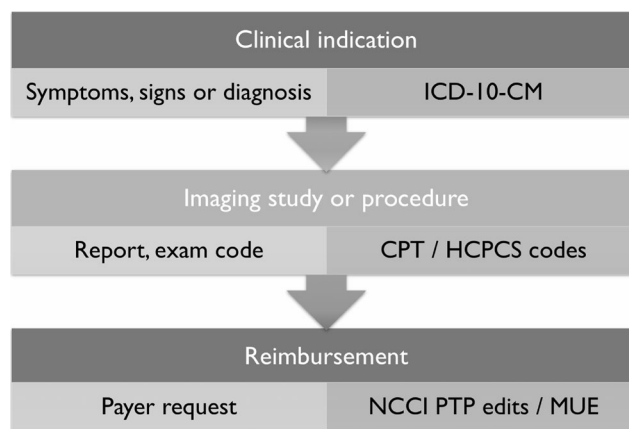
The distribution of children receiving health care services insured through governmental programs varies widely depending on the care setting, community poverty levels and state policies concerning Medicaid and CHIP eligibility. These factors can substantially affect reimbursement levels of pediatric radiology services at individual pediatric hospitals and radiology practices based on differences in payer mix.

## Overview of the radiology billing process

Performing a diagnostic examination or procedure and receiving reimbursement is best thought of as a three-part process as summarized (Fig. 2). In the first part, the provider obtains and documents information regarding the clinical necessity of the study. Next, the study or procedure is described in sufficient detail to allow accurate reporting of the examination type performed. Last, the reimbursement request is submitted to the insurer and may be allowed, subject to edits or denied based on the information provided. Each part of this process will subsequently be described in greater detail regarding how the pediatric radiologist's report translates into coding information to secure appropriate reimbursement, highlighting opportunities for improved reporting. Throughout each stage of this process, involvement of professional coders with experience and expert knowledge of the intricacies of radiology coding is critical to successful reimbursement [26, 27].

## Documenting the clinical necessity of imaging services

Each health insurer requires that services provided be appropriately documented and reported to ensure reimbursement and maintain legal compliance. As the radiology report may be the only formal, visible documentation of the pediatric



**Fig. 2** Summary of radiology coding, billing and reimbursement. Appropriate documentation begins with recording an accurate clinical indication for imaging study or procedure, which may consist of symptoms, signs or a diagnosis that is converted to an ICD-10-CM code. The performance of an imaging study or procedure may be documented in a radiology department with exam or report codes that correspond with established CPT and HCPCS codes. The combination of these ICD-10-CM and CPT/HCPCS codes are submitted to payers for reimbursement. The payer may have specific rules precluding reporting certain studies together or for certain indications that are detailed in PTP and MUE edits discussed in greater detail within the article. *CPT* Current Procedural Terminology, *HCPCS* Healthcare Common Procedure Coding System, *ICD-10-CM* International Classification of Diseases, Tenth Revision, Clinical Modification, *MUE* Medically Unlikely Edits, *NCCI* National Correct Coding Initiative, *PTP* Procedure-to-Procedure

radiologist's work, adequate documentation is paramount in facilitating quality patient care while also ensuring appropriate payment of services rendered.

When a coder reviews an imaging examination report to submit a reimbursement request, she or he is generally limited to reviewing only the content of the radiology report to determine the clinical indication. The coded diagnosis may be based on either the documented history (i.e. the diagnosis or symptom as the reason for the examination) or the diagnosis made by the radiologist in interpreting the examination (i.e. the impression). Therefore, while a study with inappropriate clinical history provided may still be reimbursed if positive findings were noted that render the exam retrospectively necessary, a normal examination that contains an inappropriate clinical indication (e.g., history of headache for a patient receiving abdominal CT) may be subject to reimbursement denial. Similarly, diagnoses of "rule out" and "concern for" are not generally considered sufficient for clinical necessity for outpatient examinations. Reimbursement denial may occur if a clinical indication does not match an approved list of acceptable medical reasons for a particular examination type based on some providers' *claims logic* processes, which are often similar to the local coverage determinations specified by Medicare [12, 28]. While many of the clinical indication errors may be addressed through *prior authorization* wherein an insurer or radiology benefit manager validates the clinical indication prior to the examination [29], many radiologic

examinations may still be denied on the basis of insufficient or inappropriate clinical necessity [25].

As such, if the provided history in the written or electronic request is inadequate, it is incumbent upon the radiologist to review the medical record and patient symptom questionnaires or discuss the reason for an examination with the referring clinician or patient or patient’s family. Documenting in the radiology report any additional history gleaned to justify the clinical need for an imaging study will reduce the likelihood of reimbursement rejection. Radiologists may also facilitate appropriate reimbursement and enhance clinical care by offering clearly worded, definitive diagnoses in the impression whenever possible.

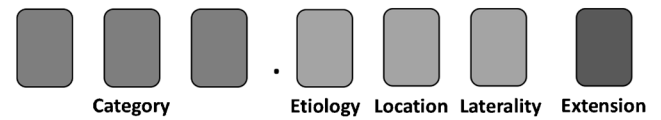
### ICD-10-CM codes

Insurers do not typically review radiologists’ reports to determine the clinical necessity of an examination; therefore, it is the task of the coder to submit a billing diagnosis or diagnoses for each imaging study or procedure. The standard language chosen for billing in the United States is currently set by the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) by CMS and the National Center for Health Statistics [30, 31]. Each code has a standard format (structure and examples shown in Procedure-to-Procedure Fig. 3) and ranges between three and seven characters in length, varying with the level of detail of a specific entity. This set of more than 70,000 signs, symptoms and diagnoses forms the common basis for describing the clinical necessity of medical services; Table 1 lists some of the most frequently encountered diagnoses and conditions in pediatric radiology. The recent transition from ICD-9-CM to ICD-10-CM resulted in an almost sixfold increase in the number of codes used to report billing indications for radiology procedures and an even greater increase in codes for musculoskeletal entities [32]. Therefore, the information required to appropriately describe medically necessary conditions has commensurately risen, especially in the setting of trauma with greater emphasis on describing a specific mechanism and site of injury.

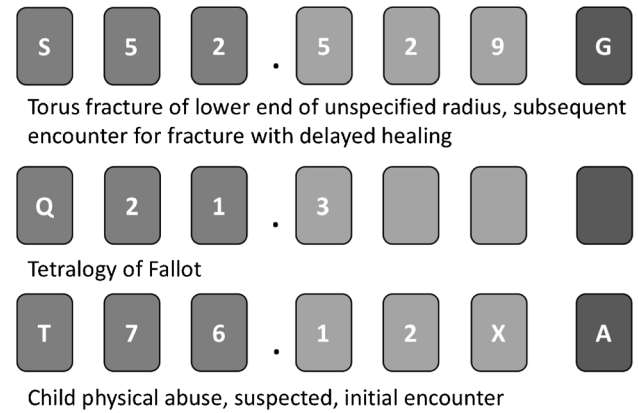
### Documenting imaging services provided

The radiology report is the pediatric radiologist’s primary means of communicating and documenting the performance and interpretation of an examination for referring clinicians, patients’ families, coders and payers [11, 33]. Therefore, it is essential to provide an appropriate level of detail in describing what imaging examination was performed to satisfy the requirements specific to each imaging modality and examination type [34]. Generally, most institutions and radiology practices rely on the automatic conversion of an ordered

### ICD-10-CM Code Structure



### ICD-10-CM Code Examples



**Fig. 3** ICD-10-CM code structure and pediatric examples. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes follow a standard format, varying between three and seven characters beginning with one letter for the category type followed by numbers for the specific category classification, etiology, location, laterality and extension. Pediatric billing ICD-10-CM codes for radial buckle fracture, tetralogy of Fallot and suspected physical child abuse are shown as examples

examination type (e.g., AP chest radiograph) with a default *examination code* that is linked to a corresponding Current Procedural Terminology (CPT) code for billing. Commonly billed pediatric imaging examination CPT codes are presented in Table 2. In converting an examination to a CPT code, there are specific requirements inherent in the description of each procedure type that must be documented to ensure accurate coding and billing [34]; accurate documentation in this step in the reimbursement process is also vital from a medicolegal vantage [35]. Currently, most radiology reports are processed using automated coding software with substantial improvements in quality over the past few years [36]. However, no program is comprehensive or perfect, and expert coders are vital for many situations including advanced studies, examinations without established CPT codes, incomplete documentation and audited claims.

### Current procedural terminology

CPT codes were first developed in 1966 by the American Medical Association as an effort to standardize descriptions of *physician work*, which were previously informal and inconsistent [37]. CPT codes are five-digit codes that describe medical procedures or services performed by qualified health care providers in any setting [38]. Three

**Table 1** Commonly billed clinical indications for pediatric imaging examinations at a large pediatric medical center

Clinical indication	ICD-10-CM code
Atelectasis	J98.11
Encounter for adjustment and management of vascular access device	Z45.2
Encounter for fitting and adjustment of non-vascular catheter	Z46.82
Cardiomegaly	I51.7
Other disorders of lung	J98.4
Pleural effusion, not elsewhere classified	J90
Unspecified abdominal pain	R10.9
Other nonspecific abnormal finding of lung field	R91.8
Cough	R05
Right lower quadrant pain	R10.31

Top 10 most commonly billed clinical indications for pediatric imaging studies performed at a pediatric medical center with outpatient imaging sites

ICD-10-CM International Classification of Diseases, tenth Revision, Clinical Modification

CPT code categories exist – category I describes accepted commonly performed procedures, category II describes performance measures, and category III describes emerging technologies or services that do not yet meet category I criteria [39, 40]. It is crucial to emphasize that having a CPT code does not guarantee reimbursement. Although category I codes are referred for valuation and are generally covered by Medicare and most insurers, there is no obligation for payers to reimburse all codes. Category III codes are often employed to collect data to support subsequent conversion to a category I code by documenting widespread use [41]. Payment determination for these temporary category III codes is at the discretionary basis of individual insurers [41].

CPT codes have specific descriptors that detail the fundamental nature of the examination and may include *parentheticals*; these comments provide guidance on reporting similarly related examinations or may denote that a code may not be billed in conjunction with another code, usually due to partial overlap of the procedure or bundling of one code within another. For example, three-dimensional (3-D) rendering (76376, 76377) cannot be reported separately for a chest CT angiography study (71275) because the study already includes image post-processing as part of its description [38].

In reporting CPT codes, there are a variety of *modifiers* to describe different billing scenarios that may alter the amount of reimbursement requested. Modifiers can be used to indicate whether a study is being billed separately for only the

**Table 2** Commonly billed pediatric imaging examinations at a large pediatric medical center

Study type	CPT code
Radiologic examination, chest; single view	71045 <sup>a</sup>
Radiologic examination, abdomen; 1 view	74018 <sup>b</sup>
Radiologic examination, chest; 2 views	71046 <sup>c</sup>
Ultrasound, retroperitoneal (e.g., renal, aorta, nodes), real time with image documentation; complete	76770
Ultrasound, abdominal, real time with image documentation; limited (e.g., single organ, quadrant, follow-up)	76705
Radiologic examination; forearm; 2 views	73090
Radiologic examination, ankle; complete, minimum of 3 views	73610
Radiologic examination, foot; complete, minimum of 3 views	73630
Radiologic examination, wrist; complete, minimum of 3 views	73110
Magnetic resonance (e.g., proton) imaging, brain (including brainstem); without contrast material without contrast material, followed by contrast material(s) and further sequences	70553

Top 10 most commonly billed clinical indications for pediatric imaging studies performed at a large pediatric medical center with outpatient imaging sites. Current Procedural Terminology (CPT) 2018 edition codes are presented [35]

<sup>a</sup> replaced 71010

<sup>b</sup> replaced 74000

<sup>c</sup> replaced 71020

*professional component* (-26) of the radiologist’s work or the *technical component* (-TC) for the owner of the imaging equipment. Others specify a procedure with laterality (-LT, -RT) or bilaterality (-50). Certain modifiers (-76 and -77) can also be useful in justifying to payers that a repeat procedure was performed on the same day for a medically necessary indication (e.g., a follow-up chest radiograph for increasing pneumothorax). While the nuances of modifiers are within the domain of professional coders, it is helpful for radiologists to think of how particular imaging scenarios may require additional documentation to satisfy criteria for the coder to list a modifier that supports fair reimbursement.

**HCPCS**

Healthcare Common Procedure Coding System (HCPCS) was established in 1978 by CMS to describe additional services and items involved in medical care that are not encompassed by the CPT code structure [42]. HCPCS became mandatory with the Health Insurance Portability and Accountability Act of 1996 (HIPAA). There are two levels of HCPCS codes; the first mirrors the category I CPT codes and the second includes items and non-physician work [42, 43]. Of relevance to the radiologist, HCPCS level II codes include contrast media and medications as highlighted in Table 3 [43, 44].

**Documentation details of specific examination types**

As an example of the nuanced requirements for accurate billing, different CPT codes for the performance of an upper gastrointestinal fluoroscopic examination exist based on whether a scout image was obtained and documented [38]. Similarly, documentation of the performance of unique views has implications in the reimbursement of radiographic studies with

differences generally commensurate with the number of views obtained for a particular examination [38]. It must be emphasized that views are defined as unique anatomically defined projections (e.g., frontal, lateral, oblique and specialized views) and not simply the number of images obtained [45]. Recent coding changes have simplified the documentation of radiologic studies and reduced requirements so that only the number (and not type) of views obtained need to be documented [46]. Therefore, while radiologists may prefer to describe the types of views obtained for professional reasons, coders only require the number of views of anatomical locations obtained for radiographic examinations [38, 46].

Ultrasound (US) coding requirements are, by far, the most comprehensive of any diagnostic imaging modality [47]. Whereas radiologic, computed tomography (CT) and magnetic resonance imaging (MRI) require only the specification of the anatomical region covered (e.g., head, abdomen, chest), US CPT codes additionally mandate that the radiologist must delineate particular organs or structures (“elements”) in the report or the reason for their non-visualization [38, 47, 48]. A complete abdominal US (76700) includes documentation of the liver, spleen, gallbladder, common bile duct, kidneys, pancreas, upper abdominal aorta and inferior vena cava [38]. Documentation errors are common in US with one study noting that key elements are omitted in 9.3-20.2% of reports, resulting in a loss of 2.5-5.5% of professional payment [49]. Complete Doppler examinations (i.e. duplex Doppler or spectral and color Doppler) require descriptions that mention evaluation of both arterial and venous flow. One of the most common documentation errors for US Doppler studies is the failure to describe both arterial and venous flow [50]. Describing only arterial or only venous flow is consistent with a limited Doppler examination. Therefore, failing to mention one type of flow, even if present on the images, would result in coding for a limited, instead of complete Doppler US.

MRI and CT codes share relatively similar structure with classifications based on the anatomical location included and the administration of intravenous contrast (e.g., without with, and without/with) [38]. Cross-sectional imaging codes do not require documentation of specific sequences or windows, nor do they stipulate a precise description of anatomical coverage. While all MRI examinations are reported separately, CT and CT angiography examinations of the abdomen and pelvis are reported with bundled codes when performed at the same time, reflecting bundling of these codes that began in 2011 and resulted in substantial reductions in reimbursement [51, 52].

When 3-D rendering is performed with a CT or MRI study (except those that already include post-processing in their description, particularly CT angiographic studies), the radiologist should record the generation of maximum intensity projection and/or volume rendered images, indicate whether post-processing was performed on the same (76376) or a separate

**Table 3** Common HCPCS Level II codes for pediatric imaging examinations

Contrast type	Code
Iodinated contrast, low osmolar	Q9951, Q9965–7
Iodinated contrast, high osmolar	Q9958–Q9964
Gadoxetate disodium (Eovist™)	A9581
Gadobutrol (Gadavist™)	A9585
Other gadolinium-based contrast media	A9575-A9579
Sulfur hexafluoride lipid microspheres (Lumason™)	Q9950
<b>Medications</b>	
Furosemide	J1940
Glucagon	J1610
Secretin	J2850

Healthcare Common Procedure Coding System (HCPCS) level II codes commonly billed for pediatric radiology examinations [44]

dedicated post-processing workstation (76377) and document supervision of the post-processing [53–56]. Familiarity of the radiologist with necessary reporting criteria for commonly performed studies is crucial to avoid missing potential reimbursement.

### Structured reporting

The concept of structured reporting has been suggested with the aim of reducing documentation errors and facilitating clear communication [57, 58]. Specifically, structured reporting strategies might prevent the omission of critical information required for appropriate billing, and these reports are most helpful in the case of US examinations in including a checklist of the essential components as defined by US CPT codes [49]. In establishing a structured reporting program for systemwide adoption, it is important to collaborate with coding staff to ensure structured reports include essential information for accurate billing.

In conjunction with a structured reporting system, communication between coders and radiologists may improve future report quality for optimal reimbursement. For instance, if a radiologist frequently fails to mention the aorta or its reason for not being evaluated on abdominal US studies, then a coder may contact the radiologist to remind him or her about the missing information that should be routinely conveyed. The use of structured reporting in conjunction with targeted evaluation of report deficiencies may provide the greatest improvement in compliance for documentation requirements, but should be implemented as a collaborative process with input from radiologists, referring clinicians and coders.

### Requesting reimbursement

Qualified health care providers submit a billing request with documentation of the coded diagnosis (ICD-10-CM code) and procedure performed (CPT/HCPCS code). Medicare has established specific payment values for CPT category I procedures based on *relative value units* (RVUs) through a valuation process described in other reviews [59–61]. However, pediatric imaging studies are often reimbursed through dollar-based fee schedules issued by state Medicaid programs or commercial insurers. Procedures without established reimbursement rates (i.e. non-covered CPT codes or unlisted procedures) may potentially be reimbursed through the prior authorization process following review by the payer.

### Reimbursement edits

Despite slight differences in reimbursement mechanisms, most payers have adopted common means of ensuring the accuracy of filed reimbursement claims through auditing

processes termed *edits*. In 1996, the National Correct Coding Initiative (NCCI) was established ostensibly to prevent unintentional coding errors and avert abuse for Medicare billing and in 2010 was incorporated into Medicaid [62]. Through Procedure-to-Procedure (PTP) edits, the NCCI enumerates code pairs that are *mutually exclusive*, indicating codes that are inclusive of another (e.g., renal Doppler US and renal transplant US, which includes duplex Doppler) [63]. Additionally, other PTP edits may *allow a modifier* in specific instances where there may be a medical necessity in certain clinical scenarios (e.g., retroperitoneal US and renal Doppler).

Another type of edit, the Medically Unlikely Edit (MUE), was later developed by CMS to limit the frequency of individual codes billed by the same provider for the same beneficiary (patient) on the same date of service [64]. Some of these MUEs may include limiting the number of billed units of a particular imaging study on the same day because of the clinical unlikelihood of performing such a study more than once or a few times for a patient on the same day. A few of the MUEs, particularly those involving radiographs, may be encountered in practice in cases where a patient needs multiple follow-up examinations in the same day (e.g., medically complex infants in the neonatal intensive care unit [NICU] or postoperative patients). As mentioned previously, coders can utilize *modifiers* to indicate the validity of a specific procedure. These modifiers can be particularly relevant in justifying why a study should not be subject to one of the aforementioned edits. For instance, a patient may receive a PET with attenuation-only CT for staging of malignancy but then go on to undergo a separate diagnostic CT examination in the same day for further evaluation of a specific anatomical region for lesion characterization. In this scenario, the services must be specified as distinct procedural services with a *modifier* (-59) to indicate that these are appropriately billed separately and not subject to an edit [65].

### Unique reimbursement challenges in pediatric radiology

Pediatric radiology presents unique challenges to reimbursement, including a study type distribution that favors lower cost studies and averts higher-valued cross-sectional imaging. Also, no additional reimbursement is typically provided for the added complexity of interventional procedures and imaging studies in children. As such, many commonly performed pediatric radiology services are undervalued.

### Secondary interpretation of outside imaging studies

As many children who visit dedicated pediatric hospitals are often initially evaluated at outside community hospitals

without dedicated pediatric imaging expertise, pediatric radiologists frequently are consulted to provide their diagnostic interpretation of these examinations with the interests of reducing health care costs, avoiding unnecessary repeat exposure to ionizing radiation and expediting care. When interpreting these outside imaging studies, only reimbursement for the image interpretation is possible, as the technical component has been performed elsewhere. These reports often may be billed using the relevant examination code with a modifier (-26) to indicate that only the professional component is being billed [66]. Alternatively, some payers may recommend reporting using a specific code for secondary interpretations of radiographs (76140), although no equivalent codes for other modalities exist [38, 67]. In dictating these studies, it is important for the radiologist to document that secondary interpretation was expressly requested by the referring clinician with an associated order documented. Inclusion of any specific clinical indication for which the consultation was requested is also important; it may be helpful for secondary imaging study interpretation orders to require clinicians to provide such information to justify the interpretation request.

While secondary interpretations in the emergency setting are generally exempted, secondary interpretations may require *prior authorization* or another previously established contractual relationship with the insurer for reimbursement. Secondary consults may also be rejected for reimbursement if the payer has already reimbursed another physician for the image interpretation. It is possible that the health care provider at the outside institution may have documented his or her independent interpretation previously and will be reimbursed instead of the subsequently consulted pediatric radiologist. Considering these barriers, secondary interpretations are often viewed in the context of assisting referring physicians and improving the quality of care, rather than providing meaningful revenue. Therefore, radiology departments may wish to work in conjunction with referring clinicians to adopt specific policies regarding appropriate situations benefit in which secondary interpretations should be performed versus those in which studies may simply be uploaded to the PACS as prior comparison studies.

### Whole-body MRI

Whole-body MRI has shown a wide variety of beneficial clinical uses including the screening evaluation of pediatric patients with cancer predisposition syndromes, malignancy, infection, chronic nonbacterial osteomyelitis and other multisystem conditions [68–71]. As the performance of a whole-body MRI does not necessarily encompass a dedicated evaluation of a targeted region and typically involves more limited sequences, it is presently coded using an unlisted CPT code (76498, Unlisted magnetic resonance procedure [e.g., diagnostic, interventional]), unless specific targeted imaging of

one or a few anatomical regions is additionally performed [72]. In using an unlisted code, pediatric radiology providers may be required to seek *prior authorization* for these examinations to facilitate appropriate reimbursement. Alternatively, some examinations in which the primary purpose is the screening of bone marrow may be reported potentially using a bone marrow MRI code (77084), although many insurers only allow billing this code in narrow instances, such as suspected bone metastases or multiple myeloma, whereas others expressly deny coverage of this code [73–75]. Therefore, pediatric radiologists performing whole-body MRI must work with coders and billing staff to understand individual payer decisions and seek clarification of these policies in advance.

### Contrast-enhanced US and elastography

Until the approval of CPT category I codes for contrast-enhanced US (CEUS) in 2017 (to go into effect in 2019), pediatric radiologists have been reporting CEUS using a combination of: existing CPT codes for conventional diagnostic US (and a temporary HCPCS technical component code for abdominal CEUS, C9744, if in the hospital outpatient setting), intravenous injection code (96374) and US contrast HCPCS code (Q9950 for sulfur hexafluoride lipid-type A microspheres) [76, 77]. In 2019, these targeted CEUS lesion assessment examinations will be reported on a per-lesion basis using new CPT codes, independent of the organ examined [78]. At that time, non-lesion CEUS studies will continue to be reported using existing coding practices. Non-lesional whole-organ assessment with CEUS (e.g., for evaluation of traumatic injury) will still be reported with existing appropriate diagnostic US ultrasound, injection and US ultrasound contrast codes. Similarly, contrast-enhanced voiding urosonography still be coded using a combination consisting of usually limited retroperitoneal US ultrasound (76775), cystography injection (51600) and US ultrasound contrast (Q9950) codes.

MR elastography (previously reported with an unlisted code) and US elastography (previously reported with a category III code, 0346T) were also recently approved for category I codes to be established for use in 2019 [78]. It is expected that the CPT code approval of CEUS and elastography imaging modalities will expand access to these newer technologies within pediatric radiology in future years by likely facilitating reimbursement.

### Future changes in pediatric radiology billing and reimbursement

This article focuses on radiologist reimbursement mechanisms mostly in the context of a fee-for-service approach that remains the dominant payment model in the United States



[79]. With the passage of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), there is increasing governmental emphasis on transitioning health care to pay-for-performance incentives and alternative payment models whose potential impact on pediatric radiology is discussed at length elsewhere [80]. These alternative payment models (APMs) philosophically de-emphasize the financial incentives for performing and billing more studies, and APMs could fundamentally change how radiologists practice and get paid [80]. However, even if health care reimbursement shifts to such APMs, it will still be necessary to document and code imaging examinations and procedures to ensure appropriate payment distribution, whether in bundled payment models or other alternative payment model structures. Therefore, it will likely be even more pertinent to establish the added value of imaging services through thorough documentation that is both clinically relevant and accurately reflects the pediatric radiologist's efforts.

## Conclusion

Understanding the payer and reimbursement environment specific to pediatric radiology can enhance advocacy efforts for pediatric radiology practices to provide economically sustainable access to high-quality care for children. Radiologists can improve coding accuracy and enhance legitimate revenue through careful documentation of clinical necessity and detailed description of the services provided with an understanding of the components required for correct billing. Accurate coding capturing the radiologist's work is essential to reflect the importance of imaging examinations in pediatric medical care even as payment models evolve.

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## Compliance with ethical standards

**Conflicts of interest** None

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