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A model to determine payments associated with radiology procedures

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ABSTRACT

Objective: Across the United States, there is a growing number of patients in Accountable Care Organizations and under risk contracts with commercial insurance. This is due to proliferation of new value-based payment models and care delivery reform efforts. In this context, the business model of radiology within a hospital or health system context is shifting from a primary profit-center to a cost-center with a goal of cost savings. Radiology departments need to increasingly understand how the transactional nature of the business relates to financial rewards. The main challenge with current reporting systems is that the information is presented only at an aggregated level, and often not broken down further, for instance, by type of exam. As such, the primary objective of this research is to provide better visibility into payments associated with individual radiology procedures in order to better calibrate expense/capital structure of the imaging enterprise to the actual revenue or value-add to the organization it belongs to.

Materials and methods: We propose a methodology that can be used to determine technical payments at a procedure level. We use a proportion based model to allocate payments to individual radiology procedures based on total charges (which also includes non-radiology related charges).

Results: Using a production dataset containing 424,250 radiology exams we calculated the overall average technical charge for Radiology to be \$873.08 per procedure and the corresponding average payment to be \$326.43 (range: \$48.27 for XR and \$2750.11 for PET/CT) resulting in an average payment percentage of 37.39% across all exams.

Discussion: We describe how charges associated with a procedure can be used to approximate technical payments at a more granular level with a focus on Radiology. The methodology is generalizable to approximate payment for other services as well. Understanding payments associated with each procedure can be useful during strategic practice planning.

Conclusions: Charge-to-total charge ratio can be used to approximate radiology payments at a procedure level.

1. Introduction

With a multitude of healthcare payment related reforms currently underway in the United States, there has been a strong focus towards integrated care delivery. The United States health care spending reached \$3 trillion in 2014, accounting for 17.5% of GDP, and although the rate of increase has slowed, it is still projected to be close to 20% of GDP by 2024 [1]. Faced with such unsustainable increases in healthcare related spending, a departure from the traditional fee-for-service payment model has emerged as the primary remedial strategy. As such, legislators and regulators have been driving toward alternative reimbursement models, such as Accountable Care Organizations (ACOs) [2] and bundled payments, in an attempt to contain or drive down costs [3].

In the traditional fee-for-service payment model, providers are reimbursed by insurers for each service provided. Since each service gets reimbursed, there is no major incentive for hospitals to minimize the number of procedures while the payer has an open-ended economic risk as there is no limit on the number of services that can be ordered when treating a patient. On the other hand, with capitated payment models, the economic risks shift to the provider entity since it would only get reimbursed a fixed amount to treat a specific condition [4] independent of the number of procedures used to manage the patient's condition.

The Centers for Medicare & Medicaid Services (CMS) which administers the Medicare and Medicaid programs to collectively provide health insurance to over 50 million Americans recently announced its new payment models which will begin to reward value-based care,

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rather than continuing volume-based payments regardless of quality of care delivered. Hospitals may be rewarded with additional Medicare payments for good quality and responsible spending performance or be required to repay Medicare in the case of poor quality services or overspending. Bundled payments have become more prevalent in recent years where various radiology procedures now get paid under ‘bundled codes’ when two or more related imaging studies are performed together. The American College of Radiology routinely monitors changes to radiology-related payments and recently reported that the bundled code payments are falling short of the payment levels of the sum of the individual predecessor codes and values; for instance, computed tomography (CT) abdomen-pelvis without contrast exams were paid at \$418.43 prior to using bundled codes; in 2013, under the bundled payment model this was reduced to \$306.05 and in 2014, this was further reduced to \$241.79 [5]. Analysis of imaging payments is further complicated by a particular current payment practice: when imaging is performed on inpatients, the payment occurs at a hospital account level instead of a procedure level, meaning that an entire hospital stay for a given patient will be billed under a single hospital specific account with charges itemized by procedure, but will be paid by insurance only as a single transaction at the account level.

With declining revenues per work unit, increasing prevalence of risk contracts with payers and the introduction of new value-based payment models, radiology is poised to eventually shift from one of the primary profit-centers for a hospital to a cost-center. Radiology departments are increasingly being asked to do more with a smaller annual budget and are challenged to remain competitive with regard to asset base, human talent and access to care, while managing decreasing bottom lines. As such, Radiology departments need to increasingly understand in near real-time how the transactional nature of the business relates to the financial rewards. The main challenge with current financial reporting systems is that the information is usually presented only at an aggregated level (typically at a cost center level), and it is not often broken down further, for instance, by type of exam. As a result, it is challenging for Radiology administrators to understand which exams are driving increase or decrease in the profitability of the business or the financial impact of each referring service. Furthermore, resource allocation in hospitals is often somewhat uncoupled from actual service line revenue streams and profit margins, because reliable and contemporaneous profit/loss statements and cost information for service lines is often not available. As a result, radiology leaders may be challenged to justify the necessary (or any additional) investments into the service line unless they are able to demonstrate or even estimate the related revenue streams. To address some of these limitations with existing reporting systems, in this paper we describe a generic methodology that can be used to determine the payments at a procedure level as well as its applicability in practice.

2. Methods

2.1. Hospital charges and payments

In the US healthcare system, after a patient has been treated in a hospital environment, the provider entity will typically bill the insurance provider directly (patient self-pay does occur, but is not the norm in the US). This statement of charges will contain the billing CPT codes that describe the evaluations, testing, imaging procedures surgeries and other medical procedures that were performed on the patient during this episode of care and the requested dollar amount per procedure (“charges”). Charges are standardized at the hospital level and are listed in the “charge master”. The charged amount does not change depending on the billed insurance provider.

On the other hand, actual payments of charges are dependent on the insurance provider and the specific contract in place (usually negotiated on a 1–6 year basis [6]) between the hospital and each insurance company at the time of care. For instance, the charge for an abdomen-

pelvis without contrast exam could be defined in the charge master as \$600, but insurance provider A may have a contracted payment rate of \$456 whereas insurance provider B may have a contracted payment rate of \$503.

Hospital billing occurs primarily under two payment models depending on the setting of the patient encounter. If treatment was delivered in an outpatient environment, billing will occur under the Hospital Outpatient Prospective Payment System with an assigned Ambulatory Payment Classification (APC) code [7]. If care delivery was in an inpatient setting, then the charges will be billed under the Inpatient Prospective Payment System using a Diagnosis Related Group (DRG) code [8] where a single code is assigned to the entire patient stay based on primary and secondary diagnosis, procedures, age, gender and discharge status. APC and DRG codes are defined for Medicare patients only, but it is common practice for other insurance providers to use the same (or similar) payment mechanisms.

Note that most radiology services or procedures, although billed under a single CPT code, usually comprise of two distinct components: the professional component and the technical component. Professional component (which itself is made up of three components—physician work RVU, practice expense RVU and malpractice RVU) is used to charge for physician activities such as supervision, interpretation and creating a report whereas the technical component would include charges for equipment, supplies, personnel and costs related to performing the exam (usually by a radiology technologist) [9]. It is usually assumed that a hospital will be billing for the technical component portion of any onsite services since most physician groups are setup as a separate billing entity.

2.2. Dataset and strategy

In this study, we chose to profile Lahey Hospital and Medical Center, the tertiary care facility of an integrated care delivery network based in Burlington, Massachusetts [10]. Working specifically with the Radiology department, we formulated the necessary queries to extract transaction level billing data (charges and payments) from the enterprise electronic health record system (Epic, Madison, WI) for all patients who had at least one radiology procedure done between 1-Apr-2015 and 31-Aug-2016.

The dataset contained the hospital account number (corresponding to a patient encounter), procedure related fields (including accession number which uniquely identifies a radiology exam, procedure code, procedure description, performing section and exam end date-time) as well as transaction related fields, such as the CPT code, relative value unit (RVU) [11], insurance provider, itemized charged amount and the paid amount for the technical component. A selected subset of the fields for two illustrative accounts are shown below in Table 1.

The primary focus of this study was to assist radiology administrators gain visibility to the payment at a procedure level in a typical hospital environment where the hospital would bill for technical services separately from the professional services. As such, we focused on the technical component only, although the proposed methodology can be adopted to other environments. For instance, if separation of the professional and technical components is not required, the third last column in Table 1 can show the combined total charge instead (i.e., the sum of technical and professional charges for each procedure).

Note that the queries were formulated for data extraction so that the total charge is calculated based on all services provided under a single hospital account number which may include other services in addition to radiology (e.g., surgery), but the extracted data contained only the radiology related procedures since this was a Radiology-focused activity. Further, in a few instances, there were multiple procedure identifiers related to billing associated with a single accession number – for instance, a MAMMO DIAGNOSTIC TOMOSYNTHESIS BILATERAL procedure (having a single accession number) may contain three CPT billing codes, such as “HC COMPUTER AIDED DETECTION

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