USF | Muma Business Review
A publication of the Muma College of Business | University of South Florida

Volume 5, Number 3	Research Question Review	31 DECEMBER 2021

What Factors Influence Physicians' Billing Accuracy ?

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The pervasiveness of billing errors has drawn national attention to the cost of healthcare. While there is debate over the exact economic impact, experts agree it's in the billions of dollars. Yet, few strategies have proven effective in reducing billing errors. This research examines the existing literature to explore theories and constructs that explain causal factors of billing errors and illuminate strategies for improving billing accuracy.

Medicare loses billions annually to physician billing errors. Medicare Part B evaluation and management services are among the most prevalent errors. Opinions vary on the causes and appropriate countermeasures of these errors. As of yet, no strategies have proven effective in reducing these errors.

This paper leverages Leavitt's system model of organization change as an organizing framework. Each of Leavitt's four components – task, people, structure, technology - is evaluated against the backdrop of billing accuracy. The paper begins with a brief overview of the concepts of billing accuracy, which give context to the subsequent discussion on contributory factors. Gaps in the literature are identified and future areas of focus for research studies are proposed.

Keywords: Evaluation and management, coding accuracy, documentation, billing errors, fraud, medical billing, medical necessity, up-coding, health information technology.

Physician billing errors continue to cost the U.S. government billions in improper payments with no viable solution on the horizon. The Office of Inspector General (OIG) for the United States Department of Health and Human Services defines improper payments as expenses incorrectly paid because they did not meet federal rules and guidelines for reimbursement (U.S. Department of Health and Human Services, 2014). According to the OIG, evaluation and management (E/M) services (office visits performed by physicians and non-physician practitioners to manage a patient's health), are 50% more likely to be paid in error than other Medicare Part B services (U.S. Department of Health and Human Services, 2014). E/M services represent an estimated 30% of Medicare Part B services and nearly 42% of all Part B improper payments. These alarming statistics mandate a strategic focus on reducing physician billing errors.

In 2016, the OIG reported the first reduction in overall errors since 2010 (See Figure 1). While overall error rates declined, E/M billing errors remained virtually flat. (U.S. Department of Health and Human Services, 2017). As Figure 1 illustrates, in each subsequent year after 2016, the overall error rates (for all medical expenditures) continued to decline while the Part B error rate, which represents physician services, consistently exceeded the overall error rate with only modest declines year over year. This discrepancy between the performance of the overall error rates and the Part B error rates, suggests health care policy makers have not given sufficient attention to physician office visit coding.

The persistent and pervasive nature of medical billing errors led to the research question: What factors influence physicians' E/M medical billing accuracy? The goal of this research study is to synthesize prior research on medical billing errors in E/M services and, in doing so, identify potential strategies for improving billing accuracy.

While Medicare only provides about one fifth of the healthcare of the US population (QUOTATION) it is the lead author of billing and reimbursement rules within the United States. All other commercial payers follow Medicare's lead. Consequently, although this paper focuses on the impact to the Medicare fund, the lessons and consequences arrived at are equally applicable across all other payer types.

The remainder of this paper is structured as follows: First the literature review methodology is discussed. Then a brief background is presented on billing accuracy, medical record documentation and evaluation and management coding. Next, to synthesize the research findings, the paper leverages Leavitt's (1965) system model of organizational change initiatives as a framework to perform the research analysis. A discussion follows on each of the contributory factors of evaluation and management errors within the Leavitt's diamond framework. The paper concludes with recommendations for future research.

BACKGROUND

What are Billing Errors

This study defines billing errors as the act of submitting an incorrect claim for payment. Billing for services that were either never performed or overcharging for medical services provided (upcoding)

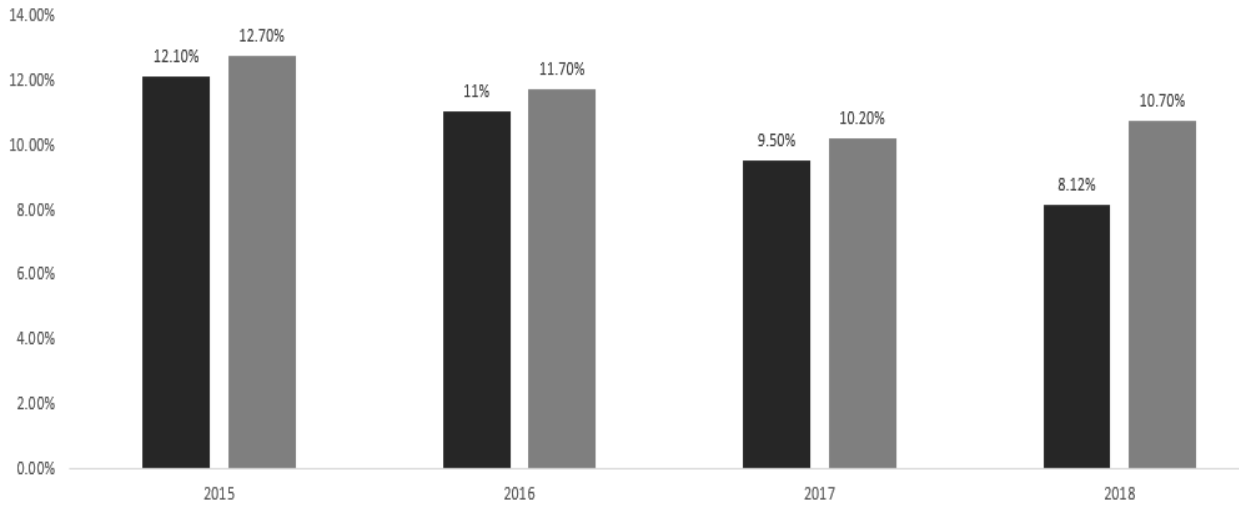

Figure 1: Comparison of US Billing Error Rates for all Medical Expenditures to Part B only Billing Error Rates (2015-2018)

Source: U.S. Department of Health and Human Services Improper Payment Rate Reports 2015 -2018

Protocol

According to Hart (2018) a good literature review justifies the inclusion and exclusion criteria to demonstrate the relevance of selected articles. Given that it was not possible to find and review all articles on this subject, a systematic process was required. To this end, this paper utilized a systematic, heuristic and iterative approach to identifying and selecting the most relevant research papers.

- First, we started the research using Medline databases. We found very few academic articles using this type of search and so expanded the search to other general databases like ABI-Inform and Google Scholar). Finally, to understand the practitioner viewpoint, we expanded the search to include practitioner trade journals.
- The bibliographies of the selected articles proved to be a rich pool of relevant sources. Consequently, most of the referenced articles were sourced from citations in the articles found in previous searches. The search protocol is depicted below:

are the most common types of billing errors (Doan, 2011). These types of errors are considered Medicare fraud and may be punishable by the U.S. government under the false claims act (Sage, 1999). Undoubtedly, there are unscrupulous physicians and non-physician practitioners (hereinafter referred to collectively as physicians) who systematically bill for services not performed and routinely up-code their services. One has only to look at the OIG most wanted physicians to understand the pervasiveness of the problem.

Upcoding Evaluation and Management (E/M) Services

E/M services have varying billing levels which reflect the level of complexity of the patient visit (See Appendix A2 for E/M billing rubric). The physician must justify the level of billing based on several different parameters, such as the patient's history of symptoms, the extent of physical examination performed, and the complexity of the physician's medical decision-making (Centers for Medicare and Medicaid Services, 2010). According to the CMS (2010), it would not be medically necessary or appropriate to bill for a higher level of E/M service when according to the billing rubric, a lower level of service is warranted. Physicians are responsible for ensuring that the charges they submit to Medicare accurate-

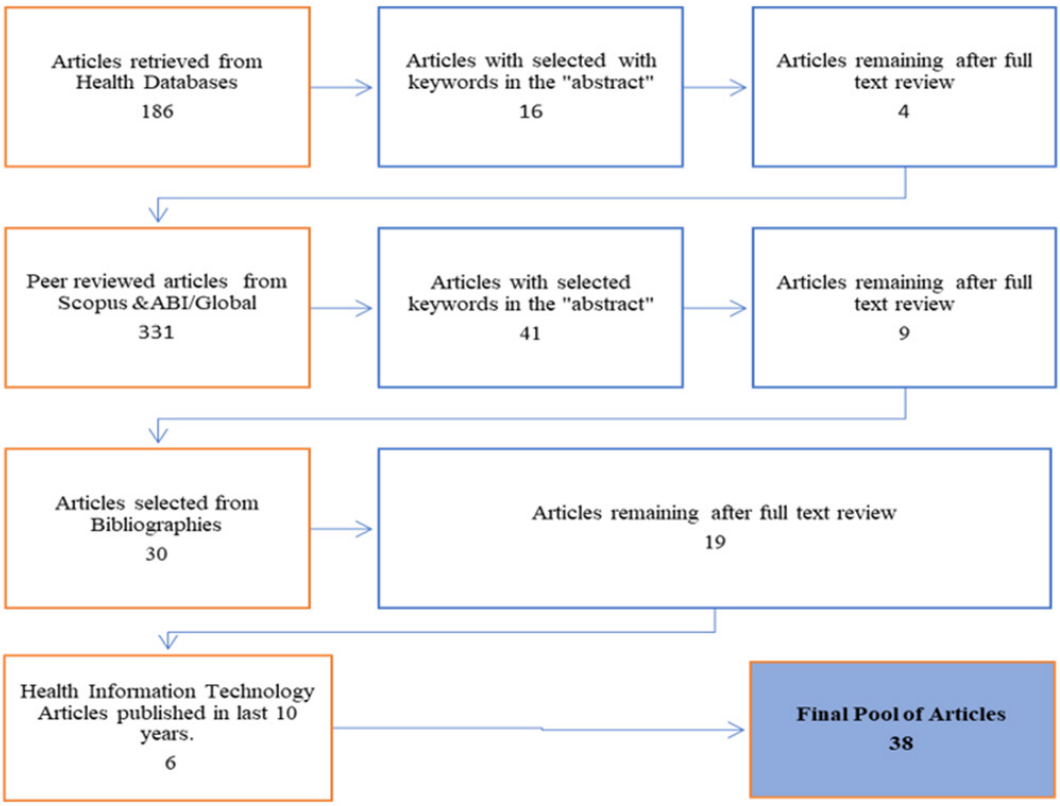

Figure 2: Literature Review Process

ly reflect the E/M services provided and the billing levels corresponding to those services. Upcoding, the most common form of E/M billing error, occurs when physicians choose to bill for, and therefore are paid for a higher level of service than was actually performed (Ornstein, C., Grochowski, R.J.,2014).

Implications of Medical Billing Errors

Medical billing errors are a matter of national concern because they carry negative consequences not only to the U.S. economy but also to healthcare policy and the financial viability of physician organizations (Doan, 2011; Hyman, 2002; Lorence & Richards, 2002). The most significant implications of billing errors are described further below and summarized in Table 1.

DISCUSSION

A Framework for Understanding Causal Factors Influencing Billing Accuracy

In his seminal work on organizational change, Harry Leavitt introduced a framework that is now known as Leavitt's Diamond (Leavitt & Bahrami, 1988). According to Leavitt & Bahrami (1988), there are four components to all organizations: people, technology, structure, and task. This model proposes that an organization can approach change through any one of these four components. This framework is also useful in conceptualizing the factors that influence medical coding and billing accuracy in physician organizations. This research organizes and discusses the concepts found in the literature according to each of Leavitt's four components. Appendix A1 contains a full list of articles used categorized by organizational component and focus of the publication.

Components of Leavitt's Diamond

People – This component deals with the skills, knowledge, and abilities of the employees of the organization. Leavitt and Bahrami (1988) assert that for any change to be successful, consideration must be given to whether the current skills, knowledge and abilities of the employees are adequate for their tasks and the technology they are expected to use.

Task – This component in the organization has to do with what things are being done in an organization and what the organization is trying to achieve. A change in an organization may involve new ways and methods of getting work done. Old methods of

Table 1: Implications of Medical Billing Errors

Legal Implications	Economic Implications	Health Policy Implications	Financial Implications
Exclusion from participation in government programs	**Over 40% of physician payments are incorrect leading to billions in losses to Medicare.**	**Systemic misreporting of medical coding data undermines national and international comparative population health analysis**	**Financial viability of physician practices compromised by high administrative burden of billing rules and regulations.**
Civil Penalties between $5,000 and $10,000 per office visit plus three times damages sustained by US government.	**Physician improper payment rate was 10.1% in 2012 costing CMS $34 billion in incorrect federal payments.**	**Negative impact to patient care due to physician distraction and concern/worry about audits and cumbersome guidelines**	**Physicians may under-code to avoid threats to legal penalties which in turn leads to loss of revenue and threatens the viability of physician practices.**
Disciplinary action such as Corporate Integrity Agreements mandating strict and often invasive remedial compliance efforts.	**Government accountability office reported $50 billion in 2008 in improper payments from physician documentation and coding errors; An estimated 3%to 10% of healthcare spending is lost to healthcare fraud and abuse.**	**Poor medical data quality jeopardizes quality and continuity of patient care.**	**Anti-fraud laws disproportionately impact small-business providers who don't have the same resources, infrastructure and training support as other large physician organizations.**

completing work may become obsolete and replaced with new methods.

Structure - The structure of an organization generally refers to the system of hierarchy and the relationship between the different levels of the organization. Leavitt and Bahrami (1988) posit that it also refers to how tasks are divided up amongst people – where the responsibility for getting work done lies - and standard procedures for getting work done within an organization.

Technology - Technology is that component of the organization that aids or facilitates people in performing their tasks. It refers to the processes by which tasks are completed and the systems used to facilitate these processes (Leavitt & Bahrami, 1988).

Considering the prevalence of the errors and their persistence over time, improvements in medical documentation and billing accuracy will require significant change initiatives within any physician organization. Therefore, the prevailing theories and concepts to improving physician accuracy are explored through the lens of Leavitt's organizational change model. In juxtaposing Leavitt's Diamond with concepts present in academic literature, the processes and relationships Influencing physicians coding errors can be depicted in the following concept map (Figure 3).

People

The impact of physicians' attributes such as knowledge, attitudes, and experience on medical billing accuracy emerged as a key theme in the literature review. Leavitt and Bahrami (1988) postulate that people are a key consideration of any change initiative because their skill sets, and attitudes greatly affect the success of change in any organization. Accordingly, this paper explores the impact of each of these attributes on billing accuracy.

Knowledge

There is overwhelming agreement in the literature that a knowledge deficit exists in physician coding and billing. Accurate medical documentation, which is the foundation for the medical code, must be a core competency in medical education programs, yet there is little formal education to help resident trainees master this process (Howard & Reddy, 2018). In their study of the adequacy of billing and coding training for 1,233 pediatric graduates, Andreae, Dunham, & Freed (2009) concluded that pediatric residency programs are failing to prepare new graduates for legal and financial responsibilities of medical billing and coding. Ng & Lawless (2002)

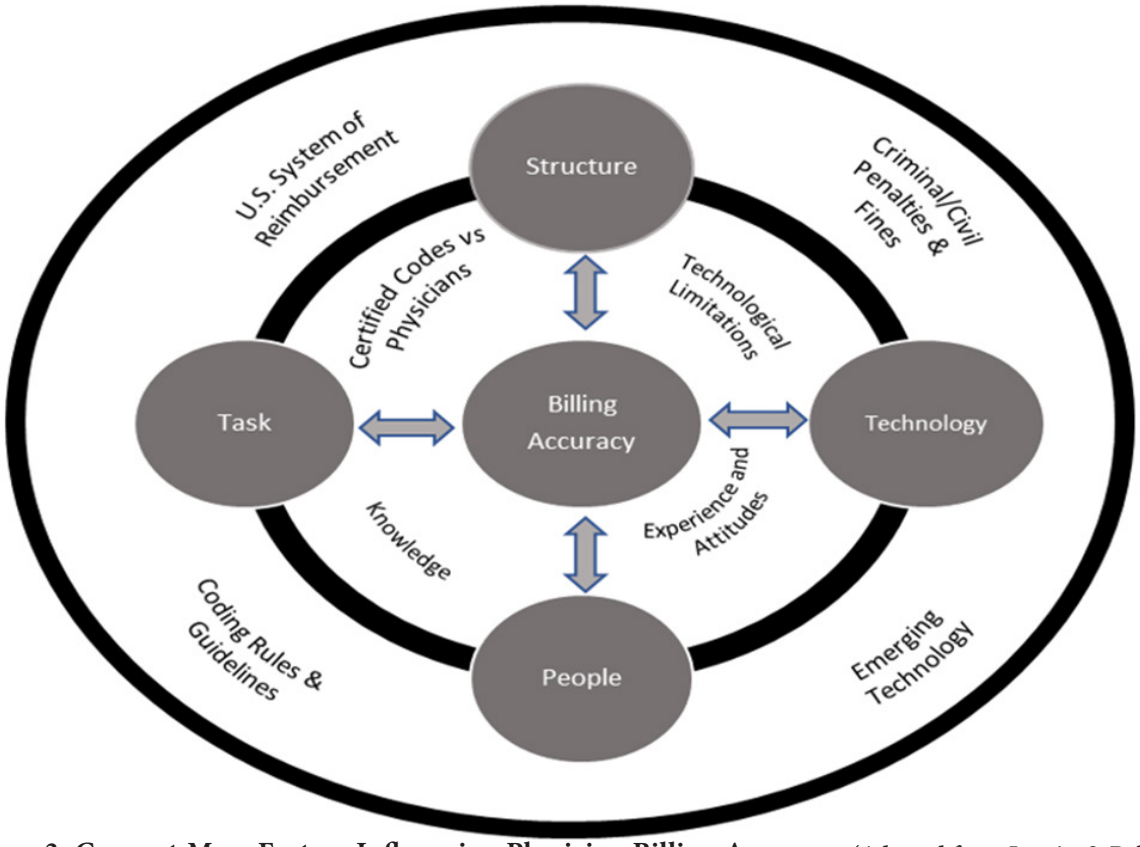

Figure 3. Concept Map: Factors Influencing Physician Billing Accuracy. (Adapted from Leavitt & Bahrami, 1988)

noted similar results in their study of 344 outpatient clinic charts. Another study conducted by Adiga, Buss & Beasley (2006) demonstrated that second year internal medicine residents across the country have a low level of understanding of medical billing, which they correlated to low test scores in this area. Yet another study of orthopedic residents yielded the same conclusions; residency programs lack formal education and training on basic medical documentation principles (Varacallo, Wolf, & Martin, 2017). Undeniably, medical billing and coding are critical components of and medical practice and failure to prepare medical students for this task has manifested in billions in improper payments.

Experienced physician practitioners fare no better. Several studies also found poor documentation practices from highly experienced physicians (Chao et al., 1998; Holt, Warsy, & Wright, 2010; King, Sharp & Lipsky, 2001; Zuber et al., 2000). In these studies, the authors found under-coding to be more prevalent in established patients and over-coding more common in new patients. The theory of availability heuristics (Tversky & Kahnerman, 1982), provides one possible explanation for this discrepancy. The coding criteria for new patients is stricter and more complex than for established patients. However, physicians may be uncertain about the additional complexity and resort to the familiarity of the coding guidelines for established patients. A similar theory is Simon's (1956) satisficing theory. This theory suggests under time pressures and limited knowledge, physicians apply the guidelines they are most familiar with uniformly across all patient types – in other words, they may guess at the appropriate code rather than search for the more appropriate code (Zuber et al., 2000). These studies suggest, regardless of experience level, billing errors are common across all physicians.

Despite the consensus that a knowledge deficit exists, there have been only a few studies that investigated the longitudinal impact of training and education programs on medical data quality and billing accuracy. One study found significant improvement in knowledge after educational sessions, but this study did not measure long term retention and is not transferable to clinical practice (Varacallo et al., 2017). Nguyen et al (2017) performed a similar study but found no impact on coding accuracy. Nonetheless, as a preventative measure to billing errors, the literature calls for formal graduate education programs during residencies and fellowships and as a prerequisite to board certifications (Agrawal, Taitsman, & Cassel, 2013; Howard & Reddy, 2018).

Attitudes

While not empirically tested, a few authors have offered behavioral theories to explain the ongoing problem of coding and billing errors. Brennan and Probe (2011) and Cohen and Sa (2001) both conducted studies using self-efficacy theory as the conceptual framework. According to self-efficacy theory, people change their behavior if two conditions are met: a) they believe that a change in their behavior will lead to the desired outcomes and b) they hold a personal conviction that they can successfully perform those behaviors (Bandura, 1978). In their study of the coding and billing patterns of orthopedic trauma surgeons, Brennan et. al (2011) found that although physicians understood the negative consequences of billing and coding errors, the system was so complex that physicians did not put forth the effort to learn to accurately perform the task. Similarly, Cohen et al. (2001) posit that strengthening nurse practitioner attitudes and knowledge towards correct coding would subsequently lead to an improvement in accuracy. In their investigation, Cohen et. al. (2001) administered a survey to 69 nurse practitioners evaluating attitudes towards medical coding. They found that most respondents did not find this task to be a rewarding part of their job, believed coding was an added stressor, and found it difficult to code accurately due to time constraints. These activities were typically delegated to clerical billing staff, regardless of their level of coding and billing experience.

Resource dependency theory is another type of behavioral theory found in the literature to explain physician attitudes and their influence on billing accuracy, specifically up-coding. Resource dependency theory (Pfeffer & Salancik, 2003) postulates that external influences (in this case, the U.S. system of healthcare reimbursement) may lead physicians to intentionally up-code to maximize reimbursement - there is a 25% to 30% increase in reimbursement for each higher level of coding (see Appendix A2). Consequently, some researchers argue that under conditions where the physician has to choose between the highest possible billable code or the appropriate code for service provided, the higher billable code will often prevail (Adams, Norman, & Burroughs, 2002; Brunt, 2011). In the same vein of profit maximizing behavior, Lorence et al. (2002) argue that the financial incentive to optimize reimbursement largely outweighs the risk of government anti-fraud enforcement efforts.

However, these arguments overlook the fact that the medical documentation determines the appropriate code. Howard & Reddy (2018) support this assertion in their argument that improving physician documentation, versus punitive measures, should be the focus of billing and coding improvement efforts. In their study of 100 patient charts, Howard & Reddy (2018) found that the documentation in the medical record only supported the medical code billed 31% of the time, leading to a high rate of both under-coding (billing for a lesser service than provided) and over-coding errors. Further refuting the argument of motivations of personal gain, in their studies of

Table 2: How People in Organizations Influence Billing Accuracy

People Attribute	Findings	Source
Knowledge	Study of second year internal medicine residents revealed low test scores and low level of understanding of Medicare coding and billing guidelines and documentation requirements.	Adiga et al., 2006
	"Despite the enormous resources at stake, physicians receive little education in how to manage and steward finite resources making formal education of physicians in "program integrity" an essential component of medical professionalism" (pg. 1115)	Agrawal et al., 2013
	"Residency programs must enhance this training component to prepare physicians to maintain a financially viable practice. (pg. 939). 81% of generalists and 78% of subspecialist indicate they could use more training in billing and coding. Fewer than 20% of study participants reported their training was adequate.	Andreae et al., 2009
	Nurse practitioners are ill prepared for the task of medical coding. Test results show a 2.27 mean knowledge score on a 10-point scale. Authors assert the development of coding skills must be an ongoing process.	Cohen et al., 2001
	"Resident training programs inadequately prepare medical students for medical coding and documentation despite it being a core competency in medical practice."	Howard et al., 2018
	Pediatric residents are not adequately trained in proper coding practices which leads to high rates of billing errors and substantial reimbursement discrepancies.	Ng, Lawless, 2001
	Study demonstrated deficit in basic coding and billing principles among residents and fellows. Following a controlled intervention whereby residents were provided with specific coding and billing training, participants demonstrated improved understanding and application of the relevant concepts.	Varcallo et al., 2017
Experience	Study found no statistical difference in coding accuracy based on years of experience.	Chao et al.,1998
	In an assessment of coding accuracy, study compared coding of three levels of experience – a professional coder, a family medicine resident and a residency faculty member. Regardless of level of experience, study found significant under-coding of medical record documentation.	Holt et al., 2010
	Using 6 hypothetical progress notes, 300 certified coding specialists were asked to assign E/M codes. Study found no statistical significance between years of experience and coding accuracy.	King et al., 2002
	In one of the largest physician documentation audits conducted, a study of 1069 patient charts revealed no statistical difference in code selection between resident physicians with 2.3 years of coding experience and attending physicians with 23.3 years of coding experience.	Zuber et al., 2000

Attitudes	**Study results suggest self-efficacy and outcome expectancy constructs - Physicians do not put forth the effort to understand coding and billing rules because the system is too complex.**	**Brennan et al., 2011**
	The conceptual framework for this study was self-efficacy theory – if NPs believe they can control the outcome they will put forth more effort in learning proper coding, documentation and billing procedures.	**Cohen et al., 2001**
	Authors discuss changing attitudes and perceptions of physicians (fraud will not be detected or punished) as an approach to designing interventions to combat healthcare fraud.	**Rashidian et al., 2012**
	Over-coding is driven by intrinsic profit motives of the physician/ organization. 43.5% of survey respondents reported influences from senior management to up-code to optimize reimbursement.	**Lorence et al., 2002**

family physicians, King et.al. (2002) and Kikano et. al. (2000) both found that the rate of up-coding errors occurred as frequently as under-coding errors. Similarly, Zuber et.al., (2000) found under-coding occurred more frequently than over-coding. Each of these studies contradict the argument that E/M errors result from physicians' attitudes of gaming the system for financial gain.

Though the results are interesting, these studies were very limited in scope and generalizability across larger physician populations. However, the theories are worthy of additional investigation. Education and other remedial strategies may have little traction if physicians are not engaged or do not experience responsibility for improving their coding accuracy. Factors such as the attitudes and perceptions of the physician, while heavily discussed, have never been empirically tested. By examining physician attitudes, policy makers and healthcare administrators may develop more effective countermeasures to reduce medical coding errors.

Experience

It seems reasonable that a physician with several years of coding and billing experience would also have a high level of billing accuracy. The literature, however, does not support this assertion. Although counter-intuitive, several studies show there is no relationship between a physician's years of coding and billing experience and their accuracy (Holt et al., 2010; King, Mitchell S., Lipsky, & Sharp, 2002; Zuber et al., 2000). These studies suggest that even though a physician is an expert in determining the patient's diagnostic and procedural conditions, their knowledge and experience in the assignment of the relevant codes for these conditions may be limited. In their study of 1,069 patient charts from 10 family physician offices, Zuber et. al (2000) found no statistical difference in code accuracy between resident physicians with 2.3 years of coding experience and attending physicians with 23.3 years of coding experience. These conclusions add weight to arguments that while hiring for experience may not yield satisfactory results, change initiatives that address physicians' knowledge and attitudes may yield more desirable outcomes.

Task

Task complexity is a significant contributor to billing errors. In healthcare, environmental forces outside the organization contribute to coding task complexity. Leavitt & Bahrami (1988) assert that organizations are dynamic entities that interact within the context of environmental factors. These environmental factors influence the functioning of the four components of an organization. Government-imposed billing and coding guidelines are reportedly very confusing and adds to overall task complexity and therefore increases billing errors (Kikano, Goodwin, & Stange, 2000; King, Mitchell S. et al., 2002; Zuber et al., 2000).

Coding Rules and Guidelines

The complexity of the coding and billing system is commonly cited as a primary factor in the magnitude of physician error rates. Coding rules are largely subjective and when applied by multiple users, often lead to different results and a high inherent error rate (King, Mitchell S. et al., 2002). Several studies have investigated the concordance rate of various coding experts by testing inter-rater reliability. Concordance rates across numerous studies showed little agreement among expert coders in their interpretation of the E/M coding guidelines. For example, Zuber et al. (2000) found a 44% concordance rate between coding auditors. Similarly, Kikano et al. (2000) noted a 43% concordance rate among family physicians. These studies underscore a prevalent concern in the literature; physicians' cannot correctly apply coding guidelines because the E/M coding system is ambiguous and too complex to be uniformly applied (Chao et al., 1998; King, M. S. et al., 2001)

While physicians agree that proper documentation is essential for good patient care and that well-main-

TABLE 3: How the Task Component Influences Billing Accuracy

Findings	Source
Related to self-efficacy theory, Brennan et. al posit the physician compensation system in the U.S. is so complex that it is prone to errors. Surgeons (the subject of this study) are forced to learn the nuances of the coding system or risk penalties or missed reimbursement opportunities.	**Brennan et al. 2011**
Study highlighted low concordance rates between physicians and trained experts. Study suggests coding system is too complex to hold physicians accountable to high standards of accuracy.	**Chao et al., 1998**
Thsi study found a 44% concordance rate between auditors. The study attributes these dismal results to vague and ambiguous coding guidelines.	**Kikano et al., 2000**
Study revealed low inter-rater reliability - 57% concordance rate between coding specialist which suggest that the E/M coding guidelines are too complex. Study recommends modifications to environmental factors changing the coding criteria, decreasing the number of codes from which physicians must choose or the number of steps involved in selecting the appropriate code.	**King et al., 2002**
Findings showed auditors agreed with medical physicians in 15.2% of the cases.	**Zuber et al., 2000**

tained records facilitate communication between patients and physicians, the coding and billing guidelines are widely seen as cumbersome and distracting from patient care (Kikano et. al., 2000). In this environment of rule complexity, ambiguity, and time restrictions, the medical documentation ultimately does not accurately capture the level of services provided. Proponents of a simpler coding system have advocated solutions such as a) creating one set of criteria for new and established patients, b) decreasing the number of potential codes from which physicians can choose, and c) decreasing the number of steps involved in arriving at the correct code (Kikano et al., 2000; King, et al., 2001; Zuber et al., 2000) while others declare the coding guidelines "too flawed to be fixed" (Kikano et al., 2000).

Ultimately, any changes to the current system of reimbursement would need to be championed by constituents outside the organization, such as the American Medical Association and the Centers for Medicare and Medicaid Services (2019). In other words, the current structure of reimbursement, including the system of penalties for inadvertent coding errors would require significant revision from actors outside the physician organization.

Structure

Organization structure refers to systems of authority, the locus of control and hierarchical systems for getting the work done. How work is grouped within an organization has an impact on business outcomes and is a key success factor in any organizational change initiative (Leavitt & Bahrami, 1988).

U.S. System of Reimbursement

The U.S. Government, namely the Centers for Medicare and Medicaid Services (CMS) determines how Physicians are reimbursed for their services. In collaboration with the American Medical Association, CMS determines the specific amount to pay Physicians for specific services provided (Centers for Medicare and Medicaid Services, 2019). Many researchers argue the fee-for-service reimbursement system invites the submission of false claims (Brunt, 2011; Lorence & Richards, 2002). This system of reimbursing a physician's work for example creates a perverse incentive to bill for work not actually performed. The more work produced, regardless of its quality, the more a provider is paid. Some work carries higher level of reimbursement and therefore Physician's may be motivated to bend the rules to obtain the higher level of reimbursement. For example, if medical decision making is the only differentiating criteria between a level 4 and level 5 E/M code (see Appendix A2), some researchers argue the Physician has a compelling incentive to document the requisite medical decision making criteria to capture the 30% higher reimbursement that accompanies the higher code (Lorence & Richards, 2002)

Another criticism of this form of reimbursement is Physicians' perceptions of the value of their work is often incongruent with the government reimbursement schedules. Physician reimbursement schedules are determined by the value (referred to as Relative Value Units) placed on each type of service performed (Brunt, 2011). A physician may bill for

Table 4: How Structure in Organizations Influence Billing Accuracy

People Attribute	Findings	Source
U.S. System of Reimbursement	Physicians will always be incentivized by financial motivations when making coding decisions.	Adams et al., 2002
	Empirical study found the greater the marginal revenue, the higher the probability of the physician to select a higher billable code. Despite education efforts, physicians will be motivated to select the higher billable code.	Brunt, 2011
	Authors argue the U.S. system of reimbursement is flawed because of its over-reliance on the resource-based relative value scale as a mechanism of determining physician reimbursement. The RVU scale, dating back to 1980's does not adequately address the full range of office-based evaluation and management activities, not does it address intensity for complex patient care. It overvalues procedural care and undervalues cognitive professional services.	Kumetz et al., 2013
	This study determined that despite the risk of penalty of prosecution, physicians will continue to be motivated to increase their own reimbursement by manipulating the coding guidelines in their favor.	Lorence et al., 2002
Criminal and Civil Penalties	Assertion is that upcoding errors, while considered fraud and punishable by civil and criminal fines, may be the result of a myriad of contributory factors such as an overly complex billing system. Author maintains the False Claims Act is overly zealous and misguided in its efforts	Doan, 2011
	"A law originally enacted to combat rampant contractor fraud during the civil war, is now being used to subject physicians to harsh penalties for what could be inadvertent billing mistakes.	Maxham, 2014
Certified Coders vs Physicians	Authors discuss changing attitudes and perceptions of physicians (fraud will not be detected or punished) as an approach to designing interventions to combat healthcare fraud.	Duszak et al., 2012

a higher level of service than the billing regulations warrant because the code choices do not adequately reflect their scope and intensity of effort (Kumetz & Goodson, 2013). In these situations, the physician bills for his services based on his judgement of the value of the service provided and not based on the requisite rules for reimbursement. This scenario is most frequently evident in the family practitioner whose cognitive effort to diagnose and treat a chronically ill patient with multiple comorbidities is not adequately represented in the relative value units of the appropriate billing codes. Investigators posit that in these instances, the family practitioner will bill for a higher code (upcoding his services) than the billing guidelines warrant.

Criminal/Civil Penalties and Fines

The U.S. government not only has the authority to dole out payments, but it also doles out penalties for non-compliance. The federal government spends billions empowering agencies to seek out upcoding errors. The False Claims Act of 1863 is the primary enforcement tool under which physicians found guilty of upcoding could be subject to penalties of not less than $5,000 and not more than $10,000 (per office visit) plus three times the amount of damages (Doan, 2011). Several healthcare attorneys zealously argue the government is overly ambitious in its enforcement arsenal. Innocent physicians, guilty only of participating in a cumbersome healthcare reim-

bursement system, can easily get ensnared in its enforcement arsenal (Doan, 2011; Maxham, 2014).

These enforcement measures while intended to curb upcoding billing errors often have the opposite impact of creating under-coding errors. To escape civil and criminal litigation for innocent billing errors, physician safeguard their practices by under-coding their office visits . While not a cost to the government, under-coding can have significant financial implications to the physician practices. By some health economists' estimates, undercoding cost physician practices millions in lost revenue annually (Brennan & Probe, 2011; Holt et al., 2010).

Certified Coders vs Physicians

One approach to neutralizing perverse incentives to over-code is centralizing the medical coding function. While the practitioner literature extensively debates the benefits of a centralized versus decentralized approach to coding, the academic literature is mostly silent on this subject. Our review found one study whose conclusions recommend changes to organizational structure to address problems of coding accuracy. According to this study, "to optimize coding accuracy, all physician-coded IR cases warrant review by an experienced individual, preferably a Radiology Certified Coder, before final claims submission" (Duszak, Blackham, Kusiak, & Majchrzak, 2004).

Technology

It was anticipated that electronic health records would improve patient safety and reduce the cost of healthcare. A decade after their emergence, the anticipated benefits are not yet realized while unintended consequences threaten their usability (Adler-Milstein & Jha, 2014; Bowman, 2013; Ganju, 2016). Technology can be an effective enabler of billing accuracy, but its adoption, utilization and training first must be effectively managed.

Technological Limitations

Practitioners were hopeful that the introduction of EMRs would improve billing accuracy by alleviating the inherent task complexity in medical coding (Bowman, 2013). Until the 20th century, physicians recorded documentation in abbreviated handwritten notes, which were stored in the patient's file, usually in a filing cabinet (Gruber, Shepherd, & Varner, 2002). In 2009, passage of the American Reinvestment and Recovery Act created financial incentives for EMR (Electronic Medical Records) adoption. HIMSS (Health Information Management Systems Society) specified an EMR Adoption Model, with eight levels of EMR adoption (Stages 0 through 7; About 70.2% of U.S. outpatient clinics achieved Stage 5 or higher by year-end 2017. Despite evidence of high rates of EMR adoption, concerns about medical documentation and the related billing accuracy remain, suggesting a failure in EMR capabilities to offset coding and billing errors (Shachak & Reis, 2010).

EMRs, if leveraged appropriately, could help ensure that patient data is complete, accurate, legible, and readily available. For example, many EMRs have built-in drop-down lists and templates that aid the physician in the correct code selection and in creating more complete documentation (Kabene, 2010; Kumar & Thomas, 2011). These capabilities have great potential to reduce reliance on the physician to remember all code choices and all relevant documentation to support the code choices. However, several studies have cited concern over unintended consequences of EMR systems. In her study of medical data quality in EMR systems, Bowman (2013) argues that with the emergence of EMRs, rather than an improvement in data quality, there is a greater quantity of bad data recorded in the medical record which is attributed to 1) improper system use 2) poor system design and 3) inappropriate documentation capture. EMR features such as standardized templates, "point and click", drop-down lists, and copy-paste functions, while all helpful in reducing the physician's cognitive load, are shown to increase errors and contribute to poor data quality (Rohr, 2015; Shachak & Reis, 2010). These errors have serious ramifications for fraud and abuse and are linked with up-coding errors, specifically in evaluation and management billing codes (Cearnal, 2013). Clearly, the potential of EMRs is not yet fully realized and "has not improved the low level of importance most physicians place on documentation" (Rohr, 2015).

Emerging Technological Advancements

Machine learning and natural language processing is an emerging area of study in facilitating coding accuracy. Natural language processing, which provides an ability to read unstructured notes, is gaining popularity in medical record documentation (Rohr, 2015). Despite their promising capabilities, these technological advancements may not be the silver bullet they are advertised to be.

In their 2017 Hype Cycle report (Appendix A3), Gartner describes adoption of specific IT applications, with five major steps: Innovation Trigger, Peak of Inflated Expectations, Trough of Disillusionment, Slope of Enlightenment and Plateau of Productivity (Shaffer, Mann, & Sachdeva, 2017). The Gartner report explained that three types of coding made use of natural language processing. Computer-Assisted ICD Coding (CAC) had reached the Slope of Enlightenment. Computer-Assisted Clinical Documentation Improvement (CACDI) was nearly out of the Trough of Disillusionment. In 2017 Gartner predicted that both CAC and CACDI would be widely adopted "within two to five years" (2019-2022). A

TABLE 4: How Technology in Organizations Influence Billing Accuracy

Findings	Source
The adoption of EMR created serious unintended consequences which could lead to fraud and abuse and have legal implications. EHRs have added a level of complexity to the already-complex healthcare system. System design flaws and inappropriate use created a myriad of patient safety and billing accuracy concerns. Automatic population of templates, reliance on copy/paste functionality, automatic object insertion and standard phrases and paragraphs, while designed to reduce the physician's task complexity, have all resulted in increased proliferation of poor medical data quality.	**Bowman, 2013**
EMRs have created new challenges for healthcare professionals. The increased availability of medical data has resulted in a high volume of poorly organized information within the records making it difficult to identify what is relevant to the patient's care. Copy/pasting texts from prior dates also obscures notes and may lead to fraud even if not intended.	**Rohr, 2015**
EMRs/EHRs are valuable in sharing information across providers but they also come with a set of disadvantages. The inclusion of drop-down menus, copy and paste capabilities and documentation templates increases the risk of "outdated" and "irrelevant" information to be included in the documentations of the current encounter. These errors could have serious consequences, thus blurring the line between physician efficiency and risk of errors.	**Shachak et al. 2010**
Machine learning and natural language processing are promising technologies in the advancement of efficient medical documentation and coding. Technologies like Computer Assisted ICD Coding and Real Time Documentation Improvement leverage natural language processing capabilities to read physicians' unstructured notes and suggest appropriate diagnoses. While these technologies potentially can transform coding processes, this Gartner report warns that the anticipated value should be tempered by the length of time required before readiness for marketplace adoption.	**Shaffer et al., 2017**

third form of computer-assisted coding, Real-Time Physician Documentation (RTPD), was dropping from the Peak of Inflated Expectations into the Trough of Disillusionment; it would take longer to mature. Some software in this category attempted to spot patterns in physician notes to suggest possible co-morbidities and provide other diagnostic and procedural guidance. These promises, however, cannot be realized if physician documentation is incomplete or simply inaccurate. As Rohr (2015) puts it, "the adage 'garbage in, garbage out' indicates the risk of poor documentation when applied to computerized analysis. In other words, if invalid or imprecise data are entered into a system, the resulting output will also be of the same caliber." In the same vein, one Gartner report cautioned: "CIOs need to steer their organizations in distinguishing between bold dreams and readiness for delivering value." (Shaffer et al., 2017, p.12). As the reports suggest, while these technological advancements are promising, they have not sufficiently matured to make an immediate impact on today's coding accuracy dilemma.

CONCLUSIONS AND FUTURE RESEARCH

The literature review demonstrates there is little consensus on the contributory factors of billing accuracy. Some researchers attribute billing errors to physician knowledge gaps and call for more training and education during and after medical school (Adiga, Buss, & Beasley, 2006; Agrawal et al., 2013; Howard & Reddy, 2018). Other researchers attribute billing errors to the complexity of the coding guidelines highlighting low concordance rates as evidence of a flawed system (Chao et al., 1998; Kikano et al., 2000; King, M. S. et al., 2001). Despite anti-fraud efforts, other investigators insist physician malaise and greed are the true culprits (Adams et al., 2002; Brennan & Probe, 2011; Lorence & Richards, 2002). What is clear is that consensus does not exist and therefore remedial strategies will have limited success.

As the previous discussion revealed, there are plenty of flaws with the way Medicare reimburses doctors.

First, because of the inherent subjectivity of E/M coding guidelines, physicians have wide latitude to set their own prices (Brunt, 2011). If a physician perceives the level of care provided (the decision-making necessary to treat a patient's condition) warrants higher compensation, he can secure this higher reimbursement by billing a higher code than the guidelines warrant. The fee-for-service reimbursement method facilitates this type of price-setting by paying physicians based on the codes they submit. Any policy initiative aimed to improve billing accuracy must address both the subjective nature of the coding guidelines in tandem with the method of reimbursement.

The low concordance rate among auditors is also problematic. The high rate of disagreement among coding experts highlights the subjectivity and complexity of the billing guidelines. Physicians should not be held to criminal and civil sanctions for billing errors based on guidelines that cannot produce consistent results. The low concordance rate among coding experts also underscores the futility of shifting responsibility for coding from physicians to coders. In our research we only found one article suggesting a reorganization of work from physicians to coders. Perhaps the low concordance rates do not justify the added cost of a team of certified coders. As the research showed, agreement in coding was low not only among physicians but also among certified trained coders. We should reiterate that the scope of this study is office visit coding in physician practices. Certified coders are more widely used in hospital-based setting where reimbursement rates offer a justifiable return on the investment.

Many were hopeful that technology would remove the subjectivity and therefore produce more consistent and accurate results. Machine learning and artificial intelligence gave hope to the realization of such promises. To date however, computer assisted coding has had more success in the hospital setting than in physician group practices (Skeete & Gogan, 2019) perhaps because hospital costs are significantly higher than physician costs. While there are significant technological advances in computer assisted coding, to date E/M coding - the largest source of Part B errors - has received little attention (Shaffer et al., 2017).

Understanding the nature and the scale of medial billing errors is a pre-requisite in any attempts to combat physician billing errors. Intervention strategies are useless without a solid understanding of these factors. Further studies are required to assess the effectiveness and cost effectiveness of current strategies to combat billing errors. Further research is also needed to understand the scale of billing errors due to intentional fraud versus unintentional billing errors. Nonetheless, it is evident from the prior research that the current system is vulnerable to abuse – whether intentional or unintentional. Mandating stronger training programs, requiring investments in coding technology or certified coders and investing in greater government oversight are hardly viable solutions. The problems inherent in the current reimbursement system which is tied to an antiquated medical coding model can only be rectified by a comprehensive redesign of physician compensation for office visits. As the literature review reveals, a simpler model of reimbursement is warranted.

EPILOGUE

In December 2020, the CMS made the most notable changes to E&M coding and billing guidelines and reimbursement since 1997. In clear recognition that the system is too complex to drive consistent accuracy, the CMS abbreviated the guidelines calling for E/M billing decisions to be based solely on either medical decision making or time spent with the patient. In its "Patients over Paperwork initiative, the CMS aims to make these particular billing guidelines less burdensome to physicians (Centers for Medicare and Medicaid Services, 2020). Second, in recognition of payment inequality for Part B physicians who bill mostly for E/M office visits (as compared to other physicians who perform procedures such as surgeries), the CMS increased reimbursement for E&M office visit codes (Centers for Medicare and Medicaid Services, 2020). These two sweeping changes give evidence that CMS acknowledges the current system of E/M reimbursement is in need of repair. Only time will tell whether these changes go far enough. Based on the findings of this literature review, we argue it does not. Medical Decision making is the most subjective portion of the billing process and as long as it remains the key factor for determining reimbursement, billing errors will continue to cost Medicare billions!

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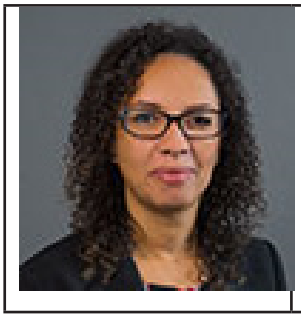


Samantha J. Champagnie's career of nearly two decades has all been in the health care realm, culminating in her current position of senior director of operations with himagine solutions, the largest provider of outsourced health information management services in the United States. She often is called upon by her company to address some of the complex problems facing all organizations in the health-care industry today. Prior to her current position, which she undertook in 2015, Champagnie worked in a variety of executive and director roles, including stints at Humana, Mercy Health, Express Scripts and SSM Healthcare.

Appendix A: Literature Review Summary by Causal Factor

Authors	Year	Leavitt's Component	Causal Factor	Publication
Adiga et al.	2006	People	Knowledge	Journal of General Internal Medicine
Agrawal et al.	2013	People	Knowledge	Journal of American Management Association (JAMA)
Andreae et al.	2009	People	Knowledge	Clinical Pediatrics
Cohen et al.	2001	People	Knowledge	Nursing Economics
Howard et al.	2018	People	Knowledge	Journal of Surgical Education
Ng et al.	2001	People	Knowledge	Pediatrics
Varcallo et al.	2017	People	Knowledge	Journal of Surgical Education
Chao et al.	1998	People	Experience	Journal of Family Practice
Holt et al.	2010	People	Experience	Southern Medical Journal
King et al.	2002	People	Experience	Archives of Internal Medicine
Zuber et al.	2000	People	Experience	Journal of Family Practice
Brennan et al.	2011	People	Attitudes	Current Orthopaedic Practice
Cohen et al.	2001	People	Attitudes	Nursing Economics
Rashidian et al.	2012	People	Attitudes	PLoS One
Lorence et al.	2002	People	Attitudes	Journal of Management in Medicine
Brennan et al.	2011	People	Coding Complexity	Current Orthopaedic Practice
Chao et al.	1998	People	Coding Complexity	Journal of Family Practice
Kikano et al.	2000	Task	Coding Complexity	Archives of Family Medicine
King et al.	2002	Task	Coding Complexity	Archives of Internal Medicine
Zuber et al.	2000	Task	Coding Complexity	Journal of Family Practice
Adams et al.	2002	Structure	U.S. System of Reimbursement	Journal of National Medical Association
Brunt	2011	Structure	U.S. System of Reimbursement	Health Economics
Kumetz et al.	2013	Structure	U.S. System of Reimbursement	Chest
Lorence et al.	2002	Structure	U.S. System of Reimbursement	Journal of Management in Medicine
Doan	2011	Structure	Criminal and Civil Penalties	Annals of Health Law
Maxham	2014	Structure	Criminal and Civil Penalties	Public Contract Law Jounal

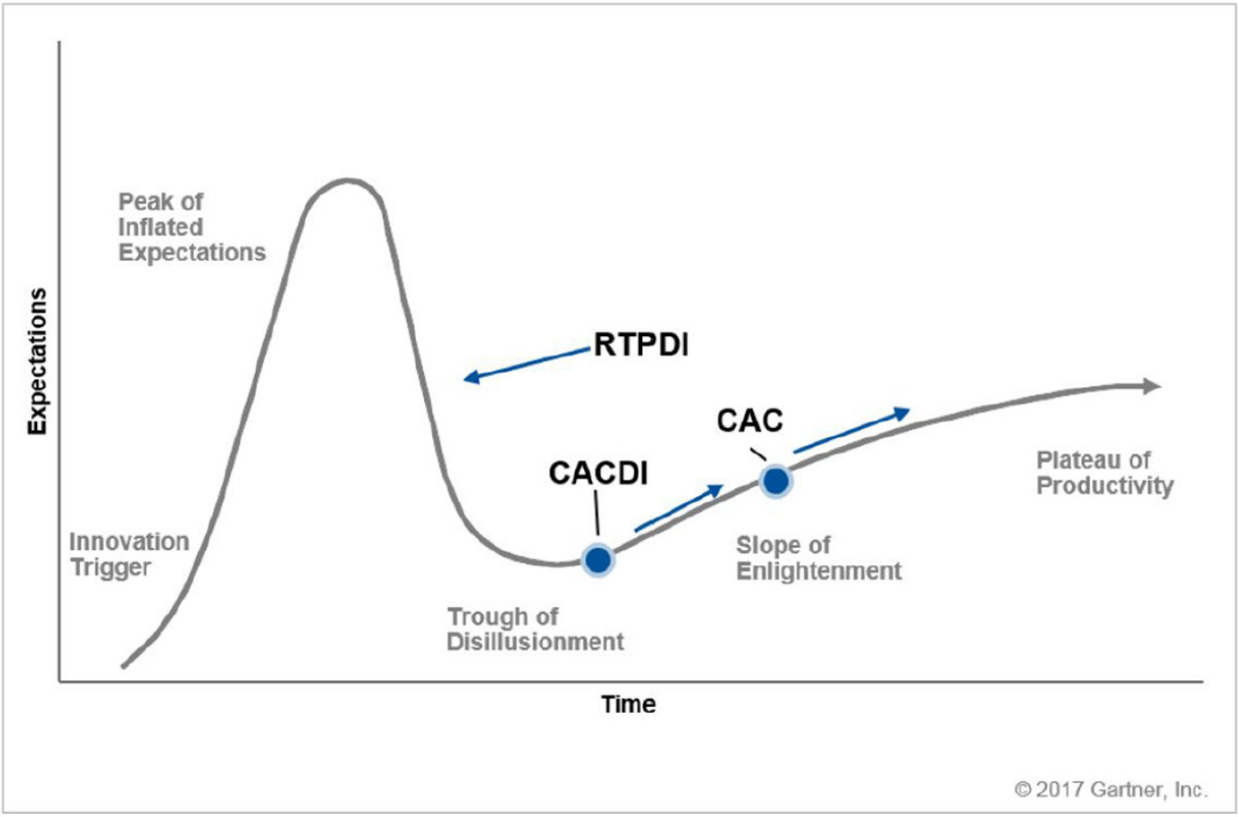
Duszak et al.	2004	Structure	Centralized Coders	Journal of American College of Radiology
Adler-Milstein et al.	2014	Technology	EMR	Health Affairs
Bowman	2013	Technology	EMR	Perspectives in Health Information Management
Cearnal	2013	Technology	EMR	Annals of Emergency Medicine
Kabene	2010	Technology	EMR	Healthcare and the effect of Technology
Kumar et al.	2011	Technology	EMR	Technology and Healthcare
Shaffer et al.	2017	Technology	Machine Learning	Gartner Report
Rohr	2015	Technology	Machine Learning	Physician Leadership Journal
Shachak et al.	2010	Technology	EMR	Healthcare and the effect of Technology

Appendix B: E/M Billing Parameters and Reimbursement

E/M Code	Description	History	Physical Examination	Medical Decision Making	2018 Medicare Reimbursement
99201	Level One - New Patient Office Visit	Problem-focused	Problem-focused	Straightforward	$45.36
99202	Level Two - New Patient Office Visit	Expanded problem-focused	Expanded problem-focused	Straightforward	$76.36
99203	Level Three- New Patient Office Visit	Detailed	Detailed	Low Complexity	$109.80
99204	Level Four - New Patient Office Visit	Comprehensive	Comprehensive	Moderate complexity	$167.40
99205	Level Five - New Patient Office Visit	Comprehensive	Comprehensive	High complexity	$210.60

Source: Adapted from Centers for Medicare and Medicaid Services (2019)

Appendix C: Gartner's 2016 Hype Cycle for Healthcare Providers: CAC and CACDI Placement



Source: Shaffer et al. 2017

Reproduced with permission. Gartner. Market guide for healthcare computer-assisted coding, computer-assisted clinical documentation improvement and real-time physician documentation improvement. Shaffer V, Mann B, Sachdeva M. 29 June 2017. ID G00276035.

Glossary of Key Terms

Term	Definition
ACO	Accountable Care Organization; ties payments to quality metrics and cost of care.
CMS	Center for Medicare and Medicaid Services, a federal agency within the U.S. Department of Health and Human Services, that administers Medicare and works in conjunction with states to administer Medicaid.
CPT	Current Procedure Terminology code set; maintained, updated, and copyrighted by the AMA.
EHR	Electronic Health Record; a longitudinal collection of an individual patient's medical history.
E/M	Evaluation and Management services represented by a five-digit numeric code within the CPT code set. They represent face-to-face visits between physician and beneficiary. Each code and code level represents the type of clinical setting (hospital, outpatient), the complexity of the visit, and whether the visit is a new patient visit or a follow-up visit.
EMR	Provider-created Electronic Medical Record of specific encounters; the data source for a patient's EHR.
ICD	International Classification of Diseases codes created and maintained by the World Health Organization. In the U.S., ICD-10 coding was mandated starting in 2015.
Improper Payment	Payments made by Medicare that should never have been made due to inadvertent billing errors such as payments for unsupported or inadequately supported claims, payments for services not rendered, duplicate payments, miscalculations, ineligible beneficiaries and payments from outright fraud from program participants.
Medicare	National health insurance program, administered by the US Federal government since 1966, for Americans age 65 and older who have worked and paid into the system through payroll taxes. Medicare Part B: "The Medicare program is divided into four parts Part A, Part B, Part C and Part D. Part A and Part B make up the fee-for-service program. Part B visits include physician visits, outpatient care, preventive services, home health supplies" Medicare Fraud: knowingly and willfully executing a scheme to defraud the Medicare program.
NLP	Natural Language Processing, a form of artificial intelligence that helps computers understand, interpret and manipulate human language.
OIG	HHS Office of the Inspector General; an independent organization commissioned by the federal government to fight fraud, waste and abuse. OIG investigations result in criminal convictions and penalties, civil settlements and administrative actions against those who commit fraud.
Under-coding	Billing for a level of service that is lower than the actual service provided
Over-coding	Billing for a level of service that is higher than the actual service provided