

Process Improvement Initiative in a Physician-owned Medical Practice: a Pretest-posttest Study

Kelley Allen

University of the Incarnate Word

Thomas Teeter

University of the Incarnate Word

ABSTRACT

In the past two decades, the U.S. healthcare marketplace has seen a dramatic shift away from physician-owned private practices. Once the norm, as of 2022 the American Medical Association reported less than 50% of physicians work in private practice (AMA, 2023). Faced with declining reimbursements and increasing administrative burden and costs, many physicians have acquiesced to vertical integration and now work for a hospital or healthcare system. This trend towards system-acquired practices means that to remain competitive, private practices have to provide exceptional patient care and outcomes while streamlining processes, cultivating lean practices, and increasing profitability. This pre-test post-test study spotlights ABC Sports Medicine, a privately-owned medical practice that was the focus of a clinical coding process improvement initiative. The study provides an overview of challenges facing the practice, describes a process improvement initiative, and offers a two-year follow-up demonstrating initiative's impact on the practice. This study compares the pre- and post-intervention coding of patient office visits and found that when physicians are aware of coding anomalies, coding can be improved, leading to higher collections. Key discoveries include the importance of accuracy in CPT billing codes, ease and minimal cost or effort of process improvement implementation, and the importance of viewing a private medical practice as a for profit business that maintains a focus on excellent patient care and quality outcomes. The study also offers insights into private practice management issues and challenges faced in modern healthcare practices in the U.S.

Keywords: CPT codes, Lean Six Sigma, private practice, ICD 11 codes, process improvement, physician ownership, hospital acquisition, small business, partnership, vertical integration.

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INTRODUCTION

There is extensive research on process improvement initiatives for hospitals, hospital systems, and hospital departments (Johannessen & Alexandersen 2018; Gavriloff et al., 2017). Existing literature has not looked at this issue in the private practice setting. Private practices are increasingly becoming hospital-owned, which leads to higher costs for patients and payors and declining income and job-satisfaction amongst providers. Looking for ways to encourage private medical practices to stay private would benefit all stakeholders in the U.S. healthcare system, including patients, payors, providers, and taxpayers. The 2022 American Medical Association benchmark survey found that 13% less physicians are in private practice in the U.S. than in 2021 (AMA, 2023). Findings indicated that more than half of U.S. physicians work for a hospital or hospital system (AMA, 2023). The impact of hospital acquisition of private medical practices on the overall healthcare marketplace has overwhelmingly been to increase costs for patients, insurers, and taxpayers (LaPointe, 2018; Owens, 2019; Madison, 2004; Muoio, 2021). This pre-test post-test study focused on potential ways to increase revenues in a private practice setting thus increasing the chance that the practice can stay profitable and avoid vertical integration. This research proposed that applying a process improvement initiative in the private practice setting could identify ways to reduce costs, increase revenues, or both, with minimal additional cost to the practice.

As physician reimbursements decline and administrative burdens increase, it is critical for privately-owned medical practices to maintain a focus on cost reduction and efficiencies in addition to patient care (Cass, 2022; Centers for Medicare Services, 2022; Coffron & Zlatos, 2019). Many private practices struggle with the business side of running a medical practice. Lacking sufficient attention to administrative functions, many practices are succumbing to the vertical integration trend and selling their practices to hospitals or hospital systems (La Pointe, 2019; Muoio, 2021; AMA, 2023).

Manufacturing and service industries have embraced Lean Six Sigma (LSS) and reaped the benefits of cost reduction, increased customer satisfaction, and improved staff empowerment through implementation of continuous improvement policies (Jevanesan et al., 2021). Jevanesan et.al (2021) reinforces the pervasive staying power of LSS application in service and manufacturing, and points out that LSS can also benefit other sectors as well. LSS is not a trendy new business tactic; it now has a strong and growing foothold in organizational success.

This quantitative study focuses on ABC Sports Medicine, a successful, thriving, multi-specialty medical practice owned by a group of physician partners that employs several additional physicians. According to the Center for Medicare Services, ABC is considered a large group practice as they have more than 15 physicians (Centers for Medicare Services, 2022). A process improvement project was proposed in 2020, with the initial intent of determining the best way to utilize unused clinic capacity and maximize income. As the project evolved, it became apparent that clinic scheduling and developing alternative uses for unused, paid-for clinic capacity, although an important issue, was both complex and time and labor intensive. A high-level review of the practice from a business perspective revealed other potential targets for process improvement that would be faster to implement. At that time, it was determined that a more efficient process improvement intervention was needed. Process improvement targets needed to meet the following criteria: they needed to be measurable, easy to implement, and either low-cost or no additional cost. Through private document analysis, discussion with partners and business office employees, and in-depth literature review, it became clear that there

were four clear areas in need of process improvement which met the criteria for immediate implementation. The four recommendations that met this criteria were correction of coding errors, increasing internal physical therapy (PT) referrals, increasing ancillary income, including durable medical equipment (DME), magnetic resonance imaging (MRI) and X-ray, and offering medically appropriate injections. This study specifically focuses on the impact of addressing under-coding issues which lead to underbilling and reduced revenue (Waller, 2007).

The key understandings include the relevance of process improvement initiatives within small businesses and the potential impact of such initiatives including increased revenues and cost containment. Findings are relevant not only to medical practices, but also to small businesses in other industries owned by sole proprietors or partnership groups. It is significant because private physician practices are closing and physicians are now more often employed by hospitals than by a private group practice (American Medical Association, 2023). In order to help private practices stay privately owned, grow, and thrive, they must increase revenues and decrease costs without sacrificing excellent patient outcomes (LaPointe, 2019).

Key Terms:

CPT codes: (Current Procedural Terminology) Medical codes that specify what type of service was provided to a patient; tied to the ICD-10 or ICD-11 diagnosis code.

Vertical integration: hospital acquisition of private medical practices; this occurs when a hospital or hospital system buys a primary care or specialty medical practice and the physicians now work for the hospital (Whaley, 2021).

Lean: A method for process improvement in management efficiency by identifying customer value, understanding the value-stream, creating an optimal work flow, and generally operating with a focus on continuous improvement (Schouten et al., 2021).

Six Sigma: A process improvement methodology founded in the manufacturing industry whose application has been effective at improving quality in many industries; it is a highly specific process that follows the principle that all business processes should be measured, monitored, and controlled through effective application of the DMAIC steps. DMAIC, define, measure, analyze, improve, control, are the strategic foundation of Six Sigma (Hernandez-Lara et al., 2021). Six Sigma seeks to reduce waste and improve quality (Hernandez-Lara et al., 2021).

ICD-10 Codes: ICD-10 (International Classification of Disease) codes are the codes that classify a specific type of patient visit, symptom, procedure, or diagnosis for billing and claims purposes; these codes were used until January, 2022 when they were replaced by ICD-11 codes (AMA, 2019).

ICD-11 Codes: ICD-11 (International Classification of Disease) codes are the codes that classify a specific type of patient visit, symptom, procedure, or diagnosis for billing and claims purposes; these codes replaced ICD-10 codes effective January, 2022 (AMA, 2019).

LITERATURE REVIEW

There are significant publications on process improvement in hospitals, hospital departments, and hospital-owned practices, yet little research in the area of private practice for several reasons. There is a perception that initiatives like Lean or Six Sigma are too expensive or will not work (Kam et al., 2021; Morrell-Santandrea et al. 2021). Additionally, private practices are already facing significant administrative burdens and the idea of any additional administrative burden is not well-received. (Cass, 2022; Centers for Medicare Services, 2022; Coffron & Zlatos, 2019). The majority of private practices are now owned by hospitals or hospital systems, so the majority of the process-improvement research in the medical field is done in the hospital setting (American Medical Association, 2023). A literature review for this topic largely yields process improvement initiatives focused on specific process improvements, health outcomes, or a combination of process improvements and health outcomes improvements. The literature exhibits a paucity of research in the specific area of private practice. This research study is timely and relevant due to the increasing number of private practices in the U.S. failing due to practice management issues. The main driver for these acquisitions seems to be the attractiveness of offloading the administrative burdens associated with medical practice management in order to focus on patients (LaPointe, 2019).

Patient Outcomes

In some settings, especially where reported patient satisfaction is low or patient outcomes are poor, health outcomes need to be the focus of any process improvement initiative. A Define, Measure, Analyze, Implement, Control (DMAIC) framework utilizing Lean processes adopted in one outpatient clinic setting employed three interventions with the goal of improving care for high-needs patients (Cho et al., 2020). It more closely approximated Lean in a private clinic setting than much of the hospital-based research. The project focused on three interventions: formal hospital discharge protocols, a model focused on behavioral health, and groupings of small resident practices (Cho et al., 2020). These interventions led to significant reductions in hospitalizations and emergency room patient visits and overall improvements in patient satisfaction and continuity of care (Cho et al., 2020).

Process Outcomes

In some cases, patient outcomes and patient satisfaction are high and the priority is cost containment, workflow process improvement, and waste or redundancy reduction or elimination. In this clinic situation, focus on specific process improvement is key. Lean has been successfully used in business and manufacturing to achieve these aims and has potential application in healthcare as well.

A literature review of Lean in healthcare conducted by Rees and Gauld found that the impact of Lean in private healthcare settings was ambiguous and there is little understanding of the potential negative impacts (Hung et al., 2018; Rees & Gauld, 2017). In some cases, Lean actually increased workload and in others it led to greater job satisfaction and increased productivity (Hung et al., 2018; Rees & Gauld, 2017). The review led to recommendations for research into the socio-cultural impacts of Lean in healthcare and its impacts on work flow and productivity (Rees & Gauld, 2017).

Level-loading, or production leveling, occurs in the healthcare context when excessive patient volume is transferred to a less busy facility to level the patient load across facilities (Lee et al., 2022). Level-loading is a novel scheduling system whereby the timing of patient visits and patient access to care are precisely coordinated to maximize utilization of clinic resources (Gavriloff et al., 2017). A study by the Institute of Medicine employed level loading in a pediatric ambulatory specialty clinic resulting in shorter patient waiting times, greater patient volume seen in the clinic, and increased revenues attributable to the 2,118 additional patients

Use of Value Stream Mapping (VSM) in Norwegian healthcare clarified the dramatically different landscape of healthcare in countries with socialized medicine (Johannessen & Alexandersen, 2018). VSM was used to reduce waiting time for appointments by identification of workflow bottlenecks and sources of waste demonstrating that relatively unsophisticated changes implemented without commensurate financial burden could positively impact waiting time (Johannessen & Alexandersen, 2018). Success was demonstrated through an average reduction in waiting time to get a patient appointment from 162 +/- 69 days to 52 +/- 10 days, and the number of new patients waiting to get an appointment was reduced from 15,874 to 8,922 after VSM implementation (Johannessen & Alexandersen, 2018).

In a literature review on Value Stream Mapping, from 2015-2019 VSM was found to be used predominantly in the U.S. and was mostly concerned with productivity metrics rather than indicators of sustainability (Marin-Garcia et al., 2021). VSM is often the first step in implementation of Lean and in the context of healthcare aims to increase patient satisfaction through a focus on continuous improvement with the primary goal of reducing and eliminating waste created by non-value-added activities (Marin-Garcia et al., 2021). The review also found that VSM was most often used in the hospital setting although potential applications exist in the outpatient and primary care settings (Marin-Garcia et al., 2021). A review of 38 Australian studies found that VSM was effectively used to reduce patient waiting times through realignment of resources, implementation of process improvement strategies, and improvement of operational efficiency (Naiker et al., 2017).

Lean Six Sigma was implemented in an outpatient ophthalmology clinic and effectively reduced waiting times for patients and increased service capacity without any additional financial expenses (Kam et al., 2021). Although this research was done in a publicly-funded clinic, the outpatient setting yielded relevance to healthcare in private practice settings. In this context, LSS was shown to reduce both the length and variation of patient time spent in clinic while increasing the clinic capacity to service patients (Brassard & Ritter, 2016; Kam et al., 2021). Lean tools have also been shown to improve management of primary care offices leading to more rapid adaptability to change and improvements in work culture in healthcare (Morrell-Santandreu et al. 2021).

Patient and Process Outcomes

Most of the relevant articles focused solely on process improvement outcomes and focused little if at all on patient-centric outcomes. One case study on process improvement programs implemented in surgical patients considered the improvements as they related to structure, processes and patient outcomes (Minami et al., 2017). Looking at the potential for process improvement implementation in healthcare as it relates to surgical patients is unique because it has to include initial diagnosis, often by a primary care physician which is subsequently confirmed by a surgeon. It also includes pre- and post-operative outpatient

appointments, the surgery itself, and possibly physical therapy or would care. Structural measures are easily observable but not easy to change (Minami et al., 2017). Patient outcomes measures are indicative of good care or poor care but do not easily confer the reasons for the variances in outcomes while process improvement metrics are both associated with outcomes and correlated with quality improvement programs (Minami et al., 2017). It is critical that process improvement metrics be evaluated in the context of both impact on workflow and structural measures but also on patient outcomes in order to gain a complete understanding of their impacts.

Discrete Event Simulation (DES) is a process improvement tool frequently utilized in healthcare settings that is focused on optimizing solutions and evaluating results based on impact on costs and efficiencies (Demirli et al., 2021). DES can be applied to facility layout, scheduling, employee, physician, and patient engagement, and process redesign (Demirli et al., 2021). DES helps Lean to be more agile in the healthcare setting due to its dynamic ability to model multiple variables in complex settings (Demirli et al., 2021). DES used in combination with Lean techniques, was applied to the outpatient clinic setting with the goals of increasing patient capacity in the clinic, reducing patient waiting times to get appointments, and reducing patient waiting times during their clinic visits (Demirli et al., 2021). In the outpatient clinic study, Lean and DES achieved the desired outcomes, but at a significant cost of time and interference with usual clinic functions (Demirli et al., 2021). Overall, they found that facility layout planning should be targeted to minimize wastes as this can be applied with minimal disruption; additionally, several viable options were presented as solutions, such as assigning each physician two exam rooms and a scribe, and each of these could be piloted within a clinic in order to ascertain what works in a specific healthcare setting (Demirli et al., 2021). Overall, DES combined with Lean has excellent potential for improvements but is time and labor intensive and complex to implement.

METHODOLOGY

The study design is a quasi-experimental pre-post intervention study. The process improvement project developed through the application of Lean Six Sigma methodology. The researcher collected baseline data on physician coding practices before implementing the process improvement initiative, and then collected follow-up data after the intervention was implemented. The practice is composed of two main types of physicians: primary care sports medicine physicians and surgeons, orthopedic and podiatric. The same groups of physicians were measured before and after the intervention, and the changes in the outcome measures were compared to determine the effectiveness of the intervention. Baseline data from Q4 2019 and Q1 2020 was compared to similar data with the same physicians from Q4 2021 and Q1 2022. Based on the fact the practice physicians see very similar types of patients, when average over two quarters, the percentage of patients coded each CPT coding level should be fairly consistent. Any significant data outlier represent potential under coding or worse, a potential billing flag for Medicare. The data was provided by the ABC Sports Medicine business office.

This study specifically focuses on the results on the implementation of one of the four suggested process improvements, correction of under-coding. Once the scope of this study was determined, each of the targets were quantified and baseline numbers established so that results could be accurately assessed after the recommendations were implemented.

The independent variables are CPT codes for new patient and existing patient office visits, coded 1,2,3,4 or 5 respectively based on type of patient visit, symptom, procedure, or diagnosis, the complexity of the medical decision-making involved, the number of body parts addressed, the amount of time spent, and necessity for testing, procedures, and additional interventions (AAFP, 2021; AMA, nd; Giovino, 1999; Stern, 2022). The researcher looked at physician-level data on the percentage of each type of office visit billed by the individual physicians over two consecutive quarters. Q4 2019 and Q1 2020 were used because typically the fourth quarter is the busiest quarter of the year and the first quarter is the slowest. By looking at data from two quarters, data anomalies would be minimized. The recommendations for process improvement in CPT coding were presented to the physicians in April of 2021. The post-intervention data set covered Q4 2021 and Q1 2022, allowing for time for the physicians to make changes regarding their coding practices. Again two quarters were averaged to avoid data anomalies. The hypothesis was that the doctors' post-intervention coding would be closer to the best practice percentages identified at the start of the project. Best practice percentages were established looking at the coding of the senior sports medicine partner with the most consistent coding and the senior orthopedic surgeon partner with the most consistent coding. The impact of this outcome should be an increase in revenue for office visit collections, as indicated in Table 1 (Appendix).

The study is completely blinded. All identifiers were removed to protect the confidentiality of the practice and physicians, including names, locations, and any other data which could serve as an identifier. Much of the data used is private financial data that is not available to the public.

ETHICAL CONSIDERATIONS

The primary ethical considerations involved maintaining the privacy of the physicians and business office of ABC Sports Medicine. As a privately-owned business, the financial information is not available for public consumption. The study was completely blinded. All identifiers were removed to protect the confidentiality of the practice and physicians, including names, locations, and any other data which could serve as an identifier and use of pseudonyms where appropriate. Much of the data used is proprietary financial data that is not available to the public.

LIMITATIONS

The study included a small number of physicians. This study used benchmarks from two senior partner physicians within the practice. The study only looked at patient office visits in clinic for new and established patients. It did not consider injections, ancillary services, durable medical equipment sales, physical therapy, surgeries, or office visit modifiers. Potential influencers of behavioral change were not address but could include: coding training, reading articles related to coding or Medicare codes, and peer discussion among others. It did not look at post-operative follow-ups or office visits for drain removal. This also does not account for patient volume that was diverted to new employee physicians; as of 2022, three additional new physicians were hired. This also does not consider modifications in coding definitions. One of the orthopedic surgeons hired a physician's assistant whose billing falls under his name; she was

not privy to the intervention and thus her addition possibly confounded the results for that provider.

RESULTS

Two years after the process improvement recommendations were made and ABC physicians were apprised of coding benchmarks and where they were potentially under coding, average per patient collections and number of patients coded respectively levels I-V were assessed to ascertain whether changes had been made. 99% of office visits for both new and established patient are still coded at level II-IV, with the majority being level III or IV, as indicated in Graph 1 (Appendix). Therefore, the greatest potential for under coding error is coding a level 3 when the visit should be coded a level 4. Due to the infrequency of level I coded visits, we removed CPT codes 99211 and 99201 from the data sets, representing level I existing patients and level I new patient visits respectively. (AAFP, 2021).

After comparing the baseline percentages for office visits coded levels I-IV to post-intervention percentages for office visits coded levels I-IV, it was clear that the intervention was successful; an improvement in alignment with best practice coding percentages was observed in the majority of the physicians, as indicated in Table 3 (Appendix). For new patients, 9 of 12 physicians increased the percentage of office visits coded level IV and 7 of 12 reduced the percentage of office visits coded level III. For existing patients, 5 of 12 physicians increased the percentage of office visits coded level IV and 5 of 12 reduced the percentage of office visits coded level III.

For example, the average sports medicine physician in the U.S. sees approximately 20 patients per clinic, where a clinic is defined as a morning or afternoon block of time, usually 8:00 AM-12:00 PM or 1:00 PM-5:00 PM. Based on 2022 Medicare reimbursements for patient office visits, as indicated in Table 1 (Appendix), the reimbursement difference between a visit coded level 3 and level 4 for a new patient is \$55.72, and for an existing patient, the difference is \$37.72. If one physician in a group is under-coding level IV visits in 20% of their patient visits, this could amount to lost revenue of approximately \$200 per clinic. At eight clinics per week and 48 working weeks per year, that amounts to a revenue loss of \$76,800 per year, per physician.

DISCUSSION

The hypothesis was that CPT coding percentages would be closer to the best practice percentages identified at the start of the project. If this occurred, that would indicate the correction of under-coding, which will increase revenues for patient office visits without incurring any additional cost or time.

Two years after the process improvement recommendations were made and ABC physicians were apprised of coding benchmarks and where they were potentially under coding, number of patients coded respectively levels I-V were assessed to ascertain whether changes had been made. 99% of office visits for both new and established patient are coded at level II-IV, with the majority being level III or IV. Therefore, the greatest potential for under coding error is coding a level 3 when the visit should be coded a level 4.

Post-intervention data indicated that making physicians aware of the potential for under-coding had a positive impact for practice revenues. This study demonstrates that a simple, easy process improvement intervention can positively affect private practice revenue.

This research was based on readily available data from the business office of a privately owned medical practice. This research has the potential to impact existing research by showing the utility of process improvement programs in private medical practices and other types of privately owned businesses. Given the current medical climate in the United States that is focused on vertical integration, this research provides a unique perspective on maintaining private ownership.

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APPENDIX

Table 1

Difference in Reimbursement Amounts for Level-I through Level-V Office Visits

| ICD-11 code | Level of Office Visit | Reimbursement Amount new patient | Difference in 1 Level under coded (new patient) | Reimbursement Amount Established Patient | Difference in 1 Level under coded (Established) |
|----------------|--|----------------------------------|---|--|---|
| 99211 | Office visit (OV) for established patient, does not require physician presence (Stern, 2022) | na | na | 38.76 | na |
| 99202 99212 | OV problem focused, 1 part of body, straightforward decision-making, low complexity diagnosis (1 point), minimal risk (Walker, 2007) | 74.06 | na | 57.45 | 18.69 |
| 99203 99213 | OV expanded problem focused, one body part, limited complexity diagnosis (2 points), low risk (Walker, 2007). | 113.85 | 39.79 | 92.05 | 34.6 |
| 99204 99214 | OV with 2/3 of the following: detailed history, detailed exam, medical decision making of moderate complexity (Giovino, J., 1999) | 169.57 | 55.72 | 129.77 | 37.72 |
| 99205 99215 | OV with extensive decision-making, extensive time, multiple body parts, testing required, possible consultation (Giovino, 1999) | 224.25 | 54.68 | 183.07 | 53.3 |

Note: All reimbursement amounts are based on 2022 reimbursement amounts. All office visits are subject to modifiers depending on testing ordered, additional diagnoses, injections, etc.

Table 2

| Number of office visits by code | | | | | |
|---------------------------------|-----------------|---------|---------|------|------------|
| PHYSICIAN | CODE NEW & EST. | Q4 2019 | Q1 2020 | SUM | PERCENT |
| Dr. A | 99211 | 0 | 0 | 0 | 0 |
| | 99211/201 | 0 | 0 | 0 | 0 |
| | 99212/202 | 65 | 45 | 110 | 0.04253674 |
| | 99213/203 | 1158 | 845 | 2003 | 0.7745553 |
| | 99214/204 | 155 | 317 | 472 | 0.18252127 |
| | 99215/205 | 1 | 0 | 1 | |
| TOTAL | | 1379 | 1207 | 2586 | |

Note: For this example, on average for the two billing quarters Q4 2019 and Q1 2020, Dr. A coded 4.25% of his office visits as Level II, 77.5% as Level III, and 18.3% as Level 4.

Graph 1

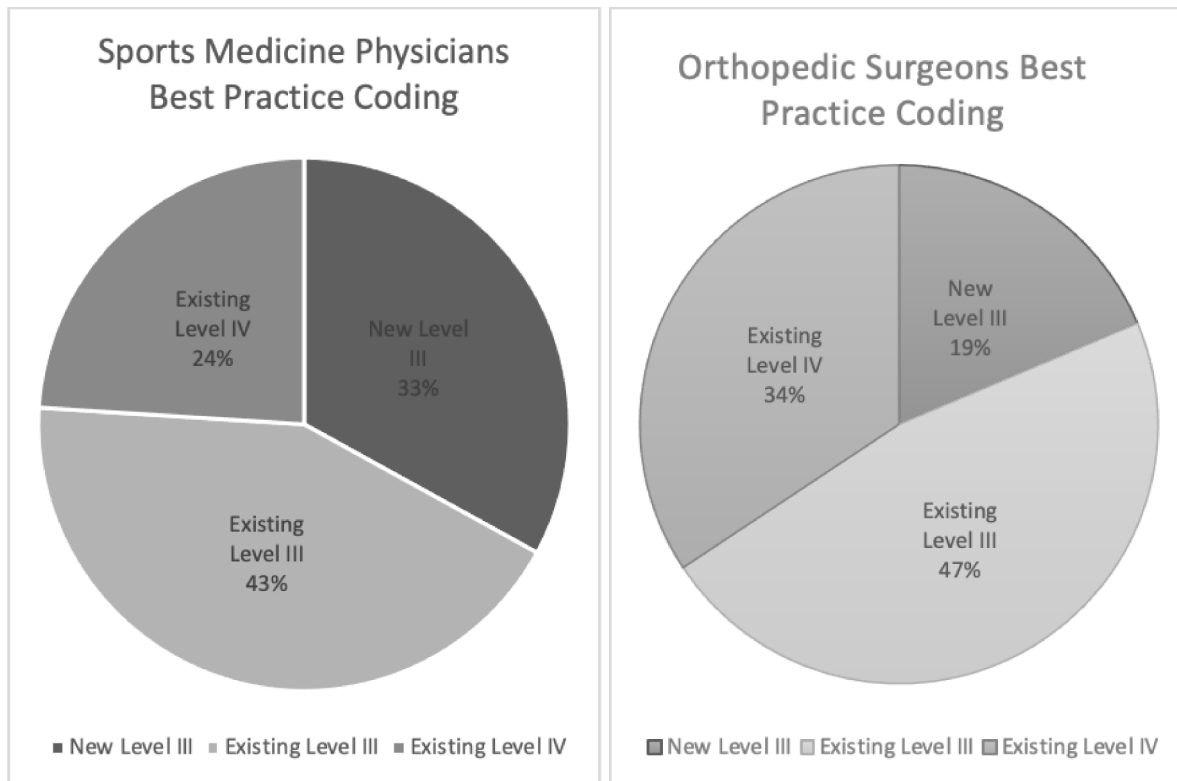
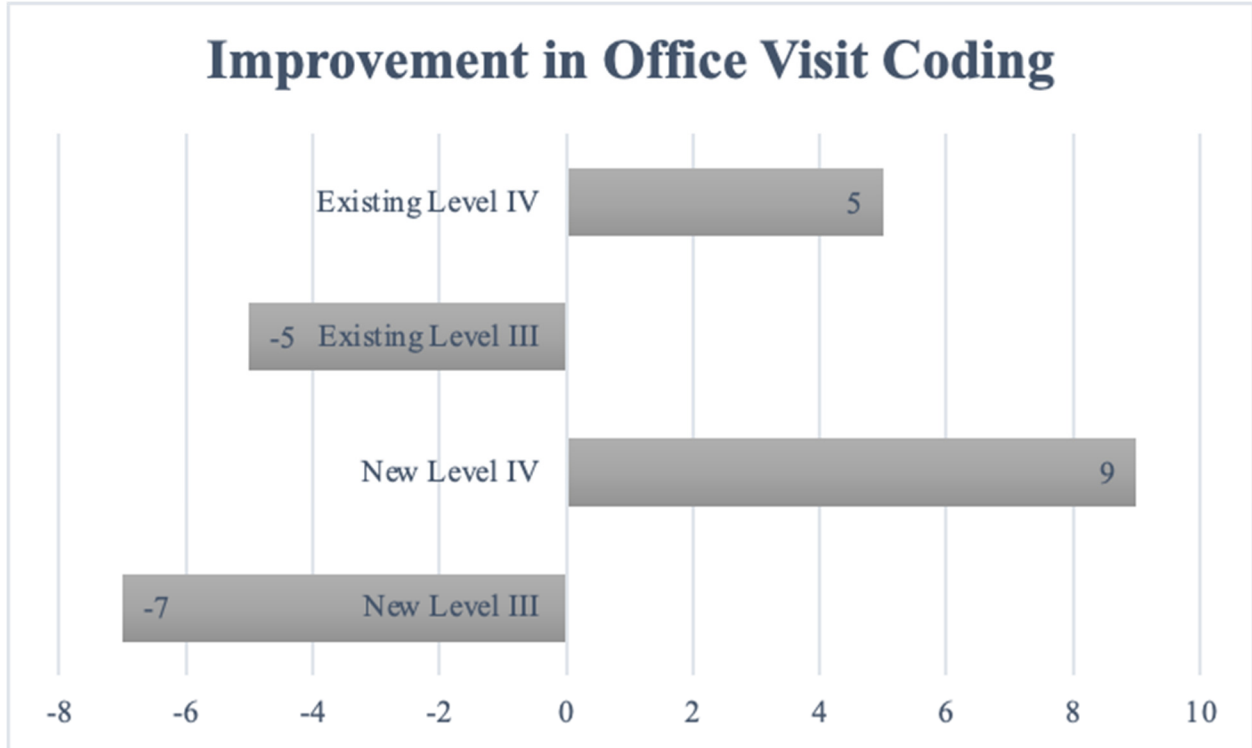


Table 3



This table shows that 9/12 physicians increased their percentage of office visits for new patients coded level IV, 5/12 increased their percentage of office visits for existing patients coded level IV, 7/12 decreased the percentage of new patient visits coded level III, and 5/12 decreased the percentage of existing patient visits coded level III.