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# Coding Practices in Hand Surgery and Their Relationship to Surgeon Compensation Structure

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*Purpose:* To evaluate the coding practices of hand surgeons in the American Society for Surgery of the Hand with respect to practice compensation structure using common, representative hand surgery cases.
*Methods:* We developed a survey of demographic factors and 4 commonly encountered hypothetical hand surgery cases. This survey was emailed to the members of the American Society for Surgery of the Hand. Respondents were asked to code these cases using prepopulated applicable Current Procedural Terminology codes or any other codes of their choosing. The membership responses were then compared with those of 3 independent orthopedic coders.
*Results:* Of the 4,477 invitations sent, a total of 421 (9.4%) respondents completed the survey. There was notable heterogeneity in the Current Procedural Terminology code choices for the trapeziectomy and distal radius fracture cases. Physicians with a collections-based model coded for significantly higher work-related value units on average compared with the fixed salary– and relative value unit–based physicians for the trapeziectomy case (14.41 vs 13.65 and 13.67, respectively; $P < .05$). The 3 independent coders all chose a single Current Procedural Terminology code for the carpal tunnel release, distal radius fracture, and scaphoid nonunion cases. The percentages of physician responses that selected only these codes were 84.6% (carpal tunnel release), 61.0% (distal radius fracture), and 73.6% (scaphoid nonunion). Physicians were less likely to code in line with the independent coders for the distal radius fracture case compared with other cases, particularly those physicians with a collections-based model.
*Conclusions:* The compensation model may be associated with coding practices for more complicated hand cases. The additional work-related value units potentially billed can quickly accumulate for frequently performed procedures. This wide variation supports a need for more frequent and accessible communication and education on coding practices in hand surgery.
*Clinical relevance:* Improved communication and education regarding appropriate coding practices as well as easily accessible reference material may assist in minimizing coding discrepancies for surgical hand procedures.



Coding in hand surgery is crucial to accurately determine both the procedure performed for a patient and to quantify the amount of work done by the surgeon. Current Procedural Terminology (CPT) codes, created and updated by the American Medical Association, are used to identify specific medical services and procedures performed and to guide reimbursement.[1] Coding errors, whether due to fraudulence or inaccuracy, can lead to substantial fines and civil penalties by the Department of Health and Human Services.[2]

Despite the importance of accurate coding, studies find that physicians and residents are often unaware of proper billing codes.[3] Surgeon compensation structures may influence patterns in the coding of procedures. It has been found that productivity-based compensation models, including work-related value unit

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(wRVU)–based and collections-based models, are associated with an increased incentive to perform procedures and testing.[4] Similarly, a retrospective study of joint arthroplasty surgeons found that transition toward a productivity-based compensation model was associated with higher rates of surgical procedures.[5]

The coding practices of hand surgeons have previously been studied. Lifchez et al[6] found heterogeneity in the coding practices of both attendings and residents and advocated for greater emphasis on coding education during training. However, their sample size was small and included only 22 attending-level orthopedic surgeons. Furthermore, the role of the compensation structure on coding practices in hand surgery remains unclear. The primary purpose of our study was to evaluate the coding practices of hand surgeons in the American Society for Surgery of the Hand (ASSH) with respect to practice compensation structures using common, representative hand surgery cases.

## Materials and Methods

This study was designed as a descriptive study of the ASSH members. With prior approval from the ASSH, the membership listserv was queried for physician email addresses. Between May 2019 and July 2019, all ASSH members were sent an invitation to complete an anonymous survey. Participation was voluntary, and no incentives were offered. The survey consisted of 2 sections as shown in Appendix 1 (available on the *Journal*'s website at www.jhsgo.org).

The first section captured demographic data, including years in practice, the setting of practice, practice structure, compensation model, and who routinely performs coding and billing for respondents' procedures. The second section provided the respondents with 4 representative descriptions of hypothetical hand surgery cases that the hand surgeons frequently encounter.[7,8] The respondents were asked to select all applicable CPT codes for each case and to indicate whether any code other than the ones provided would be applicable to the case. The respondents were provided with a list of CPT code choices, with a description of the code that was based on the senior author's expert opinion as to realistic choices for each case. Additionally, there was an option for the respondents to enter additional codes that were not listed. The 4 cases provided were as follows:

1. Open carpal tunnel release performed under surgeon-administered local anesthesia for idiopathic carpal tunnel syndrome
2. Extra-articular distal radius fracture open reduction internal fixation performed through volar approach under regional anesthesia
3. Trapeziectomy for basal joint arthritis with surgeon-preferred method of reconstruction under regional anesthesia
4. Open treatment of scaphoid nonunion through volar approach with internal fixation and cancellous autograft

Participant responses were stratified into 3 groups based on the compensation model (collections, fixed salary, and relative value unit [RVU] compensation models) reported for data analysis. The wRVU value associated with a participant response to a case was calculated using publicly available data from the American Academy of Professional Coders website.[9] Additionally, 3 independent professional coders were asked to evaluate the 4 hypothetical cases. Their responses were defined as the "preferred" codes and were used for comparison to determine coding agreement. Categorical variables were reported as counts and percentages of the total group, and continuous variables were reported as means and SDs. To detect differences between the groups, 1-way analysis of variance testing was performed. Significance was established at a $P$ value of $\leq .05$.

## Results

Of the 4,477 invitations sent, a total of 421 (9.4%) ASSH members completed the survey. Eighteen responses were excluded due to a lack of reported demographic information, leaving 403 responses for the final analysis. Table 1 summarizes the demographics for the respondents to the survey with respect to the compensation structure of their practice. Among the respondents to our survey, approximately half (49.4%) were compensated purely in relation to the revenue brought into their practice or hospital. Approximately one-third (32.0%) of the respondents reported being compensated on a pure salary basis without any incentives, and 18.6% were paid or incentivized on the basis of their RVU production. Collections-based compensation models were associated with smaller practice sizes. Fully salaried surgeons reported coding their own procedures at a significantly lower frequency than surgeons under other compensation models ($P = .036$).

The breakdown of CPT codes selected for case 1 with respect to compensation structure is summarized in Table 2. All the respondents selected CPT code 64721. Additionally, 58 (15.6%) respondents selected multiple CPT codes in response to the case.

The breakdown of CPT codes selected for case 2 with respect to compensation structure is summarized in Table 3. In response to this case, 132 (32.8%) respondents selected multiple CPT codes. The respondents with a collections-based structure were significantly more likely to select CPT code 76000 (0.3 RVUs) when compared to both fixed salary–based and RVU-based compensation structures ($P = .012$). Additionally, the respondents with RVU- and collections-based structures were more likely to select CPT code 25607 (9.56 RVUs) compared with respondents with a fixed salary–based structure ($P = .028$). When the respondents did not select CPT code 25607, they instead selected codes 25280, 25290, or 76000, or selected "other" codes as the primary code. When "other" was selected as the primary code, it was CPT code 25608 (open treatment of intraarticular distal radial fracture or epiphyseal separation with the internal fixation of 2 fragments).

The breakdown of CPT codes selected for case 3 with respect to compensation structure is summarized in Table 4. In response to this case, 297 (73.9%) the respondents selected multiple CPT codes. The respondents with an RVU-based structure were more likely to select CPT code 25447 (11.14 RVUs) than the respondents from the other 2 groups ($P = .008$). The respondents with a collection-based structure were more likely to select CPT code 25312 (9.82 RVUs) than those in the other 2 groups ($P = .044$). The collections-based respondents billed for greater wRVUs on average than either the fixed salary or RVU respondents (14.41 vs 13.65 and 13.67, respectively; $P = .030$). When the respondents did not select CPT code 25447, they instead selected code 25310, 26480, 25210, or 25312 as the primary code.

The breakdown of CPT codes selected for case 4 with respect to compensation structure is summarized in Table 5. All the respondents selected CPT code 25440. Additionally, 97 (26.4%) respondents selected multiple CPT codes in response to the case.

The 3 professional coders independently agreed that the preferred CPT code choices for cases 1, 2, and 4 consisted only of 64721, 25607, and 25440, respectively. There was disagreement among the coders for the proper CPT code choice for case 3, so it was removed from the analysis of "preferred" responses. The coding choices by the professional coders for case 3 included CPT codes 25445 (coder 1), 25447 (coder 2), and 25447 + 26480 (coder 3). An analysis of the percentages of responders that selected only these

**Table 1**
Responder Demographics*

| Variable | Collections (n = 199) | Fixed Salary (n = 129) | RVU (n = 75) | *P* value |
|---|---|---|---|---|
| Years in practice | | | | .581 |
| 0–2 y | 19 (9.55) | 23 (18.0) | 8 (10.7) | |
| 3–5 y | 25 (12.6) | 18 (14.1) | 12 (16.0) | |
| 6–10 y | 30 (15.1) | 17 (13.3) | 10 (13.3) | |
| 11–15 y | 31 (15.6) | 17 (13.3) | 15 (20.0) | |
| 16–20 y | 25 (12.6) | 17 (13.3) | 7 (9.33) | |
| 21+ y | 69 (34.7) | 36 (28.1) | 23 (30.7) | |
| Practice environment | | | | .096 |
| Urban | 78 (39.4) | 70 (54.3) | 34 (45.3) | |
| Suburban | 104 (52.5) | 48 (37.2) | 34 (45.3) | |
| Rural | 16 (8.08) | 11 (8.53) | 7 (9.33) | |
| Practice structure | | | | <.001† |
| Full-time academic faculty | 10 (5.03) | 55 (42.6) | 13 (17.3) | |
| Group practice (11+ members) | 76 (38.2) | 32 (24.8) | 32 (42.7) | |
| Group practice (2–10 members) | 77 (38.7) | 26 (20.2) | 16 (21.3) | |
| Solo practice | 33 (16.6) | 2 (1.55) | 3 (4.00) | |
| Military | 0 (0.00) | 3 (2.33) | 0 (0.00) | |
| Other | 3 (1.51) | 11 (8.53) | 11 (14.7) | |
| Who performs coding | | | | .036† |
| Self | 157 (78.9) | 82 (63.6) | 54 (72.0) | |
| Physician assistant/nurse practitioner | 1 (0.50) | 1 (0.78) | 0 (0.00) | |
| Non–health care provider | 34 (17.1) | 34 (26.4) | 15 (20.0) | |
| Resident or fellow | 0 (0.00) | 3 (2.33) | 0 (0.00) | |
| Other | 6 (3.02) | 9 (6.98) | 6 (8.00) | |
| Who performs billing | | | | .348 |
| Self | 31 (15.6) | 10 (7.75) | 10 (13.3) | |
| Physician assistant/nurse practitioner | 1 (0.50) | 1 (0.78) | 0 (0.00) | |
| Non–health care provider | 149 (74.9) | 111 (86.0) | 60 (80.0) | |
| Other | 17 (8.54) | 7 (5.43) | 5 (6.67) | |

* All values are represented as n (%).
† $P \leq .05$ denotes significant difference.

**Table 2**
CPT Coding for Case 1 (Carpal Tunnel Release)*

| CPT Code† (wRVU units) | Collections (n = 185) | Fixed Salary (n = 117) | RVU (n = 69) | *P* Value |
|---|---|---|---|---|
| 01810 (0.00) | 11 (5.95) | 9 (7.69) | 5 (7.25) | .821 |
| 20526 (0.94) | 6 (3.24) | 1 (0.85) | 3 (4.35) | .271 |
| 25295 (6.72) | 1 (0.54) | 0 (0.00) | 0 (0.00) | >.99 |
| 26145 (6.49) | 5 (2.70) | 2 (1.71) | 1 (1.45) | .897 |
| 26440 (5.16) | 2 (1.08) | 0 (0.00) | 0 (0.00) | .685 |
| 64721 (4.97) | 185 (100) | 117 (100) | 69 (100) | >.99 |
| 64727 (3.10) | 4 (2.16) | 0 (0.00) | 0 (0.00) | .187 |
| 69990 (3.46) | 2 (1.08) | 0 (0.00) | 0 (0.00) | .685 |
| Other | 8 (4.32) | 3 (2.56) | 3 (4.35) | .763 |
| wRVU | 5.24 ± 1.08 | 5.05 ± 0.52 | 5.07 ± 0.49 | .105 |

* CPT code selections are represented as n (%). Average wRVU values are represented as means ± SDs.
† CPT codes: 01810: anesthesia for procedures on the forearm, wrist, and hand; 20526: injection, therapeutic, carpal tunnel; 25295: tenolysis, flexor, or extensor tendon, forearm and/or wrist, single, each tendon; 26145: synovectomy tendon sheath, radical tenosynovectomy, flexor, palm or finger, single, each digit; 26440: tenolysis, simple, flexor tendon, palm or finger, single, each tendon; 64721: neuroplasty and/or transposition, median nerve at carpal tunnel; 64721: neuroplasty and/or transposition of the median nerve at the carpal tunnel including open release of the transverse carpal ligament; 64727: internal neurolysis, requiring the use of operating microscope; and 69990: operating microscope procedures.

**Table 3**
CPT Coding for Case 2 (Distal Radius Fracture Open Reduction Internal Fixation)*

| CPT Code† (wRVU units) | Collections (n = 199) | Fixed Salary (n = 129) | RVU (n = 75) | *P* Value |
|---|---|---|---|---|
| 25000 (3.55) | 3 (1.51) | 2 (1.55) | 0 (0.00) | .714 |
| 25280 (7.39) | 8 (4.02) | 2 (1.55) | 2 (2.67) | .499 |
| 25290 (5.43) | 14 (7.04) | 10 (7.75) | 3 (4.00) | .566 |
| 25295 (6.72) | 0 (0.00) | 0 (0.00) | 0 (0.00) | >.99 |
| 25607 (9.56) | 188 (94.5) | 114 (88.4) | 73 (97.3) | .028‡ |
| 29065 (0.87) | 2 (1.01) | 2 (1.55) | 1 (1.33) | .855 |
| 29075 (0.77) | 11 (5.53) | 10 (7.75) | 2 (2.67) | .361 |
| 76000 (0.30) | 55 (27.6) | 22 (17.1) | 10 (13.3) | .012‡ |
| Other | 11 (5.53) | 7 (5.43) | 5 (6.67) | .919 |
| wRVU | 10.07 ± 1.17 | 9.93 ± 0.89 | 9.76 ± 0.70 | .089 |

* CPT code selections are represented as n (%). Average wRVU values are represented as means ± SDs.
† CPT codes: 25000: tendon sheath incision, at radial styloid (eg, for de Quervains disease); 25280: lengthening or shortening of flexor or extensor tendon, forearm and/or wrist, single, each tendon; 25290: tenotomy, open flexor or extensor tendon, forearm and/or wrist, single, each tendon; 25295: tenolysis, flexor or extensor tendon, forearm and/or wrist, single, each tendon; 25607: open treatment of extra-articular distal radial fracture or epiphyseal separation, with or without fracture of ulnar styloid, with or without internal or external fixation; 29065: application of cast, shoulder to hand (long arm); 29075: application of cast, elbow to finger (short arm); and 76000: fluoroscopy (up to 1 h).
‡ $P \leq .05$ denotes significant difference.

CPT codes is summarized in Table 6. The participants were more likely to choose the same CPT code as the professional coders for case 1 than for case 2 or 4 ($P < .001$). For case 1, those with more than 21 years of practice experience were less likely to select the same coding choice as the coders compared with all the other groups ($P = .018$).

The respondents selected more CPT codes on average for case 3 than any of the other cases ($P < .001$). A breakdown of the average number of CPT codes selected by the survey respondents is summarized in Table 7.

## Discussion

The primary purpose of our study was to evaluate the coding practices of hand surgeons with respect to practice compensation

**Table 4**
CPT Coding for Case 3 (Trapeziectomy)*

| CPT Code† (wRVU units) | Collections (n = 200) | Fixed Salary (n = 129) | RVU (n = 73) | *P* Value |
|---|---|---|---|---|
| 25000 (3.55) | 21 (10.5) | 7 (5.43) | 4 (5.48) | .173 |
| 25210 (6.12) | 38 (19.0) | 35 (27.1) | 16 (21.9) | .222 |
| 25310 (8.08) | 93 (46.5) | 60 (46.5) | 31 (42.5) | .822 |
| 25312 (9.82) | 19 (9.50) | 7 (5.43) | 1 (1.37) | .044‡ |
| 25320 (12.75) | 10 (5.00) | 3 (2.33) | 1 (1.37) | .310 |
| 25445 (9.88) | 2 (1.00) | 1 (0.78) | 0 (0.00) | >.99 |
| 25447 (11.14) | 171 (85.5) | 98 (76.0) | 67 (91.8) | .008‡ |
| 26480 (6.90) | 33 (16.5) | 13 (10.1) | 12 (16.4) | .233 |
| 64704 (4.69) | 1 (0.50) | 0 (0.00) | 0 (0.00) | >.99 |
| 64708 (6.36) | 0 (0.00) | 0 (0.00) | 0 (0.00) | >.99 |
| Other | 39 (19.5) | 16 (12.4) | 12 (16.4) | .241 |
| wRVU | 14.41 ± 2.68 | 13.65 ± 2.98 | 13.67 ± 2.55 | .030‡ |

* CPT code selections are represented as n (%). Average wRVU values are represented as means ± SDs.

† CPT codes: 25000: tendon sheath incision, at radial styloid (eg, for de Quervains disease); 25210: carpectomy (1 bone); 25310: tendon transplantation or transfer, flexor or extensor, forearm and/or wrist, single, each tendon; 25312: tendon transplantation or transfer, flexor or extensor, forearm and/or wrist, single, with tendon graft (includes obtaining graft), each tendon; 25320: capsulorrhaphy or reconstruction, wrist, any method (eg, capsulodesis, ligament repair, tendon transfer or graft) (includes synovectomy, capsulectomy, and open reduction) for carpal instability; 25445: arthroplasty with prosthetic replacement, trapezium; 25447: interposition arthroplasty, intercarpal, or carpometacarpal joints; 26480: tendon transfer or transplant, carpometacarpal area or dorsum of hand, single, without free graft, each; 64704: neuroplasty, nerve of hand or foot; and 64708: neuroplasty, major peripheral nerve, arm or leg, other than specified.

‡ $P \leq .05$ denotes significant difference.

**Table 5**
CPT Coding for Case 4 (Scaphoid Nonunion Internal Fixation with Cancellous Autograft)*

| CPT Code† (wRVU units) | Collections (n = 183) | Fixed Salary (n = 113) | RVU (n = 71) | *P* Value |
|---|---|---|---|---|
| 20900 (3.00) | 28 (15.3) | 20 (17.7) | 10 (14.1) | .780 |
| 20902 (4.58) | 9 (4.92) | 1 (0.88) | 3 (4.23) | .159 |
| 25085 (5.64) | 1 (0.55) | 0 (0.00) | 0 (0.00) | >.99 |
| 25101 (4.83) | 3 (1.64) | 0 (0.00) | 0 (0.00) | .304 |
| 25295 (6.72) | 0 (0.00) | 0 (0.00) | 0 (0.00) | >.99 |
| 25440 (10.68) | 183 (100) | 113 (100) | 71 (100) | >.99 |
| Other | 17 (9.29) | 6 (5.31) | 4 (5.63) | .367 |
| wRVU | 11.07 ± 0.81 | 10.97 ± 0.60 | 10.99 ± 0.67 | .470 |

* CPT code selections are represented as n (%). Average wRVU values are represented as means ± SDs.

† CPT codes: 20900: bone graft, any donor area, minor or small (eg, dowel or button); 20902: bone graft, any donor area, major or large; 25085: capsulotomy, wrist (eg, for contracture); 25101: arthrotomy, wrist joint, with joint exploration, with or without biopsy, with or without removal of loose or foreign body; 25295: tenolysis, flexor or extensor tendon, forearm and/or wrist, single, each tendon; and 25440: repair of nonunion, scaphoid navicular bone, with or without radial styloidectomy (includes obtaining graft and necessary fixation).

**Table 6**
Percent of Respondents Selecting Only the Professional Coder-Selected CPT Codes*

| Variable | Percent of Preferred Responses (%) | *P* Value |
|---|---|---|
| Case† | | <.001‖ |
| Case 1 | 84.6 (81.0–88.3) | |
| Case 2 | 61.0 (56.3–65.8) | |
| Case 4 | 73.6 (69.1–78.1) | |
| Case 1 compensation type‡ | | .638 |
| Collections | 83.8 (78.5–89.1) | |
| Fixed salary | 87.2 (81.1–93.3) | |
| RVU | 82.6 (73.6–91.6) | |
| Case 2 compensation type‡ | | .004‖ |
| Collections | 55.3 (48.3–62.2) | |
| Fixed salary | 60.5 (52.0–68.9) | |
| RVU | 77.3 (67.8–86.9) | |
| Case 4 compensation type‡ | | .550 |
| Collections | 71.0 (64.4–77.6) | |
| Fixed salary | 76.1 (68.2–84.0) | |
| RVU | 76.1 (66.1–86.1) | |
| Case 1 practice experience§ | | .018‖ |
| 0–2 y | 80.4 (68.8–92.0) | |
| 3–5 y | 90.4 (82.3–98.5) | |
| 6–10 y | 85.2 (75.6–94.7) | |
| 11–15 y | 90.0 (82.3–97.7) | |
| 16–20 y | 93.0 (85.3–100) | |
| 21+ y | 74.8 (67.0–82.6) | |
| Case 2 practice experience§ | | .789 |
| 0–2 y | 60.0 (46.3–73.7) | |
| 3–5 y | 67.3 (54.8–79.8) | |
| 6–10 y | 61.4 (48.7–74.2) | |
| 11–15 y | 63.5 (51.5–75.5) | |
| 16–20 y | 53.1 (38.9–67.2) | |
| 21+ y | 60.2 (51.6–68.7) | |
| Case 4 practice experience§ | | .200 |
| 0–2 y | 72.1 (58.5–85.7) | |
| 3–5 y | 70.8 (57.8–83.8) | |
| 6–10 y | 83.9 (74.2–93.6) | |
| 11–15 y | 69.5 (57.6–81.3) | |
| 16–20 y | 62.2 (47.9–76.5) | |
| 21+ y | 76.5 (68.7–84.3) | |

* The percent of respondents that picked only the same CPT codes as the professional coders for case 1 (64721), case 2 (25607), and case 4 (25440). All values are represented as the percent of the total group who selected only those CPT codes (95% CI).

† *P* values represent whether a statistical difference exists between cases on percent agreement with professional coders.

‡ *P* values represent whether a statistical difference exists between compensation structures on percent agreement with professional coders.

§ *P* values represent whether a statistical difference exists between years of experience in clinical practice on percent agreement with professional coders.

‖ $P \leq .05$ denotes significant difference.

structure using common, representative hand surgery cases. We found notable differences in coding choices for the trapeziectomy and distal radius fracture cases. Physicians were less likely to code in concordance with the professional coders for the distal radius fracture case, particularly those physicians with a collections-based model. Additionally, the collections-based respondents coded for higher wRVU procedures for the trapeziectomy case. The magnitude of this difference was approximately 1 wRVU across groups in the trapeziectomy case. These charges to the health care system can quickly accumulate as this procedure is performed 80,000 times per year in the United States.[10]

Poor coding practices, including upcoding and unbundling, are forms of coding fraud and can have detrimental effects on medical practices. Upcoding refers to submitting a CPT code for a procedure of higher reimbursement value than the actual procedure performed and is an unethical violation by Centers for Medicare and Medicaid Services guidelines.[11] Conversely, downcoding refers to coding at a lower level than the services provided and is often done to deter audits. Unbundling is the coding of procedures separately when they have a shared code. Although the surgeon is not always responsible for the coding of procedures, he or she is ultimately liable for violations. For this reason, physicians delegating this task must review coding for their patients to prevent violations. Physician involvement in coding has also been shown to lead to higher wRVUs and physician reimbursement in vascular surgical procedures.[12] In our study, collections- and RVU-based physicians had higher rates of self-coding for procedures.

The method of compensation is a theoretical incentive for how surgeons may code for procedures. In contrast to salaried physicians, physicians subject to the collections or wRVU model have more to gain financially from using additional codes and selecting higher-valued RVU procedures. The compensation metric has been

**Table 7**
Average Number of CPT Codes Selected Per Case*

| Case | Mean ± SD | *P* Value |
|---|---|---|
| | | <.001† |
| Case 1 | 1.18 ± 0.455 | |
| Case 2 | 1.45 ± 0.758 | |
| Case 3 | 2.12 ± 0.922 | |
| Case 4 | 1.28 ± 0.484 | |

* All values represented as mean ± SD.
† $P \leq .05$ denotes significant difference.

shown to be associated with an increased incentive to offer services to the patients. In their 2006 study, Reschovsky et al[4] found in a survey of over 12,000 physicians that 23% reported motivation to increase the procedures and tests offered or the time spent with the patient in order to maximize profits. Full practice ownership and productivity-based compensation were associated with a higher likelihood of this perception. An analogous impact of physician compensation on the utilization of procedures has been studied in arthroplasty as well. Molloy et al[5] conducted a retrospective study comparing the rates of total knee and hip arthroplasty at their institution when physicians were salary based and then after transitioning to RVU-based compensation. They found productivity-based compensation encouraged higher rates of procedures. Similarly, compensation may affect the utilization and coding of hand procedures.

The results of this study indicate that there is still great variability in the coding patterns among the surgeons for even common hand procedures. Lifchez et al[6] illustrated marked variability in procedural coding among hand surgeons of all training levels. Although their study was also survey-based, they deliberately chose 6 hypothetical cases that would have questionable responses, such as the removal of bilateral supernumerary digits. None of the cases had uniform agreement among even the more experienced surgeons. They concluded that although there may be ethical underlying motivations guiding coding discrepancies, a lack of education contributes to variable coding. In comparison, our study focused on 4 common cases that the hand surgeons routinely perform. We anticipated that these common procedures would have more agreement among physicians and when compared with certified coders. However, variability was found in coding for all 4 common procedures. Most physicians identified the same primary code in concordance with the professional coders in each of the case scenarios, but variability existed among the use of additional codes.

Variations in coding in each of the cases may be attributed to individual differences in procedure techniques, but in some cases, the physicians' choices represent improper coding. For case 1, some surgeons coded for 01810, indicating their use of local anesthesia for open carpal tunnel release or coded for 69990, for the use of a microscope. While both the codes may be attributed to a surgeon's preference, neither are considered payable under the Centers for Medicare and Medicaid Services National Correct Coding Initiative edits.[13] A small number of physicians also indicated their routine use of a therapeutic carpal tunnel injection (code 20526), despite a lack of literature to support the benefits of concomitant steroid injection during open carpal tunnel release.[14] Some respondents coded for tenolysis (codes 25295 or 26440) or synovectomy (code 26145), the routine use of which has not been shown to have additional benefits for idiopathic carpal tunnel syndrome.[15] Despite the lack of evidence, with an appropriate modifier, these codes can be submitted in addition to code 64721 according to National Correct Coding Initiative edits.[13] For case 2, the majority of all respondents chose code 25607 in concordance with the professional coders. Certain additional codes are allowed under the National Correct Coding Initiative edits, but the selection of code 25608 (open treatment of intraarticular distal radial fracture or epiphyseal separation with internal fixation of 2 fragments) for this case is incorrect given that the scenario explicitly mentioned an extra-articular fracture. For the scaphoid nonunion case, all the respondents selected code 25440, which explicitly cites the inclusion of "obtaining graft and necessary fixation." However, some surgeons still coded for obtaining bone graft (codes 20900 or 20902), which is a form of unbundling. Even with treatment variation in mind, our study found multiple cases of unsupported CPT coding, underscoring the need for physician education on coding practices.

Medical coding is still rarely taught in physician training programs. Although resources have improved over the years, there is still a gap in understanding medical coding and billing.[3,16–19] The ASSH offers a free webinar on practice management, which has included topics on reimbursement and coding.[20] Formal education programs have shown significant improvement in residents' knowledge and ability to identify fraud.[17,18] A study by Greenky et al[3] looked into coding practices between residents and practicing attending physicians in orthopedics. They distributed a mock coding examination and found a significant improvement in coding accuracy among residents who received any education on coding.

We are aware of a few key limitations with our study design. The low response rate to the survey may have introduced bias in our results. It is possible that surgeons with poor coding accuracy did not respond to the survey, leading to an underestimation of coding variability. The survey relied on respondents to provide accurate and honest coding of a fictional clinical scenario. The surgeons who upcoded during a real procedure may not have chosen that option in the survey response. Additionally, surgeon technique preferences in operations such as a trapeziectomy or distal radius open reduction internal fixation may explain variations in code selection. However, these coding differences could be influenced by wRVU values and explain some of the results of this study. There was no opportunity for the surgeons to communicate why they choose a certain code or billed multiple codes for a given scenario; thus, no inferences can be directly drawn regarding the reason why certain codes were chosen. This study also does not capture whether the surgeon's chosen codes would be fully reimbursed by the payer. Given the reported low level of direct surgeon involvement with the billing process, the surgeon's codes may be modified prior to claims submission. As many surgeons do not code their own cases, it is likely that their responses to this survey do not perfectly reflect what is billed at their practice.

Common procedures in hand surgery have well-established coding guidelines in the American Academy of Orthopaedic SurgeonsGlobal Service Guidelines that delineate what is considered "bundled" in the procedure.[21] More complex operations may lack a "bundle" of included procedures and could demonstrate a greater coding disparity between groups. Lifchez et al[6] highlighted several hurdles to coding education, including a paucity of education regarding appropriate coding during training as well as the financial and opportunity costs of contemporary coding courses. Recent literature has shown that these educational problems still persist.[3,16–19] The ASSH Coding Corner newsletter is an effort to distribute coding knowledge and updates across the ASSH membership.[20] Improved communication and education regarding appropriate coding practices as well as easily accessible reference materials may assist in minimizing coding discrepancies for surgical hand procedures.

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