Microsurgical techniques were cost-effective in the base case, and this was confirmed with robust sensitivity analysis. Patients should not be discouraged to undergo microsurgical reconstruction for concerns of cost.

**Misvaluation of Hospital-based Upper Extremity Surgery Across Payment, Relative Value Units, and Operative Time**

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**PURPOSE:** To determine whether differences in estimated operative times between the Centers for Medicare & Medicaid Services (CMS) and the National Surgical Quality Improvement Program (NSQIP) contribute to payment and work relative value unit (wRVU) misvaluation for hospital-based hand and upper extremity procedures.

**METHODS AND METHODS:** Data on wRVUs, payments, and estimated operative times were collected from CMS for 53 procedures. Using regression analysis, we compared relationships between these variables, in addition to actual median operative times as reported in the NSQIP database, from 2011 to 2016. We then determined which procedures may be overvalued or undervalued based on operative time.

**RESULTS:** There was a wide discrepancy between CMS and NSQIP operative times ($R^2 = 0.49$), with 60% of CMS times being longer than NSQIP times. Payments were more strongly correlated with CMS operative times ($R^2 = 0.55$) than with NSQIP operative times ($R^2 = 0.24$). Similarly, wRVUs were more strongly correlated with CMS operative times ($R^2 = 0.84$) than with NSQIP operative times ($R^2 = 0.51$). In general, for trauma-related procedures, any distal radius open reduction internal fixation was considered overvalued, whereas any open reduction internal fixation proximal to the distal radius was considered undervalued in analysis of both databases. Nearly all elective tendon procedures were considered undervalued. Thirty-nine percent of trauma procedures were considered undervalued compared to 70% of elective procedures. Notable compensation differences were found between trapeziectomy versus ligament reconstruction and tendon interposition, epicondyle debridement with tendon repair versus denervation, proximal row carpectomy versus 4 corner fusion, and distal radius open versus percutaneous fixation.

**CONCLUSIONS:** CMS may misvalue payment and wRVU rates of hospital-based hand procedures due to inaccurate operative time estimates. By revising CMS operative times for certain procedures, associated changes in payment may improve physician compensation models, correct misvaluation-based incentives, and serve as a catalyst to improve the quality and value of elective and trauma-related hand surgery.

**A Novel 3-dimensional–Printed Hand Model to Simulate Bony Fixation With Kirschner Wires Without Fluoroscopy**

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**PURPOSE:** Simulation has become a mainstay in medical training. The field of 3-dimensional (3D) printing offers additional benefits to medical simulation, allowing for the development of affordable, custom anatomic models. Surgical subspecialties, like plastic surgery and orthopedics, can reap significant benefits from this technology. Specifically, developing the art of operative planning and mastering unique procedural skills are essential to the armamentarium of the plastic surgeon. One skill that is particularly difficult to master in early training is the use of Kirschner wires (K-wires) for bony fixation of the hand and wrist. Brichacek et al\(^1\) have used 3D printing for this specific training purpose, but their construct of silicone and iron-based bones requires fluoroscopy for evaluation of metacarpal K-wire placement, involving more than minimal risk of radiation exposure to trainees (Brichacek et al\(^1\)). Herein, the purpose of this project is to develop a 3D-printed hand and wrist model that serves as a training and evaluation tool for K-wire placement that is novel, cost-effective, durable, and does not require fluoroscopy.

**METHODS:** This novel hand model utilizes 3D printing technology and silicone molding. Data obtained from a computed tomography scan of a healthy hand and wrist were used to 3D print a reusable mold for the fabrication of the silicone-based “soft tissue.” Computed tomography scan data were also used to print out the bony structures of the hand and wrist (carpal bones, metacarpals, and phalanges) from ABS Filament on a UPrint SE+ 3D printer (Stratasys; Eden Prairie, Minn.). Three-dimensional–printed bones were placed in the 3D-printed mold and sealed with silicone to recreate the surrounding soft tissue. Thin