

have been safely provided in primary care settings, but it is unknown if these individuals had timely access to primary care services. Nevertheless, the findings by Hsia and colleagues<sup>3</sup> suggest that there is some uncertainty during ED triage assessment of visit urgency and policies that are based on this assessment must take this uncertainty into account or risk unfairly, and inappropriately, imposing cost-sharing penalties.

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1. Selby JV, Fireman BH, Swain BE. Effect of a copayment on use of the emergency department in a health maintenance organization. *N Engl J Med*. 1996;334(10):635-641.
2. Siddiqui M, Roberts ET, Pollack CE. The effect of emergency department copayments for Medicaid beneficiaries following the Deficit Reduction Act of 2005. *JAMA Intern Med*. 2015;175(3):393-398.
3. Hsia RY, Friedman AB, Niedzwiecki M. Urgent care needs among nonurgent visits to the emergency department [published online April 18, 2016]. *JAMA Intern Med*. doi:10.1001/jamainternmed.2016.0878.

### Upcoding and Anesthesia Risk in Outpatient Gastrointestinal Endoscopy Procedures

A substantial increase in the use of anesthesia services for outpatient gastrointestinal (GI) procedures may represent low-value care.<sup>1,2</sup> Some investigators have argued that this increase reflects increases in patient risk,<sup>3</sup> whereas others state that it may come from physicians “upcoding” risk because anesthesia services are often covered only for patients for whom sedation or anesthesia carries a high risk of complications.<sup>4,5</sup> A study was conducted to assess whether coding practices on claims for anesthesia services have changed with time.

**Methods** | We used the Truven MarketScan data from 2005 to 2013 to identify the use of anesthesia services during this period. We limited our analytic sample to 18.9% (1 001 841 of 5 313 979) of GI anesthesia service claims with a coded American Society of Anesthesiologists (ASA) classification, and excluded patients younger than 18 or older than 65 years and those without continuous enrollment in an employer-sponsored, non-capitation-based health insurance plan for the 6 months preceding the respective GI procedure. The GI procedures and anesthesia services were identified using the codes in *Current Procedural Terminology*, Fourth Edition (CPT-4), published by the American Medical Association.<sup>1</sup>

The outcome measure indicates whether a patient was coded as having a high (an ASA level of III or higher) or a low (an ASA level of I or II) anesthesia risk. We predicted a patient’s probability of being coded as having a high risk as a function of calendar year, age, sex, service setting, geographic region, insurance type, and procedure type, and a set of respiratory, cardiovascular, and other chronic conditions. Robust standard errors were used to account for patients with multiple GI procedures. The main results are presented as predicted probabilities adjusted for comorbid conditions and with patient-level characteristics held at their means. As a subanalysis, we added physician

**Table. Patient Characteristics by Level of Anesthesia Risk<sup>a</sup>**

Patient Characteristic	ASA Level	
	I or II (n = 692 017)	III or Higher (n = 157 728)
<b>Comorbidities</b>		
Sleep apnea	0.92	2.75
Asthma	3.71	6.18
Cardiac arrest	0.03	0.13
Congestive heart failure	0.53	2.25
COPD	3.16	7.95
Coronary artery disease	4.05	11.74
Cystic fibrosis	0.02	0.07
No. of other conditions	0.95	1.63
<b>Age group, y</b>		
≥18 but ≤35	9.09	5.07
>35 but ≤45	12.84	10.28
>45 but ≤55	37.93	35.62
>55 but ≤64	40.14	49.02
Female sex	58.41	53.58
<b>Setting</b>		
Physician office	11.71	5.14
Hospital outpatient	38.13	72.54
Ambulatory surgical center	44.47	18.40
Other	5.70	3.92
<b>Procedure type</b>		
Upper GI procedure	30.27	40.23
Colonoscopy	69.73	59.77
<b>Plan type</b>		
EPO and POS	14.41	14.31
CDHP and HDHP	11.76	6.76
PPO and others	73.83	78.93
<b>Region</b>		
Northeast	28.95	15.31
Midwest	14.91	16.09
South	47.80	48.77
West	7.86	15.65
Other	0.48	4.18

Abbreviations: ASA, American Society of Anesthesiologists; CDHP, consumer-directed health plan; COPD, chronic obstructive pulmonary disease; EPO, Exclusive Provider Organization; GI, gastrointestinal; HDHP, high-deductible health plan; POS, point of service; PPO, Preferred Provider Organization.

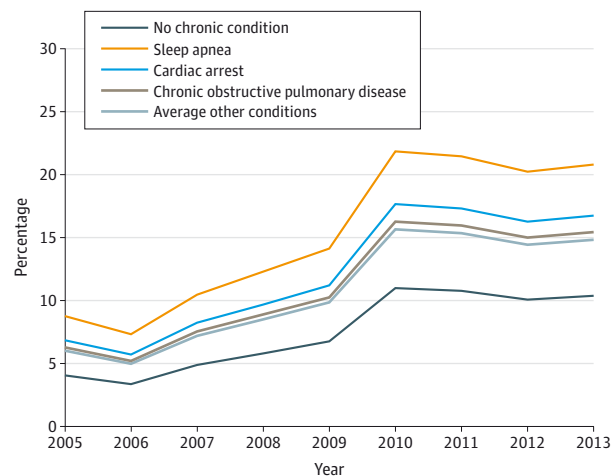
<sup>a</sup> Data are given as percentages.  $P < .01$  for all.

fixed effects into the model using data from 2010 to 2013 to test changes with time in coding practices of the same physicians.

This study was approved by the Institutional Review Board of the RAND Corporation.

**Results** | The proportion of cases with ASA coding increased from 2.9% (23 345 of 812 513 cases) in 2005 to 13.2% (224 852 of 1 697 928 cases) in 2013. The proportion of patients coded as having a high risk increased from 11.6% (2589 of 22 297 patients) in 2005 to 18.9% (39 058 of 207 117 patients) in 2013. The main analysis included 849 745 GI

**Figure. Regression-Adjusted Trends in the Likelihood of a Coding for High Anesthesia Risk by Comorbid Condition From 2005 to 2013**



Probabilities of being coded as being at high risk were predicted by holding patient-level characteristics (procedure type, insurance type, age, sex, service setting, and geographic region) at their means and controlling for comorbid conditions other than the specific condition of interest, including respiratory conditions (sleep apnea, chronic obstructive pulmonary disease [COPD], asthma, and cystic fibrosis), cardiovascular conditions (prior cardiac arrest, congestive heart failure, and coronary artery disease), and other chronic conditions (anemia, cancer, cerebrovascular diseases, dementia, diabetes mellitus, gastrointestinal bleeding, hepatobiliary diseases, human immunodeficiency virus, hypertension, inflammatory bowel disease, pancreatic disease, peripheral artery diseases, psychiatric disorder, renal failure, and other neurological diseases).

procedures and the subanalysis contained 91 907 GI procedures and 1440 unique physicians. Patient characteristics are described in the **Table**.

The **Figure** shows that the predicted probability of being coded as having a high risk of anesthesia more than doubled for all conditions from 2005 to 2013, indicating potential upcoding. The probability for patients with sleep apnea, for example, increased from 8.8% in 2005 to 21.5% in 2011 and remained at 20.8% in 2013. A similar pattern was also found among patients without any chronic conditions.

In the subanalysis, the odds of patients with similar characteristics being coded as being at high risk in 2011 were approximately twice those in 2010, more than 3 times those in 2012, and about 5 times those in 2013, with all year-to-year changes found to be statistically significant.

**Discussion** | Coding practices for anesthesia services changed with time, and there is evidence of potential upcoding of patient anesthesia risk. Our results cannot be explained by the severity of patients' conditions. Neither can they be attributed to changes in the physician population, in that the changes in coding for anesthesia risk become more marked when the same physicians were examined over time. It also seems unlikely that the prevalence of risks that we cannot detect on the basis of claims data (eg, allergies to sedatives and airway abnormalities) would have more than doubled during the study period. A likely explanation for this change is therefore that physicians used their clinical discretion to systematically change coding practices because

coding a patient as being at high risk in a claim ensures payment of the claim. Nevertheless, our study has limitations. We relied on claims data and may have missed conditions affecting anesthesia risk. We also may have underestimated potential upcoding because physicians became more likely to report comorbidities over time<sup>6</sup> and we may have overadjusted for the severity of patients' degrees of illness. Furthermore, only a minority of cases had their ASA level coded, and the proportion with a coded ASA level changed over time.

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**Additional Information:** Sedasys is the manufacturer of the SEDASYS Computer-Assisted Personalized System. The system is intended to allow trained physician-led teams to deliver minimal to moderate sedation with propofol to patients at low risk of complications during colonoscopy and other procedures.

- Liu H, Waxman DA, Main R, Mattke S. Utilization of anesthesia services during outpatient endoscopies and colonoscopies and associated spending in 2003-2009. *JAMA*. 2012;307(11):1178-1184.
- Lichtenstein DR, Jagannath S, Baron TH, et al; Standards of Practice Committee of the American Society for Gastrointestinal Endoscopy. Sedation and anesthesia in GI endoscopy. *Gastrointest Endosc*. 2008;68(5):815-826.
- Riviello K. Why we need anesthesia providers, not robots or RNs, in GI settings pushing medications. *Gastroenterology & Endoscopy News*. 2014;65:6.
- Fleisher LA. Assessing the value of "discretionary" clinical care: the case of anesthesia services for endoscopy. *JAMA*. 2012;307(11):1200-1201.
- Rex DK. Effect of the Centers for Medicare & Medicaid Services policy about deep sedation on use of propofol. *Ann Intern Med*. 2011;154(9):622-626.
- Vaughan-Sarrazin MS, Lu X, Cram P. The impact of paradoxical comorbidities on risk-adjusted mortality of Medicare beneficiaries with cardiovascular disease. *Medicare Medicaid Res Rev*. 2011;1(3):E1-E17.

## The Adequacy of Individual Hospital Data to Identify High Utilizers and Assess Community Health

Many hospitals are analyzing data from their own information systems to develop new strategies to improve popula-