

Net Revenue Analysis of Inpatient and Emergency Department Thyroid Ultrasound at a US Quaternary Care Center From 2012 to 2015

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Abstract

Purpose: The aim of this study was to understand the financial ramifications of performing nonemergent inpatient and emergency department (ED) adult thyroid ultrasound studies at a US quaternary care center.

Methods: A HIPAA-compliant, institutional review board–exempt retrospective review of 10,334 thyroid ultrasound studies performed between February 2012 and December 2015 was conducted. Demographic, imaging, clinical, and financial data were reviewed. Labor cost analysis was calculated using national salary data and local scheduling practices. Professional and technical reimbursement and utilization trends were compared across 149 payers, multiple time spans, and visit settings (outpatient, ED, and inpatient).

Results: Most thyroid ultrasound studies were performed on outpatients (97.4% [10,069 of 10,334]), with a minority performed on inpatients (2.1% [217 of 10,334]) or in the ED (0.5% [48 of 10,334]). Man-hour cost of performing thyroid ultrasound was higher in the inpatient and ED settings (\$15.30) compared with the outpatient setting (\$7.65). Professional reimbursement was highest in the outpatient setting (mean, \$37.39) and varied by payer (proprietary data; SD, \$21.36 per examination). Technical reimbursement loss due to diagnosis-related group billing for inpatients and admitted-via-ED patients was \$44,376; this was partly compensated (\$9,309) by technical reimbursement from discharged-from-ED patients (mean technical reimbursement loss, \$746 per month). Utilization increased year by year and correlated with Medicare volumes. Inpatient utilization was highest in Medicare patients; outpatient and ED utilization was highest for patients with private payers.

Conclusions: Net revenue loss from and imaging volumes of inpatient and ED nonemergent adult thyroid ultrasound studies are low.

Key Words: Cost, revenue, thyroid ultrasound, diagnosis-related group, reimbursement

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INTRODUCTION

Despite recent evidence challenging the benefits of detecting and characterizing thyroid nodules with thyroid ultrasound [1-3], thyroid ultrasound remains a commonly performed procedure for the evaluation of known or suspected thyroid abnormalities [4,5]. In

most circumstances, this procedure can be performed on an outpatient basis. However, sometimes thyroid nodules are detected incidentally on inpatient imaging studies (eg, chest CT), or thyroid-related abnormalities are detected on inpatient laboratory evaluations (eg, hypothyroidism), which may prompt an inpatient or emergency department (ED) workup. In these cases, the thyroid abnormality is often not the cause of inpatient admission (ie, it is an incidental finding), leading to a request for thyroid ultrasound that is disconnected with the diagnosis-related group (DRG) code for that encounter.

Performing thyroid ultrasound that is not related to the purpose for admission may have financial and logistic consequences. If the thyroid ultrasound study is not directly related to the DRG code for that encounter, the

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technical fee for the ultrasound study will not be reimbursed by some payers (eg, Medicare, Medicaid). Additionally, if outpatient evaluations are performed in the inpatient setting, it can prolong unnecessarily the length of the hospital stay for not only the index patient but also for other patients attempting to use the same resources (eg, ultrasound technologists, ultrasound machines, radiologists). Minimizing hospital length of stay is important to minimize hospitalization cost and hospitalization risk [6-8].

At present, it is unclear how often thyroid ultrasound examinations are performed in the inpatient setting and what financial effect this practice has on large inpatient centers. The purpose of our study was to understand the financial ramifications of performing nonemergent inpatient and ED adult thyroid ultrasound studies at a US quaternary care referral center.

METHODS

This HIPAA-compliant, retrospective, cross-sectional administrative review was considered “not regulated” by the institutional review board because it was “activities or procedures rather than human subjects” that were “the object of the study.” The requirement for informed consent was waived.

Subjects

All thyroid ultrasound examinations performed at the study institution from February 2012 to December 2015 were identified by electronic query of institutional billing data. Examination-level data for the study population was obtained using the institutional radiology information system and electronic medical records. Examinations performed for acute indications (ie, hypercalcemia, abscess, thyroid storm) and those without available reimbursement data were excluded. There were no other exclusion criteria. The final study population included 10,334 thyroid ultrasound examinations (Table 1).

For each thyroid ultrasound study, the following data were collected: subject age, subject gender, clinical indication, payer type, benefit plan description, date of service, date of reimbursement, day of examination, professional fee charge, professional fee reimbursement, technical fee charge, and technical fee reimbursement. The examinations were stratified by their clinical setting: inpatient, ED, or outpatient.

Cost and Utilization Analysis

For each population, average man-hour cost was calculated. The median hourly wage of a sonographer in 2015 was obtained from the Bureau of Labor Statistics (<http://www.bls.gov>, accessed September 18, 2016). Average time spent for each examination was determined on the basis of the prevailing scheduling patterns at the study institution. The total man-hour cost of performing each examination was then calculated by multiplying average time spent per examination by the median sonographer wage. Other indirect cost drivers, including electronic examination ordering, patient transportation, ultrasound equipment use, ultrasound room use, and electronic archiving, were considered negligible to the overall cost on a per-examination basis. Utilization trends were determined for each population across different days of the week and year over year.

Professional Fee Charge and Reimbursement Analysis

For each population, the following were calculated: average charge, average reimbursement, total reimbursement, and average number of days in accounts receivable. Average professional reimbursement data were further stratified into three major payer categories, including Medicare, Medicaid, and “other” payers. Medicare and Medicaid coverage plans administered by private payers had the same reimbursement rates as the plans administered by CMS and therefore were included in the respective Medicare or Medicaid payer categories. In total,

Table 1. Study population and financial data (in US dollars) for diagnostic thyroid ultrasound examinations performed between February 2012 and December 2015

	Outpatient (n = 10,069)	Inpatient (n = 217)	Emergency (n = 48)
Age (y), mean ± SD	53 ± 15	61 ± 17	51 ± 18
Female	80% (8,080/10,069)	53% (115/217)	79% (38/48)
Man-hour cost per examination	\$7.65	\$15.30	\$15.30
Total man-hour cost	\$77,003	\$3,319	\$734
Total technical reimbursement	\$2,626,426	−\$40,308	\$5,241
Total professional reimbursement	\$376,518	\$5,651	\$1,697
Return on man-hour investment	3,900%	−1,044%	945%

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