



Imaging Equipment Utilization Rates

Final Report

July 16, 2009

Statistical Analyses by Sage Computing

© Radiology Business Management Association (RBMA). *Readers of this article may copy it without the copyright owner's permission, if the author and publisher are acknowledged in the copy and copy is used for educational, not-for-profit purposes.*

Executive Summary

The Radiology Business Management Association (RBMA) conducted a survey of its members with freestanding/outpatient imaging centers to collect imaging equipment specific information in anticipation of possible actions to be taken by the United States Congress and the Centers for Medicare & Medicaid Services (CMS). Based on the information obtained from this survey – the most recent and comprehensive data collection of its kind to-date – RBMA calculated equipment utilization rates using two different methodologies for diagnostic imaging services, advanced diagnostic imaging services, and centers located in rural and non-rural settings.

RBMA found diagnostic imaging utilization rates that are far below those that have been proposed in Congress (75 percent in the CHAMP Act¹ and in the recently released U.S. House of Representatives “Tri Committee” healthcare reform bill²), the “normative” 90 percent standard recommended by the Medicare Payment Advisory Commission (MedPAC) for equipment costing \$1 million or more³, or the Administration’s proposal of a 95 percent utilization rate⁴. Moreover, RBMA’s results suggest a significant difference in equipment utilization between rural vs. non-rural providers. It follows then that any increase in the utilization rate could greatly harm rural imaging centers’ continued ability to provide imaging care to patients within their communities.

RBMA recommends that Medicare’s utilization rate for medical equipment be based on actual and timely equipment utilization data collection, ensuring the provision of accurate and robust information for decision makers in formulating evidence-based policy rather than projections of efficiency.

RBMA further warns that an excessive utilization rate may hamper freestanding/outpatient facilities’ ability to introduce new and emerging diagnostic services that may help further prevent and detect disease.

In conclusion, RBMA’s survey findings are more consistent with CMS’ current equipment utilization assumption of 50 percent rather than the higher rates proposed by either Congress or the White House. RBMA cautions that imaging care would experience multiple adverse impacts from any increase in equipment utilization rate that does not reflect actual use in practice. Rural imaging centers’ provision of services and all freestanding/outpatient centers’ ability to adopt new imaging services to further advance disease detection and prevention would particularly be affected.

These findings also reinforce the need for CMS and diagnostic imaging community stakeholders to work together to develop a more comprehensive and timely equipment utilization data survey for a more factual read on how diagnostic imaging services are currently used in actual practice.

Background

In determining the practice expense relative value as part of its Resource-Based Relative Value Scale, CMS currently assumes that equipment is used 50 percent of the time (or 25 hours per week in a 50 hour per week practice)⁵. There have been calls from Congress, MedPAC, and others to raise the utilization rate because of perceived over-payments, particularly for imaging modalities defined as “advanced” by the Medicare Improvements for Patients and Providers Act of 2008 (MIPPA), such as CT, MRI, and PET.

The United States Congress has pledged to introduce healthcare reform legislation by the end of the summer of 2009. This legislation likely will include provisions targeting how Medicare calculates the technical component payments for imaging services. MedPAC, an advisory body to Congress on Medicare payment issues, has recommended a “normative” utilization rate of 90 percent in the Medicare technical component formula for advanced imaging equipment, defined as equipment with a purchase price of \$1 million or more. CMS has included the MedPAC recommendation in the 2010 Medicare Physician Fee Schedule proposed rule. In addition, the White House has proposed \$313 billion in new Medicare and Medicaid cuts including increasing the utilization rate for advanced imaging from 50 to 95 percent.

RBMA is a member of the Access to Medical Imaging Coalition (AMIC) and has taken the lead in developing a questionnaire for AMIC for the purpose of collecting detailed, equipment-specific information in anticipation of analyzing and responding to imaging-related proposals that will likely emerge from Congress and CMS.

Methodology

General

The Imaging Center Subcommittee of the RBMA Data Collection and Reporting Committee joined with a task force of the RBMA Board of Directors, including representatives from the Payor Relations and Federal Affairs Committees, in order to develop the in-depth Equipment Utilization Survey (EUS) questionnaire. The survey collected information on imaging center characteristics and equipment utilization by major imaging machine/modality (with data collected for each of the elements of the Medicare formula used to calculate equipment cost per minute).

Web-based and Excel-based surveys were piloted using members of the full Board and of the Data Committee as respondents, and some of their suggestions were implemented in the final survey. The Excel-based survey was ultimately utilized because of the ease with which respondents could share it with others and print it for their own records.

An invitation to participate in the survey with a link to the questionnaire was e-mailed on April 20th, 2009 to 1,084 RBMA members who have previously indicated they have imaging centers; this list included duplicate members from some practices. The initial due date for the survey was May 8th and the deadline was later extended to May 15th. Potential respondents were asked to complete one survey for each imaging center and upload the file(s) to the RBMA Web site or e-mail them to the research associate.

A total of 46 surveys were submitted by 17 members; RBMA membership includes representatives of 1,959 imaging centers.

Modalities

The survey collected information for each of the major diagnostic imaging modalities: MR, CT, PET, PET-CT, General Radiology (GR), Dual Energy X-ray Absorptiometry (DEXA), Ultrasound (U/S), Mammography (Mammo), and Nuclear Medicine (NM). Interventional Radiology was broken down into "basic" (e.g., biopsies) and "advanced" (e.g., vein ablation, transcatheter procedures). Radiation oncology modalities were excluded. In this report, advanced imaging is defined as CT, MRI, PET, PET/CT, and Nuclear Medicine, per MIPPA statute. Unless noted otherwise, PET was removed from the final tables because there was only one observation, and furthermore, PET payment rates are carrier-priced and, therefore, not subject to the utilization rate factor.

Rural vs. Non-Rural

The questionnaire collected each respondent's ZIP Code, which was used to determine rural and non-rural status. This status was based on the CMS Rural Health Programs definition of "rural" as being outside a Census-defined Urbanized Area, and was determined by entering the ZIP Code into the Rural Assistance Center's "Am I Rural?" lookup page.⁶ This is the broadest definition of rural, and therefore yields the most conservative utilization rates as it includes respondents who were not classified as rural by any other definition. It is expected that if the utilization rate for these "rural" imaging centers is lower than that of urban imaging centers, that difference will be underestimated using this broad definition.

Equipment Utilization Rate

Two utilization rates were calculated: (1) an Availability-based rate (weekly minutes used ÷ weekly minutes available) and (2) the current Medicare-based utilization rate (weekly minutes used ÷ 3,000 [50 hours per week * 60 minutes per hour]). [The Appendix features a modified Medicare utilization rate using actual office hours (weekly minutes used ÷ (weekly hours the center is open * 60 minutes per hour)).] The last calculation excludes data for respondents who did not indicate the number of hours their imaging center is open each week. The rates were calculated for all machines by modality, for advanced vs. non-advanced modalities, and for non-rural vs. rural centers.

Data Verification

In reviewing the submitted information, a limited number of respondents' data exhibited internal inconsistencies in the depiction of equipment time. For example, one would expect that the rate the equipment was used and the rate it was not used would aggregate to approximately 100 percent. A few respondents reported utilization rates in excess of 100 percent. Utilization rate data components were updated by eliminating records for which the sum of weekly minutes in use and weekly minutes available but not used did not approximate the total number of weekly minutes available.

The utilization rate calculations were run on three variants of the survey data: (1) "All Observations", (2) excluding machines where the Availability-based utilization rate and the unused rate did not roughly equal 100 percent ("Refined"), and (3) excluding machines where the Availability-based rate and the unused rate did not roughly equal 100 percent and machines with utilization rates in excess of 100 percent ("Final"). The utilization rates presented in this report are based on the Final dataset unless otherwise noted. [Detailed utilization rates based on the original (All Observations) and Refined datasets are included in Appendix A.]

Results

The Results section presents information about the centers that responded to the survey followed by utilization rates determined in the manner described in the Methodology section. First, equipment utilization rates are calculated in the aggregate (across all modalities) using the two methodologies described in Methodology section above (Availability-based and current Medicare-based). Then, the utilization rates are presented by modality, for "advanced" imaging, and finally for rural vs. non-rural centers.

Imaging Center Characteristics

RBMA represents members in imaging centers owned (in whole or in part) by radiology practices and centers classified as Independent Diagnostic Testing Facilities (IDTFs). Table 1 shows the breakdown of respondents by their ownership status.

Table 1: Medicare provider type*

	Frequency	Percent
IDTF	6	13.3%
Physician practice/freestanding center	37	82.2%
Provider-based - paid from MPFS using CMS-1500	2	4.4%

* One center did not answer this question.

RBMA is a national organization and its members provide services in rural and non-rural settings as shown in Table 2 and Table 3.

Table 2: Rural vs. Non-rural by HHS ZIP Code

HHS rural ZIP Code		
	Frequency	Percent
Rural	9	19.6%
Non-rural	37	80.4%

Table 3: Rural vs. Non-Rural by Self-Classification*

Self-classified service area		
	Frequency	Percent
Urban	30	66.7%
Suburban	14	31.1%
Rural	1	2.2%

* One center did not answer this question.

As shown in Table 4, imaging centers represented by RBMA members are open approximately 55 hours per week.

Table 4: How many hours in an average week is the center open for regularly scheduled patient care?

N	Lower Quartile	Mean	Median	Upper Quartile
37	43.0	55.4	55.0	62.5

All-Modality Utilization Rates

Table 5 contains aggregate utilization rates across all major diagnostic imaging modalities. Depending on utilization rate methodology used, the median utilization rate ranges from 53.8 percent to 67.7 percent (means range from 53.1 percent to 65 percent). The Medicare-based methodology consistently resulted in utilization rates below the Availability-based methodology by 20.5 percent or 13.9 percentage points (median) and 18.3 percent or 11.9 percentage points (mean).

Table 5: Utilization Rates – All Modalities (Final)

	N	Lower Quartile	Mean	Median	Upper Quartile
Availability-based Utilization Rate	282	46.4%	65.0%	67.7%	90.0%
Medicare-based Utilization Rate	262	38.3%	53.1%	53.8%	72.0%

Utilization Rates by Modality

Table 6 depicts utilization rates by modality (except for PET which had only one respondent and is carrier-priced, therefore is not applicable for the utilization rate factor and was omitted from this analysis). General radiology (GR), basic interventional radiology (B-IR), and DEXA are consistently at the low range of the utilization scale. PET-CT, DEXA, advanced-IR, and mammography, as evidenced by the differences in their rates (comparing medians) -- PET-CT (12 percentage points), DEXA (17 percentage points), advanced IR (18 percentage points), and mammography (33 percentage points) -- appear to be more sensitive to the different utilization rate methodologies than the other modalities. [Caution – the low item response rate for PET/CT and interventional radiology may call into question this conclusion.] However,

many centers that offer PET/CT only do so a few days per week and this could explain the difference between the two derived rates. Mammography is most often screening exam whose frequency is determined by Medicare coverage/statute.

Table 6: Utilization Rates by Modality† (Final)

		All	MR	CT	PET-CT	GR	DEXA	U/S	Mammo-graphy	NM	B-IR	A-IR
Availability-based Utilization Rate	N	281	47	30	7	57	17	66	33	15	5	4
	Q1	46%	62%	31%	72%	39%	23%	50%	46%	54%	33%	77%
	Mean	65%	73%	62%	82%	56%	57%	66%	69%	70%	47%	86%
	Median	68%	76%	59%	84%	50%	61%	64%	86%	68%	46%	87%
	Q3	90%	90%	90%	92%	90%	90%	90%	90%	90%	53%	96%
		All	MR	CT	PET-CT	GR	DEXA	U/S	Mammo-graphy	NM	B-IR	A-IR
Medicare-based Utilization Rate	N	261	35	29	5	57	17	64	32	15	5	2
	Q1	38%	50%	30%	55%	20%	20%	45%	41%	44%	16%	64%
	Mean	53%	64%	56%	69%	44%	44%	54%	53%	58%	35%	69%
	Median	54%	72%	50%	72%	47%	44%	55%	53%	58%	36%	69%
	Q3	72%	80%	79%	79%	72%	63%	66%	72%	72%	48%	74%

†: PET had one respondent and was omitted

GR: General radiology

DEXA: Dual-energy x-ray absorptiometry

U/S: Ultrasound

NM: Nuclear medicine

B-IR: Basic interventional radiology services (e.g., biopsies)

A-IR: Advanced interventional radiology services (e.g., vein ablation, transcatheter procedures)

"Advanced" Imaging Utilization Rates

"Advanced" modalities (MR, CT, PET/CT, and Nuclear Medicine) in the aggregate show higher utilization rates than non-advanced modalities, according to Table 7. "Advanced" modalities have median rates in the 61 percent to 75 percent range (60 percent to 70 percent based on means) depending on methodology. Non-advanced imaging has median rates in the 50 percent to 64 percent range (49 percent to 62 percent based on means).

Table 7: Utilization Rates – Advanced vs. Not Advanced Imaging† (Final)

		All		
			Advanced imaging	Not advanced imaging
Availability-based Utilization Rate	N	281	100	182
	Q1	46%	56%	43%
	Mean	65%	70%	62%
	Median	68%	75%	64%
	Q3	90%	90%	90%
Medicare-based Utilization Rate	N	261	85	177
	Q1	38%	47%	33%
	Mean	53%	60%	49%
	Median	54%	61%	50%
	Q3	72%	79%	72%

†: PET had one respondent and was omitted

Utilization Rates – Non-rural vs. Rural

Table 8 presents utilization rates based on rural vs. non-rural status. RBMA's findings consistently demonstrate that rural centers have lower utilization rates (median: 48 percent to 58 percent; mean: 43 percent to 57 percent) than do non-rural centers (median: 56 percent to 71 percent; mean: 55 percent to 67 percent) depending on rate methodology used.

Table 8: Utilization Rates by Non-Rural/Rural† (Final)

		All		
			Non-rural	Rural
Availability-based Utilization Rate	N	281	233	48
	Q1	46%	49%	30%
	Mean	65%	67%	57%
	Median	68%	71%	58%
	Q3	90%	90%	85%
Medicare-based Utilization Rate	N	261	217	44
	Q1	38%	43%	22%
	Mean	53%	55%	43%
	Median	54%	56%	48%
	Q3	72%	72%	64%

†: PET had one respondent and was omitted

Discussion

From the current Medicare-based utilization rate, our initial results from this study suggest that no diagnostic imaging modality in freestanding/outpatient centers are operating close, on average, to the 90 percent normative standard proposed by MedPAC or the 95 percent standard mentioned by the Obama Administration. Imposing such a standard and the resultant estimated 22 percent payment cut that would result – particularly when coupled with other proposed payment changes included in the 2010 Medicare Physician Fee Schedule – would severely harm freestanding/outpatient diagnostic imaging centers' ability to provide imaging care to patients. In some cases centers may be forced to close, disrupting patients' continued access to care and overall access to diagnostic imaging services. The impact could be worse for imaging centers servicing rural communities since their utilization rates are double-digit percentage points below those of their non-rural colleagues.

The RBMA survey results support the current CMS rate of 50 percent as reflective of actual utilization, and reflect the need for CMS to work with stakeholders to extend this survey for a more comprehensive and timely data review.

RBMA also cautions specifically against any increase in the utilization rate for mammography. This study suggests that there is some sensitivity in how the utilization rate is determined for mammography. Mammography is an important screening and diagnostic tool in the fight against breast cancer and access problems already exist in both rural and urban areas. Payment reductions caused by an increase in the utilization rate would likely exacerbate these access problems.

RBMA warns that new imaging modalities may be particularly susceptible to payment reductions caused by an excessive utilization rate estimate. It often takes years to develop a patient/referring-physician basis to support a new modality. As a consequence, new modalities are offered on a limited basis both in terms of the number of imaging centers providing the modality and, for those centers that do, availability is usually limited to a part-time basis.

Data Limitations

While RBMA is confident that the general conclusions presented in this study are representative of radiology-affiliated imaging centers, some underlying issues remain:

Equipment Utilization Survey Questionnaire

Collecting equipment utilization data is a difficult undertaking. RBMA members are experts at managing radiology practices and imaging centers with a wealth of data at hand. Yet, the information required to calculate equipment utilization rates is not routinely tracked and thus not readily available. The questionnaire itself was detailed and lengthy and necessary for each imaging center and the imaging modalities offered. As a result, those members who completed the questionnaire spent nearly a day, in some cases, doing so. Finally, the survey was open for only approximately four weeks.

Data Verification/Control for Outliers

RBMA took steps to verify the data and control for outliers. In some cases, the time data given by respondents looked suspicious and the calculated utilization rates were found to be questionable (e.g., in excess of 100 percent).

Representativeness of Respondents

RBMA received data from seventeen members representing forty-six imaging centers. RBMA contacted 1,084 members who indicated having an imaging center. Collectively, RBMA members represent 1,959 imaging centers. This gives a response rate of 1.6 percent based on members or 2.3 percent based on imaging centers.

Though the number of imaging centers that responded is relatively small, the total number of equipment observations (N=301) is sizeable and the fact that utilization rates are based on equipment observations gives RBMA confidence in the results. It should be noted that some modalities (PET, PET/CT) had a low item response rate, making conclusions for these modalities less reliable.

Every odd year, RBMA conducts an Imaging Center Performance Survey. From the latest version of that survey (2007), which had 117 respondents, the breakdown of machines by modality is close to that in this survey with the exception of mammography. PET and PET-CT are combined in the Imaging Center Performance Survey.

	2007 Imaging Center Survey	Percent of Total	Equipment Utilization Survey	Percent of Total
General DX/Fluoro	125	20.5%	57	20.2%
Mammography	39	6.4%	33	11.7%
Ultrasound	156	25.6%	66	23.4%
Nuclear medicine	26	4.3%	15	5.3%
CT	71	11.6%	30	10.6%
MRI	108	17.7%	47	16.7%
Interven. pain mgmt	16	2.6%	N/A	N/A
DEXA	42	6.9%	17	6.0%
PET & PET/CT	18	3.0%	8	2.8%
Other	9	1.5%	N/A	N/A
Basic Interventional	NA	N/A	5	1.8%
Adv. Interventional	NA	N/A	4	1.4%
Total	610	100.0%	282	100.0%

A comparison based on Medicare provider type between the RBMA Equipment Utilization Survey and the 2007 Imaging Center Survey shows good agreement. There were relatively more IDTFs that responded to the utilization survey, but the difference is small.

	RBMA Equipment Utilization Survey		RBMA 2007 Imaging Center Survey	
	Frequency	Percent	Frequency	Percent
IDTF	6	13.3%	21	20.2%
Physician practice/freestanding center	37	82.2%	75	72.1%
Provider-based - paid from MPFS using CMS-1500	2	4.4%	7	6.7%
Other	NA	NA	1	1.0%

RBMA had respondents from each of the four major geographic regions of the United States. However, respondents to RBMA's equipment utilization survey are disproportionately from the western United States.

Non-Radiology Affiliated Imaging Centers

The data are from radiology practices or IDTFs affiliated with radiology practices. The experience of non-radiology practices could be different from those presented in this study.

Rural vs. Non-rural

There was some inconsistency in how practices viewed themselves as either “rural” or “non-rural.” RBMA attempted to control for that by basing the analyses on ZIP Codes and an established HHS-ZIP Code mapping algorithm. The utilization rates proved to be significantly lower for rural centers using two statistical tests [Wilcoxon-Mann-Whitney test on medians and T-test (independent samples) on means]:

Utilization Rates by Rural/Non-rural (Rural Assistance Center Definition) †

		All	Non-rural		Statistical Test	
					Test Statistic	p-value
Availability-based Utilization Rate	N	281	233	48		
	Q1	46%	49%	30%		
	Mean	65%	67%	57%	2.320	0.021
	Median	68%	71%	58%	-1.726	0.084
	Q3	90%	90%	85%		
Medicare-based Utilization Rate	N	261	217	44		
	Q1	38%	43%	22%		
	Mean	53%	55%	43%	2.900	0.004
	Median	54%	56%	48%	-2.591	0.010
	Q3	72%	72%	64%		

†: PET had one respondent and was omitted

Further Study

RBMA recommends that CMS work with imaging providers, equipment manufacturers and other stakeholders, leveraging the use of existing information technology systems, to more accurately measure actual equipment utilization rates across a large and geographically diverse number of imaging centers. Detailed data on imaging equipment utilization is already collected remotely and electronically by equipment manufactures and could be used to create efficient and timely patient access data.

RBMA also recognizes that frail and elderly Medicare patients may take longer to scan, and that it may be difficult to fully assess equipment utilization rates without taking this into consideration. For this reason, it may be appropriate to undertake separate studies reviewing imaging services provided to Medicare versus non-Medicare patients and practical limits to equipment utilization due to patient handling and health status factors.

Endnotes

- 1 Section 309, Payment for Imaging Services, Children's Health and Medicare Protection Act of 2007, <http://thomas.loc.gov/>
- 2 http://energycommerce.house.gov/Press_111/20090619/healthcarereform_discussiondraft.pdf
- 3 Medicare Payment Advisory Commission (MedPAC), “Report to Congress Medicare Payment Policy,” March 2009, page 110
- 4 <http://www.whitehouse.gov/MedicareFactSheetFinal/>
- 5 Centers for Medicare and Medicaid Services, “Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule and Other Revisions to Part B for CY 2009; and Revisions to the Amendment of the E-Prescribing Exemption for Computer Generated Facsimile Transmissions; Proposed Rule,” Federal Register, July 7, 2008, page 38510
- 6 <http://ims2.missouri.edu/RAC/AmIRural>

Appendix A: Other Data Tables

Table A: Utilization Rates – All Modalities (All Observations)

	N	Lower Quartile	Mean	Median	Upper Quartile
Availability-based Utilization Rate	301	45.1%	65.0%	67.5%	90.0%
Medicare-based Utilization Rate	301	38.3%	58.6%	57.1%	73.1%
Medicare-modified Utilization Rate	244	33.0%	51.6%	55.9%	62.6%

Table B: Utilization Rates – All Modalities (Refined)

	N	Lower Quartile	Mean	Median	Upper Quartile
Availability-based Utilization Rate	287	46.5%	66.0%	68.3%	90.0%
Medicare-based Utilization Rate	287	41.4%	59.2%	57.2%	72.0%
Medicare-modified Utilization Rate	230	35.7%	52.6%	57.7%	63.0%

Table C: Utilization Rates – All Modalities (Final)

	N	Lower Quartile	Mean	Median	Upper Quartile
Availability-based Utilization Rate	282	46.4%	65.0%	67.7%	90.0%
Medicare-based Utilization Rate	262	38.3%	53.1%	53.8%	72.0%
Medicare-modified Utilization Rate	221	35.2%	50.3%	56.0%	61.9%

Table D: Utilization Rates by Modality (All Observations)

		All	MR	CT	PET	PET-CT	GR	DEXA	U/S	Mammo	NM	B-IR	A-IR
Availability-based Utilization Rate	N	301	53	33	1	7	62	17	70	34	15	5	4
	Q1	45%	62%	31%	98%	72%	30%	23%	49%	41%	54%	33%	77%
	Mean	65%	74%	63%	98%	82%	58%	57%	64%	67%	70%	47%	86%
	Median	68%	77%	60%	98%	84%	50%	61%	62%	84%	68%	46%	87%
	Q3	90%	90%	90%	98%	92%	90%	90%	90%	90%	90%	90%	53%
Medicare-based Utilization Rate	N	301	53	33	1	7	62	17	70	34	15	5	4
	Q1	38%	58%	30%	90%	55%	20%	20%	43%	41%	44%	16%	69%
	Mean	59%	83%	58%	90%	83%	47%	44%	53%	54%	58%	35%	101%
	Median	57%	80%	54%	90%	79%	47%	44%	54%	53%	58%	36%	102%
	Q3	73%	109%	89%	90%	116%	72%	63%	69%	72%	72%	48%	133%
Medicare-modified Utilization Rate	N	244	43	27	1	5	53	13	56	27	11	4	4
	Q1	33%	48%	31%	64%	60%	16%	22%	35%	32%	27%	22%	50%
	Mean	52%	72%	55%	64%	71%	41%	39%	47%	49%	48%	36%	80%
	Median	56%	75%	61%	64%	68%	42%	53%	50%	57%	60%	38%	81%
	Q3	63%	98%	75%	64%	72%	60%	56%	60%	63%	60%	49%	110%

Table E: Utilization Rates by Modality (Refined)

		All											
			MR	CT	PET	PET-CT	GR	DEXA	U/S	Mammo	NM	B-IR	A-IR
Availability-based Utilization Rate	N	287	48	31	1	7	60	17	66	33	15	5	4
	Q1	47%	62%	31%	98%	72%	40%	23%	50%	46%	54%	33%	77%
	Mean	66%	74%	63%	98%	82%	59%	57%	66%	69%	70%	47%	86%
	Median	68%	76%	60%	98%	84%	52%	61%	64%	86%	68%	46%	87%
	Q3	90%	90%	90%	98%	92%	90%	90%	90%	90%	90%	53%	96%
Medicare-based Utilization Rate	N	287	48	31	1	7	60	17	66	33	15	5	4
	Q1	41%	57%	30%	90%	55%	21%	20%	45%	41%	44%	16%	69%
	Mean	59%	83%	59%	90%	83%	48%	44%	55%	55%	58%	35%	101%
	Median	57%	79%	54%	90%	79%	47%	44%	55%	55%	58%	36%	102%
	Q3	72%	109%	90%	90%	116%	72%	63%	71%	72%	72%	48%	133%
Medicare-modified Utilization Rate	N	230	38	25	1	5	51	13	52	26	11	4	4
	Q1	36%	53%	39%	64%	60%	16%	22%	38%	33%	27%	22%	50%
	Mean	53%	73%	57%	64%	71%	42%	39%	49%	50%	48%	36%	80%
	Median	58%	76%	63%	64%	68%	44%	53%	50%	59%	60%	38%	81%
	Q3	63%	95%	75%	64%	72%	60%	56%	60%	63%	60%	49%	110%

Table F: Utilization Rates by Modality (Final)

		All	MR	CT	PET	PET-CT	GR	DEXA	U/S	Mammo	NM	B-IR	A-IR
Availability-based Utilization Rate	N	282	47	30	1	7	57	17	66	33	15	5	4
	Q1	46%	62%	31%	98%	72%	39%	23%	50%	46%	54%	33%	77%
	Mean	65%	73%	62%	98%	82%	56%	57%	66%	69%	70%	47%	86%
	Median	68%	76%	59%	98%	84%	50%	61%	64%	86%	68%	46%	87%
	Q3	90%	90%	90%	98%	92%	90%	90%	90%	90%	90%	90%	53%
Medicare-based Utilization Rate	N	262	35	29	1	5	57	17	64	32	15	5	2
	Q1	38%	50%	30%	90%	55%	20%	20%	45%	41%	44%	16%	64%
	Mean	53%	64%	56%	90%	69%	44%	44%	54%	53%	58%	35%	69%
	Median	54%	72%	50%	90%	72%	47%	44%	55%	53%	58%	36%	69%
	Q3	72%	80%	79%	90%	79%	72%	63%	66%	72%	72%	48%	74%
Medicare-modified Utilization Rate	N	221	33	25	1	5	49	13	52	26	11	4	2
	Q1	35%	50%	39%	64%	60%	16%	22%	38%	33%	27%	22%	47%
	Mean	50%	67%	57%	64%	71%	39%	39%	49%	50%	48%	36%	50%
	Median	56%	65%	63%	64%	68%	42%	53%	50%	59%	60%	38%	50%
	Q3	62%	83%	75%	64%	72%	60%	56%	60%	63%	60%	49%	53%

Table G: Utilization Rates – Advanced vs. Not Advanced Imaging (All Observations)

		All		
			Advanced imaging	Not advanced imaging
Availability-based Utilization Rate	N	301	109	192
	Q1	45%	56%	42%
	Mean	65%	70%	62%
	Median	68%	76%	61%
	Q3	90%	90%	90%
Medicare-based Utilization Rate	N	301	109	192
	Q1	38%	50%	29%
	Mean	59%	72%	51%
	Median	57%	72%	50%
	Q3	73%	90%	72%
Medicare-modified Utilization Rate	N	244	87	157
	Q1	33%	48%	28%
	Mean	52%	63%	45%
	Median	56%	62%	50%
	Q3	63%	80%	60%

Table H: Utilization Rates – Advanced vs. Not Advanced Imaging (Refined)

		All	advanced	
			Advanced imaging	Not advanced imaging
Availability-based Utilization Rate	N	287	102	185
	Q1	47%	56%	44%
	Mean	66%	71%	63%
	Median	68%	76%	64%
	Q3	90%	90%	90%
Medicare-based Utilization Rate	N	287	102	185
	Q1	41%	50%	36%
	Mean	59%	72%	52%
	Median	57%	72%	51%
	Q3	72%	90%	72%
Medicare-modified Utilization Rate	N	230	80	150
	Q1	36%	51%	30%
	Mean	53%	64%	46%
	Median	58%	63%	50%
	Q3	63%	80%	60%

Table I: Utilization Rates – Advanced vs. Not Advanced Imaging (Final)

		All	advanced	
			Advanced imaging	Not advanced imaging
Availability-based Utilization Rate	N	282	100	182
	Q1	46%	56%	43%
	Mean	65%	70%	62%
	Median	68%	75%	64%
	Q3	90%	90%	90%
Medicare-based Utilization Rate	N	262	85	177
	Q1	38%	47%	33%
	Mean	53%	61%	49%
	Median	54%	63%	50%
	Q3	72%	79%	72%
Medicare-modified Utilization Rate	N	221	75	146
	Q1	35%	47%	29%
	Mean	50%	61%	45%
	Median	56%	62%	50%
	Q3	62%	77%	60%

Table J: Utilization Rates by Non-Rural/Rural (All Observations)

		All		
			Non-rural	Rural
Availability-based Utilization Rate	N	301	253	48
	Q1	45%	47%	30%
	Mean	65%	67%	57%
	Median	68%	71%	58%
	Q3	90%	90%	85%
Medicare-based Utilization Rate	N	301	253	48
	Q1	38%	43%	23%
	Mean	59%	60%	50%
	Median	57%	58%	49%
	Q3	73%	74%	72%
Medicare-modified Utilization Rate	N	244	203	41
	Q1	33%	35%	24%
	Mean	52%	54%	42%
	Median	56%	59%	42%
	Q3	63%	64%	60%

Table K: Utilization Rates by Non-Rural/Rural (Refined)

		All		
			Non-rural	Rural
Availability-based Utilization Rate	N	287	239	48
	Q1	47%	49%	30%
	Mean	66%	68%	57%
	Median	68%	73%	58%
	Q3	90%	90%	85%
Medicare-based Utilization Rate	N	287	239	48
	Q1	41%	44%	23%
	Mean	59%	61%	50%
	Median	57%	58%	49%
	Q3	72%	73%	72%
Medicare-modified Utilization Rate	N	230	189	41
	Q1	36%	38%	24%
	Mean	53%	55%	42%
	Median	58%	60%	42%
	Q3	63%	65%	60%

Table L: Utilization Rates by Non-Rural/Rural (Final)

		All		
			Non-rural	Rural
Availability-based Utilization Rate	N	282	234	48
	Q1	46%	49%	30%
	Mean	65%	67%	57%
	Median	68%	71%	58%
	Q3	90%	90%	85%
Medicare-based Utilization Rate	N	262	218	44
	Q1	38%	43%	22%
	Mean	53%	55%	43%
	Median	54%	56%	48%
	Q3	72%	72%	64%
Medicare-modified Utilization Rate	N	221	180	41
	Q1	35%	38%	24%
	Mean	50%	52%	42%
	Median	56%	59%	42%
	Q3	62%	62%	60%

Table M: Utilization Rates by Rural/Non-rural (Rural Assistance Center Definition) †

		All			Statistical Test	
			Non-rural	Rural	Test Statistic	p-value
Availability-based Utilization Rate	N	281	233	48		
	Q1	46%	49%	30%		
	Mean	65%	67%	57%	2.320	0.021
	Median	68%	71%	58%	-1.726	0.084
	Q3	90%	90%	85%		
Medicare-based Utilization Rate	N	261	217	44		
	Q1	38%	43%	22%		
	Mean	53%	55%	43%	2.900	0.004
	Median	54%	56%	48%	-2.591	0.010
	Q3	72%	72%	64%		
Medicare-modified Utilization Rate	N	220	179	41		
	Min	0%	0%	1%		
	Q1	35%	38%	24%		
	Mean	50%	52%	42%	2.790	0.006
	Median	56%	59%	42%	-2.520	0.012
	Q3	62%	62%	60%		
	Max	100%	100%	90%		

†: PET had one respondent and was omitted

Appendix B: EUS Utilization Rate-Related Questions

SECTION A: IMAGING CENTER CHARACTERISTICS

What type of Medicare provider is the imaging center?

If other, please specify:

What is the five-digit ZIP Code of your imaging center (optional)?

The federal government defines the urban to rural continuum in relation to such factors as population, population density, distance from urbanized areas and commuting patterns. Considering these variables, how would you classify your service area?

If other, please specify:

How many hours in an average week is the center open for regularly scheduled patient care (i.e., normal office hours)?

How many imaging machines are there in your imaging center?

MR

CT

PET

PET-CT

General radiology (plain film, fluoroscopy)

DEXA

Ultrasound

Mammography

Nuclear medicine (excluding PET and PET-CT)

Basic interventional (e.g., biopsies)

Advanced interventional (e.g., transcatheter procedures, vein ablation)

Other

Total

SECTION B: EQUIPMENT USE AND CHARACTERISTICS

<p>For what type of imaging machine are you reporting? <i>(Please report on only <u>one machine per row.</u>)</i></p>	<p>How many <u>total minutes in an average week</u> is this machine available for imaging patients? <i>(This should be the sum of Q #4, total minutes in use, and Q #7, total minutes available but not used.)</i></p>	<p>How many <u>total minutes in an average week</u> is this machine used for patient care? <i>(Please include pre-procedure and post-procedure time in addition to the time the machine is in actual use.)</i></p>	<p>How many <u>total minutes in an average week</u> is this machine available but not in use because no patient is scheduled, a physician is required but unavailable for supervision, patient no-shows, or other reasons?</p>
<p>[Modality drop-down]</p>			