

Recent Trends in Imaging Use in Hospital Settings: Implications for Future Planning

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Abstract

Purpose: To compare trends in utilization rates of imaging in the three hospital-based settings where imaging is conducted.

Methods: The nationwide Medicare Part B databases for 2004-2014 were used. All discretionary noninvasive diagnostic imaging (NDI) CPT codes were selected and grouped by modality. Procedure volumes of each code were available from the databases and converted to utilization rates per 1,000 Medicare enrollees. Medicare's place-of-service codes were used to identify imaging examinations done in hospital inpatients, hospital outpatient departments (HOPDs), and emergency departments (EDs). Trends were observed over the life of the study.

Results: Trendlines were strongly affected by code bundling in echocardiography in 2009, nuclear imaging in 2010, and CT in 2011. However, even aside from these artifactual effects, important trends could be discerned. Inpatient imaging utilization rates of all modalities are trending downward. In HOPDs, the utilization rate of conventional radiographic examinations (CREs) is declining but rates of CT, MRI, echocardiography, and noncardiac ultrasound (US) are increasing. In EDs, utilization rates of CREs, CT, and US are increasing. In the 3 years after 2011, when no further code bundling occurred, the total inpatient NDI utilization rate dropped 15%, whereas the rate in EDs increased 12% and that in HOPDs increased 1%.

Conclusions: The trends in utilization of NDI in the three hospital-based settings where imaging occurs are distinctly different. Radiologists and others who are involved in deciding what kinds of equipment to purchase and where to locate it should be cognizant of these trends in making their decisions.

Key Words: Imaging utilization, radiology and radiologists, socioeconomic issues, inpatient imaging, imaging in hospital outpatient facilities, emergency department imaging

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INTRODUCTION

In an era when hospitals are facing enormous costs of installing and maintaining electronic health records, other clinical resources must be carefully and thoughtfully allocated throughout the institution. Radiology has always been one of a hospital's more costly resources in terms of capital budget needs for purchasing and upgrading equipment. The operating budget is also

impacted by radiology department costs of service contracts on the equipment, supplies, and staffing requirements. In this study, we examine recent trends in utilization of the various modalities in the three hospital-based places-of-service where imaging is conducted—hospital inpatient facilities, hospital outpatient departments (HOPDs), and emergency departments (EDs). This information will be of use to radiologists, radiology managers, and hospital executives who have to make decisions on purchasing equipment, deciding where it should be located, and how it should be staffed.

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METHODS

The data sources were the nationwide Medicare Physician/Supplier Procedure Summary Master Files for 2004 through 2014. These files provide aggregated claims

information on approximately 37 million Medicare fee-for-service enrollees. They do not cover enrollees in Medicare Advantage plans. For each code in the *Current Procedural Terminology, version 4* manual, they provide annual volume, allowed payments, and other administrative information.

We selected all codes pertaining to discretionary noninvasive diagnostic imaging (NDI) in the 70,000 and 90,000 series of the manual. By “discretionary,” we mean examinations that are generally chosen by a patient’s physician in his/her discretion as part of a workup or a screening program. We did not include interventional procedures, which are generally mandated by the patient’s clinical circumstances. We also excluded codes for radiation therapy planning, codes for computer-assisted diagnosis in mammography, codes for MRI and CT postprocessing, and those nonimaging tests in the nuclear medicine section (eg, radioimmunoassays) that are more properly considered laboratory tests.

Procedure volumes for each code were determined by tabulating professional component and global claims, but not technical-component-only claims as that would have led to double counting. Whenever a hospital bills Medicare using a technical component claim, there is always a corresponding professional component claim from the interpreting physician. However, the converse is not true. When an interpreting physician submits a professional component claim to Medicare, there is often no corresponding technical component claim from the hospital. For example, imaging examinations on Medicare inpatients do not trigger technical component claims from hospitals because those costs are subsumed within Medicare’s Diagnosis Related Group payments to the hospital. However, there will always be a professional component claim submitted by the interpreting physician for such examinations. Thus the use of professional component claims provides an accurate count of procedure volume, whereas using technical component claims instead would drastically underestimate the actual volume.

We determined the numbers of Medicare fee-for-service enrollees each year from the Medicare Advantage State/County Penetration Reports and used those numbers to calculate utilization rates per 1000 fee-for-service enrollees. Procedure codes were grouped by modality—conventional radiographic examinations (including plain radiography, fluoroscopy, and mammography), CT, MRI, nuclear imaging (including

PET), echocardiography, all noncardiac ultrasound, and bone densitometry.

Medicare uses place-of-service (or location) codes to indicate where examinations are performed. Virtually all imaging is conducted in one of four locations—hospital inpatients, HOPDs, EDs, and private offices. As noted above, we evaluated only the first three because they encompass all examinations done in hospitals. Trendlines were plotted to show the use of the different modalities in each of the three locations, as well as the total utilization of all NDI in each.

Because the Medicare Physician/Supplier Procedure Summary Master Files are complete population counts, sample statistics and significance tests are not appropriate or required. Data analysis was performed using SAS version 9.3 for Windows (SAS Institute, Inc, Cary, NC).

RESULTS

Figure 1 shows the utilization rate trendlines for all NDI performed in each of the three hospital-based settings. At the beginning of the study period, the total inpatient utilization rate of NDI was 22% higher than the HOPD rate (1,224 vs 1,005 examinations per 1,000 enrollees). In 2009, 2010, and 2011, declines were noted in both locations. These declines were due primarily to code bundling that occurred in

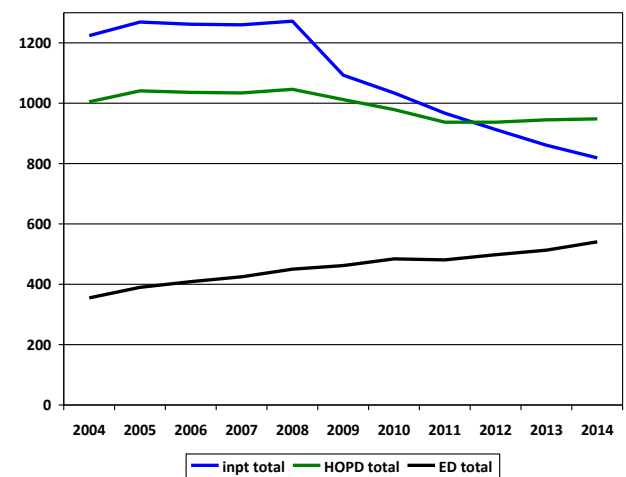


Fig 1. Imaging utilization rates per 1000 Medicare fee-for-service enrollees in hospital settings. The three lines show total imaging utilization rates (ie, all modalities) in hospital inpatients (blue line), hospital outpatient departments (HOPD, green line), and emergency departments (ED, black line). Vertical axis shows examinations per 1000 enrollees.

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