The Recent Reversal of the Growth Trend in MRI: A Harbinger of the Future?

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Purpose: Diagnostic imaging services have been repeatedly targeted as a source of excess health care expenditure. In particular, MRI is considered a high-tech and high-cost imaging service that saw rapid increases in utilization in the early 2000s. However, the most recent trends in the utilization of MR are not known. The aim of this study was to quantify trends in MR utilization overall and by body system from 1998 to 2010 in the Medicare population.

Methods: Medicare Part B data sets were obtained for 1998 to 2010 for all MR examinations performed in the Medicare population. Using Current Procedural Terminology codes, the total volume and utilization rates of all MR examinations were tabulated for each year of the study period. MR volume was then categorized by body system.

Results: The utilization rate of MR examinations in the Medicare population was 73 per 1,000 beneficiaries in 1998, increased to a peak of 189 in 2008, and decreased to 183 in 2010. The compound annual growth rate from 1998 to 2008 was 10%. The utilization rate in 2010 represents a decrease of 3.1% from the 2009 utilization rate. The most frequently imaged body section in every year was the head, which accounted for 2,404,250 examinations in 2010, 37.3% of all MR examinations in that year.

Conclusions: The overall MRI utilization rate sharply increased from 1998 until 2008 but then decreased in each of the next 2 years. A similar trend was noted for MR examinations performed in most body sections. These trends are likely to be the result of a number of possible causative factors.

Key Words: MRI, utilization, health care economics, Medicare, health policy

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INTRODUCTION

From 2000 to 2006, Medicare expenditures for high-tech imaging services, such as MR, CT, and nuclear medicine, increased from $3.6 billion to $7.6 billion, with a compound annual growth rate (CAGR) of 17% [1]. This rate of growth was more rapid than that of any other physician service between 2000 and 2006.

In 2007, imaging expenses accounted for approximately $14 billion, and the overall Medicare budget was approximately $457.5 billion. In 2007, imaging expenses for Medicare Part B represented <3% of the overall Medicare budget. However, the increased per-beneficiary expense grew from nearly nothing in 1985 to $62 in Vermont and $472 in Florida during 2007 [1], and this increase drew attention from policymakers.

Growth in imaging utilization has come under increasing scrutiny from the US government, policy boards, payers, providers, and patients seeking to slow the growth in imaging expenses or to provide data that these additional imaging studies provide value for the health care system. MRI is one high-tech modality that has come under scrutiny for the increased proliferation of MR units and the increased volume of MR examinations performed in the recent decade.

The United States has more MRI capacity and performs more MR examinations per capita than nearly all other developed countries. As of 2009, there were approximately 7,000 sites offering MR studies in the United States, and this number of units corresponds to

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approximately twice as many MR units per million persons as Switzerland and 3 to 4 times the number of units per million persons as other industrialized countries [1,2]. In addition to high capacity for MRI, a relatively large number of MR examinations are performed per capita in the United States. Greece, the United States, and Germany have the highest utilization rate of MR per 1,000 persons among developed countries [2].

Recent studies have demonstrated that the utilization of advanced imaging in the United States is growing at a slower rate or in some cases even decreasing. After years of rapid growth, CT use in the Medicare population declined by 1.7% in 2010 and is now decreasing in every practice setting except emergency departments [3]. A previous study indicated that MR use in the Medicare population grew rapidly in the early part of the past decade but that this growth began to slow [4].

The aim of this study was to update the existing knowledge regarding MR utilization, with particular emphasis on the period from 2008 to 2010. We further investigated the volume of MRI by specific body section.

METHODS

The source data sets were the CMS Part B Physician/Supplier Procedure Summary Master Files (PSPSMFs) for 1998 through 2010. This data set summarizes the complete billing record for all procedures paid under Medicare Part B in its traditional fee-for-service program. For every Current Procedural Terminology®, version 4 (CPT®-4), code in each year, the PSPSMFs provide the volume of services performed nationwide. Beneficiaries enrolled in HMOs through Medicare Advantage plans (25.2% in 2010) are not included in this data set. The PSPSMFs are a government-published, anonymized, aggregated data set that does not follow individual patients or outcomes, and our study was therefore exempt from the requirement for institutional review board approval.

For this study, we analyzed all allowed primary claims submitted for MR examinations. To arrive at the volume figures, we tabulated global claims and professional component-only claims but did not include technical component-only claims because doing so would have led to double counting procedures.

We also used Medicare Advantage state and county market penetration reports to determine the fee-for-service beneficiary population for all of Medicare. We then calculated the utilization rate per 1,000 beneficiaries per year. A utilization trend line was plotted from 1998 through 2010.

MR examinations were tallied overall and also by categories using the following categories and CPT-4 codes: MR abdomen (CPT-4 codes 72195-72197 and 74181-74183), MR breast (CPT-4 codes 76093-76094 and 77058-77059), MR cardiac (CPT-4 codes 75552-75564), MR vascular (CPT-4 codes 71555, 72159, 72198, 73225, 73725, 74185, 76400, and 77084), MR chest (CPT-4 codes 71550-71552), MR head (CPT-4 codes 70336, 70540-70559, and 76390), MR musculoskeletal (CPT-4 codes 73218-73223 and 73718-73723), and MR spine (CPT-4 codes 72141-72158). MR angiography of the head and neck was included in the MR head category because it is typically considered part of neuroradiology.

RESULTS

Figure 1 shows the overall Medicare MR utilization trend line from 1998 to 2010. The utilization rate was 73.1 per 1,000 beneficiaries in 1998 and increased to 189 per 1,000 beneficiaries in 2008. The CAGR from 1998 to 2008 was 10%. The utilization rate decreased very slightly in 2009 to 188.9 and in 2010 further decreased to 183. The utilization rate in 2010 represents a decrease of 3.2% from the 2009 utilization rate.

A total of 2,354,758 MR examinations were performed in 1998, and the total MR volume increased to a peak of 6,641,666 examinations in 2006. After that, there was a slight decrease in volume over each of the next 3 years, but the rate of decrease accelerated somewhat in 2010. There were 6,450,780 examinations performed in 2010. The CAGR from 1998 to 2006 was 13.9%, and the CAGR from 2006 to 2010 was −0.7%. The volume and utilization rate curves differ somewhat from each other because of year-to-year variations in the number of fee-for-service beneficiaries in the Medicare population.

The utilization rate of MRI varied by body section over the study period, as shown in Table 1. In 2010, the largest utilization rates were from MR examinations of the head (68.2 per 1,000), spine (63.7 per 1,000), and musculoskeletal system (35.5 per 1,000). The lowest utilization rates corresponded to chest (0.33 per 1,000), cardiac (0.4 per 1,000), and breast (1.8 per 1,000) MR. Examinations for each body section reached a peak between 2006 and 2009 and then subsequently decreased, except for MR cardiac, which continued to increase through 2010. The CAGR by body section from 1998 to year of peak ranged from 3.5% for MR chest to 53.4% for MR vascular. The CAGR by body section from year of peak to 2010 ranged from −22.7% for MR vascular to 0% for MR abdominal.

The largest number of examinations in every year was MR head examinations, which accounted for 2,404,250 examinations in 2010, 37.3% of all MR examinations in that year. The next largest number of examinations was MR spine, which accounted for 2,244,836 examinations in 2010, 34.8% of all MR examinations performed in 2010. The third largest number of examinations was MR musculoskeletal, which accounted for 1,251,562 examinations in 2010 and represented 19.4% of all 2010 examinations. The fourth largest number of examinations was performed to evaluate the abdomen, which accounted for 382,174 examinations in 2010 and represented 5.9% of all 2010 MR examinations. In 2010,