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The case for radiotherapy in a Value based environment

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ABSTRACT

Aim: Describe the Value proposition for radiotherapy (RT) in the United States.
Background: In the United States since 2005, two forces have worked to decrease RT cost per patient: Federal changes in reimbursement and hypofractionation of treatment courses. We theorize that these have driven stable reimbursement in the context of increasing technology of intensity modulation (IMRT) and image guidance (IGRT). This phenomenon provides increasing Value of the discipline to patients and systems.
Materials and methods: We searched the Medicare Physician/Supplier data for Program Payments per Person with Utilization for 2000 through 2016. This involves two databases: Enrollment Database (EDB) for 2000–2012 and Common Medicare Enrollment (CME) since 2013. RT payments to individual patients accessing services were retrieved.
Results: Taking into account the change of calculation algorithm used by CMS in 2013, costs per patient were similar in 2012 and 2003, and 2016 and 2013.
Conclusions: In the United States, stabilizing costs in the face of increasing work, better outcomes, and decreased toxicity contributes to increasing RT value over the past 10 years.

1. Background

The watchword of the new world order of healthcare finance in the United States is Value. Problematically, different groups define Value differently. While patients consider out of pocket costs as their metric in 45% of cases,[1] and clinicians will invariably point to their patient's outcomes, systems are driven by Warren Buffet's famous quote: "Price is what you pay; value is what you get."[2]

As a discipline, Radiation Oncology is well suited to make its case in the healthcare new world order in several of these arenas. This is due to two major reasons:

- Coding/reimbursement decisions made to stunt rapid cost growth of the early 2000s; and

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- The current evidence-based move to hypofractionated treatment courses.

Hypofractionation refers to the move from the prolonged courses required by daily doses of 1.8–2.0 Gy considered "standard". To achieve therapeutic total doses, many radiation therapy (RT) courses could extend to seven weeks or longer. Improved technology over the past ~20 years have permitted shorter courses of fewer, larger daily doses, and data have shown that these may be done in several body sites with equivalent therapeutic outcomes and no added toxicity.[3]

Nationally, costs of radiation therapy (RT) increased dramatically after 2003, the impact of widespread availability of intensity modulation (IMRT) treatment planning.[4] Governmental cost containment moves during that period impacted those costs. In 2010, the Center for Medicare & Medicaid Services (CMS) bundled medical management of the patient, and review of dosimetry, dose delivery, and port films into the previously used code for weekly on-treatment visits (77 427), that could only be charged once every 5 fractions. Beginning in 2016, the simulation code 77 290 was not billed in the case of subsequent IMRT.

Simultaneously, radiation oncologists have embraced abbreviated treatment courses in clinical situations where supporting data exist.[4] These are numerous: palliative therapy of uncomplicated bone metastases,[5] many curative breast,[6] lung[7] and prostate[8] cancers, and stereotactic treatment of oligometastatic brain,[9] lung,[10] liver[11] and other[12,13] lesions.

Uptake of these opportunities has been slow by some.[14,15] This is understandable (while not defensible) because of the current fee-for-service environment prevalent in much of the country. However, many radiation oncology practices understand that patents prefer briefer treatment courses.[16] Contracts linking reimbursement to patient satisfaction exist, and many radiation practices are making the conceptual and financial move from maximizing reimbursement per *patient* to maximizing reimbursement per *linear accelerator treatment slot*. This requires a large number of patients and their continuous flow.

We hypothesize that the dual forces of reimbursement bundling/cuts and hypofractionation combine to drive down costs per patient. While private insurer data are proprietary, Medicare data exist in a searchable format. This, admittedly, is only a subset of the broader US population, but provides a reasonable mechanism to test our hypothesis. If RT costs are stable or lower over time in the context of more inherent technology and better outcomes, we consider the case made that radiation oncology is meeting the Value requirements of the new world order.

2. Aim

Describe the Value proposition for radiotherapy (RT) in the United States.

3. Methods

We queried the available *United States Center for Medicare & Medicaid Services (CMS)* Medicare Physician/Supplier data for Program Payments per Person with Utilization for 2000 through 2016. This includes professional payments to radiation oncologists and does not include the broader technical costs that generally revert to hospitals and healthcare systems. We were required to access two separate CMS databases,[17,18] since the 2000–2012 data were calculated using the enrollment Database (EDB) and values since 2013 were calculated using the Common Medicare Enrollment (CME) algorithm. In the former,[17] attention was paid to Table 57, updated annually, through the 2002 data. In this table, Radiation Therapy (RT) payments to individual Medicare patients who received RT services specifically are tabulated. Beginning with 2003, those data were in Table 9.3 until 2012, when the MDB algorithm was changed to CDB. Subsequently,[18] PHYSUPP 6 was of interest for the same metric. These data were collated by year; latest data are available for 2016.

These data were then adjusted to the Consumer Price Index in 2016 dollars, using the US government website https://data.bls.gov/cgi-bin/cpicalc.pl.

Table 1 – Review of the Medicare physician/supplier data for Program Payments Per Person With Utilization for Calendar Year (CY) 2000 through CY 2016 (2, 3). Note that between 2012 and 2013, CMS shifted from using the Enrollment Database to using the Common Medicare Environment.

Calendar year	Medicare payment per utilizing patient ($)
2000	1219.67
2001	1141.96
2002	1075.55
2003	1127.86
2004	1366.23
2005	1473.43
2006	1481.47
2007	1535.62
2008	1491.67
2009	1405.95
2010	1318.59
2011	1323.23
2012	1154.97
2013	2024.71
2014	2110.73
2015	2135.93
2016	2034.56

4. Results

Table 1 and Fig. 1 show the inflation-adjusted data from calendar years 2000–2016. Please note the discontinuity in data in 2012–2013 is due to the shift from EDB to CME algorithms. In 2007 a maximum is appreciated; subsequent annual payments decreased until the algorithm shift. Using these data, payments in 2012 were similar to adjusted payments from 2003, despite more sophistication of RT practice.

This is true in both time frames. Despite fewer years involved, costs from 2016 resemble those from 2013.

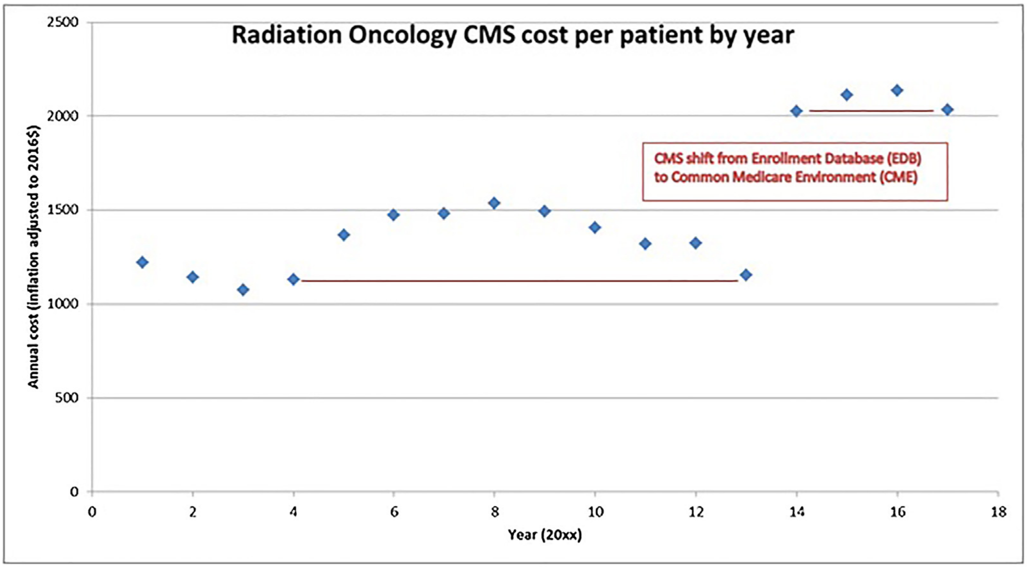

Fig. 1 – CMS Radiation Oncology cost per patient by year.

5. Discussion

If system costs are equal in the context of better outcomes and greater sophistication and work involved, Value is better. These data reveal that this is the case for RT *in the United States*.

A recent analysis of the National Cancer Data Base by Royce and colleagues[19] has documented a decrease in the mean number of fractions delivered per patient between 2004 and 2014: from 28.7 to 25.2. Hypofractionation leads to more patients treated; Vu and colleagues have described an increase of 14% in work Relative Value Units (wRVUs) billed to CMS between 2012 and 2015.[20] It is axiomatic that IMRT and image guidance are increasing the technology involved in daily treatment. This increase in technology contributes to better outcomes,[21,22] and less toxicity in some sites.[23,24] Thus, the quality and work inherent in current Radiation Oncology is quantitatively better now than earlier in the century.

Others have posited that another rationale for cost-effectiveness of hypofractionation involves its increasing use to defer chemotherapy and more expensive systemic therapies. Lester-Coll and associates have described this for pulmonary oligometastasis.[25] From a patient perspective, Konski[26] has pointed out that both direct medical costs and productivity costs (time lost from work) must be considered in any such calculus. Both of these are reduced by adopting hypofractionation where supporting data exist.

Finally, there are entire cadres of patients now who do not receive RT in favor of evidence-based managed observation: low risk prostate cancer,[27] seminoma[28] patients are examples.

Skeptics will point to the fact that much of the cost containment has been due to the government reform. To some extent this is true: such reforms are the cost of doing business in the current US Healthcare environment. As such, they are borne by all American physicians. However, given these data, there seems little argument that much also has been accomplished by radiation oncologists who are concerned about patient preferences, benefit and outcomes. As new data emerge revealing efficacy of abbreviated treatment schedules, they are being adopted (admittedly at variable pace).

More still needs to be done. We have far to go before hypofractionation is uniformly accepted throughput the discipline. However, the influence of payers and the confluence of clinical data continue to push in this direction. Doing so will further cement our place in modern cancer care based on the Value of the care we deliver to our patients.

The primary drawback of this study involves its focus on the Medicare population; data from private payers are unavailable. Medicare reviews claims and compares ICD 10 diagnosis codes to determine if medical necessity is achieved. If the prescribed treatment plan conforms with CMS Medical Necessity guidelines, CMS will pay the claim. If Medical Necessity is not met, the claim is denied and the facility must initiate a tedious process to file an appeal. In contrast, most insurance companies compare and review proposed treatment CPT codes for appropriateness before any treatment may be initiated. Private payers have unique guidelines that are followed to obtain pre-authorization (or not). We suspect private payers will be quick to require hypofractionated regimens where supporting data exist. This difference between private payers and CMS is concerning: the latter has no mechanism to determine the number of treatment fractions that will be delivered. Potentially, this can result in CMS patients not being offered hypofractionated courses of treatment and overspending as a result.

In conclusion, these CMS data reveal that RT costs have stabilized over the past ~15 years despite more technology involved, better outcomes, and decreased toxicity. We consider this to support a strong Value proposition for Radiation Oncology.

Key points

Decreasing reimbursement of radiation therapy, with briefer courses where supporting data exist, have stabilized costs over the past 10–15 years. This contributes to increasing Value of the discipline to health systems and payers.

Conflict of interest

None declared.

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