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Abstract

As the Medicare program struggles to control expenditures, there is increased focus on opportunities to manage patient populations more efficiently and at lower cost. A major source of expense for the Medicare program is beneficiaries at end of life. Estimates of the percentage of Medicare costs that arise from patients in the last year of life differ, ranging from 13% to 25%, depending on methods and assumptions. We analyze the most recently available Medicare Limited Dataset to update prior studies of end of life costs and examine different methods of performing this calculation. Based upon these findings, we conclude that higher estimates that take into account the spending over the 12 months leading up to death more accurately reflect the full cost of a patient's last year of life. Comparing current year costs of decedents with Medicare's current year costs understates the full budgetary impact of end-of-life patients. Because risk-taking entities such as Medicare Advantage plans and ACOs need to reduce costs while improving the quality of care, they should initiate programs to better manage the care of patients with serious or advanced illness. We also calculate costs for beneficiaries dying in different settings and conclude that more effective use of palliative care and hospice benefits offers a lower cost, higher-quality alternative for patients at end of life.

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Background:

As the Medicare program struggles to control expenditures, there is increased focus on opportunities to manage patient populations more efficiently and at lower cost. Patients at end of life represent a disproportionate share of Medicare's costs, implying that these patients are an appropriate population for management by risk-taking Medicare entities such as Medicare Advantage plans and ACOs, whose mission is to reduce cost as well as improve the quality of care. Because risk-taking entities need to reduce costs to share savings, they seek opportunities for more intense patient engagement and management. Actuaries, health economists, policy analysts and health services researchers have studied expenditures at the end of life (EOL) for Medicare decedents for more than thirty years. What is important from the perspective of managing patients and costs is that for patients at the end of life, alternative care pathways that involve palliative care are available that can result in higher quality of life at less cost.

The objectives of this article are fourfold:

1. To summarize some of the main findings of previously published research articles on EOL expenditures and utilization patterns;
2. To propose an appropriate methodology for estimating the proportion of Medicare spending accounted for by patients at end of life that takes into account spending during the final year of life, not just at the time of death.
3. To investigate recent Medicare EOL expenditures using the most recent Medicare Limited Data set (LDS) data for Calendar Year (CY) 2015-6.
4. To model the opportunity for Medicare Advantage plans and MSSP ACOs to reduce cost of care for members in their final year of life while maintaining or improving care quality.

Literature Review on End-of-Life Costs

There is a considerable literature about EOL costs, delivery and financing from different disciplines. To better understand EOL costs and utilization patterns we summarize examples of different aspects, as well as some recent developments in palliative care, quality and futile care.

Numerous articles on EOL costs show that a large proportion of Medicare expenditures occur during the last six months of life [1-9]. This phenomenon has continued for many years as the number of Medicare decedents has increased with the aging American population. Medicare expenditures for end-of-life have increased dramatically from 1983 to 2016, primarily because of the increase in the number of decedents. Other articles compare EOL expenditures in the US to other countries [10, 11], or focus on Medicare expenditures for specific diseases [12-14]. A recent development in the literature challenges the idea that end-of-life costs are responsible for a high percentage of healthcare costs [15]. Below, we discuss methodological differences that could account for differences in estimated proportions. Utilization trends also affect Medicare expenditures and utilization patterns at the EOL, including a higher proportion of Medicare decedents electing hospice. In addition, an increasing proportion of Medicare decedents electing hospice are living longer than 6 months and non-cancer patients now constitute the majority of hospice patients.

Cost Savings: Several researchers have studied the hypothesis that hospice care reduces Medicare expenditures [16-18]. Although the evidence is mixed, recent research challenges this hypothesis, although methodological issues make testing difficult [19]. Hospice eligibility is based upon a prognosis of 6 months or less, but predicting the remaining length of life for most terminally ill patients is difficult, especially for those with non-cancer diagnoses. CMS reimburses hospices on a per diem basis for all care related to the terminal prognosis including, nursing care, social services, spiritual care, medications, medical equipment, personal aides, volunteers and bereavement services. Based upon a per diem payment system, patients with long lengths of stay (LOS) in hospice are less likely to create savings [20]. The patient's diagnosis is an important variable [21-25]. Several innovative programs have been tried to alter the payment methods for the delivery of hospice services designed

to improve the coordination of EOL care and better control EOL costs. Descriptions of experimental and successful palliative care programs are provided in the March, 2018 MedPAC report and several other references [19, 26-30]. Finally physicians have noted that some care, particularly in acute hospitals, is futile. Attempts to define, identify, and address such care is in its infancy [26, 31].

Data/Methods

The Medicare 5% Limited Data Set Analytical File ("Medicare 5% file")

For the purpose of understanding cost of care at the end of life we perform analysis of the Medicare 5% file for the years 2015 and 2016. This file is a random sample of Medicare's claims for the two years, containing experience of approximately 2.9 million patients for each year. Approximately 30% of these patients are enrolled in managed care plans (Medicare Advantage HMOs and PPOs) leaving approximately 2.1 million beneficiaries enrolled in "traditional Medicare" and available for analysis. We exclude members who have less than 6 months of eligibility in any year. Our sample shows 259,000 of the 5.8 million total patients (including Medicare Advantage patients) died in 2015-6, or 4.47%, a rate that is consistent with the Krumholz study [32] and Medicare's published rate.

Table 1: Study Population

Deaths are assigned to a particular place of death based on the last service date. For deaths reported in the eligibility file, the service with the latest reported date determines the place of death.

We calculated the Medicare expenditures for Inpatient, Outpatient, Professional, Emergency department, physician office visits, hospital outpatient visits, Hospice, Skilled Nursing Facility, Home Health and Durable Medical supplies. Outpatient pharmaceutical data are not included in the 5% files, although inpatient and outpatient infused drugs are paid under Medicare Part B and are included.

Results

Medicare costs at End of Life

The share of Medicare's total costs represented by sub-populations helps identify areas of opportunity for program management. There is some controversy over the share of Medicare's cost that Medicare decedents represent. A defined period, usually the last 12 months of life, is essential for assessing the cost of end-of-life patients because of the exponential increase in cost in the last months of life (see for example Table 3 below). However, some comparisons are made on a calendar period basis, which (by definition) includes patients with differing life expectancies. A typical statistic is that 25% of all Medicare's annual costs are accounted for by decedents (Riley and Lubitz, 2010 [1], based on 2006 Medicare payments). Cubanski et al in a 2016 Kaiser Family Foundation Data Note [33] report that "in 2014, beneficiaries who died at some point during the year accounted for 4% of all beneficiaries in traditional Medicare, but 13.5% of traditional Medicare spending…This estimate is lower than the 25% estimate cited earlier because it is based on Medicare spending for people who died at some point in a given calendar year (in this case, 2014), rather than the last 12 months of spending for people who died." Aldridge and Kelley [15] also challenge the traditional estimate from the perspective of total end-of-life spending in the population (not restricted to Medicare patients). They report 13% of total spending due to patients in the last year of life. French et al [34] compare international costs at end-of-life, reporting 8.5% for the United States. Finally a recent paper by Finkelstein et al (2018), [35], using Medicare data from 2007-8 reports that patients dying in 2008 accounted for 15% of total Medicare cost for that year. Whether total spending on EOL patients is 13% or closer to 25% matters in terms of the priority given to managing this sub-population.

Medicare's cost in the last 12 months of end-of-life patients can be estimated on a current cost basis, by dividing the cost of those members who die in a year by Medicare's total cost in the year. As we show in Table 2, allowed costs for those members who died in 2015 is $2.5 billion; total allowed costs for 2015 amounted to $19.0 billion, resulting in a share of decedents of 13.4%. However, this current cost basis overlooks two

important adjustments that are necessary to estimate accurately the cost of decedents that takes their final 12 months of costs into consideration:

1. Depending on the date of death in 2015, the last 12 months of a member's life will include some months in 2014. To estimate the percentage of cost represented by the last 12 months of life of 2015 decedents, it is necessary to add to the 2015 costs their cost in those months in 2014 that are part of the member's last 12 months. For 2014 decedents, these costs amount to $1.4 billion. Without this adjustment the cost of people dying in 2015 as a percentage of 2015 total costs is 13.4%; adding the full 12 months of costs the percentage rises to 19.7%.
2. In addition to adjusting the numerator of the percentage calculation we also need to adjust the denominator. The cost of all members in 2015 is $19.0 billion. At some point in 2016, some of those costs will be attributed to members who die in 2016. It is therefore appropriate to deduct the 2015 cost of 2016 decedents from the 2015 costs. We reduce the 2015 costs by this amount to reflect the total cost incurred by 2015 decedents and survivors.

With these two adjustments the percentage of Medicare's cost represented by 2015 decedents rises to 21%. This percentage is somewhat lower than that reported by Riley and Lubitz based upon Medicare data between 1978 and 2006, [1]) although these authors report a decreasing trend in end-of-life costs. The percentage is higher than that reported by other authors, likely because we include a full 12 months of final year expenses for decedents, and defer the current year's final 12 month costs for those members that die in the following year.

Table 2 Last 12 months of Cost of Persons Dying in 2015

Costs by type of service

In order to model the opportunity for Medicare Advantage plans and MSSP ACOs through reducing the cost of EOL care we investigate recent Medicare EOL expenditures by type of service, using the most recent Medicare Limited Data set (LDS) data for Calendar Years (CY) 2015-6. Table 3 shows an analysis of Medicare's cost per decedent by type of service during the 90 and 180 days prior to death, according to the place of death.

Average Medicare expenditures per decedent per month are greater in the last 90 days preceding death vs. the last 180 days preceding death, confirming the exponential increase in costs as death approaches. The highest spending occurs in acute hospitals. Care provided in skilled nursing, hospice and home health care are other major sources of Medicare expenditures. An increasing proportion of Medicare decedents' final care is rendered by hospices. Average Medicare expenditures per decedent per month increased by 2% from 2015 to 2016.

Table 3 Average Medicare Expenditures Prior to Death

It might be expected that the mean expenditure is influenced by "outliers," which we define as beneficiaries with Medicare expenditures above or below 3.0 * (Q3 – Q1), where (Q3 - Q1) is the interquartile range. However, the results shown in Table 4, when compared to Table 1, show relatively little effect on average Medicare payments of removing outliers, implying that people with very high costs are relatively few among all decedents.

Table 4: Average Medicare Expenditures – Outliers Removed

Table 5 displays the average Medicare expenditures for patients treated in acute hospitals during the last 180 days of life, compared with the hospice per diem cost. The cost of patients treated in the inpatient setting far exceeds the per diem expenditure for palliative or hospice care. Key to the estimation of potential savings from earlier hospice referral is the reimbursement rates paid by CMS [36]. For Fiscal Year 2017 (October 2016-September 2017) the base rate was $190.55; for the last 7 days of life this rate is boosted by a service intensity add-on of $40.19. For the last 7 days of life, total reimbursement is $230.74. Thus savings are possible from admission to hospice within 90 days of death, based on the lower hospice reimbursement rate compared with the average cost of a patient who dies in hospital. With 25% of all Medicare beneficiaries dying in inpatient hospitals, the savings from increased hospice use could be considerable. One challenge, as described by Finkelstein et al [35], is identifying patients who could be eligible for hospice earlier. An additional challenge is educating patients and families about hospice benefits.

Table 5: Average Cost per Day for Patients Dying in Hospital Compared with Cost per Day in Hospice

Discussion

As CMS struggles to contain Medicare costs numerous innovative programs and interventions are tried. One important statistic for program, planning, however, is the ratio between the cost of a patient sub-population and the number of patients. A relatively high ratio indicates a possible opportunity to reduce overall cost (subject to maintaining quality). Whether the ratio for end-of-life patients is 2.9 (13.0/4.5) 4.7 (21/4.5) or 5.6 (25/4.5) matters from the perspective of those that are responsible for managing the cost of the program (and particularly risk-taking entities such as MA plans and ACOs). Patients, clinicians, policy analysts, and administrators agree that the most important goal of end-of-life is to provide services that respect the wishes of

the patient and his/her family. Palliative or hospice care can help to ensure that care is concordant with the preferences of patients and their caregivers while at the same time reducing Medicare expenditures. One critical challenge is to provide information to patients and caregivers at an appropriate juncture in a patient's care. A related challenge is to have a discussion between patients and families and providers about treatment options most likely to meet their end-of-life preferences.

Medicare expenditures increase sharply in the last few days of life, particularly for patients that die in hospital. Recent developments in hospice and palliative care offer the possibility of higher-quality care at lower cost to Medicare, if patients enter hospice earlier. Finding a lower cost site of care that does not jeopardize patients' wishes is a realistic, worthy goal. Expensive, futile care---especially given in an intensive care unit of an acute hospital---probably does not meet the preferences of most people at the end of life. Identifying those who will benefit from intensive care from those in which aggressive care is likely to be futile and burdensome is a challenge for providers, patients and families. The increased existence of hospital-based palliative care services and the recent development of community-based palliative care programs may help to ensure that care at the end of life is concordant with patient and family goals, while at the same reducing the cost of care.

Conclusion

Beneficiaries at end of life account for a significant portion of Medicare spending. Comparing current year cost of decedents with Medicare's current year costs understates the full budgetary impact of end-of-life patients. Greater use of hospice and palliative care, with their lower cost per patient, offers the possibility of expense reduction to the Medicare program while also improving quality of life outcomes.

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Table 1: Study Population

Sample Size Description	Member Count
1. All Members	3,114,712
2. Non-Medicare Advantage Members	2,129,432
3. Parts A and Part B With > 5 Months of Eligibility	1,668,000
4. Final Sample – Members Dying Between 1/1/2015 – 12/31/2016	114,028

Table 2 Last 12 months of Cost of Persons Dying in 2015

Costs in Year	Disposition	Total Allowed Amount	% of Total Cost
2015	2015 Survivor	$ 16,421,958,669	86.6%
2015	2015 Decedents	$ 2,535,371,134	13.4%
	SUB-TOTAL	$ 18,957,329,802	100.0%
2014	2015 Decedents	$ 1,204,327,168	6.4%
2015	SUB-TOTAL: 2015 Decedents	$ 3,739,698,301	19.7%
2015	2016 Decedents	$ 1,165,667,047	6.1%
2015	TOTAL 2015 COST	$ 17,791,662,755	93.9%
	2015 Decedents	$ 3,739,698,301	21.0%

Table 3: Average Medicare Expenditures 90-Days Prior to Death (Per decedent, per month)

YEAR	PLACE OF DEATH	TYPE OF SERVICE									% Place of Death
		INPATIENT	PROFESSIONAL	HOSPICE	OUTPATIENT	SNF	HHA	DME	TOTAL	DECEDENTS	
2015	HOME	$808	$411	$30	$312	$249	$89	$117	$2,015	2,592	4.5%
2015	HOME HEALTH AGENCY	$3,541	$1,129	$65	$1,065	$963	$1,040	$180	$7,983	1,251	2.2%
2015	HOSPICE	$3,985	$1,272	$2,049	$1,062	$986	$288	$63	$9,705	26,924	46.6%
2015	INPATIENT	$11,232	$2,476	$62	$1,531	$1,072	$286	$88	$16,747	14,462	25.0%
2015	OUTPATIENT	$1,712	$853	$47	$1,383	$628	$121	$56	$4,800	9,593	16.6%
2015	SKILLED-NURSING FACILITY	$7,485	$1,906	$63	$1,165	$4,135	$231	$38	$15,022	2,945	5.1%
2015	**SUBTOTAL**	**$5,448**	**$1,495**	**$984**	**$1,204**	**$1,075**	**$264**	**$72**	**$10,542**	**57,767**	**100.0%**
2016	HOME	$712	$365	$40	$285	$229	$78	$107	$1,816	2,332	4.1%
2016	HOME HEALTH AGENCY	$3,534	$1,078	$27	$1,001	$857	$1,029	$112	$7,636	1,249	2.2%
2016	HOSPICE	$4,148	$1,306	$2,177	$1,109	$942	$294	$58	$10,034	26,989	48.0%
2016	INPATIENT	$11,615	$2,528	$74	$1,599	$1,078	$288	$90	$17,271	13,816	24.6%
2016	OUTPATIENT	$1,608	$828	$51	$1,388	$575	$128	$49	$4,627	9,201	16.4%
2016	SKILLED-NURSING FACILITY	$7,281	$1,885	$49	$1,277	$4,445	$239	$36	$15,212	2,674	4.8%
2016	**SUBTOTAL**	**$5,559**	**$1,512**	**$1,075**	**$1,247**	**$1,051**	**$270**	**$66**	**$10,779**	**56,261**	**100.0%**

Place of Death of HOME includes Professional and DME claims.

Average Medicare Expenditures 180-Days Prior to Death (Per decedent, per month)

YEAR	PLACE OF DEATH	TYPE OF SERVICE									% Place of Death
		INPATIENT	PROFESSIONAL	HOSPICE	OUTPATIENT	SNF	HHA	DME	TOTAL	DECEDENTS	
2015	HOME	$806	$398	$29	$330	$263	$90	$106	$2,021	2,592	4.5%
2015	HOME HEALTH AGENCY	$2,785	$968	$66	$956	$754	$737	$161	$6,426	1,251	2.2%
2015	HOSPICE	$2,724	$1,047	$1,331	$1,079	$794	$244	$65	$7,284	26,924	46.6%
2015	INPATIENT	$6,597	$1,700	$50	$1,369	$802	$231	$87	$10,835	14,462	25.0%
2015	OUTPATIENT	$1,404	$707	$42	$1,133	$543	$105	$54	$3,987	9,593	16.6%
2015	SNF	$4,666	$1,346	$49	$1,035	$2,450	$206	$45	$9,797	2,945	5.1%
2015	**SUBTOTAL**	**$3,488**	**$1,138**	**$645**	**$1,122**	**$814**	**$219**	**$72**	**$7,499**	**57,767**	**100.0%**
2016	HOME	$725	$359	$39	$326	$238	$85	$100	$1,873	2,332	4.1%
2016	HOME HEALTH AGENCY	$2,687	$934	$28	$922	$675	$738	$110	$6,094	1,249	2.2%
2016	HOSPICE	$2,827	$1,080	$1,407	$1,123	$770	$249	$60	$7,516	26,989	48.0%
2016	INPATIENT	$6,810	$1,728	$59	$1,445	$800	$230	$91	$11,162	13,816	24.6%
2016	OUTPATIENT	$1,293	$684	$44	$1,164	$483	$109	$49	$3,827	9,201	16.4%
2016	SNF	$4,563	$1,343	$44	$1,150	$2,593	$216	$44	$9,954	2,674	4.8%
2016	**SUBTOTAL**	**$3,546**	**$1,154**	**$701**	**$1,172**	**$793**	**$224**	**$68**	**$7,659**	**56,261**	**100.0%**

Place of Death of HOME includes Professional and DME claims.

Table 4: Average Medicare Expenditures – Outliers Removed

Cost PMPM 90 Days Prior to Death - Outliers Removed									
Year	INPATIENT	CARRIER	HOSPICE	OUTPATIENT	SNF	HHA	DME	TOTAL	MEMBERS
2015	$ 5,291	$ 1,466	$ 984	$ 1,055	$ 1,072	$ 264	$ 50	$ 10,182	57,767
2016	$ 5,401	$ 1,485	$ 1,075	$ 1,094	$ 1,045	$ 270	$ 43	$ 10,414	56,261
Cost PMPM 180 Days Prior to Death - Outliers Removed									
Year	INPATIENT	CARRIER	HOSPICE	OUTPATIENT	SNF	HHA	DME	TOTAL	MEMBERS
2015	$ 3,379	$ 1,102	$ 645	$ 936	$ 813	$ 219	$ 51	$ 7,144	57,767
2016	$ 3,440	$ 1,118	$ 701	$ 980	$ 791	$ 224	$ 46	$ 7,300	56,261

Table 5: Average Cost per Day for Patients Dying in Hospital Compared with Cost per Day in Hospice

Days Prior to Death	Hospital Cost Per day	Hospice Cost Per day
1 - 3	$5,983	$230.74
4 - 7	638	230.74
8-20	493	190.55
21-40	349	190.55
41-60	267	190.55
60-90	220	190.55
90-130	184	190.55
130-180	156	190.55