

Appendix. Traditional Medicare Spending on Inpatient Episodes as Hospitalizations Decline Methods

Extended explanation of episode definition

We constructed an episode measure that captured traditional Medicare spending for the 30 days leading up to an acute hospital admission, the hospitalization duration, and the 90 days following hospital discharge. Our approach is described in more detail in the appendix. Using Part A, B, and D claims data for the years 2008 – 2018, we captured spending across all sectors for episodes with an index hospital admission in the calendar years 2009 – 2017. If a beneficiary died during an episode, we measured health care spending until death. We excluded episodes where the beneficiary did not have traditional Medicare Part A and B for the entire length of the episode or the beneficiary lived outside the 50 states or Washington, D.C.

Any acute hospitalization triggered a new episode, with one exception: if a beneficiary was discharged and readmitted within 90 days for the same Diagnosis-Related Group (DRG), then the readmission did not trigger the start of a new episode. The spending for that readmission was attributed to the initial hospital stay for that DRG. In effect, the annual number of episodes is equivalent to the annual number of acute hospital admissions minus subsequent rehospitalizations for the same DRG. Hospitalizations in inpatient rehabilitation facilities, psychiatric facilities, and other long-term settings and observations stays were not considered acute hospital admissions and did not trigger a new episode.

We assigned claims from non-inpatient sectors to an episode based on whether the start date of each claim fell between 30 days prior to hospital admission or 90 days after hospital discharge. Spending from all traditional Medicare sectors was measured, including outpatient services, emergency room visits, physician claims, skilled nursing facility services, home health, hospice, durable medical equipment, and Part D prescription drug events.

Our analysis aimed to measure all spending related to inpatient episodes without double-counting spending for overlapping episodes. If a beneficiary was rehospitalized for a different DRG during an episode window, then these inpatient readmission costs were apportioned across the initial and subsequent episodes. The readmission triggered a new episode that overlapped with the end of the episode window for the prior hospitalization. Accordingly, we weighted spending proportionately for these situations. For example, consider one episode spanning January 1 – April 15 and a second episode spanning April 1 – July 15. We weighted spending during the overlapping period, April 1 – April 15, to attribute half to the earlier episode and half to the later episode. Our episodes measure allowed for up to 3 overlapping episodes at one time. For 4 or more overlapping episodes, which happened for fewer than 6% of index hospitalizations, all spending for overlapping time was distributed among the first three episodes.

Example of Decomposition Calculations

To illustrate how we decomposed the change in mean episode-related spending per beneficiary into changes associated with two factors – changes in volume of episodes (or number of episodes per beneficiary), changes in spending per episode, and an interaction between these two factors - consider the following example with hypothetical numbers.

In this example, the number of episodes per beneficiary declined by 0.05 episodes, spending per episode increased by \$5,000, and episode-related spending per beneficiary declined by \$500.

	Number of episodes per beneficiary*	Spending per episode	Mean episode-related spending per beneficiary
2009	0.20	\$25,000	\$5,000
2017	0.15	\$30,000	\$4,500
Change	-0.05	\$5,000	-\$500

*To simplify the calculations for this example, we report the number of episodes per beneficiary instead of the number of episodes per 1,000 beneficiaries (estimate reported in paper).

Each of decomposition term is calculated by multiplying the relevant terms:

Change in episode-related spending if:		
Volume of episodes changed & spending per episode stayed the same	Change in number of episodes per person (-0.05) x 2009 spending per episode (\$25,000)	-\$1,250
Spending per episode changed & Volume of episodes stayed the same	Change in spending per episode (\$5,000) x 2009 Number of episodes per beneficiary (0.20)	\$1,000
Interaction to allow for changes in both factors	Change in number of episode per person (-0.05) x Change in spending per episode (\$5,000)	-\$250
Total of these terms (\$1,000 - \$1,250 - \$250) = Change in mean episode-related spending per beneficiary		-\$500

In this hypothetical example, we find that declines in spending associated with a declining volume of admissions (\$-1,250) were partially offset by increases in spending associated with greater spending per episode (\$1,000). The sum of these terms, plus the interaction between them (-\$250) equals the total change in mean episode-related spending per beneficiary.

Conceptually, the estimates reported in Table 1 for number of episodes per beneficiary and spending per episode can be used to calculate the decomposition terms reported in Figure 2. In practice, the decomposition term estimates will be slightly off (by about \$5) due to rounding of the numbers in Table 1.