Conceptual Paper on a Skilled Nursing Facility Update Framework

Office of the Actuary

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The need for an update framework

Under the Skilled Nursing Facility (SNF) Prospective Payment System (PPS), Medicare payments to SNFs are based on a predetermined national payment amount per day. By law, annual updates to these payments are based on changes in the prices of inputs (labor, materials, capital) to providing SNF care. HCFA should have a method for analyzing and comparing expected trends in the underlying cost per day to these updates.

The SNF input price index developed by HCFA's Office of the Actuary (OACT) is just one component in SNF cost per day. It captures only the pure price change of inputs used by the SNF to produce a constant quantity and quality of care. Other factors also contribute to the change in costs per day. These factors include changes in case-mix, intensity, productivity, and profit rates. HCFA would need to develop an analytic framework to account for each of these factors and a way to determine them through policy since SNF payments are set prospectively under the SNF PPS.

This paper explains the factors inherent in SNF payments and costs per day. It explains how these factors could be incorporated into an update framework and presents an illustrative SNF payment update framework. Finally, it describes some additional conceptual and data issues that must be considered when the framework is constructed and applied.

What are the factors inherent in SNF payments per day?

In theory, payments per day under SNF PPS are based on the cost and an implicit normal profit margin to the SNF of providing an efficient level of care. We have developed a methodology to identify a mutually exclusive and exhaustive set of factors included in SNF payments per day. The discussion here details a set of equations to identify these factors.

In its simplest form, the average payment per day to a SNF can be separated into a cost term and a profit term as shown in equation (1):

$$(1) \qquad \frac{Payments}{Days} = \frac{Costs}{Days} + \frac{\mathrm{Pr}\,ofits}{Days}$$

This equation can be made multiplicative by converting profit per day into a profit rate as shown in equation (2):

$$(2) \qquad \frac{Payments}{Days} = \frac{Costs}{Days} * \frac{Payments}{Costs}$$

An output price term can be introduced into the equation by multiplying and dividing through by input prices and productivity. As shown in equation (3), the term inside the brackets represents the output price since the definition of an output price is the input price and profit margin adjusted for productivity:

(3) $$\frac{Payments}{Days} = \frac{Costs}{Days} * \left(\frac{Payments}{Costs} * \frac{Input\ Prices}{Productivity} \right) * \frac{Productivity}{Input\ Prices}$$

The cost per day term can be further separated by accounting for "real" case-mix. Under SNF PPS, Resource Utilization Groups (RUGs) are used to classify patients. Based on RUG classification data, an average "real" case-mix per day index can be incorporated, as shown in equation (4):

(4) $$\frac{Payments}{Days} = \frac{Costs/Days}{Real\ Case\ Mix/Days} * \frac{Real\ Case\ Mix}{Days} * \left(\frac{Payments}{Costs} * \frac{Input\ Prices}{Productivity} \right) * \frac{Productivity}{Input\ Prices}$$

The term "real" is imperative here because only true case-mix should be measured, not case-mix caused by improper coding behavior. By rearranging the terms in equation (4), a set of mutually exclusive and exhaustive factors such as those shown in equation (5) can be identified:

(5) $$\frac{Payments}{Days} = \left(\frac{\frac{Costs}{Days}}{Input\ Prices * \frac{Real\ Case\ Mix}{Days}} * Productivity \right) * \frac{Real\ Case\ Mix}{Days} * \frac{1}{Productivity} * Input\ Prices * \frac{Payments}{Costs}$$

The first term of the equation can be analyzed in two steps. First, excluding the productivity term from the equation results in case-mix adjusted real cost per day, which is defined as <u>input intensity</u> per day. Second, multiplying input intensity by productivity results in case-mix adjusted real payment per day, or <u>output intensity</u> per day. The rationale behind this step is explained in detail in the next section.

The result of these calculations is that SNF payment per day can be determined from the following factors:

(6) $$Payment\ Per\ Day = \frac{\left(\begin{matrix} Case\text{-}Mix\text{-}Constant \\ Real\ \ Output\ Intensity \\ Per\ Day \end{matrix} \right) * \left(\begin{matrix} Real\ Case\ Mix \\ per\ Day \end{matrix} \right) * (Input\ Prices) * (Profit\ Margins)}{Productivity}$$

Thus, it holds that the change in SNF payment per day is a function of the change in these factors. Each of these factors must be accounted for when an update framework is developed. A brief discussion of each factor, including specific conceptual and data issues, is provided in the next section.

Defining each factor inherent in SNF payment per day

Each factor from equation (6) above is discussed here in detail. Because this is a conceptual discussion, it is likely that more detailed issues may be relevant that are not explored here. More research is required to determine whether these issues should be considered.

Input Prices

Input prices are the pure prices of inputs[1] used by the SNF in providing services. These inputs include labor, capital, and materials, such as drugs. By definition, an input price reflects prices faced by SNFs in purchasing these inputs, whereas an output price reflects the prices faced by buyers of SNF services. HCFA currently can measure input prices using the SNF input price index, or "market basket."

Productivity

Productivity is the efficiency of the SNF in producing outputs. It is the amount of real outputs, or real payments, that can be produced from a given amount of real inputs, or real costs. For SNFs, these inputs are in the form of both labor and capital; thus, multi-factor productivity, not just labor productivity, must be reflected. The following set of equations shows how multi-factor productivity can be measured in terms of available data, such as payments, costs, and input prices:

$$\text{Productivity} = \frac{\text{Real Payments}}{\text{Real Costs}}$$

$$= \frac{(\text{Payments}/\text{Output Price})}{(\text{Costs}/\text{Input Price})}$$

$$= \frac{\text{Payments}}{\text{Costs}} * \frac{\text{Input Price}}{\text{Output Price}}$$

Rearranging the terms, the multi-factor productivity equation was used as the basis for incorporating an output price term in equation (3) above. This equation is the basis for understanding the relationship between input prices, output prices, profit margins, and productivity.

Equation (6) shows that productivity is divided through the equation, offsetting other factors. The theory behind this offset is that if an efficient SNF in a competitive market can produce more output with the same amount of inputs, the full increase in input costs does not have to be passed on by the provider to maintain a normal profit margin.

Profit Margins

Profit margins are the ratio of revenues to costs for SNF services provided under Medicare. A profit margin is implicitly built into the base PPS rate. Like the hospital PPS, the SNF PPS gives

[1] When we refer to inputs we are alluding to *costs*, which have both a price and a quantity component. The price is an input price, and the quantity component reflects real inputs, or real costs. Similarly, when we refer to outputs we are alluding to *payments*, which also have a price and a quantity component. The price is the transaction output price, and the quantity is real outputs, or real payments.

SNFs the financial incentive to maximize efficiency and productivity, and therefore, their Medicare margins, by allowing firms to keep excess profits if payments exceed costs. However, firms may also suffer losses if costs exceed payments.

"Real" Case-Mix per Day

"Real" case-mix per day is the average overall mix of care provided by the SNF, as measured using the RUG classification system. Over time, a measure of real case-mix will change as care is given in more or less complex RUGs. Changes in the level of care *within* a RUG classification group would not be reflected in a case-mix measure based on RUGs, but instead should be captured in the intensity factor of equation (6).

The important distinction here is the difference between "real" and "nominal" case-mix. SNFs submit claims to HCFA using the RUG classification system. The case-mix reflected by the claims is considered "nominal." However, because SNFs are classifying their own cases, questions arise concerning whether the reported classification reflects the true level of care provided or if it reflects improper coding behavior. An example of improper coding behavior would be the upcoding, or case-mix "creep," that took place when the hospital PPS was implemented. Any change in case mix that is not associated with a true change in the level of care provided must be excluded if policy makers are to determine "real" case-mix. The BBA gives HCFA the authority under SNF PPS to make adjustments for changes caused by case-mix "creep."

Case-Mix-Constant Real Output Intensity per Day

Intensity is the true underlying nature of the product or service and can take the form of output and/or input intensity. In the case of SNFs, output intensity per day is associated with real payment per day, while input intensity per day is associated with real cost per day. For example, input intensity would be associated with hours of therapy provided, whereas output intensity would be associated with the number of therapy treatments. The underlying nature of SNF services is determined by such factors as technological capabilities, increased utilization of inputs (such as labor or drugs), site of care, and practice patterns. Because these factors can be difficult to measure, intensity per day is usually calculated as a residual after the other factors from equation (6) have been accounted for.

Accounting for output intensity associated with an efficient SNF would be easier if the analysis could be conducted on a SNF's costs rather than on its payments. This analysis would also provide an alternative to developing or using a transaction output price index, which has been difficult for the Bureau of Labor Statistics (BLS) and HCFA to measure for SNFs. The following series of equations shows how to use the definition of an output price as defined earlier to convert the equation for output intensity per day to reflect costs instead of payments, as used in equation (6):

Case-Mix-Constant Real Output Intensity per Day =

$$\frac{[Payments/Days]}{Output\ Prices * Real\ Case\ Mix/Days}$$

$$= \frac{[Payments/Days]}{\left(\frac{Payments}{Costs} * \frac{Input\ Prices}{Productivity}\right) * Real\ Case\ Mix \Big/ Days}$$

$$= \frac{[Payments/Days] * \text{Costs}}{Payments * \frac{Input\ Prices}{Productivity} * Real\ Case\ Mix \Big/ Days}$$

$$= \frac{\text{Payments} * [Costs/Days]}{\text{Payments} * \frac{Input\ Prices}{Productivity} * Real\ Case\ Mix \Big/ Days}$$

$$= \frac{[Costs/Days]}{\frac{Input\ Prices}{Productivity} * Real\ Case\ Mix \Big/ Days}$$

$$= \frac{[Costs/Days]}{Input\ Prices * Real\ Case\ Mix/Days} * Productivity$$

The last equation is identical to the first term in equation (5)—case-mix-constant real input intensity per day multiplied by productivity. Thus, output intensity per day can be defined in such a way that the cost data of the SNF are utilized. This equation can be broken down even further to account for different types of input intensity per day, such as a measure of the level of care provided within RUGs. We discuss this matter more fully in the next section.

Applying the factors that affect SNF payment per day in an update framework

As discussed in the introduction, payments per day under SNF PPS must be updated each year. Currently, the updates are specified by legislation as the percent change in the SNF market basket minus 1 percentage point through 2002, and the percent change in the SNF market basket thereafter. However, HCFA should have an understanding of the underlying trends in SNF costs per day for an efficient provider, especially should the change in these costs deviate from the legislated updates. The development of an update framework with a sound conceptual basis will give HCFA this capability.

Earlier, factors inherent in SNF payment per day were identified. Changes in these factors determine the change in SNF payment per day. Fitting these factors into a framework would allow HCFA to recommend updates each year that appropriately reflect changes in underlying SNF costs. Accounting for each of these factors from equation (6) under SNF PPS is discussed below:

- Change in **case-mix constant real output intensity per day** would be accounted for in the update framework. Because change in output intensity can be difficult to measure, it would be developed through policy, based on the factors that affect not only case-mix constant real input intensity per day, but also productivity, which is determined separately. Factors that can cause changes in case-mix constant real input intensity per day include, but are not limited to, changes in site of service, changes in within-RUG case-mix, changes in practice patterns, changes in the use of inputs, and changes in technology available.

- As discussed earlier, changes in "nominal" case-mix are automatically included in the payment to the SNF through adjustments in the case-mix index. However, the law allows HCFA to make adjustments for case-mix change due to improper coding behavior. Therefore, the update framework should include an adjustment to convert changes in "nominal" case-mix per day to changes in **"real" case-mix per day**.

- Change in **multi-factor productivity** would be accounted for in the update framework. This factor would also need to be developed through policy. However, the availability of historical data on input prices, payments, and costs are useful in the analysis of this factor. Both HCFA and MedPAC set this factor as a target under hospital PPS.

- Changes in **input prices** for labor, material, and capital would be accounted for in the update framework. HCFA's Office of the Actuary currently has an input price index, or "market basket," for SNF services. This is the market basket referred to in the legislated updates. In an update framework, a forecast error adjustment is reflected because the updates are set prospectively and errors of various degrees are inevitable. In the case of the inpatient hospital PPS, this adjustment is made on a two-year lag and only if the error exceeds a defined threshold (0.25 percentage points).

- Under present law, changes in **profit margins** are not explicitly accounted for when SNF payments are updated. The profit margin from the base year implicitly changes when SNF costs change in relation to legislated updates of payments. However, it is important that HCFA monitor profit margins to determine the effect of the PPS on SNFs. Should the profit margins get out of line (in either direction), HCFA could then recommend adjustments to payment rates to bring them back in line for efficient providers. Such an adjustment could be applied directly or, more likely, indirectly through other factors, such as intensity add-ons or offsets, that are determined by policy.

Current HCFA inpatient hospital PPS and illustrative SNF PPS payment update frameworks

The table below shows the payment update framework for the current inpatient hospital PPS and an illustrative update framework for the SNF PPS. Some of the factors in the hospital framework are computed using the Medicare Cost Report data, while others are determined via policy targets. Details in calculating each factor for the hospital framework can be found in the August 1, 2000 Federal Register, 'Medicare Program; Changes to the Hospital Inpatient Prospective Payment System and Fiscal Year 2001 Rates; Final Rule.' This design for a SNF update framework is for illustrative purposes only, as much more work needs to be done to determine the appropriate level of detail for each factor and the manner in which the factors would be developed through policy.

MedPAC supports the use of a framework such as this for updating payments and applies a similar framework when it proposes updates to hospital payments in its annual recommendation to Congress (MedPAC, 2000). The appropriateness of this framework for updating hospital payments has also been discussed in a paper by *Sheingold and Richter (1992).* We believe a similar framework would be useful for analyzing updates to the SNF payments.

Current HCFA Hospital PPS and Illustrative SNF PPS Payment Update Frameworks

HCFA Hospital PPS Update	FY 2001 Calculated Hospital Update	Illustrative SNF PPS Update
Percent Change in:	*Percent Change*	*Percent Change in:*
HCFA PPS Hospital Market Basket	3.4	**HCFA SNF Market Basket**
Forecast Error	0.0	**Forecast Error**
Productivity	-0.5 to –0.4	**Productivity**
Output Intensity:	0.0 to –0.6	**Output Intensity:**
Science and Technology		Science and Technology
Practice Patterns		Practice Patterns
Real within-DRG Change		Real within-RUG Change
Site of Service		Utilization of Inputs
		Site of Service
Case-mix Adjustment Factors:		**Case-mix Adjustment Factors:**
Projected Case-mix	-0.5	Nominal across-RUG Case-mix
Real across-DRG Change	0.5	Real across-RUG Change
Total Cost per Admission	-0.5 to –1.0	**Total per Diem Cost**
Other Policy Factors:		**Other Policy Factors:**
Reclassification and Recalibration	0.0	None
Total Calculated Update	**-0.5 to –1.0**	**Total Calculated Update**

*Table data derived from the August 1, 2000 Federal Register, 'Medicare Program; Changes to the Hospital Inpatient Prospective Payment System and Fiscal Year 2001 Rates; Final Rule.'

Additional conceptual and data issues

Three conceptual issues specific to the SNF PPS are the relevance of a site-of-service substitution adjustment, the necessity of an adjustment for RUG reclassification, and how to handle one-time factors.

Under hospital PPS, a site-of-service substitution factor (captured as part of intensity) was necessary because of the incentive to shift care from hospital inpatient to such other settings as hospital outpatient, SNFs, or HHAs. For SNF PPS, it must be determined whether incentives to shift care to these other settings will continue (a positive factor in the framework) or whether the SNF PPS will reduce these incentives and/or create alternative incentives to shift care out of SNFs (a negative factor). Research is required in this area to account for any changes in behavior created by the different Medicare payment systems.

A reclassification and recalibration adjustment under hospital PPS is necessary to account for additional changes in the case-mix factor resulting from reclassifying and recalibrating the DRG classification software. This factor is applied to the current fiscal year update but reflects the effect of revisions in the fiscal year 2 years prior. MedPAC does not account for this adjustment in it's update framework. Whether a RUG reclassification adjustment would be necessary in the update framework would depend on the data availability and the likelihood of revisions to RUG classifications on a periodic basis.

There is also a question about how to handle one-time factors, such as the increased costs of converting computer systems to year 2000 compliance. An update framework is the appropriate mechanism to account for these items, but because of uncertainty surrounding their impact on costs, determining an appropriate adjustment amount would be difficult. MedPAC discussed this issue in their April 2000 session, but was unable to agree on the exact methodology for these types of factors.

Concerns also exist about the usefulness of some of the data from the Medicare Cost Reports (MCR). As is widely known, the incentives of a cost-based reimbursement system affect the accuracy of the data from the MCR. This fact is particularly relevant in recent years for SNFs, which have had an explosion in the use of ancillary services and questionable overhead allocations. It must be determined how to make best use of the MCR data for analyzing the update framework in a historical context--a task that is required to understand and estimate the factors within that framework. It may be necessary to conduct analysis of efficient providers or use sensitivity analysis to get maximum use out of the MCR.

The lack of historical case-mix data is another important issue. These data are currently being collected under contract but will not be available for most historical years. This factor may prove difficult to account for in a historical analysis. There are also concerns about the BLS output price measures for SNFs, especially during the first years of publication in 1996 and 1997. Output prices are relevant for trying to measure productivity in a historical context.

Finally, the experience gained from implementing the hospital PPS update framework illustrates the necessity of substituting facility-wide data for Medicare data (and vice versa) when certain data are not available. Substitution is only done when this data is applicable and appropriate for estimating the Medicare sector. HCFA has been required to substitute data to determine the productivity adjustment under the hospital PPS update framework.

Conclusion

This paper provides the conceptual basis for developing an update framework for SNF PPS that reflects changes in the underlying costs of providing an efficient level of skilled nursing services. It is important to note that the framework does not handle distributional issues such as geographic wage variations. The update framework presented here is also viewed by many experts as conceptually more appropriate than are updates based on a target expenditure amount—such as the sustainable growth rate used under the Physician Fee Schedule.

Due to some variations in technical methodologies for measuring the factors of an update framework, and because of some of the data concerns mentioned earlier, implementing an update framework for SNF PPS would require important policy judgements. A consistent methodology must be developed to prospectively set each policy-oriented factor. OACT looks forward to providing any needed support in the development of such a framework.

References

MedPAC. *Report to Congress: Medicare Payment Policy*. March 2000.

Sheingold, Steven H., and Elizabeth Richter. "Are PPS Payments Adequate? Issues for Updating and Assessing Rates." *Health Care Financing Review*, (Winter 1992), 165-175.