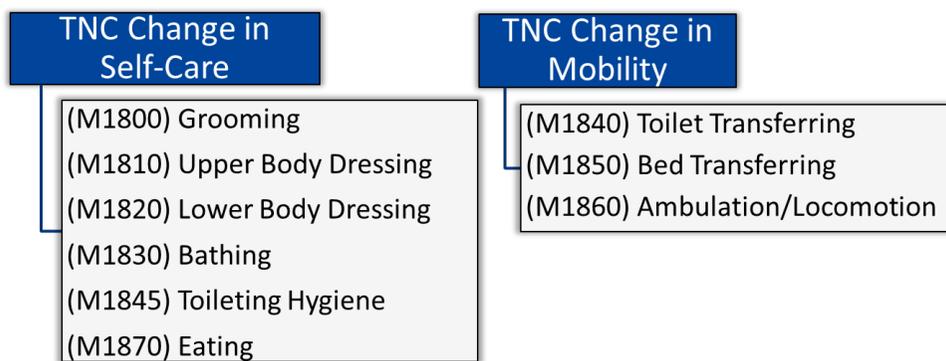


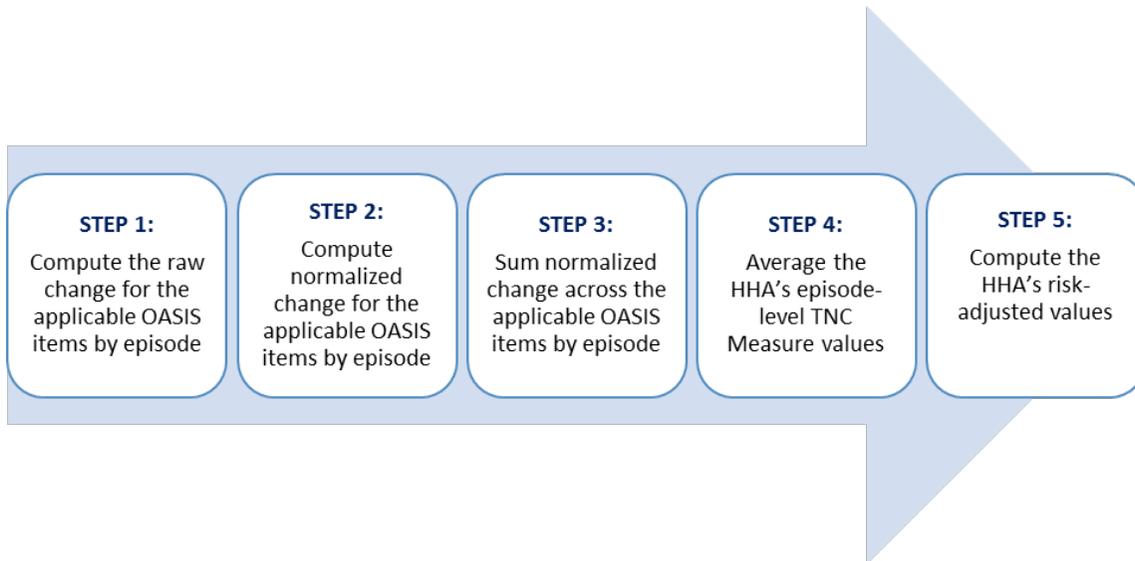
The Home Health Value-Based Purchasing (HHVBP) composite measures, Total Normalized Composite (TNC) Change in Self-Care and TNC Change in Mobility, capture the magnitude of change (not just improvement) in multiple OASIS items. Therefore, they reward efforts to improve patients who are less independent at start or resumption of care, as these patients have a greater opportunity for higher TNC measure scores. Normalization accounts for the variation in the number of response options on the applicable OASIS items for each TNC Measure.

Exhibit 1



CMS calculates the TNC Change in Self-Care and TNC Change in Mobility measures at the episode level and then aggregates to the home health agency level using the five-step process below for each TNC measure. Steps 1 - 3 describe the calculation of the normalized change values for each applicable OASIS item at the **episode level**. Steps 4 and 5 describe the aggregation of these values to the **agency level**. As composite measures, the TNC Change in Self-Care and TNC Change in Mobility measures reflect multiple OASIS items, so there are no numerators and denominators for these two measures.

Exhibit 2



Step 1: Compute the Raw Change for the Applicable OASIS items by Episode

For each TNC measure, CMS calculates the raw change score for each applicable OASIS item at the episode level, which is the difference between the patient's status at start or resumption of care and the patient's status at discharge. CMS does this calculation for each of the six applicable OASIS items used to calculate TNC Change in Self-Care and the three applicable OASIS items used to calculate TNC Change in Mobility.

Please note that patients who are fully independent at start or resumption of care **ARE** included in the calculations. Patients who are fully independent can either remain the same or worsen. If the patient worsens, the episode will earn a negative change score.

Step 1 Example: If the patient goes from a "3" on bathing at start or resumption of care to a "0" on bathing at discharge, the raw change score for the episode is "3".

Step 2: Compute Normalized Change for the Applicable OASIS items by Episode

Step 2 Example: Following our example above, we take the raw change score for the episode of "3" for bathing and divide it by "6" (maximum possible change for bathing) to obtain the normalized change score of "0.5".

For each applicable OASIS item used to calculate the TNC measure score, CMS normalizes episode raw change by dividing this value by the maximum possible change for that OASIS item. The maximum possible range of episode level raw change scores for TNC Change in Self-Care is "-6" to "+6", and for TNC Change in Mobility is "-3" to "+3". CMS repeats this process for each applicable OASIS item in the TNC measures to fit scores into a range of "-1" and "+1" for all nine OASIS items. CMS expects few patients will achieve the maximum normalized



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change scores of “-1” or “+1” during their episode of care. Typically, patients may achieve smaller amounts of proportional change during their episode of care.

Step 3: Sum Normalized Change across the Applicable OASIS Items by Episode

This step sums the normalized change scores for each episode of the six and three OASIS items for TNC Change in Self-Care and TNC Change in Mobility, respectively. Please refer to **Exhibit 1** for the list of applicable OASIS items for each TNC measure.

Step 4: Average the HHA’s Episode-level TNC Measure values for each TNC Measure

CMS averages the episode level TNC Change in Self-Care or TNC Change in Mobility scores for each agency. The maximum possible range for these averages at the agency level are “-6” to “+6” for TNC Change in Self-Care, and “-3” to “+3” for TNC Change in Mobility.

Again, agencies are very unlikely to achieve such extreme scores based on the average of all patients they serve. CMS expects an individual agency’s observed scores for TNC Change in Self-Care to be higher than their observed scores in TNC Change in Mobility because the range of possible scores is larger for Self-Care than for Mobility.

Step 5: Compute the HHA’s risk-adjusted values for each TNC Measure

The agency’s TNC Change in Self-Care or TNC Change in Mobility observed scores are risk adjusted based on the following formula:

$$HHA_{\text{Risk Adjust}} = HHA_{\text{Observed}} + (\text{National}_{\text{Predicted}} - HHA_{\text{Predicted}})$$

This is the same formula that is used to risk adjust all other OASIS-based measures. Note that the agency’s predicted value is the average across all episodes of care for that agency, and the national predicted is the average across all episodes of care for all agencies in the US.

At this point, the HHVBP Model treats the risk adjusted TNC measures similar to other measures in the Model, (e.g., to compare an agency’s risk adjusted measures with its state’s Achievement Thresholds and Benchmarks to calculate a Total Performance Score (TPS)). Please refer to the following resources addressing the calculation of the TPS score are available under the Libraries tab on [HHVBP Connect](#):

- The *Total Normalized Composite (TNC) Change in Self-Care and TNC Change in Mobility Achievement Thresholds and Benchmarks* document for state specific values;
- The *Technical Specification for Composite Measures* document provides the prediction model coefficients for the composite measures, definition of the measures, and a description of the five-step process;
- The *HHVBP FAQs* provide information on measure weighting and formulas for TNC Change in Self-Care and TNC Change in Mobility;
- The *HHVBP Model Report and Payment Guide* includes information about the HHVBP Model, including the measures, calculations, and reporting; and



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- The *HHVBP Newsletter* “By the Numbers” series features articles on the five-step calculation for the HHVBP composite measures, found in both the March – June 2019 Newsletters and in [Appendix A: By the Numbers](#).

Additional information on the HHVBP composite measures is available in the [CY 2019 Home Health Prospective Payment System \(HH PPS\) Final Rule](#). If you have questions regarding the calculation of the HHVBP Model composite measures, or other program questions about the HHVBP Model, please email the HHVBP Help Desk, at HHVBPquestions@cms.hhs.gov.

Appendix A – By the Numbers

Note: The HHVBP Model Technical Assistance Team first published the following four articles in the HHVBP Newsletter “By the Numbers” series from March – June 2019. This Appendix consolidates the articles below as an additional resource for calculating the HHVBP composite measures.



All Good Things Come in "Fives"

Beginning in Performance Year 4 (2019), the two composite measures replaced the three Activities of Daily Living-related outcome measures currently included in the HHVBP applicable measure set:

- Improvement in Ambulation/Locomotion;
- Improvement in Bed Transferring; and
- Improvement in Bathing.

Unlike the three predecessors measuring agency performance based on any change in improvement in patient status, the two composite measures report the magnitude of patient change (either improvement or decline) across multiple patient items. This important distinction requires a different computational approach than the Performance Year 1-3 OASIS-based outcome measures.

This article will review the “five-step process” to calculate the two composite measures by reviewing patient-specific examples. The five elements in the “five-step process” to calculate TNC Change in Mobility and TNC Change in Self-Care are:

1. Compute the raw change for the applicable OASIS items by episode
2. Compute normalized change for the applicable OASIS items by episode
3. Sum normalized change across the applicable OASIS items by episode
4. Average the HHA’s episode-level TNC measure values
5. Compute the HHA’s risk-adjusted values

The two composite measures are first calculated, normalized, and summed at the episode level (steps 1, 2, and 3) and then aggregated to the agency level (steps 4 and 5). Given the composite measures are based on multiple OASIS items, there is neither a numerator nor a denominator for these two measures. Rather, the two composite measures report a risk-adjusted normalized (and averaged) amount of change that the agency helps its patients achieve in self-care and mobility. The goal is for the agency to maximize the total amount of change they help their patients achieve. The next article provides examples to illustrate each calculation step in more detail.



Easy as "1, 2, 3"

The April 2019 Interim Performance Reports (IPRs) included baseline year performance information and Achievement Thresholds and Benchmarks for the two new composite measures, Total Normalized Composite (TNC) Change in Self-Care and TNC Change in Mobility, for all eligible HHAs. This article reviews one of the two fictional case scenarios discussed during the March 14, 2019 learning event “Strategies to Improve Patient Function: New Self-Care and Mobility Measures.”

Mrs. L is 80 years old and was referred to home health from her doctor’s office for constipation and lack of bowel movement for three days. The following table summarizes her status at start of care (SOC) and discharge (DC) for each of the six and three OASIS items included in TNC Change in Self-Care and TNC Change in Mobility, respectively.

Composite Measure	Activity (OASIS Item)	Status at SOC	Status at DC	Maximum Possible Change	Step 1	Step 2	Step 3
					Raw Change	Normalized Change	Sum of Normalized Change
TNC Change in Mobility	Ambulation (M1860)	5	2	6	3	0.50	1.40
	Toilet Transferring (M1840)	2	0	4	2	0.50	
	Bed Transferring (M1850)	2	0	5	2	0.40	
TNC Change in Self-Care	Grooming (M1800)	3	1	3	2	0.667	3.70
	Upper Body Dressing (M1810)	2	0	3	2	0.667	
	Lower Body Dressing (M1820)	3	0	3	3	1.00	
	Bathing (M1830)	5	2	6	3	0.50	
	Toileting Hygiene (M1845)	2	0	3	2	0.667	
	Eating (M1870)	1	0	5	1	0.20	

For example, Mrs. L. improves from a “2” to a “0” on both toilet transferring and bed transferring, and from a “5” to a “2” on ambulation. In **Step 1**, we calculate the raw change by subtracting the DC value from the SOC value for each individual OASIS item. For ambulation, we subtract “2” from “5” resulting in a raw change of “3.” Go ahead and work your way through the remaining OASIS items and try to replicate each item’s raw change. Do your calculations produce matching numbers?

In **Step 2**, we normalize the raw change. The process of normalizing creates a common scale that allows us to compare changes across all nine OASIS items. Let’s take a look at M1840 and M1850 to show why this step is necessary. Mrs. L has the same SOC and DC status on these two OASIS items. Based on the raw change of “2”, Mrs. L’s improvement on these two activities looks identical. In reality, Mrs. L improved more in toilet transferring than bed transferring. The difference is because of the number of

maximum possible change for the particular OASIS item. Toilet transferring allows for a possible maximum change of “4” if a patient starts at “3” and ends at “0” by DC. Each incremental improvement (e.g., from “0” to “1”, “1” to “2”, etc.) equates to a positive change of 0.25. With a maximum possible change of “5” for bed transferring, however, each incremental improvement only equates to a positive change of 0.2. Hence, improving from “2” to “0” on toilet transferring constitutes a greater improvement compared to bed transferring. To create the normalized change for each OASIS item, we divide the raw change by the maximum possible change. For Mrs. L, we calculate a normalized change of 0.5 for toilet transferring (i.e., “2” divided by “4”) and 0.4 for bed transferring (i.e., “2” divided by “5”). The raw change can be deceiving if you fail to take the maximum possible change into account for a given OASIS item.

Has your head started spinning yet? Luckily, **Step 3** is straightforward: Add up the normalized change across the OASIS items that constitute TNC Change in Self-Care and TNC Change in Mobility, respectively. Given Mrs. L. improved across all nine OASIS items, the two values we calculate in Step 3 are both positive (see table for the actual values). In the next section, we will review an example of a patient who mostly declined to illustrate that Steps 1 through 3 work just the same for worsening patients!



Reinforce. Practice. Repeat.

The previous article reviewed the first three steps of the “five-step process” to calculate Total Normalized Composite (TNC) Change in Mobility and TNC Change in Self-Care for a patient who improved in all underlying OASIS items. To reinforce these three steps, we will practice the calculations for another fictitious patient (“Mr. A”) whose mobility and self-care abilities mostly declined between start of care (SOC) and discharge (DC).

Composite Measure	Activity (OASIS Item)	Status at SOC*	Status at DC*	Maximum Possible Change	Step 1	Step 2	Step 3
					Raw Change	Normalized Change	Sum of Normalized Change
TNC Change in Mobility	Toilet Transferring (M1840)	1	4	4	-3	-0.750	-2.05
	Bed Transferring (M1850)	1	5	5	-4	-0.800	
	Ambulation (M1860)	1	4	6	-3	-0.500	
TNC Change in Self-Care	Grooming (M1800)	1	1	3	0	0.000	-2.50
	Upper Body Dressing (M1810)	1	3	3	-2	-0.667	
	Lower Body Dressing (M1820)	1	2	3	-1	-0.333	
	Bathing (M1830)	0	3	6	-3	-0.500	
	Toileting Hygiene (M1845)	0	3	3	-3	-1.000	
Eating (M1870)	0	0	5	0	0.000		

* A value of “0” indicates a status of most independent for each OASIS item. The value for most dependent status varies by OASIS item and is equal to the item’s “Maximum Possible Change”.



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Mr. A’s status at both SOC and DC across the nine OASIS items reveals that he declined in all three mobility activities and in four out of six self-care activities. At DC, his status remained at “1” for grooming and at “0” for eating.

In Step 1, we calculate the raw change by subtracting the DC value from the SOC value for each individual OASIS item. For bed transferring, we get a raw change of negative 4 (i.e., “1” minus “5”). Unsurprisingly, the raw change for grooming and eating is “0” (i.e., “0” minus “0”). In Step 2, we normalize the raw change. To create the normalized change for each OASIS item, we divide the raw change by the maximum possible change. For Mr. A, we calculate a normalized change of negative 0.8 for bed transferring (i.e., “-4” divided by “5”). Without peeking at the results in the table, can you guess the normalized change for grooming and eating? In Step 3, we add up the normalized change across the OASIS items that constitute TNC Change in Self-Care and TNC Change in Mobility, respectively. Because Mr. A declined in all of the mobility and most of the self-care activities, the two values we calculate in Step 3 are both negative (see table for the actual values).

We hope you are starting to get the hang of these calculations. The next article will explore the agency-level calculations and review Steps 4 and 5 to complete the “five-step process” of computing the two composite measures.



Moving Up the Ladder

In this section, we complete the “five-step process” of computing the two composite measures by reviewing Steps 4 and 5, e.g. leaving episode level and moving on to agency level. For illustrative purposes, let’s calculate the risk-adjusted values for Total Normalized Composite (TNC) Change in Mobility for a fictitious HHA (HHA #1).

HHA #1 has 20 episodes of care that are eligible to be used to calculate the composite measures (the minimum number of episodes of care to calculate the two composite measures in a given performance period). In Step 4, we calculate the HHA’s average episode-level TNC Change in Mobility values across these 20 episodes of care, as summarized in Step 3 of the “five-step process”. The following table lists the values created in Step 3 for HHA #1.



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Mobility						
Episode	Step 3	Step 4	Episode-Level Predicted	HHA-Level Predicted	National Predicted	Step 5
1	1.4	0.63	1.54	0.73	1.00	0.90
2	1.4		1.26			
3	1.4		1.54			
4	1.4		1.68			
5	1.4		1.54			
6	1.4		1.26			
7	1.4		1.54			
8	1.4		1.68			
9	1.4		1.54			
10	0		0.15			
11	0		0.20			
12	0		-0.15			
13	0		0.20			
14	0		0.15			
15	0		0.20			
16	0		-0.15			
17	0		0.20			
18	0		0.20			
19	0		0.20			
20	0		-0.15			

Note: Values presented in the table are fictitious.

In Step 4, we calculate the HHA’s average episode-level TNC Measure values for Mobility across the 20 episodes of care. This average is also called HHA-level “observed” TNC Change in Mobility. For HHA #1, this yields a value of 0.63 $((9*1.4)+[10*0])/20 = 0.63$.

In Step 5, we calculate the risk-adjusted TNC Change in Mobility. Let’s review the risk-adjustment formula as a reminder:

$$\text{HHA-level Observed} + (\text{National Predicted} - \text{HHA-level Predicted})$$

Given that we have already calculated the “HHA-level Observed” value in Step 4 for HHA #1, we only need the “National Predicted” and the “HHA-level Predicted” value for TNC Change in Mobility to complete Step 5. The “National Predicted” value is the average of the episode-level predicted TNC Measure values across all eligible episodes of care nationally. Similarly, the “HHA-level Predicted” value is the average of the episode-level predicted TNC Measure values across all eligible episodes of care for HHA #1. According to the table, we can see that HHA #1 has a risk-adjusted TNC Change in Mobility value of 0.9. Are you able to match this value by plugging in the values in the formula for risk-adjustment? Go ahead and give it a try!