

Numerator Calculation

The numerator ranges from 0 to 380. The numerator can be expressed mathematically as below:

$$0.5 \times 20 \times \sum_{c=1}^{19} \omega_c I(s_c > 0) + 0.5 \times 19 \times \sum_{p=1}^{20} \omega_p I(s_p > 0)$$

where s_c and s_p are number of services provided for each care type, c, in the care category and each procedure type, p, in the procedure category, respectively. ω_c and ω_p are weights for each care type c, and procedure type p, respectively, where $c = \{1, 2, \dots, 19\}$ and $p = \{1, 2, \dots, 20\}$. I is an indicator function.

Measure Score Calculation Diagram

Here is how those components were derived. To operationalize the average of the 2 weighted proportions into a single measure consisting of a numerator and denominator, algebra is used to establish a functional calculation.

To start, consider the equation as weighted proportions calculated separately and then averaged:

$$\left[\frac{\sum_{c=1}^{19} w_c I(s_c > 0)}{19} + \frac{\sum_{p=1}^{20} w_p I(s_p > 0)}{20} \right] \times 0.5$$

Individual fractions reflect the weighted proportion for care services and procedure services. These fractions can be summed, then multiplied by 0.5 to reflect an average.

These fractions use “indicator” functions where each service the PCP provides is equal to 1 if the service was provided and 0 if the services was not provided. Each service is then multiplied by its corresponding weight, then each service is summed to comprise a number which is divided by the total number of services in that care category. An example calculation using the care-based services category is provided:

$$\left[\frac{\sum_{c=1}^{19} w_c I(s_c > 0)}{19} \right] = \frac{[1.13(1) + 1.11(0) + 1.15(1) + \dots]}{19}$$

In this example, the PCP offered adult outpatient care (with a weight of 1.13) and chronic disease management (1.15) as evidenced by their indicator function equaling “1”. The PCP did not offer behavioral health care (where the weight is 1.11) thus the indicator function equals “0”. The full calculated sum of the numerator would have terms for each of the 19 services (indicated by the ellipsis). Note, for each weight multiplied by zero, this service would not affect the numerator sum.

To calculate the average of two weighted proportions into a single proportion with one numerator and one denominator, the equation must be converted with algebra. This requires finding a common denominator for the two proportions and multiplying through by 0.5. The effect is a single numerator and denominator as shown:

$$\left[\frac{\sum_{c=1}^{19} w_c I(s_c > 0)}{19} + \frac{\sum_{p=1}^{20} w_p I(s_p > 0)}{20} \right] \times 0.5$$

$$= \left[\frac{0.5 \times 20 \times \sum_{c=1}^{19} w_c I(s_c > 0)}{19 \times 20} + \frac{0.5 \times 19 \times \sum_{p=1}^{20} w_p I(s_p > 0)}{20 \times 19} \right]$$

$$= \left[\frac{0.5 \times 20 \times \sum_{c=1}^{19} w_c I(s_c > 0) + 0.5 \times 19 \times \sum_{p=1}^{20} w_p I(s_p > 0)}{380} \right]$$