

Measure ID: ABFM12, CBE #3617

Measuring the Value-Functions of Primary Care: Continuity of Care  
National Quality Strategy Domain: Person and Family Centered Care  
Meaningful Measure Area: Appropriate Use of Healthcare  
High Priority Measure: Care Coordination

**2024 COLLECTION TYPE:**

QCDR MIPS CLINICAL QUALITY MEASURES

**MEASURE TYPE:**

Efficiency

**Calculation TYPE:**

Proportional measure

**DESCRIPTION:**

This is a measure evaluating primary care physicians (PCPs); for each PCP, the denominator is all patients seen during the evaluation period who had at least 2 PCP visits. The numerator is the number of those patients whose Bice-Boxerman Continuity of Care Index is  $\geq 0.7$ . The Bice-Boxerman index is a validated measure of patient-level care continuity that ranges from 0 to 1; 0 reflects completely disjointed care and 1 reflects complete continuity with the same PCP for all visits. The Bice-Boxerman index was used in a previously NQF endorsed measure for children with medical complexity. Compared to lower scores (e.g., 0.6 or lower), continuity index scores of 0.7 or higher have been associated with significantly lower Medicare expenditures and significantly lower odds of hospitalization.

References:

Higher Primary Care Physician Continuity is Associated with Lower Costs and Hospitalizations. Bazemore et al. Annals of Family Medicine. 2018. 16, 492-497.

**DENOMINATOR:**

The denominator is the total number of patients with at least 2 visits to any PCPs during the measurement period. The denominator is calculated by summing the total number of patients with two or more primary care visits who had at least one of those visits with that physician. A patient with visits to more than one physician will appear in the denominator for the physician who saw the patient the most.

***DENOMINATOR NOTE:*** The requirement of at least 2 visits is necessary to calculate a Continuity of Care index. There are no denominator exclusions or exceptions. Telehealth visits are included.

**Denominator Criteria (Eligible Cases):** The denominator is the total number of patients with continuous enrollment with at least 2 visits to any primary care physicians in the measurement period.

**NUMERATOR:**

The numerator is the number of patients with a continuity index of at least 0.7.

For each patient, the continuity index score is calculated using the Bice-Boxerman Continuity of Care calculated as follows: Bice Boxerman-Continuity of Care Patient =  $(\sum_{i=1}^k n_i^2) - N(N-1) / (N(N-1))$  where  $k$  is the number of PCPs,  $n_i$  is the number of visits to PCP  $i$  and  $N$  is the total number of visits.

***NUMERATOR NOTE:*** The index can range from 0 to 1, the higher the number the greater the Continuity of Care. If someone has all their visits with a single PCP, their index will equal 1. There are no numerator exclusions.

**DEFINITIONS:**

**Primary care visit** Any visit with a primary care clinician. This is done using the health care services categorization code of 01 to identify primary care physicians, and the place of service codes 01,02,03,04,11,12,13,14,15,16,17,41,42,49,50,53,57,60, or 71.

**Primary care clinician** Physicians with a health care services categorization code of 01. Does not include nurse practitioners or physician assistants.

**Measurement year** 12-month period between January 1 and December 31 of the calendar year of interest

**Bice-Boxerman Continuity of Care (CoC) index** The Bice-Boxerman index is a validated measure of patient-level care continuity that ranges from 0 to 1; 0 reflects completely disjointed care (a different provider for each visit) and 1 reflects complete continuity with the same provider for all visits.  $Bice-Boxerman-Continuity\ of\ Care = \frac{(\sum_{i=1}^k n_i^2) - N}{N(N-1)}$  Where k is the number of providers, n\_i is the number of visits to provider i, and N is the total number of visits.

**CALCULATION ALGORITHM**

Step 1: Identify all patients with at least 2 visits to a Primary Care Provider in either the office or outpatient setting. This is done using the health care services categorization code (HCCC) 01 to identify primary care physicians, and the place of service codes (POS) 01,02,03,04,11,12,13,14,15,16,17,41,42,49,50,53,57,60, or 71.

Step 2: Retain the unique physician identifier (NPI) associated with each visit for the patients in step 1. A patient with visits to more than one physician will appear in the denominator for the physician who saw the patient the most.

Step3: Calculate patient continuity index score using the Bice-Boxerman calculation as follows:

Bice-Boxerman-Continuity of Care Patient =  $\frac{(\sum_{i=1}^k n_i^2) - N}{N(N-1)}$  Where k is the number of PCPs, n\_i is the number of visits to PCP i, and N is the total number of visits. Note that it is necessary that the patient has at least two visits.

Step 4: Determine if the patient level continuity has Met or Not Met the 0.7 threshold. For each patient, if their index is  $\geq 0.7$  then they are included in the numerator.

Step 5: Divide the numerator by the denominator. This reflects the proportion of patients that the PCP saw who have a Continuity of Care index of at least 0.7.

**DATA DICTIONARY**

variable name	description	values used
patid	patient unique id	all
gdr_cd	gender	all (female, male, unknown)
yrdob	birth year	all
d_race_code	race	all (white, black, asian, hispanic, unknown)
prov	provider id	all
hccc	health care services categorization code	primary care physician (01)

## **RATIONALE:**

Continuity of Care is defined as seeing the same PCP over time and remains one of the pillars of a high functioning health care system. The motivation behind this physician-level measure is to be able to assess the level to which physicians serve as the primary physician to their patients. High care continuity is shown to improve patient outcomes and physician well-being; is associated with decreased health care costs including total costs, ED costs, inpatient costs, primary care costs, and costs for specific conditions or treatments; and health care utilization such as ED visits and hospitalizations (Bazemore A, Petterson S, Peterson LE, Bruno R, Chung Y, Phillips RL. Higher Primary Care Physician Continuity is Associated With Lower Costs and Hospitalizations. *Ann Fam Med*. 2018;16(6):492-497). Since Continuity of Care is typically thought of as a characteristic of a patient's experience, this measure first calculates Continuity of Care for each patient using a previously validated index (the Bice-Boxerman index), where patients who have most of their primary care visits to the same PCP or a small number of PCPs have higher Continuity of Care scores closer to 1.0, while those who see a larger number of different PCPs have lower Continuity of Care scores closer to 0.0. The measure evaluates physicians based on the percent of their patients who have a care continuity index of at least 0.7, which was identified as a threshold associated with good outcomes and was established based on published literature (Bazemore A, Petterson S, Peterson LE, Bruno R, Chung Y, Phillips RL. Higher Primary Care Physician Continuity is Associated With Lower Costs and Hospitalizations. *Ann Fam Med*. 2018;16(6):492-497). The Continuity of Care quality measure reflects quality of primary care from the patient perspective, allowing for comparisons of individual physician's performance to others in their practice or more broadly. In order to help support our discussion around Continuity of Care's value, we have developed a Continuity of Care bibliography that was completed in June 2021. In summary, the bibliography demonstrates that Continuity of Care has been researched as far back as 1927 and has been heavily researched throughout the past two decades. The findings of these studies overwhelmingly indicate that primary care continuity should be promoted (Merenstein, Z. (2021). Continuity of Care Bibliography. The Center for Professionalism and Value in Health Care. American Board of Family Medicine. [https://y7i6a8f8.rocketcdn.me/wp-content/uploads/2021/07/Continuity\\_of\\_Care\\_Bibliography.pdf](https://y7i6a8f8.rocketcdn.me/wp-content/uploads/2021/07/Continuity_of_Care_Bibliography.pdf)). This work led to a manuscript which was published in *Annals of Family Medicine* in May 2023 where we summarized two decades of peer-reviewed literature relating continuity to health care costs and use, information critical to assessing the need for continuity measurement in value-based payment design. This was published in the *Annals of Family Medicine* in May 2023. Our search yielded 83 articles describing studies that were published between 2002 and 2022. Of these, 18 studies having a total of 18 unique outcomes examined the association between continuity and health care costs, and 79 studies having a total of 142 unique outcomes assessed the association between continuity and health care use. Interpersonal continuity was associated with significantly lower costs or more favorable use for 109 of the 160 outcomes. Interpersonal continuity today remains significantly associated with lower health care costs and more appropriate use (Bazemore A, Merenstein Z, Handler L, Saultz JW. The Impact of Interpersonal Continuity of Primary Care on Health Care Costs and Use: A Critical Review. *The Annals of Family Medicine* 2023;21(3): 274-279. DOI: 10.1370/afm.2961).

The Continuity of Care quality measure was developed with extensive input from patients and physicians during measure development, implementation, and testing. Crowd-sourced samples of 412 patients, 525 PCPs, and 85 health care payers were asked to describe what value in primary care means to them and the same question was asked in a 1/2-day international conference consisting of 70 primary care and health services experts (with funding by AHRQ) - Continuity of Care was clearly identified as a primary care function of critical importance to both patients and physicians. There is more evidence over three decades to support Continuity of Care's value to clinicians, patients and our health care system than for most other current measures in CMS' portfolio. To highlight one study in particular, a group studied priorities for care among 225 patients attending the medical clinics of a university teaching hospital. Eight attributes of medical care were considered: continuity, coordination, comprehensiveness, availability, convenience, cost, expertise, and compassion. Continuity of care was the highest priority for these patients, while cost and convenience were lowest (<https://doi.org/10.1097/00005650-198302000-00010>).

CMS' own approved improvement activities includes patient empanelment which indicates that a patient should be linked to a MIPS eligible clinician to promote continuity: CMS IA\_PM\_12 Population empanelment: Empanel (assign responsibility for) the total population, linking each patient to a MIPS eligible clinician or group or care team. Empanelment identifies the patients and population for whom the MIPS eligible clinician or group and/or care team is responsible and is the foundation for the relationship continuity between patient and MIPS eligible clinician or group

/care team that is at the heart of comprehensive primary care. We recognize that some physicians utilize a “team” model, where a patient has the option to see one of multiple physicians. In many cases the team model employs a Nurse Practitioner (NP) or Physician Assistant (PA) for acute, same day visits. This team-based model could disrupt continuity while supporting access, thus these NP and PA visits are not included in the measure’s calculation. More research is needed to determine what size or make-up should constitute a primary care “team” model so that the association with the positive outcomes linked to care continuity are maintained. Future iterations of the measure will incorporate any new research in this area.

**CLINICAL RECOMMENDATION STATEMENT:**

Primary Care has more measures than any other sector under the federal Quality Payment Program (QPP), yet most of these are disease-specific or process measures and do not capture the core Primary Care functions. Despite a variety of definitions and calculations over the last forty years, little has been done to operationalize continuity as a quality measure linked to policy-relevant outcomes, in the U.S. or other nations. Our study of the relationship between continuity and cost/utilization outcomes is published in the November 2018 Annals of Family Medicine. If actualization of this measure in practice reflects study outcomes, it would be the most potent impact of any existing QPP measure. The fact that systematic reviews shows that it also aligns with patient-reported outcomes is also of significant importance. Adjusted expenditures for beneficiaries cared for by physicians in the highest continuity quintile were 15.1% lower than for those in the lowest quintile, and the odds of any hospitalization were 16.1% lower between the highest and lowest continuity quintiles. This demonstrates that continuity of care, as measured by the Bice Boxerman Index, reduces hospitalizations and health expenditure. Additionally, we summarized two decades of peer-reviewed literature relating continuity to health care costs and use, information critical to assessing the need for continuity measurement in value-based payment design. This was published in the Annals of Family Medicine in May 2023. Our search yielded 83 articles describing studies that were published between 2002 and 2022. Of these, 18 studies having a total of 18 unique outcomes examined the association between continuity and health care costs, and 79 studies having a total of 142 unique outcomes assessed the association between continuity and health care use. Interpersonal continuity was associated with significantly lower costs or more favorable use for 109 of the 160 outcomes. Interpersonal continuity today remains significantly associated with lower health care costs and more appropriate use.

**References:**

Pereira Gray DJ, Sidaway-Lee K, White E, Thorne A, Evans PH. Continuity of care with doctors—a matter of life and death? A systematic review of continuity of care and mortality. *BMJ Open*. 2018;8(6);

Tammes P, Purdy S, Salisbury C, MacKichan F, Lasserson D, Morris RW. Continuity of Primary Care and Emergency Hospital Admissions Among Older Patients in England. *The Annals of Family Medicine*. 2017;15(6):515-522;

Bazemore A, Petterson S, Peterson LE, Bruno R, Chung Y, Phillips RL. Higher Primary Care Physician Continuity is Associated With Lower Costs and Hospitalizations. *Ann Fam Med*. 2018;16(6):492-497;

Bazemore A, Merenstein Z, Handler L, Saultz JW. The Impact of Interpersonal Continuity of Primary Care on Health Care Costs and Use: A Critical Review. *The Annals of Family Medicine* 2023;21(3): 274-279. DOI: 10.1370/afm.2961

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