

# Care Coordination Accountability Measures for Primary Care Practice



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# Care Coordination Accountability Measures for Primary Care Practice

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## Introduction and Purpose

Care coordination has been recognized as an important aspect of high quality, patient-centered care, and was identified by the National Priorities Partnership as a priority area for improving health care delivery in the U.S. Much work remains to be done to elucidate how best to achieve coordinated care and how care coordination relates to important outcomes such as hospitalization rates, readmissions, mortality, quality of life, and patient satisfaction. Yet even as this evidence base is developing, efforts are underway across the health care system to evaluate and improve care coordination. Robust measures of care coordination processes are essential tools for generating evidence about care coordination and its outcomes; evaluating current practices; designing, implementing and assessing improvement activities; and supporting payment initiatives that target care coordination.

The Agency for Healthcare Research and Quality (AHRQ) recognizes a particularly urgent need for measures that may be used in assessing or recognizing care coordination as it is carried out by primary care practices. Such measures may be used by health plans, insurers, or other payers to assess or recognize the degree and quality of coordination performed by primary care practices, as well as by practices themselves in assessing, and ultimately improving, their own performance.

As a critical step in providing measures to the field, AHRQ commissioned the development of the *Care Coordination Measures Atlas*, a compendium of existing measures of care coordination.<sup>1</sup> It categorizes measures by their perspective (patient/family, health care professional, or system representative) and mechanisms used to coordinate care (activity domains). It includes measures that use a variety of data sources, although most rely on survey methods. Furthermore, it includes measures designed or used for three key purposes: quality improvement, research, and accountability.

This report presents measures selected systematically from the *Atlas* that are well-suited to primary care practice accountability and recognition purposes. It focuses on measures that are widely applicable and that reflect coordination as carried out by primary care practices rather than by other health care entities (e.g., hospitals, long-term care facilities, specialist providers). The report also includes measures that may be used to guide improvement efforts in response to the accountability measures. Measures were selected with four primary goals in mind:

- Ideally, measures included in the set should be comprehensive, covering all or most *Atlas* activity domains from the *Atlas* measurement framework. (For a list of these domain definitions, see Appendix A).
- Measures should balance comprehensiveness with feasibility.
- Measures should be valid and reliable.
- Measures should be useful for accountability and recognition purposes, as the first priority, though measurement gaps can be addressed by measures that are useful for quality improvement purposes.

We selected measures separately for use in pediatric and adult populations.

## **Selection Criteria**

In selecting measures, we considered the following criteria:

- Applicability to primary care practice evaluation
- Focus on general population (not disease-specific)
- Broad coverage of activity domains from *Care Coordination Measures Atlas* framework (see Appendix A for a list of domain definitions)
- Focus on care coordination (some measures in the *Atlas* embed care coordination items within a broader assessment of care)
- Feasibility
- Evidence of reliability and validity

We first narrowed the candidate measures (i.e. measures in the *Atlas*) to include only those that were applicable to a primary care setting or not setting specific. Second, we divided the measures into pediatric and adult indicator groups. Measures that were not age specific were included in both groups. Third, we further narrowed adult measures to those that focused on general chronic disease or that were not disease specific. We assigned the remaining measures to prioritization groups based on feasibility and degree of focus on care coordination. Following the goal to prioritize a comprehensive set, we identified high priority measures that mapped to the most activity domains from the *Atlas* measurement framework. We considered adult and pediatric measures separately. Finally, we assessed the validity and reliability of the most comprehensive measures.

We relied on published sources and information from measure developers in assessing these criteria. For complete details of selection methods, see Appendix B. For detailed results of the measure selection process, including a detailed assessment of each selected measure, see Appendix C.

## **About Measure Use**

The measures evaluated in this report have been validated in their entirety. Although most measures contain items that are not focused on care coordination concepts, the validity reported here only applies to the care coordination related items in the context of the full instrument. In the case of survey-based measures, the respondent may answer differently based on other questions in the survey. For instance, one may assume a question does not include a concept contained in another question, but may not make that assumption if answering the same question in isolation. Therefore, further research is required to establish the validity of using only the care coordination portions of these measures.

## **An Emerging Field**

This report is based on assessment of 64 measures included in the *Care Coordination Measures Atlas*.<sup>i</sup> We recognize that new measures of care coordination are being developed at a rapid pace, and existing measures are being further refined and tested. Thus, this report is necessarily

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<sup>i</sup> Sixty-one measures are included in the original *Atlas*, available for download from <http://www.ahrq.gov/qual/careatlas/index.html>. An additional three measures were added to a web searchable version of the *Atlas*, which will be available soon from the AHRQ web site.

limited to a sub-set of the full and dynamic universe of measures available for assessing care coordination. Furthermore, the level of reliability and validity testing that has become expected in other fields is largely lacking in the field of care coordination measurement.

Therefore, we emphasize that as this field matures and new measures are developed and existing measures are further tested and refined, the process of evaluating measures and making recommendations for primary care practice accountability evaluation will need to be revisited. We encourage measure users to share, and to the extent possible publish, their findings to help further development in this field. For further discussion of measure development and measurement gaps, see Measurement Development Gaps and Recommendations.

### ***Organization of This Report***

This report recommends two sets of measures:

**Care Coordination Accountability Measures for Primary Care Practice** contains measures recommended for evaluating care coordination performed by primary care practices in pediatric and adult populations for accountability or recognition purposes. Only measures from the patient/family perspective were considered because currently available measures from the health care professional and system representative perspectives rely on self-assessment, which is not appropriate for accountability purposes. In the future, new measures or audit procedures for current measures that reflect these additional perspectives would allow a more complete assessment of care coordination for accountability purposes.

The **Companion Measure Set** (not for accountability purposes) contains measures recommended as potential companions to the Accountability Measure Set for quality improvement purposes using a health care professional and system representative perspective. Selection criteria and processes are the same as those used for the Accountability Measure Set. The only reason these measures are not part of the Accountability Measure Set is that all of the available measures are based on self-assessment, creating an inherent conflict of interest if used directly for accountability assessments.

Recommendations are presented for pediatric and adult populations from each of these perspectives, and alternatives are provided based on expected differences in users' measurement priorities.

The final section, Measurement Development Gaps and Recommendations, discusses measurement gaps and recommendations for research priorities. This section may be particularly of interest to measure developers and funders of quality measurement efforts.

Additional material is presented in a series of appendices:

**Appendix A** provides *Atlas* perspective and activity domain definitions.

**Appendix B** provides details of measure selection methods.

**Appendix C** provides detailed results of the measure selection process, including additional information about all measures included in the final measure sets.

### ***Additional Key Sources***

The *Care Coordination Measures Atlas* contains additional information about all measures considered for this measure set, and is a key source of information about the care coordination activity domains and perspectives referred to throughout this document.<sup>1</sup> The *Atlas* is available for download at <http://www.ahrq.gov/qual/careatlas/index.html>.

An additional key resource is Appendix IV of the *Atlas*, which contains contact information for measure developers and copies of measure instruments for many of the *Atlas* measures. It is available for download as a separate document from: <http://www.ahrq.gov/qual/careatlas/> (see list of appendices).

## Care Coordination Accountability Measure Sets for Primary Care Practice

We recommend the following measures for evaluating primary care practices for accountability or recognition purposes (Table 1). We identified measures separately for application to pediatric and adult primary care settings. All measures contained in this set are from the patient/family perspective.

<b>Table 1. Recommendation for the Care Coordination Accountability Measures Set for Primary Care Practice</b>		
	<i>Atlas</i> Measure # <sup>ii</sup>	<i>Atlas</i> Measure Title
Pediatric Measure	17a	Primary Care Assessment Tool-Child Edition (PCAT-CE)
Pediatric Alternative	11a	Family-Centered Care Self-Assessment Tool - Family Version
Adult Measure	6	Client Perceptions of Coordination Questionnaire (CPCQ)
Adult Alternative	17b	Primary Care Assessment Tool-Adult Edition (PCAT-AE)

### ***Pediatric Measure: Primary Care Assessment Tool – Child Edition (PCAT-CE)***

*Atlas Measure Number:* 17a<sup>ii</sup>

*Description:* This measure surveys parents and guardians about pediatric care delivery for their children. The 115-item survey takes approximately 25 minutes to administer by telephone. The survey may also be administered through self-assessment, although no information is available on typical completion times using this method. The survey covers many aspects of pediatric primary care including but not limited to care coordination. Testing has established its reliability and validity; however, no information is available about how the measure score relates to outcomes.<sup>2</sup>

*Strengths for Accountability Purposes:* The measure was designed for accountability purposes and has established reliability and validity. In addition to the measure's total score, sub-scale scores may be calculated for care coordination and coordination related to information systems, which may be useful when interpreting results. The measure covers all *Atlas* activity domains and sub-domains except Facilitate Transitions as Coordination Needs Change, Create a Proactive Plan of Care, and Link to Community Resources.

*Weaknesses for Accountability Purposes:* The measure's focus extends beyond care coordination to include many aspects of pediatric primary care (29 of 115 measure items do not map to any *Atlas* care coordination activity domain). Inclusion of additional primary care concepts should be considered when interpreting the total measure score for the purposes of care coordination

<sup>ii</sup> Throughout this document, measure numbers refer to numbering used in the *Care Coordination Measures Atlas* (available for download at <http://www.ahrq.gov/qual/careatlas/index.html>).

assessment. Although the instrument was designed for accountability purposes, all published instances of use identified to date were for research purposes.<sup>3-5</sup>

*For More Information:* Additional information about the measure properties is summarized in the *Care Coordination Measures Atlas* measure profile and in Appendix C of this document. A copy of the measure instrument and user guide may be obtained by contacting the measure developer. Contact information is available in Appendix IV of the *Atlas*.

### **Alternative Pediatric Measure: Family-Centered Care Self-Assessment Tool – Family Version**

If a focus on care coordination is of higher interest than reliability or validity, then users may consider the **Family-Centered Care Self-Assessment Tool – Family Version** as an alternative to the PCAT-CE. Although no reliability or validity testing for this instrument was identified, all but 8 of its 98 items relate to care coordination and it covers all but one *Atlas* care coordination activity domain.

*Atlas Measure Number:* 11a

*Description:* This measure surveys parents or other family members about the provision of family-centered pediatric care. No information is available on typical completion times for the 98-item self-assessment instrument. No reliability or validity testing has been reported among the sources identified. Due to lack of psychometric testing, the measure developers do not recommend combining responses across items to develop mean or aggregate scores for groups of conceptually-related instrument items. Rather, they recommend reporting percent responses to individual items only. Therefore, while the instrument should be administered as a whole, responses on items most relevant to care coordination may be reported separately.<sup>6, 7</sup>

*Strengths for Accountability Purposes:* Nearly all measure items (92%) map to an *Atlas* care coordination activity domain and the measure covers all *Atlas* activity domains and sub-domains except Facilitate Transitions Across Settings.

*Weaknesses for Accountability Purposes:* The measure was designed for quality improvement rather than accountability purposes and no information is available on its validity or reliability.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile as well as in Appendix C of this document. A copy of the measure instrument may be obtained by visiting the *Care Coordination Measures Atlas* Appendix IV. A user guide may be obtained by contacting the measure developer; however, to use the measure, written permission must be provided by the measure developer. Contact information is available in Appendix IV of the *Atlas*.

### **Adult Measure: Client Perceptions of Coordination Questionnaire (CPCQ)**

*Atlas Measure Number: 6*

*Description:* This measure surveys patients about patient-centered care and care coordination. The instrument contains 31 items; no information is available on typical completion times for this self-administered survey. Although the overall reliability score was very high, the measure developers note concerns about reliability of two sub-scales included in the instrument. Thus, results are reported for individual items in the instrument rather than calculating total or sub-scale scores. Validity has been established through comparison of various test groups. Patients expected to experience similar levels of coordination (participants in a coordination trial and the general population) did so, while those expected to experience lower levels of coordination (patients with chronic pain) reported lower CPCQ scores than trial participants.<sup>8</sup> For more information about validity and reliability, refer to the *Atlas* measure profile and Appendix C.

*Strengths for Accountability Purposes:* Validity is established and overall reliability is strong. Although no information is available on typical completion times, the brevity of the instrument suggests lower measurement burden on patients than alternative measures. The measure is designed to focus on care coordination (23 of 31 items map to an *Atlas* care coordination domain) and covers all *Atlas* activity domains except Facilitate Transitions (both sub-domains), and Link to Community Resources. Additional items cover concepts related to care access and satisfaction by additional members involved in the care process.

*Weaknesses for Accountability Purposes:* Developers note some concerns about reliability of selected items related to ‘client comprehension and capacity’. The measure has been used for research, but no information was available about use for accountability purposes. No items map to Facilitate Transitions (either sub-domain). Most *Atlas* activity domains are covered by only one or two instrument items, although this partially reflects the brevity of the instrument.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. Prior to use of the measure written permission is required by the measure developer. A copy of the measure and contact information are available in Appendix IV of the *Atlas*.

### **Alternative Adult Measure: Primary Care Assessment Tool – Adult Edition (PCAT – AE)**

If coordination related to transitions across settings is of particular interest, the **Primary Care Assessment Tool – Adult Edition (PCAT-AE)** may be an alternative to the CPCQ. The PCAT-AE includes three items that map to the Transitions Across Settings sub-domain, whereas the CPCQ does not measure coordination related to transitions of care. The PCAT-AE may also be of interest if consistency with measurement in a pediatric population is desired, as the PCAT-AE is based on the very similar Child Edition of the Primary Care Assessment Tool, which is recommended as the pediatric primary care practice accountability measure. However, the validity of the PCAT-AE is less well established than that of the CPCQ.

*Atlas Measure Number: 17b*

*Description:* This measure surveys patients about the quality of primary care. The 131-item survey reportedly takes approximately 40 minutes to complete. The survey may be administered

by an interviewer (by telephone or in person) or through self-assessment, although the measure developers note that a high school reading level is required for self-assessment. The survey covers many aspects of primary care, including but not limited to care coordination. Testing has established its reliability and factor analyses provide some preliminary information on validity, although no information is available about how the measure score relates to outcomes.<sup>9</sup>

*Strengths for Accountability Purposes:* The measure was designed for accountability purposes and has established reliability. It is related to the child edition of the PCAT. In addition to the measure’s total score, sub-scale scores may be calculated for care coordination and coordination related to information systems, which may be useful when interpreting results. The measure covers all *Atlas* activity domains and sub-domains except Facilitate Transitions as Coordination Needs Change, Create a Proactive Plan of Care, and Link to Community Resources.

*Weaknesses for Accountability Purposes:* Validity of the measure is not well established. The measure’s focus extends beyond care coordination to include many aspects of primary care (51 of 131 measure items do not map to any *Atlas* care coordination activity domain). Inclusion of additional primary care concepts should be considered when interpreting the total measure score for the purposes of care coordination assessment. Although the instrument was designed for accountability purposes, all published instances of use identified to date were for research.<sup>10</sup>

*For More Information:* More information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this report. A copy of the measure and user guide may be obtained from the developer. Contact information is available in Appendix IV of the *Atlas*.

Table 2 summarizes measures recommended for primary care practice accountability.

<b>Table 2. Summary of Recommendations for the Care Coordination Accountability Measure Set for Primary Care Practice</b>			
		<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
Pediatric Measure		17a	Primary Care Assessment Tool-Child Edition (PCAT-CE)
Pediatric Alternative	If broader coverage of care coordination is of greater interest than evidence of measure validity/reliability	11a	Family-Centered Care Self-Assessment Tool - Family Version
Adult Measure		6	Client Perceptions of Coordination Questionnaire (CPCQ)
Adult Alternative	If coordination related to transitions is of greater interest	17b	Primary Care Assessment Tool-Adult Edition (PCAT-AE)

## Measure Sets for Additional Perspectives

Although only measures from the patient/family perspective were considered for inclusion in the accountability measure set, measures from the health care professional and system representative perspectives that may be appropriate for quality improvement purposes are reviewed here. These measures may be useful in guiding improvements if the patient/family perspective accountability measures suggest short-comings. Before being used for accountability purposes, methods of auditing the responses on these tools would be desired, to balance their reliance on self-assessment by health care professionals and system representatives. These tools may also be useful for research purposes, depending on the focus and scope of the research study.

Recognizing that the choice of measures involves many trade-offs, suggestions are offered here based on different measurement priorities anticipated by different types of measure users.

<b>Table 3. Companion Measure Options (Not for Accountability Purposes)</b>		
	<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
<b>Health Care Professional Perspective</b>		
Pediatric Measures	11b	Family-Centered Care Self-Assessment Tool - Provider Version
	17d, 5	Primary Care Assessment Tool-Provider Edition (PCAT-PE), Care Coordination Measurement Tool (CCMT)
Adult Measure	17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
<b>System Representative Perspective</b>		
Pediatric Measures	16a	Medical Home Index (MHI-LV)
	17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
Adult Measures	16a	Medical Home Index (MHI-LV)
	1	Assessment of Chronic Illness Care (ACIC)

### ***Pediatric Measures From Health Care Professional Perspective***

If comprehensive measurement is of chief interest, consider the **Family-Centered Care Self-Assessment Tool – Provider Version**.

*Atlas Measure Number:* 11b

*Description:* This measure surveys health care professionals and staff about the provision of family-centered pediatric care in their practices. No information is available on typical completion times for the 105-item self-assessment instrument. No reliability or validity testing has been reported among the sources identified. Due to lack of psychometric testing, the measure developers do not recommend combining responses across items to develop mean or aggregate scores for groups of conceptually-related instrument items. Rather, they recommend reporting percent responses to individual items only. Therefore, while the instrument should be administered as a whole, responses on items most relevant to care coordination may be reported separately.<sup>6,7</sup>

*Strengths for Quality Improvement Purposes:* The measure is designed for use as a quality improvement tool. It provides comprehensive assessment of care coordination, with three or more items mapped to all but one *Atlas* activity sub-domain (Facilitate Transitions Across Settings).

*Weaknesses for Quality Improvement Purposes:* No information is available on validity or reliability of the measure. Although no information is available on typical completion times, the lengthy instrument may add a large measurement burden on busy clinicians.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile as well as in Appendix C of this document. A copy of the measure instrument may be obtained by visiting the *Care Coordination Measures Atlas* Appendix IV. To use the measure, written permission must be obtained from the measure developer. A user guide is also available on request from the measure developer. Contact information is available in the *Atlas* Appendix IV.

If consistency with the pediatric patient/family perspective accountability measure is of chief interest, consider the **Primary Care Assessment Tool – Provider Edition (PCAT-PE)**.

*Atlas Measure Number:* 17d

*Description:* This measure surveys physicians about care delivery in their practices. No information is available on typical completion times for the 153-item self-administered survey. The survey covers many aspects of primary care delivery, including but not limited to care coordination. No information is available on reliability or validity, although some testing has been performed on the closely related patient surveys (PCAT-CE and PCAT-AE).

*Strengths for Quality Improvement Purposes:* The survey is closely related to the PCAT-CE, which will improve comparability of responses across the two instruments. Results of the provider version survey may be particularly useful in guiding improvement initiatives that aim to improve performance on the related child version of the survey (used for accountability purposes).

*Weaknesses for Quality Improvement Purposes:* The measure's focus extends beyond care coordination to include many aspects of primary care (39 of 153 measure items do not map to any *Atlas* care coordination activity domain), which increases measurement burden on busy clinicians. However, if measurement burden is less of a focus, this may be viewed as a strength because it will provide more comprehensive information about practice characteristics. The instrument does not measure two *Atlas* activity domains, (Establish Accountability or Negotiate Responsibility, and Create a Proactive Plan of Care), nor the sub-domain (Facilitate Transitions as Coordination Needs Change) so it will not be useful for guiding improvement initiatives related to these coordination mechanisms.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. A copy of the measure and user guide may be obtained by contacting the measure developer. Contact information is available from Appendix IV of the *Atlas*.

If validity/reliability is of chief interest, none of the health care professional measures identified through the inclusion, exclusion, and prioritization process had well established reliability and validity. For more information about the selection criteria as well as detailed methodology, refer to Appendix B.

If feasibility is of chief interest, there is insufficient information about the measurement burden on available measures to make a recommendation based on feasibility.

If an alternative to survey-based measurement is of interest: consider the **Care Coordination Measurement Tool (CCMT)**.

*Atlas Measure Number: 5*

*Description:* This tool relies on self-report by health care professionals to collect detailed information about coordination activities carried out in a clinic. Specifically, it collects information on actions, resource use, outcomes, and time associated with individual patient encounters that included an element of care coordination. The measure was designed for use by clinicians, but there is no report of its impact on clinical work flow or completion rates. No information was identified regarding validity or reliability.

*Potential for Accountability Purposes:* If methods of auditing or validating self-reported information were developed, the CCMT might be useful as an accountability measure. However, note that validity and reliability remain unknown at this time.

*Strengths for Quality Improvement Purposes:* The tool may be useful for quality improvement purposes by providing detailed information about the types of coordination-related activities performed in a clinic.

*Weaknesses for Quality Improvement Purposes:* Measurement burden may be a concern and some time is likely required to train clinicians in the use of the tool. In one study, use of the instrument required 2-hour training sessions prior to data collection and ongoing technical support throughout the data collection period. Generally, practice personnel were able to incorporate accurate use of CCMT into clinical workflow after 1 week of using the instrument. No information is available on validity and reliability of the tool. It would be particularly important to assess inter-rater reliability among various users of the tool in a particular clinic.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. To use the measure, written consent must be provided by the measure developer. A copy of the measure and contact information for the measure developer are available in Appendix IV of the *Atlas*.

### ***Adult Measures From the Health Care Professional Perspective***

After applying the inclusion and exclusion criteria, only one adult measure is available from this perspective for primary care practice evaluation: the **Primary Care Assessment Tool – Provider Edition (PCAT-PE)**. For more information about the selection criteria as well as detailed methodology, refer to Appendix B.

*Atlas Measure Number:* 17d

*Description:* This measure surveys physicians about care delivery in their practices. No information is available on typical completion times for the 153-item self-administered survey. The survey covers many aspects of primary care delivery, including but not limited to care coordination. No information is available on reliability or validity, although some testing has been performed on the closely related patient surveys (PCAT-CE and PCAT-AE).

*Strengths for Quality Improvement Purposes:* The survey is closely related to the PCAT-AE, which will improve comparability of responses across the two instruments. Results of the provider version survey may be particularly useful in guiding improvement initiatives that aim to improve performance on the related adult version of the survey. (the PCAT-AE is a measurement option for accountability purposes for the patient/family perspective.)

*Weaknesses for Quality Improvement Purposes:* The measure’s focus extends beyond care coordination to include many aspects of primary care (39 of 153 measure items do not map to any *Atlas* care coordination activity domain), which increases measurement burden on clinicians. However, if measurement burden is less of an interest, this may be viewed as a strength because it will provide more comprehensive information about practice characteristics. The instrument does not measure two *Atlas* activity domains, (Establish Accountability or Negotiate Responsibility and Create a Proactive Plan of Care) nor the sub-domain (Facilitate Transitions as Coordination Needs Change), so it will not be useful for guiding improvement initiatives related to these coordination mechanisms.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. A copy of the measure and user guide may be obtained by contacting the measure developer. Contact information is available in Appendix IV of the *Atlas*.

### ***Pediatric Measures From the System Representative Perspective***

If validity/reliability is of chief interest, consider the **Medical Home Index (MHI)**.

*Atlas Measure Number:* 16a

*Description:* This 25-item instrument asks system representatives (administrators or clinicians reflecting on system characteristics) to assess the level of progress towards providing a medical home for a particular practice. Some items require both a physician and non-physician staff member’s perspective. Both pediatric and adult versions of the instrument exist. Typical completion time for the measure is 30-to-45 minutes. The measure has strong reliability and validity, including an association between higher total MHI score (indicating better adherence to medical home model) and lower hospitalization rates. The measure is strongly focused on care coordination; all items map to an *Atlas* care coordination

activity domain. It covers all activity domains except Monitor, Follow-up, and Respond to Change.

*Strengths for Quality Improvement Purposes:* The MHI is designed and has been used for quality improvement purposes.<sup>11</sup> The instrument is designed to stimulate self-reflection and to guide improvement by specifying more advanced levels of medical home implementation.

*Weaknesses for Quality Improvement Purposes:* The measure includes only one or two items for most activity domains. It does not measure the Monitor, Follow-up, and Respond to Change domain.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. Permission to use the instrument requires written consent from the measure developer. A user guide is also available on request from the measure developer. A copy of the measure and contact information for the measure developer are available in Appendix IV of the *Atlas*.

If feasibility is of chief interest, consider the **Medical Home Index (MHI)**. Typical completion time is 30 to 45 minutes. A 10-item short version of this survey is also available (*Atlas* measure # 16b) which offers reduced measurement burden, albeit at the expense of comprehensive domain coverage. See measure details above.

If in-depth measurement is of chief interest, consider the **Primary Care Assessment Tool – Facility Expanded Edition (PCAT-FE)**. Although it does not cover every *Atlas* activity domain, it does include at least three items for most domains, offering a more comprehensive assessment of care coordination mechanisms.

*Atlas Measure Number:* 17c

*Description:* This measure surveys practice administrators (or other representatives of a facility) about care delivery in their practices. No information is available on typical completion times for the 153-item self-administered survey. The survey covers many aspects of primary care delivery, including but not limited to care coordination. No information is available on reliability or validity, although some testing has been performed on the closely related patient surveys (PCAT-CE and PCAT-AE).

*Strengths for Quality Improvement Purposes:* The survey is closely related to the PCAT-CE, which will improve comparability of responses across the two instruments. Results of the provider version survey may be particularly useful in guiding improvement initiatives that aim to improve performance on the related child version of the survey (used for accountability purposes). The measure includes at least three items for most domains, offering a more in-depth assessment and more detail that may be useful for guiding improvement initiatives.

*Weaknesses for Quality Improvement Purposes:* The measure's focus extends beyond care coordination to include many aspects of primary care (39 of 153 measure items do not map to any *Atlas* care coordination domain), which increases measurement burden. However, if

measurement burden is less of an interest, this may be viewed as a strength because it will provide more comprehensive information about practice characteristics. The instrument does not measure two *Atlas* activity domains, Establish Accountability or Negotiate Responsibility, and Create a Proactive Plan of Care nor the sub-domain Facilitate Transitions as Coordination Needs Change, so it will not be useful for guiding improvement initiatives related to these coordination mechanisms.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. A copy of the measure and user guide may be obtained by contacting the measure developer. Contact information is available in Appendix IV of the *Atlas*.

If consistency with the pediatric patient/family perspective measure is desirable, consider the **Primary Care Assessment Tool – Facility Expanded Edition (PCAT-FE)**. See measure details above.

### ***Adult Measures From the System Representative Perspective***

If a focus on care coordination is of chief interest, consider the **Medical Home Index (MHI)**. It is strongly focused on care coordination, with all items mapped to an *Atlas* care coordination domain.

*Atlas Measure Number:* 16a

*Description:* This 25-item instrument asks system representatives (administrators or clinicians reflecting on system characteristics) to assess the level of progress towards providing a medical home for a particular practice. Some items require both a physician and non-physician staff member's perspective. Both pediatric and adult versions of the instrument exist. Typical completion time for the measure is 30 to 45 minutes. The measure has strong reliability and validity, including an association between higher total MHI score (indicating better adherence to medical home model) and lower hospitalization rates.<sup>12</sup> The measure is strongly focused on care coordination; all items map to an *Atlas* care coordination domain and it covers all activity domains except Monitor, Follow-up, and Respond to Change.

*Strengths for Quality Improvement Purposes:* The MHI is designed and has been used for quality improvement purposes.<sup>11</sup> The instrument is designed to stimulate self-reflection and to guide improvement by specifying more advanced levels of medical home implementation.

*Weaknesses for Quality Improvement Purposes:* The measure includes only one or two items for most activity domains. It does not measure the Monitor, Follow-up and Respond to Change domain.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. Permission to use the instrument requires written consent from the measure developer. A user guide is also available on

request from the measure developer. A copy of the measure and contact information for the measure developer are available in Appendix IV of the *Atlas*.

If validity and/or reliability are of chief interest, consider the **Assessment of Chronic Illness Care (ACIC)**. This measure has well-established validity and demonstrated links to outcomes, including attributable risk of coronary heart disease, hemoglobin A1c values, cholesterol levels and cardiac events among patients with diabetes and heart disease. It also has been shown to be sensitive to system improvements made during quality improvement initiatives.

*Atlas Measure Number: 1*

*Description:* This 34-item instrument is designed to be completed by a team of representatives (health care professionals and/or system representatives) from a practice. It assesses the level of support for chronic illness care. No information is available about typical completion times; this likely depends on the method of administration (e.g., team members discuss and reach consensus together or complete separately and average scores). The measure has very strong validity. Higher total and sub-scale scores, indicating better support for chronic illness, have been associated with lower attributable risk of coronary heart disease and lower hemoglobin A1c values among patients with diabetes.<sup>13</sup> Quality improvement initiatives that were associated with increases in ACIC scores were also associated with improvements in composite measures of cholesterol levels and hemoglobin A1c scores among diabetics and cholesterol levels and cardiac events among patients with heart disease.<sup>13-15</sup>

*Strengths for Quality Improvement Purposes:* The ACIC is designed and has been used for quality improvement purposes.<sup>16, 17</sup> The instrument specifies more advanced levels of support for chronic illness care, which may help guide improvement initiatives. It has been shown to be sensitive to system improvements made during quality improvement initiatives.

*Weaknesses for Quality Improvement Purposes:* The measure is not focused exclusively on care coordination (9 of 34 items do not map to an *Atlas* activity care coordination domain). It does not provide information about the transition of care.

*For More Information:* Additional information on the measure properties is summarized in the *Atlas* measure profile and Appendix C of this document. No permission is needed by the measure developer for non-commercial quality improvement work or research. However, if you intend to use it for other purposes you must obtain written permission from the Group Health Cooperative through its MacColl Center. A copy of the measure and contact information are available in Appendix IV of the *Atlas*.

If feasibility is of chief interest, consider the **Medical Home Index (MHI)**. Although no information is available on typical completion times for the ACIC, the shorter length of the MHI, combined with its usual completion time of 30 to 45 minutes, suggest that it may offer a lower measurement burden than the ACIC. In addition, a 10-item short version of this instrument is also available (*Atlas* measure #16b), which offers reduced measurement burden, albeit at the expense of comprehensive domain coverage. See measure details above.

Table 4 summarizes the measures recommended as companion measure options for quality improvement uses for the health care professional and system representative perspectives. These measures are not recommended for accountability purposes.

<b>Table 4. Companion Measure Options (not for accountability purposes)</b>			
Health Care Professional Perspective			
	If the primary interest is...	<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
Pediatric Measures Set	Comprehensive measurement	11b	Family-Centered Care Self-Assessment Tool - Provider Version
	Consistency with the pediatric primary care accountability measure	17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
	An alternative to survey-based measurement	5	Care Coordination Measurement Tool (CCMT)
Adult Measures Set	Only one measure is available from the health care professional perspective	17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
System Representative Perspective			
	If the primary interest is...	<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
Pediatric Measures Set	Validity/reliability	16a	Medical Home Index (MHI-LV)
	Feasibility	16a	Medical Home Index (MHI-LV)
	In-depth measurement of domains	17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
	Consistency with the pediatric accountability measure	17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
Adult Measures Set	Focus on care coordination	16a	Medical Home Index (MHI-LV)
	Validity/reliability	1	Assessment of Chronic Illness Care (ACIC)
	Feasibility	16a	Medical Home Index (MHI-LV)

## Measure Development Gaps and Recommendations

Our review of existing measures of care coordination revealed several key measurement gaps for primary care practice accountability and recognition purposes. These are priority areas for further measure development.

### Measurement Gaps

#### Domains Not Captured by Existing Measures

No adult measures from the patient/family or health care professional perspectives that are applicable for primary care practice evaluation mapped to the Facilitate Transitions as Coordination Needs Change sub-domain. To date, most of the focus in the literature on changing coordination needs has centered on the transition from pediatric to adult care, and related measures have targeted pediatric populations. However, other changes in needs occur during patients' life spans, such as increases in coordination needs during periods of acute illness or injury, following changes in patients' support networks or personal circumstances, or as some elderly patients' functional or cognitive abilities decline. No measures have been identified that assess how well primary care practices respond to these kinds of changes in coordination need. This area is ripe for further measure development.

#### Perspectives Not Captured by Existing Measures

A full understanding of care coordination requires measurement from multiple perspectives. The *Care Coordination Measures Atlas* framework identifies three key perspectives: patients and family, health care professionals, and system representatives. During the measure selection process for the accountability set, no measures suitable for measuring care coordination from the health care professional or system representative perspectives were identified for the purposes of accountability. (Measures from these perspectives suitable for quality improvement use are identified in the companion measures set section of this report). This gap reflects the predominance to date of survey-based measures of care coordination. Relying on self-assessment through surveys is not appropriate for accountability purposes.

One way to address this measurement gap would be to develop methods of auditing measures that are self-reported by health care professionals or system representatives. Another method would be to develop measures that rely on data other than self-reported survey responses. While some such measures exist, to date they have been limited in scope, typically focusing on a particular process for specific disease populations, and as such are not appropriate for this measures set, which aimed to identify measures that covered *Atlas* care coordination activity domains comprehensively in the setting of primary care. Developing a set of care coordination measures that rely on auditable data sources and that together evaluate all care coordination activity domains would enable measurement from these additional perspectives.

### **Focus on Care Coordination and Measurement Burden**

Most measures considered for the Care Coordination Accountability Measures for Primary Care Practice were broad in scope rather than focusing specifically on care coordination. Developing or refining instruments to focus on care coordination would help fill this gap and reduce measurement burden. Enabling and encouraging measurement of care coordination in the context of growing demands for quality measurement in other areas will depend on the availability of measures that offer valuable information with minimal measurement burden. Much work is needed to reach this goal.

### **Additional Recommendations to Advance the Field**

In addition to gaps in available measures, we found many gaps in evidence relating to existing measures. Routinely providing this additional information would help further advance the field of care coordination measurement.

- Most measures we reviewed need more robust reliability and validity testing. Indeed, many measures had no such testing reported in the published literature. At a minimum, internal consistency and test-retest reliability and well-designed multivariate evaluations of construct validity should be performed and reported. Evidence linking measure results to key outcomes such as hospitalization rates, readmissions, mortality, costs, or patient satisfaction will greatly enhance the validity of such measures. This information is particularly important when considering measures to be used for accountability or recognition purposes.
- Information on the feasibility of measures as demonstrated by the resources required to use the measure and evidence that the measure has been successfully implemented for quality improvement or accountability purposes was rarely reported in the published literature, and was also often lacking from supporting materials, such as user guides. Understanding the burden of data collection is a key consideration in choosing measurement tools and is difficult to assess in the absence of such information. Feasibility information, such as typical survey completion times and completion rates, should be routinely reported for all measures as part of reports of reliability, validity, and measure development. In addition, the usability of the measure was rarely reported. In some cases a measure may be easy to collect, but difficult to interpret without extensive additional work.
- When multiple versions of a measure are developed, (e.g., versions targeted towards pediatric vs. adult patients, or versions designed for patients vs. health care professionals), or multiple means of collecting data (e.g. use of an interviewer vs. self-administration), each version and method should undergo reliability and validity testing, and results of this testing should be reported. Although the content of related instruments may be very similar, their reliability and validity may differ when completed by different respondents or by different methods. For example, reading comprehension likely varies for groups of elderly patients compared to groups of physicians. Extrapolating testing results from one group of respondents to another offers only weak evidence of reliability and validity; this weak evidence is likely insufficient to assure appropriateness of a measure for use as an accountability or recognition tool.

## Care Coordination Accountability Measures for Primary Care Practice

- In many instances, adapting existing instruments, with repeated reliability and validity testing, may greatly improve their value for care coordination-specific measurement without undertaking entirely new measure development. Users who adapt existing instruments by, for example, using only a sub-set of items from the original instrument, should repeat and report reliability and validity testing. Making this information available to others will help advance the field of care coordination measurement.

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## Appendix A: *Atlas* Perspective and Domain Definitions

### ***Measurement Perspective***

The measurement perspective is the point of view for which the coordination is being measured. In survey-based measures, the perspective is the individual or team filling out the survey. The perspective of non-survey-based measures reflects the source of the data used to calculate the measure.

*Patient/Family Perspective* – The patient or a family member completes the survey based on his/her experience. All *Atlas* measures from this perspective are survey-based.

*Health Care Professional Perspective* – A health care professional, or team of professionals, completes the survey or collects the measure data. Health care professionals include physicians, nurses, nurse practitioners, physician assistants, or other clinical or hospital staff.

*System Representative Perspective* – A system administrator or someone else acting as a representative of a health care facility or system completes the survey, or the measure data source is from a health care delivery system, such as an electronic medical record or claims data. Measures based on chart review or administrative data are categorized as system representative perspective. When an individual health care professional is providing information that reflects the system experience, rather than their individual experience, that is also classified as a system representative perspective.

### ***Measurement Domains***

The *Care Coordination Measures Atlas* categorizes measures according to a framework of activities that have been hypothesized as important for carrying out care coordination and broad approaches that have been proposed as a means of achieving coordinated care. The activity domains from this framework were used in assessing how comprehensively care coordination is assessed by measures under consideration for the primary care practice accountability/recognition measure set.<sup>1</sup> Definitions of each activity domain are listed below. For additional information about the care coordination measurement framework and domains, see Chapter 3 of the *Atlas*.<sup>1</sup>

*Establish Accountability or Negotiate Responsibility.* Make clear the responsibility of participants in a patient's care for a particular aspect of that care. The accountable entity (whether a health care professional, care team, or health care organization) will be expected to answer for failures in the aspect(s) of care for which it is accountable. Specify who is primarily responsible for key care and coordination activities, the extent of that responsibility, and when that responsibility will be transferred to other care participants.

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<sup>1</sup> Broad Approaches domains from the *Atlas* measurement framework were not considered in selecting measures for this report.

*Communicate.* Share knowledge among participants in a patient's care. Communication may occur through a wide variety of channels, but for the purposes of measurement, we distinguish two key modes of communication:

*Interpersonal Communication.* The give-and-take of ideas, preferences, goals, and experiences through personal interactions. Examples include face-to-face interactions, telephone conversations, email, and letters.

*Information Transfer.* The flow of information, such as medical history, medication lists, test results, and other clinical data, from one participant in a patient's care to another. Examples include a written summary of laboratory results sent from a primary care practice to the patient, verbal confirmation of a laboratory value from the laboratory to a physician, or transfer of a disk containing CT images from a hospital to a primary care office.

While in practice interpersonal communication and information transfer often occur together, for the purposes of measurement, *interpersonal communication* is distinguished from *information transfer* by a two-way exchange of knowledge through personal interactions. *Information transfer* is characterized by the transfer of data—whether orally, in writing, or electronically—and does not necessarily involve direct interaction between sender and receiver.

*Facilitate Transitions.* Efforts aimed at specific transitions, which occur when information about or accountability for some aspect of a patient's care is transferred between two or more health care entities, or is maintained over time by one entity.

*Across Settings.* Examples include transitions from the inpatient (hospital) setting to the outpatient setting (e.g., physicians' offices), or transitions between ambulatory care settings (e.g., primary care to specialty clinics).

*As Coordination Needs Change.* Examples include the transition from pediatric to adult care, transitions over the course of a woman's changing reproductive cycle, and transitions between acute episodes of care and chronic disease management.

*Assess Needs and Goals.* Determine the patient's needs for care and for coordination, including physical, emotional, and psychological health; functional status; current health and health history; self-management knowledge and behaviors; current treatment recommendations, including prescribed medications; and need for support services.

*Create a Proactive Plan of Care.* Establish and maintain a plan of care, jointly created and managed by the patient/family and health care team, which outlines the patient's current and longstanding needs and goals for care and identifies coordination gaps. The plan is designed to fill gaps in coordination, establish patient goals for care and, in some cases, set goals for the patient's providers. Ideally, the care plan anticipates routine needs and tracks up-to-date progress toward patient goals.

*Monitor, Follow Up, and Respond to Change.* Jointly with the patient/family, assess progress toward care and coordination goals. Monitor for successes and failures in care and coordination. Refine the care plan as needed to accommodate new information or circumstances and to address any failures. Provide necessary followup care to patients.

*Support Self-Management Goals.* Tailor education and support to align with patients' capacity for and preferences about involvement in their own care. Education and support include information, training, or coaching provided to patients or their informal caregivers to promote patient understanding of and ability to carry out self-care tasks, including support for navigating their care transitions, self-efficacy, and behavior change.

*Link to Community Resources.* Provide information on the availability of and, if necessary, coordinate services with additional resources available in the community that may help support patients' health and wellness or meet their care goals. Community resources are any service or program outside the health care system that may support a patient's health and wellness. These might include financial resources (e.g., Medicaid, food stamps), social services, educational resources, schools for pediatric patients, support groups, or support programs (e.g., Meals on Wheels).

*Align Resources with Patient and Population Needs.* In the health care setting, assess the needs of patients and populations and allocate health care resources according to those needs. At the population level, this includes developing system-level approaches to meet the needs of particular patient populations. At the patient level, it includes assessing the needs of individual patients to determine whether they might benefit from the system-level approach. For example, a system-level approach to meeting the needs of patients with cancer (the population) might be to establish a multidisciplinary tumor board meeting to help coordinate cancer care among the many relevant specialties. In this scenario, aligning a particular patient's needs with available resources would include assessing whether that individual would likely benefit by having his/her case presented at the multidisciplinary tumor board meeting either for coordinating a consensus recommendation or for simplifying the patient's care pathway or both.

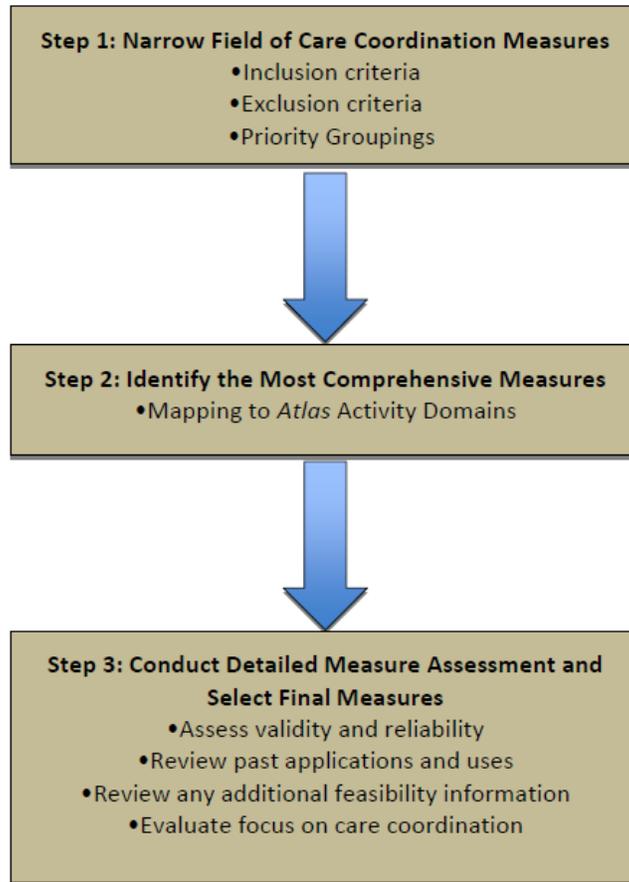
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<sup>1</sup> McDonald K, et al. Care Coordination Atlas (Prepared by Stanford University under subcontract to Battelle on Contract No. 290-04-0020). AHRQ Publication No. 11-0023-EF. Rockville, MD: Agency for Healthcare Research and Quality, November 2010.

## Appendix B: Full Details of Methods

To identify a comprehensive, valid, and feasible set of primary care practice accountability measures, the researchers followed three key steps (Figure B-1). This appendix provides details of how each step was performed. Appendix C provides detailed results of the measure selection process using these methods.

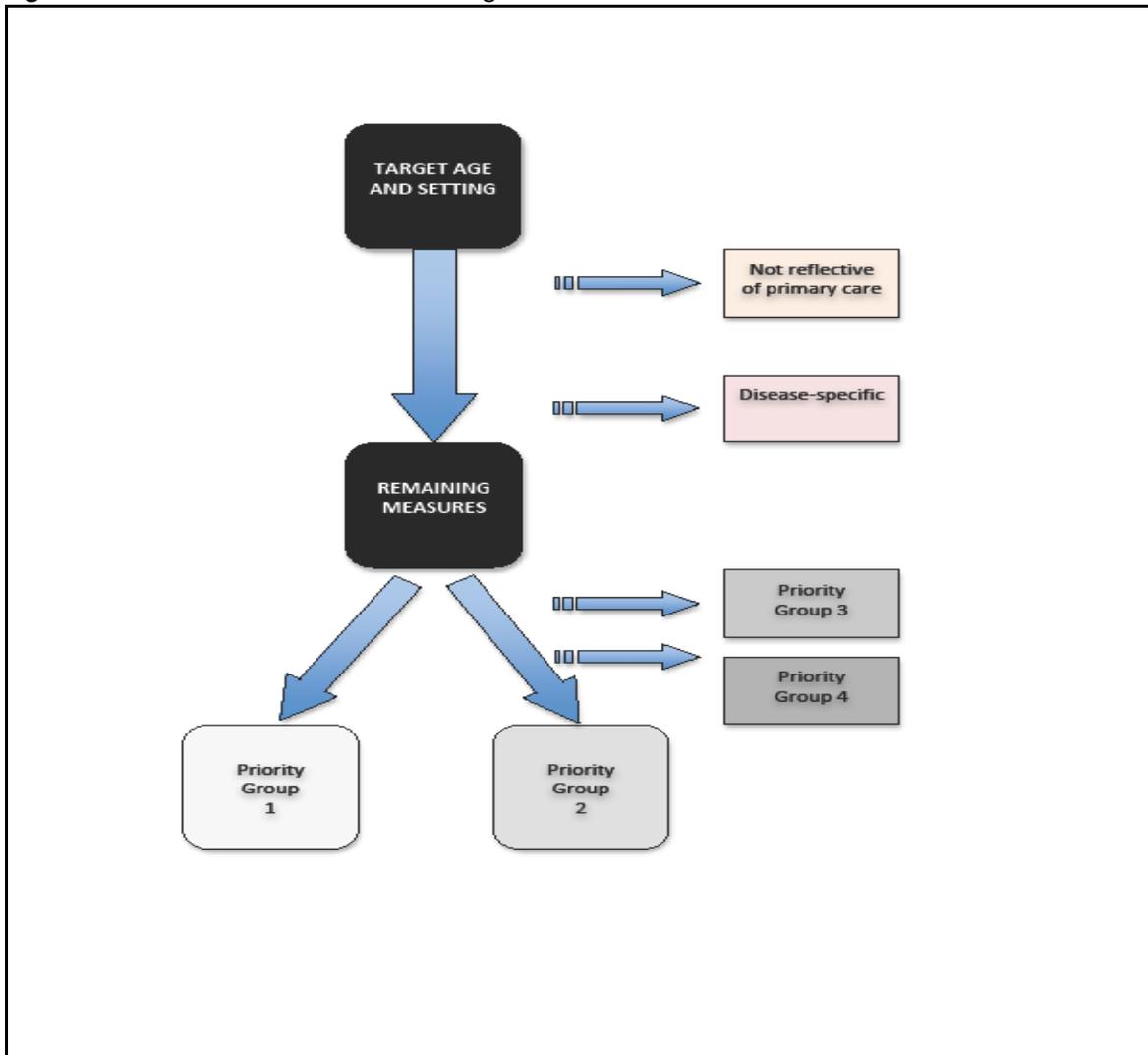
**Figure B-1** Key Steps Used to Identify Measure Set from *Atlas* Measures



### ***Step 1. Narrow the Field of Care Coordination Measures***

Given the number of measures included in the *Care Coordination Measures Atlas* and the resources required to assemble a comprehensive, valid, and feasible set of these measures, the process of selecting the measures set began by narrowing the field of candidate measures based on a set of inclusion and exclusion criteria. These criteria are meant to focus measurement on those most applicable to the primary care setting. Figure B-2 provides an overview of this process.

Figure B-2. General Process for Narrowing the Field of Measures



### Inclusion Criteria

Two key inclusion criteria were used for identifying measures eligible to be included in the final measure set: (1) primary care setting and (2) patient age group (adult and pediatric). For the adult measure set, a third criterion (patients with chronic conditions), was used because nearly all *Atlas* measures met the first two criteria. Definitions of these criteria are detailed below. In determining the applicable setting, patient age, and patient conditions groups for a measure, we relied on information from published *Atlas* measure sources about the populations in which the measure has been used and any intended patient population. As part of development efforts surrounding the *Atlas* measure developers were also contacted and asked that they provide feedback on how measures were categorized.

#### **Primary Care Setting**

Given the focus on measures of care coordination as it is carried out by primary care practices, selection of measures was limited to those that are designed for or have been used in primary

care facilities. Measures that are not setting specific were also included, as they may be used to assess care coordination in any setting.

*Primary Care Facility* - Any setting described as primary care or settings providing care by generalists or practitioners in internal medicine, family practitioners, general pediatricians or general practice providers. This includes settings described as a medical or health care home or PCMH.

*Not Setting Specific* - The measure application is not limited to a particular type of setting, or the setting was not specified in measure development or application publications.

### **Age Groups**

Measures separately for adult and pediatric populations were assessed separately. The pediatric measure set includes measures applicable to children, measures that are not age specific, and measures where the patient age is not applicable (i.e., the measure focuses on health care providers or a practice, not patients). The adult measure set includes measures applicable to adults and those that are not age specific or where the patient age is not applicable.

*Children* – Measure is targeted toward or has been used in a patient population described as pediatric; children, or parents/care takers of children receiving health care.

*Adults* – Measure is targeted toward or has been used in an adult population. This includes measures applicable to older adults.

*Not Age Specific* – Purpose states measure is intended for application to patients of all ages, or no information is available on the ages of patients to whom the measure has been applied.

*Not Applicable* – Measure does not focus on patients.

Some measures were included in both reviews (e.g., measures that are not age specific or where age is not applicable).

### **Patient Condition**

For the adult measure set, we further limited inclusion to measures that are applicable to patients with chronic conditions, or that are not condition specific or where the patient condition is not applicable (i.e., the measure focuses on health care providers or a practice, not patients).

*General Chronic Conditions* - Patients who are described as having chronic conditions, chronic diseases, or chronic illnesses without specifying particular conditions. A chronic condition is a disease or condition of long duration and typically slow progression.

*General Population or Not Condition Specific* - Measure is targeted toward or has been applied to the general population or to a patient group not limited by condition. Validation or application of the measure is not limited to particular patient disease or condition groups, or the disease/condition of interest was not specified.

*Not Applicable* - Measure does not focus on patients.

## **Exclusion Criteria**

In each of these age groups, we narrowed the field of measures using three additional exclusion criteria: (1) measures not focused entirely on coordination performed by a primary care provider or practice, (2) disease-specific measures, and (3) prioritization groups (after inclusion/exclusion) based on feasibility and degree of focus on care coordination.

### ***Measures Not Focused Entirely on Coordination Performed by Primary Care Provider or Practice***

These represent a sub-set of the broader group of measures that were included in the Primary Care Facility or Not Setting Specific categories.<sup>i</sup>

In assessing applicability of measures for primary care evaluation, we relied on the measure instrument. We reviewed the content and wording of all measure items that mapped to an *Atlas* care coordination domain, or in the case of non-survey measures, we reviewed the detailed measure specifications. We also reviewed instructions and other introductory materials that accompanied survey-based measure instruments. We then assessed whether the instrument reflected coordination as performed by a primary care provider or a primary care practice.

Measures falling into any of the following categories were excluded from further review:

- Measures that assess coordination in the entire health care system, or overall experiences of care in any part of the health care system.
- Measures that assess how well other health care entities, such as hospitals or behavioral health facilities, coordinate care with primary care providers or practices.
- Measures that assess how well non-primary care providers coordinate care with providers in other settings or specialties, including primary care.
- Inpatient Discharge Measures. When measures focused specifically on assessing coordination at the time of discharge from an inpatient facility, we excluded those that assessed coordination as performed by the discharging facility, such as quality or adequacy of discharge planning or complete and timely transfer of a discharge summary to the appropriate primary care provider or practice.

### ***Disease-Specific Measures***

For the purposes of this measure set, condition-specific measures were excluded, such as those that are applicable only to patients with diabetes, schizophrenia, or HIV/AIDS. We did not exclude measures that are applicable to patients with any chronic condition. Indeed, measures

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<sup>i</sup> In the setting criterion used for the initial measure inclusion, measures were included in the Primary Care Facility category if they had been used in any primary care setting, or assessed a transition that included primary care, ambulatory care in general, or patients receiving care in the community. Measures were included in the Not Setting Specific category if their design or purpose clearly stated application to any health care setting, or if information on settings where the measure has been applied was not available in the *Atlas* sources reviewed. These definitions include some measures that focus on assessing coordination for a number of entities outside the scope of the primary care practice accountability/recognition measure set, and were thus excluded.

focused on general chronic conditions were of particular interest, especially for the adult population.

**Prioritization Groups (After Inclusion/Exclusion) Based on Feasibility and Degree of Focus on Care Coordination**

An important consideration in creating a useful measure set is the feasibility of the measures included. Feasibility concerns include the availability of data and the burden of obtaining data or data collection if data are not readily available. Almost all measures under review require some amount of data collection, and a large majority used a survey format. However, few of the measure sources reviewed addressed feasibility and information on typical completion times for survey instruments was rarely available.

As a proxy for the time burden of data collection, the total number of survey items included in a measure was reviewed. This method was not suitable for assessing feasibility of the limited number of measures that do not use a survey format. Those items were assessed on a case-by-case basis using any information available on data sources and data collection burden from among the measures’ *Atlas* profile sources. If no information was available on the feasibility of non-survey measures, they were included in the highest priority group for further review.

Recognizing that feasibility must be balanced with the benefits of a measure, we assessed the degree to which a particular measure focuses on care coordination. As an initial gauge of this focus, we reviewed the percent of measure items that mapped to any care coordination domain from the *Care Coordination Measures Atlas* framework, out of the total number of measure items. As with the proxy measure for feasibility, this method was not suitable for measures that did not contain multiple aspects (e.g. single process measure). Degree of focus on care coordination was assessed on a case-by-case basis for those measures, as was done for feasibility.

These two criteria to categorize measures were combined into one of four priority groups for further review (Table B-1).

**Table B-1.** Priority Groups of Survey Measures Based on Feasibility and Degree of Focus on Care Coordination

	<b>Degree of Focus on Care Coordination*</b>	
<b>Survey Length*</b>	<i>Minimal (50% map)</i>	<i>Strong (≥50% map)</i>
<i>Short (≤50 items)</i>	Priority Group 1: Highest priority for further review. These measures likely have both good feasibility and strong relevance.	Priority Group 3: Lower priority for further review, but potentially useful if higher priority measures are inadequate.
<i>Long (&gt;50 items)</i>	Priority Group 2: Second priority for further review. These measures are likely highly relevant, but may have some feasibility concerns.	Priority Group 4: Lowest priority for further review. These measures are likely less feasible and less relevant.

\*Measures close to cut-points along both dimensions (length, focus) were elevated to next higher priority category than what categorization criteria specify here.

Short measures with a strong focus on care coordination (Priority Group 1) are clearly of interest for the measure set and are highest priority for further review and inclusion. Lengthy measures with many mapped measures (Priority Group 2) are not as desirable compared to shorter measures from a user feasibility perspective, but their density of relevant items could be attractive to some users. Therefore, these measures were moved to the next stage of review. Measures that are short but with few mapped items (Priority Group 3) might be useful alternatives if higher priority measures are inadequate (for example, none have adequate validity or reliability). Measures that are long and have a minimal focus on care coordination (Priority Group 4) are lowest priority for inclusion in the measure set, and were reviewed only if no other measures filled a particular measurement need.

We recognize that strict cut-points in separating surveys by length or focus are arbitrary. Before finalizing measure selection procedures, we confirmed that shifting the cut-points slightly would not change which measures were selected for any of the measure sets.

### ***Step 2. Identify the Most Comprehensive Measures***

A key goal of the final measure set is that the included instruments measure care coordination comprehensively. Comprehensive was defined as mapping to all of the activity domains<sup>ii</sup> from the *Atlas* measurement framework. A list of those activity domains and their definitions may be found in Appendix A.

Starting with the group of measures remaining after narrowing the field based on setting, age, condition, applicability to primary care, feasibility, and focus on care coordination (Step 1), we mapped the measures by domain and perspective. We then identified those measures that mapped to the most activity domains for a particular perspective. In considering breadth of domain coverage, we grouped the Communicate and Interpersonal Communication domains together, because they differ only in whether the mode of communication (personal interactions vs. any other mode) was specified. We considered the Information Transfer domain to be separate from this combined communication domain because this domain is distinguished by its focus on transmission of data through a variety of channels.

The goal of Step 2 was to identify a set of measures to undergo detailed assessment of validity, reliability, links to outcomes, and any further information on feasibility and use. Thus, when more than one measure offered broad domain coverage, both were included in the set to undergo detailed review. Choices among these measures were then determined based on the detailed assessment (Step 3).

We repeated this process for each age group (pediatric and adult) and each perspective (patient/family, health care professional, and system representative).

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<sup>ii</sup> We did not consider mapping to the broad approaches domains from the *Atlas* framework as part of the domain coverage review because these domains reflect complex care delivery models rather than discrete coordination activities.

### **Step 3. Conduct Detailed Measure Assessment and Select Final Measures**

Our primary focus in the detailed assessment is a review of evidence of measures' reliability and validity. Details of how we conducted that assessment are provided below.

In addition to assessing reliability and validity, we also examined any additional information available on feasibility, past or suggested uses of the measure (quality improvement, research or accountability/recognition) the unit of analysis in past applications of the measure, the degree of focus on care coordination (i.e., percent of total instrument items that map to any care coordination domain) and the depth of domain focus (i.e., number of items that map to each domain). Information for the detailed assessments was obtained from the sources in the *Atlas* profile for the measure. To supplement the sources cited in the *Atlas* measure profiles, we performed a search of references that cited the initial development, validation or testing publication for each measure. When no published source was available, we performed a search of the measure title using Google Scholar and reviewed resulting sources published in peer-reviewed journals.

It is rarely possible to directly compare results of reliability or validity testing from one study with another, due to differences in study design, analytic methods, and the measures themselves. Therefore, to summarize the weight of evidence in support of each measure that underwent a detailed review, we examined the kinds of testing done and the conclusions drawn from that testing. Two broad categories of conclusions were used—evidence that raises concerns and evidence that does not raise concerns (including supporting evidence)—based on critical assessment of the interpretation and discussion of the results in the published source.

We also noted when evidence was mixed, such as when two sources reported conflicting results, or when a single source reported multiple analyses that addressed the same element of reliability or validity but reported conflicting results. Any concerning results from a single analysis were categorized as raising concerns. For example, if a test of reliability showed for a measure reporting a composite score, one measure sub-domain had low reliability while several others used in the composite score had good reliability, this was scored as a single test that raises reliability concerns.

We approached the review of sources systematically to describe the evidence available, gaps in testing, and areas where a specific type of test is not applicable. Several types of tests of reliability and validity were identified:

#### **Evidence of Reliability**

**Internal Consistency** – Tests of the reliability of a total instrument score, typically using Cronbach's alpha. Not applicable to measures that do not generate composite scores based on multiple items. In summarizing evidence, we focused on tests of the entire instrument rather than tests of subscales, but did note reliability of subscales that were particularly relevant to care coordination.

**Inter-rater Reliability** – Reliability of the measure when rated by multiple observers, typically assessed through a Kappa statistic. This is not applicable for measures that assess personal experience using a single rater.

Test-retest Reliability – Assessment of reliability when the measure is completed by the same raters or methods over two or more time periods when change would not be expected.

### **Evidence of Validity**

Factor Analysis/Principal Components Analysis (PCA). Analyses to identify or confirm the relatedness of items within the instrument. This is typically performed to validate sub-scales within an instrument and is not applicable if no sub-scales are used or it is not anticipated that a measure captures multiple concepts.

Construct Validity – Analyses performed to assess whether expected distributions are observed, or expected relationships with structures, processes or outcomes are observed. This relationship suggests an underlying “construct” – in this case, what we assume to be “care coordination.” We distinguish two levels of construct validity testing:

- Univariate or bivariate testing – description of response distribution or relationship with structures, processes or outcomes using bivariate statistical tests, such as correlations or t-tests. This is a weaker level of evidence than multivariate testing.
- Multivariate testing – assessment of relationships with structures, processes or outcomes using multivariate statistical techniques that control for potential confounding factors, such as multivariate regression analyses.

Convergent Validity – Responses or score on the measure are similar to the score on another validated measure of the same or related concept.

Content Validity – Measure is examined by subject matter experts to assess whether the measure reflects the underlying concept it was designed to capture. This includes expert panel review, Delphi or Nominal Group techniques, and focus groups. Revision following review and feedback is considered evidence supporting validity of the revised measure.

Indirect – Evidence that an earlier or related version of the measure is valid. This includes validation of the instrument outside a health care setting. This is a weaker category of evidence than evidence relating to the version and application of the measure under review.

In some cases, a particular test is not applicable to a measure. For example, assessing inter-rater reliability is not appropriate for measures of personal experience. Similarly, factor analyses are not appropriate for measures that do not group items into subsets.

A table was used to summarize the type of testing conducted and the conclusions of that testing for each measure that underwent detailed assessment (Table B-2).

Appendix B: Full Details Of Methods

**Table B-2.** Example of Method to Compare Reliability and Validity Evidence Between Measures

	<b>Measure A</b>	<b>Measure B</b>	<b>Measure C</b>
<b>Reliability</b>			
Internal Consistency			
Inter-rater			
Test-retest			
<b>Validity</b>			
Factor Analysis			
Construct: Uni/bivariate			
Construct: Multivariate			
Convergent			
Content			
Indirect			

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

This schema was used for summarizing reliability and validity to provide an overview of testing and evidence for measures that underwent detailed assessment, and to highlight gaps where more testing may be needed. We did not use the reliability and validity profile to score measures in a quantitative way, because the weight of evidence is not equal among these categories of evidence. For example, multivariate analyses demonstrating construct validity is much stronger evidence of measure validity than indirect evidence pertaining to a previous or related version of a measure.

When making choices among measures, we based that choice on the details of reliability and validity testing and evidence linking measure results to outcomes.

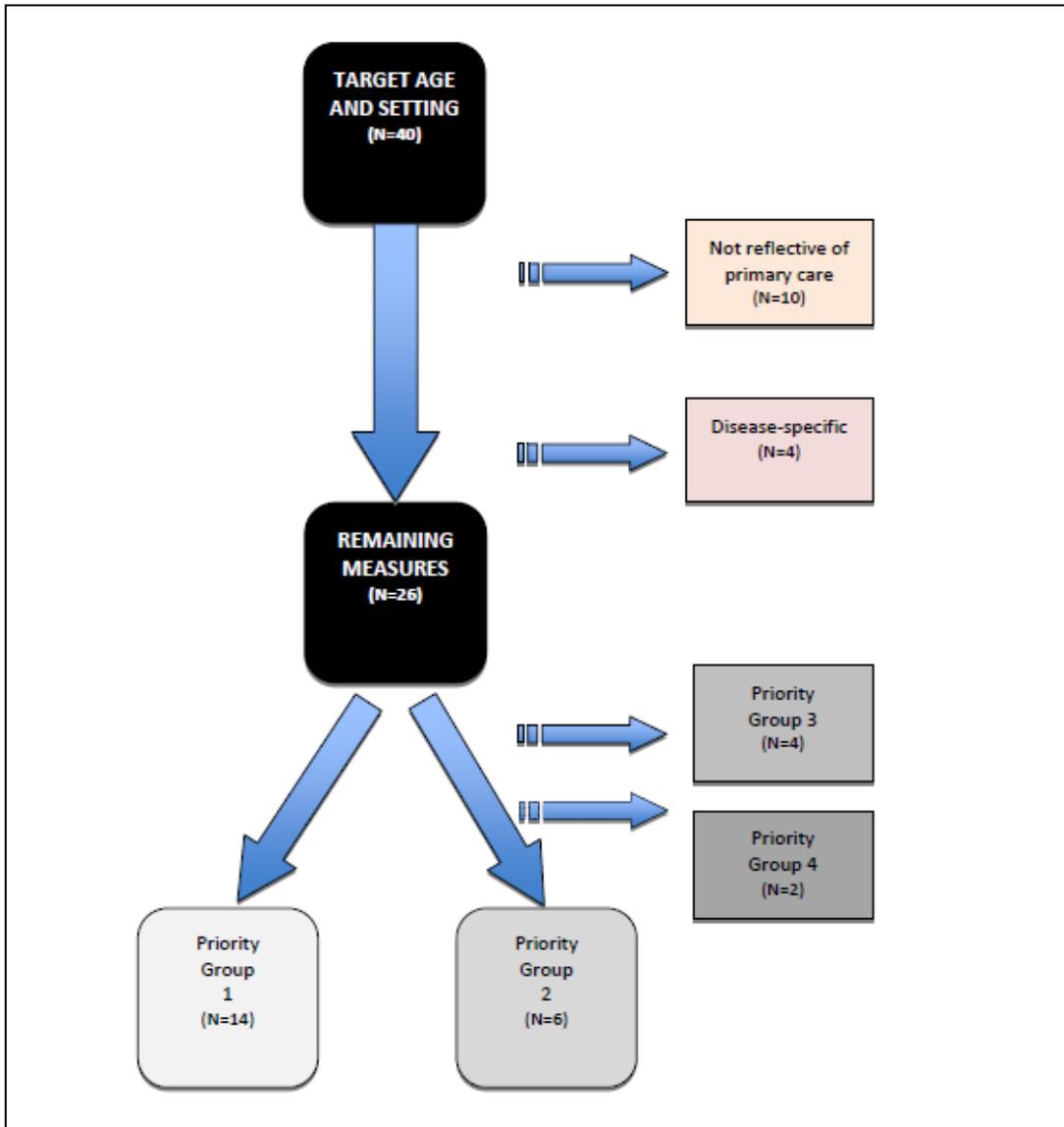
## Appendix C: Detailed Results of Measure Selection Process

### *Pediatric Measure Set Creation*

#### Step 1: Narrow the Field of Measures

Figure C-1 provides an overview of the measure field narrowing process. Details of each step are provided below.

**Figure C-1.** Narrowing the Field of Pediatric Primary Care Measures



Note: Throughout this section, multiple versions of a particular measure are counted separately if they were profiled separately in the *Atlas*. In addition, one measure (4c) was further divided into two components each based on the potential to use different components of the instrument separately.

## Appendix C: Detailed Results of Measure Selection Process

### **Inclusions**

Table C-1 lists the set of 40 measures that meet the following two inclusion criteria:

- Measures that are applicable to primary care facilities or that are not setting specific
- Measures that are applicable to children or that are not age specific or for which patient age is not applicable.

**Table C-1. Pediatric Primary Care Measures**

<b>Atlas Measure #</b>	<b>Atlas Measure Title</b>
4c – core*	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Child Primary Care (core survey only)
4c – full*	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Child Primary Care (core survey plus supplemental items)
5	Care Coordination Measurement Tool (CCMT)
7a	Collaborative Practice Scale (CPS): Nurse Scale
7b	Collaborative Practice Scale (CPS): Physician Scale
8	Breast Cancer Patient and Practice Management Process Measures Surgeon Survey
9a	Care Transitions Measure (CTM-3)
11a	Family-Centered Care Self-Assessment Tool - Family Version
11b	Family-Centered Care Self-Assessment Tool - Provider Version
14	National Survey of Children with Special Health Care Needs (CSHCN)
16a	Medical Home Index (MHI-LV)
16b	Medical Home Index (MHI-SV)
16c	Medical Home Family Index and Survey (MHFIS)
17a	Primary Care Assessment Tool-Child Edition (PCAT-CE)
17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
18	Physician-Pharmacist Collaboration Instrument (PPCI)
19	Patient Centered Medical Home Survey of the Structural Capabilities of Primary Care Practice Sites
20	Family Medicine Medication Use Processes Matrix (MUPM)
21	Resources and Support for Self-Management
27	Care Coordination Services in Pediatric Practices
31	Korean Primary Care Assessment Tool (KPCAT)
34	Personal Health Records (PHR)
36	Physician Office Quality of Care Monitor (QCM)
41	Ambulatory Care Experiences Survey (ACES)
43	Psychometric Properties of an Attitude Scale Measuring Physician-Nurse Collaboration
44	Clinical Microsystems Assessment Tool (CMAT)
45	Components of Primary Care Index (CPCI)
46	Relational Coordination
49	Schizophrenia Indicators
50	Degree of Clinical Integration Measures
51	National Survey for Children's Health (NSCH)
54	Cardiac Rehabilitation Patient Referral from an Outpatient Setting
56	Biopsy Follow Up

Appendix C: Detailed Results of Measure Selection Process

<b>Atlas Measure #</b>	<b>Atlas Measure Title</b>
57	Reconciled Medication List Received by Discharged Patients
58	Transition Record with Specified Elements Received by Discharged Patients (Inpatient Discharges)
59	Timely Transmission of Transition Record
60	Transition Record with Specified Elements Received by Discharged Patients (Emergency Department Discharges)
61	Melanoma Continuity of Care - Recall System
64	Promoting Healthy Development Survey – Plus (PHDS-PLUS)

\* The Consumer Assessment of Healthcare Providers and Systems (CAHPS) Child Primary Care instrument (Measure #4c) consists of two components. The core survey contains 31 items and may be used by itself. An additional supplemental survey contains items that may be used in conjunction with the core instrument.

**Exclusions**

In total, 10 measures were excluded because they are not focused entirely on coordination performed by a primary care provider or practice. Specific reasons for the exclusions were:

- Measures assessing coordination by providers or entities other than primary care: 8, 56.
- Measures assessing coordination at the level of the health care system, not primary care practices: 14, 51.
- Measures of discharge from inpatient setting: 9a, 57, 58, 59, 60.
- Measure 43 focuses on general attitudes towards the relative roles of physicians and nurses and specifies a hospital context for some items. Although there may be linkages between attitudes about collaboration and care coordination activities, we are unaware of any evidence base to inform use of these for assessing the quality of care coordination, therefore, this measure is excluded as not reflective of primary care coordination processes.

An additional 4 measures were excluded because they are disease-specific:

- Measure 21 focuses on patients with diabetes.
- Measure 49 focuses on patients with schizophrenia.
- Measure 54 focuses on patients with cardiac conditions or who have undergone cardiac procedures, including acute myocardial infarction, chronic stable angina and cardiac valve surgery.
- Measure 61 focuses on patients with melanoma.

While not age-specific, these 4 measures are also not generally applicable to a pediatric population.

**Feasibility and Degree of Focus on Care Coordination**

Next, we assessed the feasibility and degree of focus on care coordination for the 26 remaining measures. Table C-2 reports the priority rankings based on this assessment.

**Table C-2.** Priority Groups of Pediatric Primary Care Survey Measures Based on Feasibility and Degree of Focus on Care Coordination

<b>Survey Length</b>	<b>Degree of Focus on Care Coordination</b>	
	<i>Strong (≥50% map)</i>	<i>Minimal (&lt;50% map)</i>

Appendix C: Detailed Results of Measure Selection Process

<i>Short (≤50 items)</i>	Priority Group 1: 5, 7a, 7b, 16a, 16b, 18, 19, 20, 27, 34, 44, 45, 46, 50	Priority Group 3: 4c (core only), 4c (full), 31, 41
<i>Long (&gt;50 items)</i>	Priority Group 2: 11a, 11b, 17a, 17c, 17d, 64	Priority Group 4: 16c, 36

Notes:

- The Care Coordination Measurement Tool (measure #5) is an audit tool rather than a survey and thus feasibility cannot be assessed in the same manner of tallying the number of items and percent of items related to care coordination domains. The instrument consists of a form to be completed by pediatric primary care office personnel as care is provided. The form collects information about the purpose, mode, and nature of encounters, time spent, and outcomes associated with patient encounters. As it was designed to be completed by busy clinicians as part of their work processes, it has face validity for feasibility, and remains in our group of potentially feasible and relevant measures. It is listed in the table above in the highest priority group because we have no basis upon which to rank it lower.
- The Consumer Assessment of Healthcare Providers and Systems (CAHPS) Child Primary Care instrument (measure #4c) consists of two components. The core survey contains 31 items and may be used by itself. An additional supplemental survey contains items that may be used in conjunction with the core instrument. Because inclusion of the supplemental items is optional, we assessed feasibility and degree of focus on care coordination separately for the core-only and full (core plus supplement) versions of the CAHPS measure.

Table C-3 lists the set of 26 measures that remain for consideration during the Set Assembly process (Step 2) after applying the exclusion criteria and priority groupings. Twenty measures in Priority Groups 1 and 2 will be considered first in assembling a measure set. A further 6 measures from Priority Group 3 and 4 may be considered if none of the Priority Group 1 and 2 measures are appropriate.

**Table C-3** Pediatric Primary Care Measures for Consideration in Step 2

<b>Atlas Measure #</b>	<b>Atlas Measure Title</b>
<b>Priority Group 1</b>	
5	Care Coordination Measurement Tool (CCMT)
7a	Collaborative Practice Scale (CPS): Nurse Scale
7b	Collaborative Practice Scale (CPS): Physician Scale
16a	Medical Home Index (MHI-LV)
16b	Medical Home Index (MHI-SV)
18	Physician-Pharmacist Collaboration Instrument (PPCI)
19	Patient Centered Medical Home Survey of the Structural Capabilities of Primary Care Practice Sites
20	Family Medicine Medication Use Processes Matrix (MUPM)
27	Care Coordination Services in Pediatric Practices
34	Personal Health Records (PHR)
44	Clinical Microsystems Assessment Tool (CMAT)
45	Components of Primary Care Index (CPCI)
46	Relational Coordination
50	Degree of Clinical Integration Measures
<b>Priority Group 2</b>	
11a	Family-Centered Care Self-Assessment Tool - Family Version
11b	Family-Centered Care Self-Assessment Tool - Provider Version

Appendix C: Detailed Results of Measure Selection Process

17a	Primary Care Assessment Tool-Child Edition (PCAT-CE)
17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
64	Promoting Healthy Development Survey – Plus (PHDS-PLUS)
<b>Priority Group 3</b>	
4c core	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Child Primary Care (core survey only)
4c full	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Child Primary Care (core survey plus supplemental items)
31	Korean Primary Care Assessment Tool (KPCAT)
41	Ambulatory Care Experiences Survey (ACES)
<b>Priority Group 4</b>	
16c	Medical Home Family Index and Survey (MHFIS)
36	Physician Office Quality of Care Monitor (QCM)

**Step 2: Identify the Most Comprehensive Measures**

Table C-4 maps measures from priority groups 1 and 2 to the *Atlas* activity domains. Note that in assessing domain gaps, measures that do not map to the Communicate domain are still considered to be comprehensive if they instead map to both the Interpersonal Communication and Information Transfer sub-domains.

**Table C-4.** High Priority Measures for Pediatric Accountability/Recognition Measure Set

	MEASUREMENT PERSPECTIVE		
	<i>Patient/Family</i>	<i>Health Care Professional(s)</i>	<i>System Representative(s)</i>
<b>CARE COORDINATION ACTIVITIES</b>			
Establish accountability or negotiate responsibility	11a, 17a, <b>45</b> , 64	<b>5, 7a, 7b</b> , 11b, <b>18, 20, 46</b>	<b>16a, 16b</b>
Communicate	11a, 17a, <b>45</b>	<b>5, 7a, 7b</b> , 11b, 17d, <b>46</b>	<b>16a, 16b</b> , 17c, <b>34</b>
<i>Interpersonal communication</i>	11a, 17a, <b>45</b> , 64	<b>7a, 7b</b> , 11b, 17d, <b>18</b>	17c
<i>Information transfer</i>	11a, 17a, <b>45</b>	<b>5</b> , 11b, 17d, <b>18, 20, 27</b>	<b>16a</b> , 17c, <b>34, 44, 50</b>
Facilitate transitions			
<i>Across settings</i>	17a, 64	<b>5</b> , 17d, <b>27</b>	<b>16a</b> , 17c, <b>50</b>
<i>As coordination needs change</i>	11a	11b	<b>16a, 16b</b>
Assess needs and goals	11a, 17a, <b>45</b> , 64	<b>5</b> , 11b, 17d, <b>20, 27, 46</b>	<b>16a, 16b</b> , 17c, <b>44</b>
Create a proactive plan of care	11a	<b>5, 7b</b> , 11b, <b>27</b>	<b>16a, 16b</b>
Monitor, follow-up, and respond to change	11a, 17a, <b>45</b> , 64	<b>5</b> , 11b, 17d, <b>20</b>	17c, <b>19, 44</b>
Support self-management goals	11a, 17a, 64	<b>5</b> , 11b, 17d, <b>20</b>	<b>16a</b> , 17c, <b>19, 34</b>

## Appendix C: Detailed Results of Measure Selection Process

Link to community resources	11a, 64	<b>5</b> , 11b, 17d, <b>27</b>	<b>16a</b> , 17c, <b>44</b>
Align resources with patient and population needs	11a, 17a	<b>5</b> , 11b, 17d, <b>20</b>	<b>16a</b> , <b>16b</b> , 17c, <b>19</b>

Measures in **bold** are highest priority (group 1). Measures in plain font are in priority group 2.

### ***Patient/Family Perspective***

Measures with Broadest Domain Coverage:

- The sole Priority Group 1 measure (Measure 45) does not offer comprehensive domain coverage (maps to only 6 of 11 activity domains).
- From Priority Group 2, measure 11a covers all *Atlas* activity domains and sub-domains except Facilitate Transitions Across Settings and Measure 17a covers all *Atlas* activity domains and sub-domains except Facilitate Transitions as Coordination Needs Change, and Links to Community Resources.
- Measure 64 is lower priority (Group 2) and has weaker domain coverage (7 of 11 activity domains).

Measure for Detailed Review:

- Measure 11a (Family-Centered Care Self-Assessment Tool – Family Version)
- Measure 17a (Primary Care Assessment Tool – Child Edition).

### ***Health Care Professional Perspective***

Measures with Broadest Domain Coverage:

- Measure 5 covers all *Atlas* activity domains except the sub-domain Facilitate Transitions as Coordination Needs Change. Although it does not map to Interpersonal Communication, this is not considered a gap because it does map to Communicate. However, it is important to note that this mapping is based on possible response choices from an audit tool rather than a survey-based measure.
- No other high priority (Priority Group 1) measures cover more than 6 of 11 *Atlas* activity domains.
- Of the Priority Group 2 measures, 11b covers all *Atlas* activity domains except the sub-domain Facilitate Transitions Across Settings and 17d covers all activity domains and sub-domains except Establish Accountability or Negotiate Responsibility, Facilitate Transitions as Coordination Needs Change, and Create a Proactive Plan of Care.

Measure for Detailed Review:

- Measure 5 (Care Coordination Measurement Tool)
- Measure 11b (Family-Centered Care Self-Assessment Tool – Provider Version)
- Measure 17d (Primary Care Assessment Tool – Provider Edition)

### ***System Representative Perspective***

Measures with Broadest Domain Coverage:

- Measure 16a covers all *Atlas* activity domains except Monitor, Follow-up and Respond to Change.

Appendix C: Detailed Results of Measure Selection Process

- Alternatively, 17c covers all *Atlas* activity domains and sub-domains except Establish Accountability or Negotiate Responsibility, Facilitate Transitions as Coordination Needs Change, and Create a Proactive Plan of Care.

Measure for Detailed Review:

- Measures 16a (Medical Home Index).
- Measure 17c (Primary Care Assessment Tool – Facility Edition).

**Step 3: Conduct Detailed Assessment and Select Final Measures**

For those measures selected to undergo detailed review in the previous step, we conducted a cited reference search to identify additional sources pertaining to the measure, evaluated any available evidence regarding reliability or validity of the measure, and assessed any additional information on feasibility, past applications, measurement purpose, and focus on care coordination.

**Patient/Family Perspective**

Table C-5 summarizes the reliability and validity information for the pediatric patient/family perspective measures.

**Table C-5.** Comparison of Reliability and Validity Evidence for Patient/Family Perspective Measures

	<b>Measure 11a Family-Centered Care Self- Assessment Tool – Family Version</b>	<b>Measure 17a PCAT-CE</b>
<b>Reliability</b>		
Internal Consistency		+
Inter-rater	N/A	N/A
Test-retest		+
<b>Validity</b>		
Factor Analysis		+
Construct: Uni/bivariate		
Construct: Multivariate		
Convergent		
Content		+/-
Indirect		

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

**Measure 11a – Family-Centered Care Self-Assessment Tool – Family Version<sup>1,2</sup>**

**Validity and Reliability**

- The instrument was developed based on 10 components of family-centered care within a framework for partnership between families and professionals. No detailed testing information was described in the sources identified.

**Further Information on Feasibility**

- No further information available. The survey contains 98 items.

**Past or Suggested Uses**

- This measure is designed for quality improvement purposes.

**Unit of Analysis in Past Applications**

- No information available on analysis of past applications.

**Focus on Care Coordination**

- 90 of 98 total instrument items mapped to a care coordination domain (92%).
- Due to lack of psychometric testing, the measure developers do not recommend combining responses across items to develop mean or aggregate scores for groups of conceptually-related instrument items. Rather, they recommend reporting percent responses to individual items only. Therefore, while the instrument should be administered as a whole, responses on items most relevant to care coordination may be reported separately.

**Depth of Domain Focus**

- This measure has at least three items for every *Atlas* activity domain except Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains).

**Measure 17a – Primary Care Assessment Tool – Child Edition (PCAT-CE)<sup>3-6</sup>**

**Validity and Reliability**

- Test-retest Reliability. Though absolute agreement was modest for many items (range across all items 37% to 39%), results using a pi coefficient that adjusts for prevalence and variation were adequate ( $>0.50$ ) for all included items.
- Internal Consistency Reliability. The alpha coefficient was  $>0.70$  for all but 2 scales. The Longitudinality-relationship scale was revised due to a low alpha ( $\alpha=0.40$ ). The First Contact Accessibility scale was very near the threshold typically considered as adequate reliability ( $\alpha=0.68$ ).
- Factor Analysis. A principal components factor analysis yielded 5 separate factors. These corresponded to the instrument's 5 scales: (1) Longitudinality-relationship; (2) First Contact Accessibility; (3) Comprehensiveness of Services Available; (4) Comprehensiveness of Services provided; (5) Coordination. Only factors with adequate loadings on a hypothesized factor were retained in the final instrument.
- Content Validity. A panel of 9 content experts rated appropriateness and representativeness of domains included in the measure. Agreement among experts was strong ( $>75\%$ ) for most items. Agreement was lowest for items included in the Longitudinality-relationship scale (range 11% to 100%).

**Further Information on Feasibility**

- Among a sample of 450 survey respondents, average time to complete the telephone survey was 25 minutes.

- The survey may be administered by telephone or through self-assessment. No information is available on typical self-assessment completion times.

**Past or Suggested Uses**

- This measure is designed for accountability purposes. It has also been used for research purposes.

**Unit of Analysis in Past Applications**

- Patient.
- Family.
- Physician.
- Practice.

**Focus on Care Coordination**

- 86 of 115 total items map to a care coordination domain (75%).
- The instrument includes a sub-domain for coordination and another sub-domain for coordination related to information systems. The user guide contains information for calculating scores for each of these sub-domains, as well as for an overall primary care score.
- Although the instrument should be administered as a whole, scores for the coordination sub-domains may provide useful information in understanding the measure results most relevant to care coordination. Note that many items in other sub-domains map to care coordination domains, even if the focus of the sub-domain overall is not on coordination.

**Depth of Domain Focus**

- PCAT-CE has at least three items for each *Atlas* activity domain, except: Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains), and Establish Accountability (n=1).

**Recommendations for Final Measure Set:**

- The PCAT-CE has been much more thoroughly tested than the Family-Centered Care Self-Assessment Tool – Family Version. Overall, it has been shown to have adequate reliability and validity. In addition, it was designed for use as an accountability measure, though we have not identified published sources of such use. Furthermore, though lengthy and focused on many aspects of primary care beyond care coordination, it does include sub-domains particular to coordination which will aid in interpretation and reporting of results for coordination measurement purposes. Therefore, we recommend the PCAT-CE for inclusion in the measure set.
- If validity or reliability is of less interest, the Family-Centered Care Self-Assessment Tool – Family Version may be considered as an alternative.

**Table C-6.** Recommendation for Care Coordination Accountability Measures for Primary Care Practice

Patient/Family Perspective		Atlas Measure #	Atlas Measure Title
Pediatric Measure		17a	Primary Care Assessment Tool-Child Edition (PCAT-CE)
Alternative	If care coordination is of greater interest than validity/reliability	11a	Family-Centered Care Self-Assessment Tool - Family Version
Adult Measure		6	Client Perceptions of Coordination Questionnaire (CPCQ)
Alternative	If coordination related to transitions is of greater interest	17b	Primary Care Assessment Tool-Adult Edition (PCAT-AE)

## Health Care Professional Perspective

Measures from this perspective were considered for use as quality improvement tools that may be used to guide improvement initiatives in response to the accountability measure set (patient/family perspective) results. Given the reliance on health care professional self-assessment for all measures from the health care professional perspective, no measures from this perspective were selected for use as accountability tools. Table C-7 summarizes the reliability and validity information for the pediatric health care professional perspective measures.

**Table C-7.** Comparison of Reliability and Validity Evidence for Health Care Professional Perspective

	Measure 5 CCMT	Measure 11b Family-Centered Care Self- Assessment Tool – Provider Version	Measure 17d PCAT-PE
<b>Reliability</b>			
Internal Consistency			
Inter-rater	N/A	N/A	N/A
Test-retest			
<b>Validity</b>			
Factor Analysis	N/A		
Construct: Uni/bivariate			
Construct: Multivariate			
Convergent			
Content			
Indirect	+		+

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

**N/A** Testing not applicable to this measure.

A blank cell indicates the test was not done.

**Measure 5 – Care Coordination Measurement Tool<sup>7,8</sup>**

**Validity and Reliability**

- No validity or reliability testing reported.
- Later use notes that the measure was adapted from earlier instrument and pilot tested, but details are not provided.

**Further Information on Feasibility**

- The measure was designed for use by clinicians, but there is no report of its impact on clinical work flow or completion rates.
- In one study, use of the instrument required 2-hour training sessions prior to data collection and ongoing technical support throughout data collection period. Generally, practice personnel were able to incorporate accurate use of CCMT into clinical workflow after 1 week of using the instrument. No quantitative assessment of feasibility was provided.

**Past or Suggested Uses**

- This measure has been used for research.

**Unit of Analysis in Past Applications**

- Patient encounters.

**Focus on Care Coordination**

- Domain mapping was based on response choices available from an audit tool. As such, it is not useful to report the percent of items that map to care coordination activity domains. However, the tool as a whole was designed to document care coordination processes.

**Depth of Domain Focus**

- Domain mapping was based on response choices available from an audit tool. As such, it is not useful to report the percent of items that map to care coordination domains.

**Measure 11b – Family-Centered Care Self-Assessment Tool – Provider Version<sup>1,2</sup>**

**Validity and Reliability**

- The instrument was developed based on 10 components of family-centered care within a framework for partnership between families and professionals. No detailed testing information was described in the sources identified.

**Further Information on Feasibility**

- No further information available. The survey contains 98 items.

**Past or Suggested Uses**

- This measure is designed for quality improvement purposes.

**Unit of Analysis in Past Applications**

- No information available on analysis of past applications.

**Focus on Care Coordination**

- 88 of 105 total instrument items mapped to a care coordination domain (84%).
- Due to lack of psychometric testing, the measure developers do not recommend combining responses across items to develop mean or aggregate scores for groups of conceptually-related instrument items. Rather, they recommend reporting percent responses to individual items only. Therefore, while the instrument should be administered as a whole, responses to items most relevant to care coordination may be reported separately.

**Depth of Domain Focus**

- This measure has at least three items for every *Atlas* activity domain **except** the sub-domain: Facilitate Transitions Across Settings (n=0).

<b>Measure 17d – Primary Care Assessment Tool – Provider Edition (PCAT-PE)<sup>3-6</sup></b>
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**Validity and Reliability**

- Indirect. No validity or reliability testing of this version is reported, but it is very similar to the PCAT-CE, which has undergone validity and reliability testing. That testing found adequate test-retest and internal consistency reliability for all items and factor analyses identified five separate factors which correspond to the PCAT-CE instrument sub-scales. Agreement among a panel of content experts was generally good about the appropriateness and representative-ness of domains included in the PCAT-CE, on which the PCAT-PE is based.

**Further Information on Feasibility**

- The instrument includes a sub-domain for coordination and another sub-domain for coordination related to information systems. The user guide contains information for calculating scores for each of these sub-domains, as well as for an overall primary care score.
- Although the instrument should be administered as a whole, scores for the coordination sub-domains may provide useful information in understanding the measure results most relevant to care coordination. Note that many items in other sub-domains map to care coordination domains, even if the focus of the sub-domain overall is not on coordination.

**Focus on Care Coordination**

- 114 of 153 total instrument items map to a care coordination domain (75%).

**Past or Suggested Uses**

- This measure is designed for accountability purposes. It has also been used for research.

**Unit of Analysis in Past Applications**

- Physician.
- Practice.

**Depth of Domain Focus**

- PCAT-PE has at least three items for all but five *Atlas* activity domains or sub-domains: Establish Accountability (n=0); Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains); Facilitate Transitions Across Settings (n=2); Facilitate Transitions as Coordination Needs Change (n=0); and Create a Proactive Plan of Care (n=0).

**Recommendations for Final Measure Set:**

- No validity or reliability testing has been performed for any of the measures under consideration. Indirect evidence of validity and reliability is available for the PCAT-PE, which is based on the validated PCAT-CE instrument, but given that the two instruments are designed for different users (parents of pediatric patients vs. health care providers), we recommend caution in extrapolating validity and reliability information.
- If comprehensive measurement is of chief interest, consider the Family-Centered Care Self-Assessment Tool – Provider Version, which provides comprehensive assessment of care coordination, with three or more items mapped to all but one *Atlas* activity sub-domain (Facilitate Transitions Across Settings).
- If consistency with the pediatric patient/family perspective measure is desirable, consider the Primary Care Assessment Tool – Provider Edition (PCAT-PE), which is closely related to the PCAT-CE, which will improve comparability of responses across the two instruments. Results of the provider version survey may be particularly useful in guiding

improvement initiatives that aim to improve performance on the related child version of the survey that is recommended for accountability purposes.

- The Care Coordination Measurement Tool (CCMT) offers an alternative to survey-based measurement. It uses an audit technique to collect detailed information about coordination activities carried out by health care professionals. Although the tool still relies on self-reporting by health care professionals, if methods of auditing or validating self-reported information were developed, the CCMT might be useful as an accountability measure. However, note that validity and reliability remain unknown at this time. The tool may be useful for quality improvement purposes by providing detailed information about the types of coordination-related activities performed in a clinic.

## System Representative Perspective

Table C-8 summarizes the reliability and validity information for the system representative perspective measures.

**Table C-8.** Comparison of Reliability and Validity Evidence for System Representative Perspective

	Measure 16a MHI	Measure 17c PCAT-FE
<b>Reliability</b>		
Internal Consistency	+	
Inter-rater	+	
Test-retest		
<b>Validity</b>		
Factor Analysis/PCA		
Construct Validity: Univariate or bivariate	+	
Construct Validity: Multivariate	+	
Convergent Validity		
Content Validity	+	
Indirect Evidence		+

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

### Measure 16a – Medical Home Index (MHI)<sup>9,10</sup>

#### Validity and Reliability

- Inter-rater reliability assessment suggested acceptable reliability between assessment by outside observers (study site visitors) and practice staff (self-assessment).
- Internal consistency reliability was strong for the total score (Cronbach’s alpha >0.70).
- Content validity was assessed by experts in medical home concept. Instrument revised following review.
- Construct validity – univariate or bivariate. Practice MHI score was not correlated with family satisfaction with care. In bivariate analyses, higher overall practice MHI score (indicating better adherence to the medical home model) was significantly associated

with lower hospitalization rates. No significant correlations were observed between overall score and ED visits or the ratio of primary to specialty care visits.

- Construct validity – multivariate. In multivariate analyses controlling for patients' chronic conditions, overall MHI practice score was significantly associated with hospitalization rates. Rate of emergency department (ED) visits was significantly associated with the care coordination and chronic condition management sub-domain scores, but not the overall practice MHI score. The care coordination domain was also associated with lower hospitalization rates. No significant associations were found between overall MHI score or any sub-domain scores and the ratio of primary to specialty care visits.

#### **Further Information on Feasibility**

- Typical completion time for the Medical Home Index is 30-45 minutes, including time needed for both practice representatives to reach consensus.

#### **Past or Suggested Uses**

- This measure has been used for quality improvement and research purposes.
- Use for accountability or recognition purposes was also suggested by the measure developer, but we are not aware of any instances in which the measure has been used in this way. The reliance on self-assessment may limit the usefulness for accountability purposes.

#### **Unit of Analysis in Past Applications**

- Primary care practice.

#### **Focus on Care Coordination**

- All 25 instrument items map to a care coordination domain.
- The instrument includes a sub-domain for care coordination which may be scored separately from the total instrument score. However, given the relevance of all items to care coordination, the total score is also highly relevant for care coordination measurement.

#### **Depth of Domain Focus**

- The MHI has at least 3 items for only 5 activity domains. Those domains or sub-domains with <3 items are: Establish Accountability (n=2); Interpersonal Communication (n=0, but 4 items address the Communicate domain); Information Transfer (n=2); Facilitate Transitions Across Settings (n=2); Facilitate Transitions as Coordination Needs Change (n=1); Monitor, Follow-up and Respond to Change (n=0); Support Self-Management Goals (n=1). This lower domain density largely reflects the brevity of the instrument, as all 25 survey items mapped to one of the framework domains.

### **Measure 17c – Primary Care Assessment Tool – Facility Edition (PCAT-FE)<sup>3,11</sup>**

#### **Validity and Reliability**

- Indirect. No validity or reliability testing of this version is reported, but it is very similar to the PCAT-AE and PCAT-CE, which have undergone validity and reliability testing.

#### **Focus on Care Coordination**

- 114 of 153 total instrument items map to a care coordination domain (75%).

#### **Past or Suggested Uses**

- This measure is designed for accountability purposes.

#### **Unit of Analysis in Past Applications**

- No information available on analysis of past applications of the instrument.

### Further Information on Feasibility

- The instrument includes a sub-domain for coordination and another sub-domain for coordination related to information systems. The user guide contains information for calculating scores for each of these sub-domains, as well as for an overall primary care score.
- Although the instrument should be administered as a whole, scores for the coordination sub-domains may provide useful information in understanding the measure results most relevant to care coordination. Note that many items in other sub-domains map to care coordination domains, even if the focus of the sub-domain overall is not on coordination.

### Depth of Domain Focus

- PCAT-FE has at least three items for all but five *Atlas* activity domains or sub-domains: Establish Accountability (n=0); Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains); Facilitate Transitions Across Settings (n=1); Facilitate Transitions as Coordination Needs Change (n=0); and Create a Proactive Plan of Care (n=0).

### Recommendations for Final Measure Set:

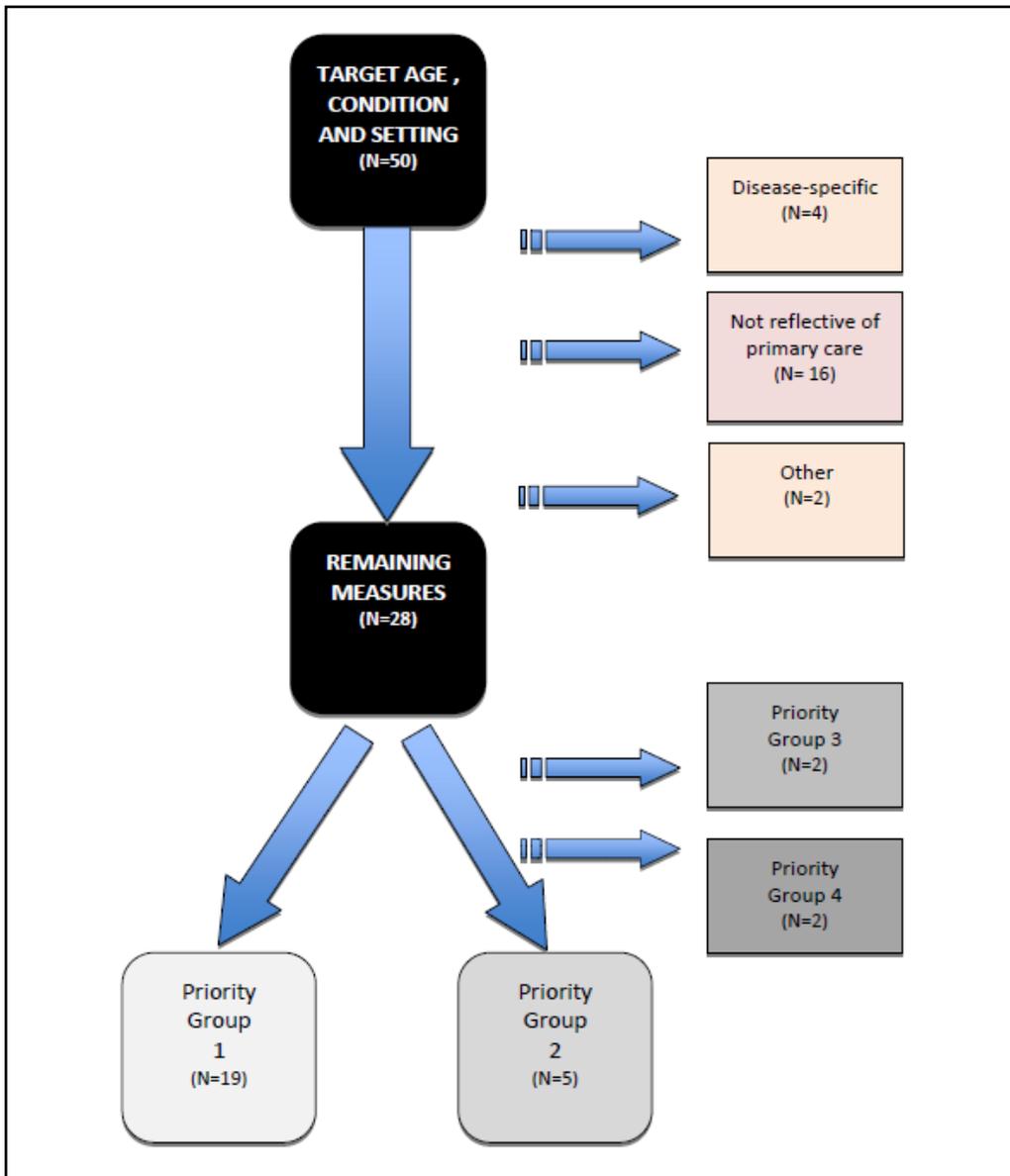
- If validity or reliability is of chief interest, consider the **Medical Home Index (MHI)**. This measure has strong validity and reliability and is designed and has been used for quality improvement purposes.
- If feasibility is of chief interest, consider the **Medical Home Index (MHI)**, which is limited to 25 items and has reported a typical completion time of 30 to 45 minutes. A 10-item short version of this survey is also available (*Atlas* measure # 16b) which offers reduced measurement burden, although it offers less comprehensive domain coverage.
- If in-depth measurement is of chief interest, consider the **Primary Care Assessment Tool – Facility Expanded Edition (PCAT-FE)**. Although this measure does not cover every *Atlas* activity domain, it does include at least three items for most domains, offering a more detailed assessment of those coordination mechanisms than the briefer MHI. The additional detail provided by in-depth measurement may be particularly useful for guiding improvement initiatives.
- If consistency with the pediatric patient/family perspective measure is desirable, consider the **Primary Care Assessment Tool – Facility Expanded Edition (PCAT-FE)**. This survey is closely related to the PCAT-CE, which will improve comparability of responses across the two measures. Results of the provider version survey may be particularly useful in guiding improvement initiatives that aim to improve performance on the related child version of the survey that is recommended for accountability purposes.

## Adult Measure Set Creation

### Step 1: Narrow the Field of Measures

Figure C-2 summarizes the process of narrowing the field of measures for the adult measure set. Details of each step are provided below.

**Figure C-2.** Narrowing the Field of Adult Primary Care Measures



#### 3.2.1.1 Inclusions

Table C-9 lists the set of measures that meet the following three inclusion criteria:

- Measures that are applicable to primary care facilities or that are not setting specific

## Appendix C: Detailed Results of Measure Selection Process

- Measures that are applicable to adults or that are not age specific or for which patient age is not applicable.
- Measures that are applicable to patients with chronic conditions or that are not condition specific or where patient condition is not applicable. This inclusion criterion was added to further limit the field of measures given the large number that remained when using only the age and setting criteria. We chose to focus on patients with chronic conditions because they have some of the greatest needs for care coordination and such measures would be widely applicable given the prevalence of chronic disease.

**Table C-9. Adult Primary Care Measures Applicable to Patients with General Chronic Conditions\***

<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
1	Assessment of Chronic Illness Care (ACIC)
2	ACOVE-II Quality Indicators: Continuity and Care Coordination
4a - full†	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Adult Primary Care
4a - core only†	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Adult Primary Care
6	Client Perceptions of Coordination Questionnaire (CPCQ)
7a	Collaborative Practice Scale (CPS): Nurse Scale
7b	Collaborative Practice Scale (CPS): Physician Scale
9a	Care Transitions Measure (CTM-3)
9b	Care Transitions Measure (CTM-15)
10	Patient Assessment of Chronic Illness Care (PACIC)
13	Primary Care Assessment Survey (PCAS)
16a	Medical Home Index (MHI-LV)
16b	Medical Home Index (MHI-SV)
17b	Primary Care Assessment Tool-Adult Edition (PCAT-AE)
17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
18	Physician-Pharmacist Collaboration Instrument (PPCI)
19	Patient Centered Medical Home Survey of the Structural Capabilities of Primary Care Practice Sites
20	Family Medicine Medication Use Processes Matrix (MUPM)
21	Resources and Support for Self-Management (RSSM)
26	Oncology Patients Perceptions of the Quality of Nursing Care Scale (OPPQNCS)
31	Korean Primary Care Assessment Tool (KPCAT)
32	Primary Care Multimorbidity Hassles for Veterans with Chronic Illnesses
33	Primary Care Satisfaction Survey for Women (PCSSW)
34	Personal Health Records (PHR)
36	Physician Office Quality of Care Monitor (QCM)
37	Patient Perceptions of Care (PPOC)
38a	PREPARED (Patient Version)
38b	PREPARED (Carer Version)
38c	PREPARED (Residential Care Staff Version)
38d	PREPARED (Community Service Provider Version)
38e	PREPARED (Medical Practitioner Version)

## Appendix C: Detailed Results of Measure Selection Process

<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
38f	PREPARED (Modified Medical Practitioner Version)
39	Health Tracker Household Survey
41	Ambulatory Care Experiences Survey (ACES)
42	Patient Perceptions of Continuity Instrument (PC)
43	Psychometric Properties of An Attitude Scale Measuring Physician-Nurse Collaboration
44	Clinical Microsystems Assessment Tool (CMAT)
45	Components of Primary Care Index (CPCI)
46	Relational Coordination
47	Fragmentation of Care Index (FCI)
50	Degree of Clinical Integration Measures
52	Mental Health Professional HIV/AIDS Point Prevalence and Treatment Experiences Survey Part II
54	Cardiac Rehabilitation Patient Referral from an Outpatient Setting
57	Reconciled Medication List Received by Discharged Patients
58	Transition Record with Specified Elements Received by Discharged Patients (Inpatient Discharges)
59	Timely Transmission of Transition Record
60	Transition Record with Specified Elements Received by Discharged Patients (Emergency Department Discharges)
62	Team Survey for Program of All-Inclusive Care for the Elderly (PACE)
63	Medication Reconciliation in Ambulatory Care

\*Also included are measures that are not condition specific or for which patient condition is not applicable.

† The Consumer Assessment of Healthcare Providers and Systems (CAHPS) Child Primary Care instrument (measure #4c) consists of two components. The core survey contains 31 items and may be used by itself. An additional supplemental survey contains items that may be used in conjunction with the core instrument.

### Exclusions

In total, 22 measures were excluded for the following reasons:

- Measures that are disease-specific were excluded because they would not be widely applicable: 21, 26, 52, and 54
- Measures that are not applicable for evaluating care coordination as performed by primary care practices or providers: 9a, 9b, 32, 38a, 38b, 38c, 38d, 38e, 38f, 39, 43, 57, 58, 59, 60 and 62
- Measure that is applicable only to older adults and therefore limits overall use in a general population: 2
- Measure that is applicable only to women and therefore limits overall use in a general population: 33

### ***Feasibility and Degree of Focus on Care Coordination***

Next, we assessed feasibility and degree of focus on care coordination for these 28 measures. Table C-10 reports the priority rankings based on this assessment.

Appendix C: Detailed Results of Measure Selection Process

**Table C-10.** Priority Groups of Adult Primary Care Survey Measures Based on Feasibility and Degree of Focus on Care Coordination

Survey Length	Degree of Focus on Care Coordination	
	Strong ( $\geq 50\%$ map)	Minimal ( $< 50\%$ map)
Short ( $\leq 50$ items)	Group 1: 1, 6, 7a, 7b, 10, 16a, 16b, 18, 19, 20, 34, 37, 42, 44, 45, 46, 47, 50, 63	Group 3: 4a (core only), 31
Long ( $> 50$ items)	Group 2: 4a (full), 17b, 17c, 17d, 41	Group 4: 13, 36

Note: Measures 47 and 63 are not survey-based and therefore cannot be assessed in this way. They are displayed in priority group 1 will be considered in Step 2.

Table C-11 lists the set of 24 measures that remain for consideration during Step 2 (Priority Groups 1 and 2) after applying the exclusion criteria and priority groupings. Measures in Group 1 will be considered first for inclusion in the final measure set, followed by measures in Group 2. Only if no adequate measures are identified from groups 1 and 2, measures in Group 3 or Group 4 would be considered.

**Table C-11.** Adult Primary Care Measures for Consideration in Step 2

Atlas Measure #	Atlas Measure Title
<b>Priority Group 1</b>	
1	Assessment of Chronic Illness Care (ACIC)
6	Client Perceptions of Coordination Questionnaire (CPCQ)
7a	Collaborative Practice Scale (CPS) – Nurse Scale
7b	Collaborative Practice Scale (CPS) – Physician Scale
10	Patient Assessment of Care for Chronic Conditions (PACIC)
16a	Medical Home Index (MHI) – Long Version
16b	Medical Home Index (MHI) – Short Version
18	Physician-Pharmacist Collaboration Instrument (PPCI)
19	Patient Centered Medical Home Survey of the Structural Capabilities of Primary Care Practice Sites
20	Family Medicine Medication Use Processes Matrix (MUPM)
34	Personal Health Records (PHR)
37	Patient Perceptions of Care (PPOC)
42	Patient Perception of Continuity Instrument (PC)
44	Clinical Microsystems Assessment Tool (CMAT)
45	Components of Primary Care Index (CPCI)
46	Relational Coordination Survey
47	Fragmentation of Care Index (FCI)
50	Degree of Clinical Integration Measures
63	Medication Reconciliation in Ambulatory Care
<b>Priority Group 2</b>	
4a - full	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Adult Primary Care
17b	Primary Care Assessment Tool (PCAT) – Adult Expanded Edition

Appendix C: Detailed Results of Measure Selection Process

17c	Primary Care Assessment Tool (PCAT) – Facility Expanded Edition
17d	Primary Care Assessment Tool (PCAT) – Provider Expanded Edition
41	Ambulatory Care Experiences Survey (ACES)
<b>Priority Group 3</b>	
4a - core only	Consumer Assessment of Healthcare Providers and Systems (CAHPS) - Adult Primary Care
31	Korean Primary Care Assessment Tool (KPCAT)
<b>Priority Group 4</b>	
13	Primary Care Assessment Survey (PCAS)
36	Physician Office Quality of Care Monitor (QCM)

**Step 2: Identify the Most Comprehensive Measures**

Table C-12 maps domain and perspective for the measures in Priority Groups 1 and 2 that will be considered in step 2.

**Table C-12.** Measures Under Consideration in Step 2 for Adult Measure Set

	<b>MEASUREMENT PERSPECTIVE</b>		
	<i>Patient/Family</i>	<i>Health Care Professional(s)</i>	<i>System Representative(s)</i>
<b>CARE COORDINATION ACTIVITIES</b>			
Establish accountability or negotiate responsibility	4a (full), 6, 17b, 37, 42, 45	7a, 7b, 18, 20, 46, 63	1, 16a, 16b
Communicate	4a (full), 6, 10, 17b, 37, 45	7a, 7b, 17d, 46	1, 16a, 16b, 17c, 34
<i>Interpersonal communication</i>	4a (full), 6, 10, 17b, 37, 41, 42, 45	7a, 7b, 17d, 18	17c
<i>Information transfer</i>	4a (full), 6, 10, 17b, 37, 41, 42, 45	17d, 18, 20, 63	1, 16a, 17c, 34, 44, 50
Facilitate transitions			
<i>Across settings</i>	17b, 37, 42	17d, 63	16a, 17c, 50
<i>As coordination needs change</i>			16a, 16b
Assess needs and goals	4a (full), 6, 10, 17b, 37, 41, 42, 45	17d, 20, 46	1, 16a, 16b, 17c, 44
Create a proactive plan of care	6, 10, 37	7b	1, 16a, 16b
Monitor, follow-up, and respond to change	4a (full), 6, 10, 17b, 37, 41, 45	17d, 20, 63	1, 17c, 19, 44
Support self-management goals	4a (full), 6, 10, 17b, 37, 41	17d, 20	1, 16a, 17c, 19, 34
Link to community resources	10	17d	1, 16a, 17c, 44
Align resources with patient and population needs	6, 17b	17d, 20	1, 16a, 16b, 17c, 19

Measures in **bold** are in Priority Group 1. Measures in plain font are in Priority Group 2. Note that Measure 47 maps only to the Health Care Home broad approaches domain (broad approaches domains not considered in this report), so does not appear on this map.

**Patient/Family Perspective**

Measures with Broadest Domain Coverage:

- Measure 6 (Client Perceptions of Coordination Questionnaire) covers all *Atlas* activity domains except Facilitate Transitions (both sub-domains), and Links to Community Resources.
- Measure 37 covers all domains and sub-domains except Facilitate Transitions as Coordination Needs Change, Links to Community Resources, and Align Resources with Patient and Population Needs.
- Among Priority Group 2, Measure 17b (Primary Care Assessment Tool – Adult Version) offers the broadest domain coverage, mapping to all *Atlas* activity domains and sub-domains except Facilitate Transitions as Coordination Needs Change, Create a Proactive Plan of Care, and Links to Community Resources.
- No measures map to the Facilitate Transitions as Coordination Needs Change sub-domain. This is a true measurement gap.

Measures for Detailed Review:

- Measure 6 (Client Perception of Coordination Questionnaire)
- Measure 37 (Patient Perceptions of Care)
- Measure 17b (Primary Care Assessment Tool – Adult Version)

**Health Care Professional Perspective**

Measures with Broadest Domain Coverage:

- Only Measure 17d (Primary Care Assessment Tool – Provider Edition) has broad domain coverage. No other measures map to more than six *Atlas* activity domains. None of the measures in priority groups 3 or 4 are from the health care professional perspective.

Measures for Detailed Review:

- Measure 17d (Primary Care Assessment Tool – Provider Edition). The strengths and weaknesses of this measure will be assessed, as it is the only measure under consideration.

**System Representative Perspective**

Measures with Broadest Domain Coverage:

- Measure 1 (Assessment of Chronic Illness Care) covers all *Atlas* activity domains except Facilitate Transitions (both sub-domains).
- Measure 16a (Medical Home Index – Long Version) covers all *Atlas* activity domains except Monitor, Follow-up and Respond to Change.

Measures for Detailed Review:

- Measure 1 (Assessment of Chronic Illness Care)
- Measure 16a (Medical Home Index – Long Version)

### Step 3: Conduct Detailed Measure Assessment and Select Final Measures

For those measures selected to undergo detailed review in the previous step, we conducted a cited reference search to identify additional sources pertaining to the measure, evaluated any available evidence regarding reliability or validity of the measure, and assessed any additional information on feasibility, past applications, measurement purpose, and focus on care coordination.

### Patient/Family Perspective

Table C-13 summarizes the reliability and validity evidence for adult patient/family perspective measures.

**Table C-13.** Comparison of Reliability and Validity Evidence for Patient/Family Perspective

	Measure 6 CPCQ	Measure 37 PPOC	Measure 17b PCAT-AE
<b>Reliability</b>			
Internal Consistency	+/-		+
Inter-rater	N/A		
Test-retest			
<b>Validity</b>			
Factor Analysis	+		+/-
Construct: Uni/bivariate	++		
Construct: Multivariate			
Convergent			
Content			
Indirect		+	+

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

Multiple entries indicate multiple tests were performed.

#### Measure 6 –Client Perception of Coordination Questionnaire (CPCQ)<sup>12</sup>

##### Validity and Reliability

- Internal Consistency Reliability. Overall Cronbach’s alpha was 0.92, suggesting high internal consistency. Four of six sub-scales had acceptable Cronbach’s alpha (>0.70), but the authors note that poor internal consistency of the two remaining scales (client comprehension and client capacity) raise concerns about the reliability of the overall scale score. All but two individual items were statistically significantly correlated with the global CPCQ score. The uncorrelated items focused on decision-making preferences.
- Factor Analysis. Principal components analysis suggested six sub-scales. These generally fit with the hypothesized five survey components, with two sub-scales distinguishable for the first component (global quality and quality of specific aspects of care).
- Construct Validity. Mean scores for all items were very similar between two test groups (general population and participants in a care coordination trial), as expected.

- Construct Validity. As expected, respondents with chronic pain reported less coordinated care (65.5% well coordinated among chronic pain group vs. 83.9% well coordinated among patients without chronic pain). At the level of individual survey items, patients with chronic pain also reported less coordinated care for all but three survey items.

**Further Information on Feasibility**

- No information available on typical completion times.
- Completion rates for sections in the measure instrument suggest good feasibility, but the authors note that some items were not applicable to a substantial percent of respondents (i.e., no recent test, no change in needs). Missing responses were most prevalent on the portion of the instrument that focuses on a single provider (range 8.1% to 10.3% missing).

**Past or Suggested Uses**

- This measure has been used for research purposes.

**Unit of Analysis in Past Applications**

- No information available on analysis of past applications.

**Focus on Care Coordination**

- The instrument is designed to focus on care coordination.
- 23 of 31 total instrument items map to a care coordination domain (74%).
- No total or sub-domain scores are calculated for the measure; results are reported for individual items in the instrument.

**Depth of Domain Focus**

- The CPCQ has at least three items for only two *Atlas* activity domains: Communicate and Support Self-management Goals. It has no items mapped to the following *Atlas* activity domains: Facilitate Transitions (both Across Settings and as Coordination Needs Change sub-domains), and Links to Community Resources. This lower domain density partially reflects the brevity of the instrument, as 23 of 31 survey items mapped to one of the *Atlas* framework domains.

**Measure 37 – Patient Perceptions of Care (PPOC)<sup>13,14</sup>**

**Validity and Reliability**

- Indirect. This measure is based on components of the 1998 VA National Outpatient Customer Satisfaction Survey, conducted by the VA National Performance Data Resource Center. Similar items have been used in the Veterans Satisfaction Survey. However, no information is available on the validity or reliability of the original survey, nor the validity of selecting items from that survey to create this measure.

**Further Information on Feasibility**

- The survey contains 40 items. No further information available.

**Past or Suggested Uses**

- This measure is has been used for research purposes. The VA survey on which it is based is used for quality improvement purposes.

**Unit of Analysis in Past Applications**

- Practice
- Hospital

**Focus on Care Coordination**

- 26 of 40 total instrument items mapped to a care coordination domain (65%).

- The instrument includes two sub-scales related to care coordination: overall coordination of care and coordination of care at a visit. Scores for these sub-scales may be reported separately, although psychometric testing of sub-scales is not reported.

**Depth of Domain Focus**

- The PPOC has at least three items for six *Atlas* activity domains or sub-domains. Those with <3 items are: Facilitate Transitions Across Settings (n=1); Facilitate Transitions as Coordination Needs Change (n=0); Create a Proactive Plan of Care (n=1); Support Self-Management Goals (n=2); Link to Community Resources (n=0) and Align Resources with Patient and Population Needs (n=0).

**Measure 17b – Primary Care Assessment Tool – Adult Edition (PCAT-AE)<sup>11,15</sup>**

**Validity and Reliability**

- Internal Consistency Reliability. Only those items with item-total correlations >0.30 were retained in the final instrument. The range of correlations in the final instrument was 0.34 to 0.91. Cronbach’s alpha for sub-scales >0.70 for all but one sub-scale (First Contact-Utilization, alpha=0.64).
- Factor Analysis. Seven factors were identified, in accordance with the hypothesized conceptual model. One factor (First Contact-Accessibility) retained only four of 12 items, suggesting this concept may not be well measured by the instrument. The authors suggest that users review the appropriateness of the items from this scale before determining whether they are applicable to their particular setting of interest.
- Indirect. The adult version of the PCAT is based on the child edition, which has been previously validated.

**Further Information on Feasibility**

- The measure was reported to take approximately 40 minutes to complete in a sample of 890 U.S. patients.
- The measure developers report that the survey can be self-administered (as was the case in published use of the instrument) or completed in person or by phone with the help of an interviewer. They note that a high school reading level is required for self-administration.

**Past or Suggested Uses**

- This measure is designed and has been used for accountability purposes. The authors suggest use for research purposes, as well.

**Unit of Analysis in Past Applications**

- Payer.

**Focus on Care Coordination**

- 80 of 131 total instrument items map to a care coordination domain (61%).
- The instrument includes a sub-domain for coordination and another sub-domain for coordination related to information systems. The user guide contains information for calculating scores for each of these sub-domains, as well as for an overall primary care score.
- Although the instrument should be administered as a whole, scores for the coordination sub-domains may provide useful information in understanding the measure results most relevant to care coordination. Note that many items in other sub-domains map to care coordination domains, even if the focus of the sub-domain overall is not on coordination.

**Depth of Domain Focus**

- The PCAT-AE has at least three items for each *Atlas* activity domain or sub-domain, except: Establish Accountability (n=1); Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains); Facilitate Transitions as Coordination Needs Change (n=0); and Create a Proactive Plan of Care (n=0).

**Recommendations for Final Measure Set:**

- The Client Perceptions of Coordination Questionnaire (Measure 6) has the strongest validity and reliability, an important consideration for measurement for accountability purposes. It also offers comprehensive domain coverage and a strong focus on care coordination. Although no information is available about typical completion times, its relatively short length (31 items) suggests good feasibility. Therefore, we recommend the CPCQ for inclusion in the measure set.
- The Primary Care Assessment Tool – Adult Edition (Measure 17b) may be a useful alternative to Measure 6 for those who are interested in consistency with the Pediatric measure set, or if understanding transitions of care is of particular interest. (Measure 17b maps to the Facilitate Transitions Across Settings sub-domain, while Measure 6 does not).

**Health Care Professional Perspective**

Table C-14 summarizes the reliability and validity evidence for adult health care professional perspective measures.

**Table C-14.** Reliability and Validity Evidence for Health Care Professional Perspective Measure

	<b>Measure 17d PCAT-PE</b>
<b>Reliability</b>	
Internal Consistency	
Inter-rater	N/A
Test-retest	
<b>Validity</b>	
Factor Analysis	
Construct: Uni/bivariate	
Construct: Multivariate	
Convergent	
Content	
Indirect	+

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

Multiple entries indicate multiple tests were performed.

**Measure 17d – Primary Care Assessment Tool – Provider Edition (PCAT-PE)<sup>3-6,16</sup>****Validity and Reliability**

- Indirect. No validity or reliability testing of this version is reported, but it is very similar to the PCAT-CE, which has undergone validity and reliability testing. That testing found adequate test-retest and internal consistency reliability for all items and factor analyses identified five separate factors which correspond to the PCAT-CE instrument sub-scales. Agreement among a panel of content experts was generally good about the appropriateness and representative-ness of domains included in the PCAT-CE, on which the PCAT-PE is based.

**Further Information on Feasibility**

- The instrument includes a sub-domain for coordination and another sub-domain for coordination related to information systems. The user guide contains information for calculating scores for each of these sub-domains, as well as for an overall primary care score.
- Although the instrument should be administered as a whole, scores for the coordination sub-domains may provide useful information in understanding the measure results most relevant to care coordination. Note that many items in other sub-domains map to care coordination domains, even if the focus of the sub-domain overall is not on coordination.

**Past or Suggested Uses**

- This measure is designed for accountability purposes. It has also been used for research.

**Unit of Analysis in Past Applications**

- Physician.
- Practice.

**Focus on Care Coordination**

- 114 of 153 total instrument items map to a care coordination domain (75%).

**Depth of Domain Focus**

- The PCAT-PE has at least three items for all but five *Atlas* activity domains or sub-domains: Establish Accountability (n=0); Communicate (but  $\geq 3$  items each for Interpersonal Communication and Information Transfer sub-domains); Facilitate Transitions Across Settings (n=2); Facilitate Transitions as Coordination Needs Change (n=0); and Create a Proactive Plan of Care (n=0).

**Recommendations for Final Measure Set:**

- Only the adult primary care measure (PCAT-PE) maps to more than six *Atlas* activity domains from the health care professional perspective. This measure may be considered for quality improvement purposes, but it is important to note that only indirect evidence of validity and reliability is available for this measure, which is based on the validated PCAT-CE instrument. Given that the child and provider versions of the PCAT are designed for different users (parents of pediatric patients vs. health care providers for adults), we recommend caution in extrapolating validity and reliability information.

**System Representative Perspective**

Table C-15 summarizes the reliability and validity evidence for adult system representative perspective measures.

**Table C-15.** Comparison of Reliability and Validity Evidence for System Representative Perspective Measures

	Measure 1 ACIC	Measure 16a MHI
<b>Reliability</b>		
Internal Consistency		+
Inter-rater		+
Test-retest		
<b>Validity</b>		
Factor Analysis/PCA		
Construct Validity: Univariate or bivariate	+	+
Construct Validity: Multivariate	+++	+
Convergent Validity	+	
Content Validity		+
Indirect Evidence		

+ Test was done and evidence does not raise concerns.

- Test was done and evidence raises concerns.

+/- Indicates mixed results of testing, either in same study (some forms testing raised concerns but not all, or from multiple studies).

N/A Testing not applicable to this measure.

A blank cell indicates the test was not done.

#### Measure 1 – Assessment of Chronic Illness Care (ACIC)<sup>17-20</sup>

##### Validity and Reliability

- Construct Validity – Bivariate. The instrument was tested in 108 organizational teams implementing 13-month long quality improvement collaboratives in health care systems across the U.S. Paired t-tests were used to evaluate the sensitivity of the ACIC to detect system improvements. Testing revealed that all six subscale scores were responsive to system improvements made by care teams, as assessed by faculty raters.
- Convergent Validity. In the same study noted above, a significant positive relationship between differences in self-reported ACIC scores and a RAND measure of the presence of chronic care model components in care program implementation was found.
- Construct Validity – Multivariate. In a study of patients with type II diabetes from 20 primary care clinics in Texas, one study found that attributable risk but not absolute risk of fatal or non-fatal coronary heart disease was inversely associated with ACIC score.<sup>18</sup> Attributable risk is the excess risk estimated to be due to poor control of modifiable risk factors. A 1-point increase in ACIC score, indicating better adherence to the Chronic Care Model, was associated with a 16% relative decrease in attributable risk (95% confidence interval [CI] 5% to 26%).<sup>18</sup>
- Construct Validity – Multivariate. In a related study, the authors found that for every 1-unit increase in ACIC score patients' most recent hemoglobin A1c value decreased by 0.07 among a sample of 538 type II diabetes patients.<sup>19</sup> They reported that the relationship between ACIC score and HbA1c values was strongest among patients who did not adhere to exercise recommendations; adherence to diet recommendations did not change the relationship between ACIC and HbA1c when controlling for exercise adherence.<sup>19</sup>

- **Construct Validity – Bivariate and Multivariate.** In a large multi-specialty medical group, seventeen primary care clinics found that ACIC scores improved after implementation of the Chronic Care Model in their clinics, as did scores on composite outcomes measures assessing cholesterol (LDL) and hemoglobin A1c values among diabetic patients and assessing LDL levels and cardiac events in patients with coronary heart disease. The authors noted that although the overall ACIC score increased over the implementation period, the score for the support for self-management component did not, suggesting that changes in outcomes were not associated with improvements in self-management support. A significant change was observed post-intervention in the community linkages sub-scale of the ACIC. Correlations between sub-scales of the ACIC and the outcomes measures did not show any significant relationship between either the self-management support or community linkage sub-scales and any outcomes, however. Results were similar using multivariate regression.<sup>20</sup>

**Focus on Care Coordination**

- 25 of 34 total instrument items map to a care coordination domain (74%).

**Further Information on Feasibility**

- The measure contains 34 items.
- No information is available on typical completion times.

**Past or Suggested Uses**

- This measure has been used for quality improvement and research purposes.

**Unit of Analysis in Past Applications**

- Practice.
- Geographic region (non-U.S.)

**Depth of Domain Focus**

- The ACIC has at least three items for six *Atlas* activity domains or sub-domains. Those with <3 items are: Establish Accountability (n=2); Communicate (n=2); Interpersonal Communication (n=0); Facilitate Transitions Across Settings (n=0); Facilitate Transitions as Coordination Needs Change (n=0); and Create a Proactive Plan of Care (n=1).

**Measure 16a – Medical Home Index (MHI)<sup>9,10</sup>**

**Validity and Reliability**

- Inter-rater reliability assessment suggested acceptable reliability between assessment by outside observers (study site visitors) and practice staff (self-assessment).
- Internal consistency reliability was strong for the total score (Cronbach’s alpha >0.70).
- Content validity was assessed by experts in the medical home concept. Instrument revised following review.
- **Construct Validity – univariate or bivariate.** Practice MHI score was not correlated with family satisfaction with care. In bivariate analyses, higher overall practice MHI score (indicating better adherence to the medical home model) was significantly associated with lower hospitalization rates. No significant correlations were observed between overall score and ED visits or the ratio of primary to specialty care visits.
- **Construct Validity – multivariate.** In multivariate analyses controlling for patients’ chronic conditions, overall MHI practice score was significantly associated with hospitalization rates. Rate of emergency department (ED) visits was significantly associated with the care coordination and chronic condition management sub-domain scores, but not the overall practice MHI score. The care coordination domain was also

associated with lower hospitalization rates. No significant associations were found between overall MHI score or any sub-domain scores and the ratio of primary to specialty care visits.

**Further Information on Feasibility**

- Typical completion time for the Medical Home Index is 30-45 minutes, including time needed for both practice representatives to reach consensus.

**Past or Suggested Uses**

- This measure has been used for quality improvement and research purposes.
- Use for accountability or recognition purposes was also suggested by the measure developer, but we are not aware of any instances in which the measure has been used in this way. The reliance on self-assessment may limit the usefulness for accountability purposes.

**Unit of Analysis in Past Applications**

- Primary care practice.

**Focus on Care Coordination**

- All 25 instrument items map to an *Atlas* care coordination domain (100%).
- The instrument includes a sub-domain for care coordination which may be scored separately from the total instrument score. However, given the relevance of all items to care coordination, the total score is also highly relevant for care coordination measurement.

**Depth of Domain Focus**

- The MHI has at least three items for only five *Atlas* activity domains or sub-domains. Those with <3 items are: Establish Accountability (n=2); Interpersonal Communication (n=0, but four items for Communicate domain); Information Transfer (n=2); Facilitate Transitions Across Settings (n=2); Facilitate Transitions as Coordination Needs Change (n=1); Monitor, Follow-up and Respond to Change (n=0); and Support Self-Management Goals (n=1). This lower domain density largely reflects the brevity of the instrument, as all 25 survey items mapped to one of the framework domains.

**Recommendations for Final Measure Set:**

- If focus on care coordination is of chief interest: consider the Medical Home Index, for which all items map to a care coordination domain. Therefore, both the total score and care coordination sub-scale of the MHI are of use in care coordination assessment.
- If validity is of chief interest: consider the Assessment of Chronic Illness Care (ACIC), which has very strong evidence supporting validity, although reliability is unknown. Note that the MHI does also have evidence of validity, although not as robust as the ACIC.
- If feasibility is of chief interest: also consider the MHI, which is reported to take 30 to 45 minutes to complete and is shorter in length than the ACIC. Also note that an abbreviated version (10 items) of the MHI is available (Measure 16b), although it offers narrower domain coverage.

Appendix C: Detailed Results of Measure Selection Process

**Table C-16.** Companion Measure Options (Not for Accountability Purposes)

Health Care Professional Perspective			
	If the primary interest is...	<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
Pediatric Measure Set	Comprehensive measurement	11b	Family-Centered Care Self-Assessment Tool - Provider Version
	Consistency with the pediatric primary care accountability measure	17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
	An alternative to survey-based measurement	5	Care Coordination Measurement Tool (CCMT)
Adult Measure Set	Only one measure is available from the health care professional perspective	17d	Primary Care Assessment Tool-Provider Edition (PCAT-PE)
System Representative Perspective			
	If the primary interest is...	<i>Atlas</i> Measure #	<i>Atlas</i> Measure Title
Pediatric Measure Set	Validity/reliability	16a	Medical Home Index (MHI-LV)
	Feasibility	16a	Medical Home Index (MHI-LV)
	In-depth measurement of domains	17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
	Consistency with the pediatric accountability measure	17c	Primary Care Assessment Tool-Facility Edition (PCAT-FE)
Adult Measure Set	Focus on care coordination	16a	Medical Home Index (MHI-LV)
	Validity/reliability	1	Assessment of Chronic Illness Care (ACIC)
	Feasibility	16a	Medical Home Index (MHI-LV)

## Appendix C References

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