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Evaluation of Health Care Innovation Awards (HCIA): Primary Care Redesign Programs

Second Annual Report

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Awardee Name	Abbreviation
Atlantic General Hospital	AGH
CareFirst Blue Cross Blue Shield	CareFirst
Cooper University Hospital and Camden Coalition of Health Care Providers	CUH/CCHP
Denver Health and Hospital Authority	Denver Health
Finger Lakes Health Systems Agency	FLHSA
Foundation for California Community Colleges and the Transitions Clinic Network	TCN
Pacific Business Group on Health	PBGH
PeaceHealth Ketchikan Medical Center	PeaceHealth
Research Institute at Nationwide Children's Hospital	NCH
Rutgers Center for State Health Policy	CSHP
Sanford Health	Sanford Health
TransforMED	TransforMED
University Hospitals of Cleveland Rainbow Babies and Children’s Hospital	UHC
Wyoming Institute of Population Health at Cheyenne Regional Medical Center	WIPH

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EXECUTIVE SUMMARY

A. Introduction

In July 2012, the Center for Medicare & Medicaid Innovation (CMMI) awarded cooperative agreements to a select group of programs proposing innovative ways to improve the quality and lower the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) enrollees. This initiative, the Health Care Innovation Awards (HCIA), is a central part of CMMI's objective of finding effective and efficient ways to achieve better quality of care, improved population health, and lower costs. These programs also seek to increase and improve the performance of the health care workforce through enhanced training and education, as well as to rethink the roles and functions of different types of health care workers. CMMI subsequently classified 14 of the 107 HCIA Round 1 awards as primary care redesign (PCR) programs. Together, they represent a broad range of intervention models, target populations, organizational settings, and health care markets. Table 1 summarizes key characteristics about these 14 programs.

Table 1. PCR awardee characteristics

Awardee name	Abbreviation	Awardee location	Type of entity	Award amount
Atlantic General Hospital	AGH	Berlin, MD	Provider – hospital	$1,097,512
CareFirst Blue Cross Blue Shield	CareFirst	Baltimore, MD	Payer	$20,000,000[b]
Cooper University Hospital and the Camden Coalition of Healthcare Providers	CUH/CCHP	Camden, NJ	Provider – hospital and community health organization	$2,788,457
Denver Health and Hospital Authority	Denver Health	Denver, CO	Provider	$19,789,999
Finger Lakes Health System Agency	FLHSA	Greater Rochester area, NY	Community health planning organization	$26,584,892
Foundation for California Community Colleges and the Transitions Clinic Network	TCN	Sacramento, CA	Foundation[a]	$6,852,153
Pacific Business Group on Health	PBGH	San Francisco, CA	Nonprofit business coalition	$19,139,861
PeaceHealth Ketchikan Medical Center	PeaceHealth	Ketchikan, AK	Provider	$3,169,386
Research Institute at Nationwide Children's Hospital	NCH	Columbus, OH	Provider – hospital	$13,160,092
Rutgers Center for State Health Policy	CSHP	New Brunswick, NJ	University research department	$14,347,808
Sanford Health	Sanford Health	Sioux Falls, SD	Provider – Integrated health care system	$12,142,606

Table 1 *(continued)*

Awardee name	Abbreviation	Awardee location	Type of entity	Award amount
TransforMED	TransforMED	Leawood, KS	Nonprofit consultant	$20,750,000
University Hospitals of Cleveland Rainbow Babies & Children's Hospital	UHC	Cleveland, OH	Provider – hospitals	$12,774,935
Wyoming Institute of Population Health, a division of Cheyenne Regional Medical Center	WIPH	Cheyenne, WY	Provider – hospital-based institute	$14,246,153

Source: Mathematica analysis of program documents.

Note: Programs were implemented between August 2012 and August 2013.

[a] The foundation acts as a fiscal agent for a college and two universities.

[b] CareFirst was originally awarded $20 million to expand its PCMH program to Medicare beneficiaries in Maryland. An additional $4 million was allocated for use if CareFirst could find a partner to expand the program outside of Maryland, which did not happen.

CMMI selected Mathematica Policy Research to evaluate these PCR programs. CMMI's primary aim for the evaluation is to identify promising models or components of models that can be scaled to diverse settings and tested again among a larger sample to determine definitively whether they improve outcomes and reduce spending. Mathematica's evaluation approach examines the PCR initiatives across four key areas of inquiry: (1) effectiveness of program implementation, (2) workforce development, (3) program effects on clinicians' behavior, and (4) program effects on patients' outcomes. We are using a mixed-methods approach, essential to conducting a comprehensive and policy-relevant evaluation of the HCIA initiative, and are tailoring the components of the general approach to reflect the specific details of each of the 14 programs. Consistent with CMMI's goals, the impact evaluation is designed to identify programs, or program components, that are promising in terms of improving patient outcomes and reducing spending, not only those that definitively met these aims.

This report, the second of three planned annual evaluation reports, has three purposes: (1) to synthesize findings and draw conclusions, after two rounds of site visits and telephone calls, about the implementation experiences of the 14 PCR programs, identifying implementation barriers and facilitators and describing the determinants of effective program implementation across program settings and contexts; (2) to synthesize findings and draw preliminary conclusions from a first round of the HCIA Primary Care Clinician Survey about clinicians' experiences with the PCR initiative, including their perceptions of effects on clinicians' behavior and barriers and facilitators to implementation, across 11 PCR awardees; and (3) to present preliminary estimates of program impacts on four core and other relevant patient outcome measures, examining the impacts by type of target population for 10 PCR programs for which Medicare fee-for-service (FFS) and awardee data are available to construct relevant outcome measures. The report concludes with a brief discussion about future evaluation activities. In addition, Volume II consists of 14 individual program summaries, each as a standalone report.

B. Conclusions about implementation effectiveness

Status of implementation evaluation. The implementation evaluation results presented in this report are based on a qualitative analysis of the implementation experiences of the 14 PCR programs through the end of their three-year award periods. Six awardees (CareFirst, CUH/CCHP, FLHSA, NCH, TCN, and UHC) received full or partial no-cost extensions in the final year of their awards for up to an additional 12 months to continue providing services and/or finalizing administrative and evaluation duties. The implementation evaluation findings presented in this report do not cover awardees' experiences during the extension period.

Methods. We based our analysis on information collected through telephone interviews with program administrators and in-person interviews with clinic administrators and frontline staff at two to four sites from each awardee in spring 2014 and 2015. In most cases, we visited only a small subset of purposively selected sites and spoke only with selected staff at those sites. Therefore, our findings might not be generalizable to all HCIA-funded practices and providers. To supplement the primary data, we reviewed the self-reported quarterly program reports collected by the HCIA implementation and monitoring contractor, including program narratives, operational plans, self-measurement and monitoring plans, and Excel-based program data files.

To analyze implementation effectiveness, we used the Consolidated Framework for Implementation Research (CFIR). The CFIR methodology uses a core set of constructs based on a comprehensive and systematic review of the implementation science literature. It provides a conceptual framework and a consistent typology, terminology, and set of definitions that can be used to identify the drivers of implementation effectiveness in specific contexts and settings. Using the CFIR methodology tailored to the needs and circumstances of this study, we coded the qualitative information that we collected into three domains: (1) program characteristics, (2) implementation process, and (3) internal and external factors. In addition, we coded the information based on key operational aspects of the programs, including intervention components and protocols; identification, recruitment, assessment, and enrollment of high-risk patients; uses of data to improve patient care; and roles and responsibilities of nontraditional staff. Implementation outputs included the degree to which awardees' met their enrollment targets, the timeliness with which they implemented the core components of their programs, their ability to meet their service- and staffing-related goals, and their ability to sustain and/or expand program operations after the end of HCIA funding.

Key components of primary care transformation. All 14 PCR programs included at least one of five key program components: care coordination, care management, care transitions, patient-centered care, and health information technology (health IT) (Table 2). Awardees operationalized these components in different ways, often in combination, to meet the needs of their target populations across different settings. Activities related to program components often overlapped, and awardees adjusted and enhanced their approaches as they discovered gaps and identified opportunities to better serve participants and achieve program goals.

Table 2. Key components of primary care transformation

Innovation component	Description of component	Awardees	Number of awardees
Care coordination	Deliberate organization of patient care activities and sharing information among stakeholders involved with patients' care	AGH, CareFirst, CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PeaceHealth, TCN, UHC, WIPH	11
Care management	Interaction with patients directly to assist them in managing their medical, social, and mental health conditions more effectively	AGH, CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PBGH, PeaceHealth, TCN, UHC	10
Care transitions	Customized planning to ensure the coordination and continuity of care as patients transfer between settings, such as from the hospital to home	AGH, CareFirst, CUH/CCHP, Denver Health, FLHSA, NCH, PeaceHealth, UHC, WIPH	9
Patient-centered care	Care that responds to patients' needs, desires, and abilities and ensures that patients' values guide clinical decisions	AGH, CareFirst, Denver Health, FLHSA, NCH, Sanford Health, WIPH	7
Health IT	Development, deployment, or enhancement of health information systems to improve coordination and management of patients' care	Denver Health, NCH, Sanford Health, TransforMED, UHC, WIPH	6

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March–May 2015.

Note: The total number of awardees for each component differs from that shown in the first annual report. In this report, we applied the revised definitions to identify the key components of each awardee's program based on a deeper understanding of each awardee's implementation activities.

Strategies for identifying high-risk patients. High-risk patients, including those with chronic conditions or high utilization, are a priority subgroup for many awardees. Program impacts among this group often are expected to be concentrated in three key domains: (1) quality-of-care outcomes, (2) service use, and (3) spending. Four of the 14 PCR awardees—CSHP, CUH/CCHP, NCH, and TCN—targeted *only* high-risk patients for their programs (and therefore screened for severity *before* enrollment), while the other 10 awardees either attributed or enrolled a broader sample of patients, then used identification strategies to target a high-risk subgroup for the program or program component(s). Awardees used data-based strategies to identify these patients (Table 3).

Table 3. Strategies for identifying high-risk patients

Identification strategy	Description of identification strategy	Awardees	Number of awardees
Claims-based algorithms	Used claims-based algorithm to target high-cost or high-utilizer patients, most often using Medicare FFS claims	CareFirst, Denver Health, PeaceHealth, PBGH, TransforMED	5
Referrals	Incorporated use of referrals for patients who might be appropriate for intervention services, either exclusively or to supplement other risk identification strategies	CareFirst, FLHSA, PBGH, UHC, WIPH,	5
Review of discharge data or hospital records	Reviewed hospital system discharge, admission, or emergency department records to identify high-risk patients or potentially eligible participants, often those with recent hospitalizations.	CUH/CCHP, UHC, WIPH	3
Health assessments	Used assessment or screening tools to identify high-risk participants, which involved collecting data directly from participants or their medical records	AGH, FLHSA, Sanford Health	3
Varied criteria across sites	Applied different criteria across participating practices, including screening tools, medical record review, and provider or patient self-referrals	FLHSA, TransforMED	2

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March–May 2015.

Strategies for using data to improve care. All awardees acknowledged the importance of actively using data to guide quality improvement, and adopting strategies to generate access to information that would facilitate care decisions and support program implementation. Data sources included insurance claims, custom data reporting tools, internal documentation, and medical records, which were analyzed to generate results and reports to prepare for scheduled visits, identify gaps in care, and improve population health management, depending on the awardee (Table 4).

Table 4. Strategies for using data to improve patient care

Data strategy	Description of data strategy	Awardees	Number of Awardees
Identifying gaps in care	Using patient data, commonly electronic health records, to identify missed appointments, gaps in care, or clinical indicators for patients with chronic conditions	AGH, CareFirst, FLHSA, PeaceHealth, Sanford Health, TransforMED, WIPH	7
Improving population health management	Using administrative or health registry data for broader population health management to identify patients who would benefit from medical care	CareFirst, CUH/CCHP, FLHSA, Sanford Health, TCN, TransforMED, UHC	7
Preparing for scheduled visits	Using medical records to deliberately plan for scheduled patient visits through daily or weekly team-based process activities, such as scrub and huddle	Denver Health, FLHSA, PeaceHealth, Sanford Health, WIPH	5

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March–May 2015.

Nonclinicians' roles in primary care. To try to make primary care services more accessible, efficient, and effective, all 14 PCR awardees incorporated new staff roles and positions into their programs. These roles can include providing services historically performed by clinicians (such as identification of preventive and chronic care needs or care coordination) or services typically absent from current health care settings (such as care navigation and peer-to-peer support). Nonclinicians' roles can be filled by a wide variety of licensed health care professionals, such as registered nurses and licensed clinical social workers, as well as unlicensed health care personnel, such as medical assistants and community health workers. However, the 14 PCR awardees varied greatly in how they defined and staffed these roles, and in the educational and training requirements for these positions. Nearly all awardees reported challenges integrating these new roles, including garnering providers' buy-in, defining nonclinicians' roles and duties, and developing program and workplace policies that supported the integration of new roles into existing settings.

Evidence of implementation effectiveness. Awardees collected a wide range of implementation effectiveness measures, including those related to program enrollment, service provision, staffing, and timeliness; these data were self-reported by the awardees and unverified by CMS or its contractors. Differences in how awardees enrolled patients and reported service- and staff-related metrics, and the lack of consistent targets or meaningful benchmarks, make comparisons across awardees difficult.

Four awardees met or exceeded their patient enrollment goals and three others reached more than 80 percent of their enrollment targets. More programs that actively enrolled patients met their enrollment targets compared with programs using passive enrollment processes (in passive processes, there was no formal enrollment process, although patients might have received HCIA-funded services or benefited from HCIA investments, such as EHR systems or training). Among all awardees, the UHC complex care program was the furthest from reaching its enrollment target, enrolling 34 percent of its expected target. This program used a narrow set of criteria to identify patients eligible for the program, and program staff reported that they limited program enrollment after realizing how much time was required to provide services to participants. Common challenges to meeting enrollment targets included implementation delays, lack of staff capacity, and patient recruitment problems. Implementation delays included delays in hiring key staff, defining patient care protocols, long wait times for institutional review board approval, and struggles in negotiating contracts with Medicaid MCOs.

Of the 10 awardees that reported program staffing goals, 8 met or exceeded their goals and the other 2 came close. However, most awardees cited the recruitment and retention of intervention staff as a challenge. Staffing challenges varied by awardee and included staff burnout caused by the emotionally intense nature of some new positions, lack of program resources to adequately support program operations, contractual issues within the awardee organization related to hiring, lack of qualified staff interested in working with providers located in rural or isolated communities, or loss of newly trained personnel seeking other opportunities or pursuing a higher medical education degree. Only 4 awardees set training targets and all 4 either met or nearly met their training goals.

Most awardees implemented their programs (or most components of their programs) on schedule or with minor delays. Flexibility in program operations and prior experience facilitated implementing program components on schedule. Common reasons for implementation delays included disruptions caused by the adoption of new EHR systems or modules, problems recruiting program staff, difficulty negotiating new payment models with plans and payers, and difficulty obtaining timely data for patient recruitment and screening.

Factors associated with effective program implementation. In our analysis, we identified the factors in each CFIR domain that were most closely associated with implementation effectiveness (Table 5). We identified these factors by coding each program individually, then aggregating the individually identified constructs across the 14 awardees. Although the table summarizes the most commonly cited facilitators and barriers to implementation effectiveness, these factors do not apply to all programs and should not be considered an exhaustive list of individual awardee experiences. Next, we briefly discuss each factor by domain.

Table 5. Summary of key determinants of PCR implementation success

Domain	Factor	Description of factor
Program characteristics	Adaptability	The program can be adapted or tailored to meet the needs of the local setting.
	User control	Frontline staff are empowered to address implementation challenges on their own and modify how program components are applied.
	Perceived relative advantage	Stakeholders perceive advantages of implementing the program versus an alternate solution or the standard delivery of care.
Implementation process	Staff engagement	Involves attracting and including appropriate people in the implementation and use of the intervention.
	Stakeholder engagement	Involves attracting people not directly staffed on the program, but important for successful program implementation.
	Self-monitoring	Reflecting and evaluating using quantitative and qualitative feedback about the progress and quality of the implementation.
Internal and external environment	Team characteristics	The extent to which those responsible for and affected by implementation communicate and collaborate effectively.
	Leadership	The extent to which organization and practice leaders who are not directing the program affect implementation through support and leadership style.
	Health IT	The extent to which internal technological infrastructure/capacity and external technological trends influenced implementation of the program.
	Patients' needs and resources	The extent to which the needs and preferences of the target patient population affect implementation.

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March–May 2015.

- **Program characteristics.** The characteristics of the intervention an organization is implementing, including the core design elements and adaptable peripheral elements, can have a significant effect on implementation effectiveness. Three program characteristics emerged as important drivers of implementation success among PCR awardees. First, the

adaptability of program components to the local context is critical to overcoming implementation challenges and maximizing implementation effectiveness. Three principal adaptations related to (1) eligibility requirements, identification, and enrollment of program participants; (2) staff roles and responsibilities; and (3) patient-centeredness. Second, giving frontline staff control over how they implement the intervention to meet an individual patient's needs, define staff roles and practice workflows, and address implementation challenges was also an important facilitator in implementing PCR programs. Frontline staff most often tailored interventions in response to participants' needs or challenges unique to the practice setting. Third, the perceived relative advantage of PCR models over traditional delivery systems for primary care helped overcome frontline staff's resistance to adopting new practices and increased their motivation to implement these programs. The most prominent perceived relative advantages of PCR programs were fulfilling previously unmet needs for specific populations and using health IT and new care team members to streamline clinical processes.

- **Implementation process.** Among the 14 PCR awardees, we identified three common process-related factors that emerged as important for program implementation in both assessment years. The first factor was staff engagement: awardees engaged staff by integrating nonclinical staff into existing clinical practice and building capacity to facilitate program implementation. Some awardees also experienced challenges initiating or maintaining engagement among clinical and nonclinical staff because it was difficult to integrate new staff or engage busy clinicians. The second factor was stakeholder engagement: awardees engaged other stakeholders, both external and internal to the programs, to facilitate implementation. Some awardees also faced challenges engaging other stakeholders who did not have direct involvement in the program, or when program partners experienced turnover among their staff. The third factor was self-monitoring: awardees collected and reported self-monitoring metrics to guide program improvements, although they also experienced challenges related to data availability and quality.
- **Internal and external environment.** The characteristics of the organization implementing a program and the features of the environmental context within which an organization operates can facilitate or impede program implementation. Effective teamwork, as evidenced by strong communication and collaboration among team members, was the most widely mentioned internal facilitator. Active support from practice, organization, and corporate leaders was critical to successful program implementation as well. Practice and organization leaders supported program implementation by engaging staff and fostering staff morale, contributing care coordination and care management expertise, ensuring consistency of intervention activities across settings, empowering staff to seek ways to improve program quality, and encouraging team communication. The most common impediments to implementation effectiveness were health IT and the challenges of serving high-risk patient populations. Health IT showed great promise, but was often difficult to implement or did not have needed functionality and interconnectivity across practices, causing the need for time-consuming manual data extraction or use of paper-based data systems. Programs also struggled to meet the complex medical and social needs of many target populations, even when they were designed to do so. Staff in several programs encountered challenges in delivering care to participants with multiple chronic diseases and serious social needs.

Sustainability of innovative models. Nearly all the awardees (12 of 14) planned to sustain at least one or more program activities beyond the HCIA funding period (Table 6). Strategies for continuing or expanding program activities included (1) planning for sustainability at the beginning and throughout the award, (2) integrating activities into existing programs or departments, (3) leveraging new payment models, (4) using new opportunities to bill for FFS-covered services, and (5) developing partnerships and other mechanisms for sustainability. Providers' commitment to changes in care delivery and the challenge of transitioning to newer payment models also influenced sustainability. Several awardees noted that efforts to sustain award-funded activities would be driven in large part by a culture change among providers, including enthusiasm for the changes in care that occurred during the award and an increased focus on high quality, high-value care. Many awardees expected to continue to face significant challenges in transitioning from older FFS-based payment models to newer quality-, cost-, or value-based models, particularly when payers resist moving to newer payment models.

Table 6. Sustainment plans for HCIA PCR award activities

Sustainment plans	Awardees	Number of awardees
All program activities with no or minor changes	CUH/CCHP, TCN	2
Some program activities with no or minor changes	AGH, Denver Health, FLHSA, NCH, Sanford Health, UHC, WIPH	7
Some program activities with significant changes	CSHP, NCH, PBGH, TransforMED, UHC, WIPH	6
Discontinue specific program activities	Denver Health, Sanford Health, UHC, WIPH	4
Unclear for some program activities	AGH, Denver Health, FLHSA, Sanford Health, UHC, WIPH	6
Unclear for all program activities	CareFirst, PeaceHealth	2

Source: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March–May 2015.

Note: An awardee can adopt multiple sustainment plans.

C. Clinician attitudes and behavior

Status of analyses. Findings from a selected number of questions from the HCIA Primary Care Redesign Clinician Survey focused on familiarity with and attitudes toward the HCIA award are presented in this synthesis report. Full survey findings for each awardee are presented in the individual program summaries in Volume II. The findings about clinician attitudes and behavior presented in this report come from the first round of the HCIA PCR Clinician Survey for 11 of the 14 HCIA-PCR awardees: CareFirst, CSHP, CUH/CCHP, Denver Health, FLHSA, PBGH, Sanford Health, TCN, TransforMED, UHC, and WIPH. Although the survey also was administered to clinicians from AGH and PeaceHealth, data from these clinicians are not reported here due to the small number of respondents, as required by CMS. Clinicians at NCH were not surveyed because the HCIA program implemented there did not involve primary care clinicians.

Methods. Survey items were drawn from previously validated instruments such as the Maslach Burnout Inventory, Medical Home Builder, Safety Climate Survey, and the Minimizing Error, Maximizing Outcome survey. New content was developed based on initial telephone calls with awardees and implementation team feedback. The survey instrument was pre-tested and reviewed by awardees and CMMI before fielding. The sample consisted of all clinicians, including physicians, nurse practitioners, and physician assistants, at the 13 awardees named above. The survey was administered from September 15 to December 30, 2014 via the internet, with hard-copy mailings for all nonrespondents. Clinicians received a $100 prepaid check as an incentive for participation. We achieved an overall response rate of 64 percent.

For the 11 awardees with enough clinicians, we analyzed data on clinicians' familiarity with the HCIA program, receipt of training, perceptions of barriers and facilitators to program implementation, and perceived effects on patient care. Due to the structure of their HCIA program, clinicians associated with two awardees (CSHP and CUH/CCHP) were not asked the survey questions on receipt of training and barriers and facilitators to implementation.

Preliminary findings about clinician attitudes and beliefs. Findings about clinician attitudes and beliefs reported here for 11 awardees are preliminary; future analysis of a follow-up survey, conducted in 2015, will provide further understanding about facilitators and barriers to implementation and program effects. Future work also is expected to provide insight about how clinicians' perceptions change as the programs mature (and the HCIA funding ends).

- More than half of responding clinicians from 10 of the 11 PCR programs surveyed were somewhat or very familiar with the HCIA initiative being implemented; PBGH is the only program where most responding clinicians (65 percent) were unfamiliar with the initiative. Clinicians responding that they were very familiar with the program ranged from 9 percent (PBGH) to 76 percent (TCN). Some awardees that directly employ clinicians, like Denver Health and Sanford Health, had high levels of clinician familiarity with the HCIA program, although we also see high levels of familiarity at awardees that do not directly employ all the clinicians that participate in their PCR programs, including CareFirst, FLHSA, UHC, and WIPH.
- When asked about factors that affect implementation (such as program time commitment and availability of personnel), clinicians across programs were the most positive about the effect of program personnel (both new and existing staff) on implementation success, and most negative about the amount of time and documentation required. The percentage of clinicians rating the impact of personnel availability on program implementation as positive or very positive ranged from 22 percent (WIPH) to 79 percent (TCN). Across awardees, many clinicians either were neutral about, or negatively rated, the amount of time and the amount of documentation the program required. For example, at least one-third of clinicians at five awardees (FLHSA, Sanford Health, TransforMED, UHC, and WIPH) rated the amount of time required as having a negative impact on implementation, and, except for UHC, at least one in five clinicians across these same awardees gave this same negative rating to the amount of documentation the new programs required.

- When asked about the availability of community resources, relevant patient information, evidence-based clinical information at the point of care, and use of health IT to support implementation, clinicians were most positive about the availability of community resources and relevant patient information, and least positive about evidence-based clinical information at the point of care and the use of health IT. Across awardees, perceptions of positive or very positive effects about the availability of community resources ranged from 30 percent (WIPH) to 64 percent (FLHSA). More than half of clinicians associated with five awardees—CareFirst, Denver Health, FLHSA, PBGH, and UHC—rated the availability of community resources as having a positive or very positive effect on program implementation, and nearly half of clinicians at Sanford Health also positively rated this factor. Many clinicians also were positive about the effect of having patient information available at the point of care; across awardees, perceptions of positive or very positive effects ranged from 41 percent at Denver Health to 69 percent at TCN. Positive ratings on required use of health IT ranged from 29 percent at Denver Health to 49 percent at CareFirst; neutral ratings on required use of health IT ranged from 20 percent at PBGH to 35 percent at UHC.
- When asked about the quality of communications among team members, clinicians had the most positive ratings about the quality of communications with other allied health professionals, and fewer positive views on the quality of communications with other primary care providers and specialists. Exceptions here included UHC, where clinicians rated the quality of communications with specialists slightly more positively than communications with allied health professionals (54 percent compared to 49 percent); Sanford Health, where positive views of communications with allied health professionals and primary care providers received the same positive rating (51 percent); and WIPH, where more clinicians positively rated communications with primary care providers (32 percent) and specialists (27 percent) than communications with other allied health professionals (24 percent). At TCN, 88 percent of responding clinicians reported that the quality of their communications with allied health professionals had a positive or very positive impact on program implementation. This was the highest positive percentage seen on any of the communication measures the survey asked about.
- Most clinicians from eight awardees—CareFirst, CUH/CCHP, Denver Health, FLHSA, PBGH, Sanford Health, TCN, and UHC—had positive perceptions of the programs' effect on quality of care. TransforMED and WIPH were the only awardees where fewer than half of clinician respondents rated program effects on quality of care positively; at both programs, nearly a third of clinicians responded that it was too soon to tell program effects on quality of care.
- Across awardees, more than half of clinicians reported positive effects of the HCIA program on the patient centeredness of the care they provided. The percentage of clinicians reporting a positive impact on patient centeredness ranged from 51 percent (UHC) to 94 percent (TCN). About one-fifth to one-quarter of clinicians at PBGH, TransforMED, and WIPH responded that it was too soon to tell the impact on patient centeredness.
- Compared to the other measures of patient care, clinicians were less positive about program effects on efficiency, equity, and safety, although there were exceptions. Exceptions

included TCN, where most clinicians responding rated all of these measures positively, and CUH/CCHP, where nearly three-quarters of clinicians reported a positive effect on equity (small samples sizes prevented responses from CUH/CCHP clinicians on the other two measures). Positive ratings on efficiency and equity hovered between 30 and 40 percent for most awardees. Across these three measures, the survey found more positive effects reported on safety issues, with more than 40 percent of clinicians at most awardees positively rating program implementation effects on safety.

D. Program impacts on patient outcomes

This section summarizes our findings about the impacts of the HCIA-PCR programs on patients' outcomes. Our conclusions about program impacts are preliminary for two reasons. First, we examine outcomes only for Medicare FFS beneficiaries through December 2014 or January 2015 (depending on the awardee), although the programs operated at least through June 2015 and, for some programs, the largest effects were expected in the later months. Second, the analyses do not yet include Medicaid data (due to limitations of available data) and we might, in the future, include Medicaid beneficiaries for some awardees if the data become available.

Status of analyses. We present quantitative results in this report for 10 of the 14 HCIA-PCR awardees: AGH, CareFirst, CSHP, CUH/CCHP, Denver Health, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH. Some of these awardees used their HCIAs to fund multiple distinct program components. For AGH, we present results only for the awardee's care transitions program. For WIPH, we present results only for the patient-centered medical home (PCMH) component but not for the transitional care component, which we will evaluate in future reports. For the remaining four awardees (NCH, PBGH, TCN, and UHC), we do not present any quantitative results because the needed data are not yet available; for one awardee (TCN) a rigorous impact evaluation is not possible within the constraints of existing data.

Among the 10 awardees with quantitative results, we present preliminary conclusions about program impacts on Medicare FFS beneficiaries for 7 of them (all except CUH/CCHP, Denver Health, and WIPH-PCMH). For the three awardees for which we have conducted quantitative analyses but have not yet drawn conclusions, we present information on the treatment group. Drawing conclusions about program impacts is premature for these awardees because (1) the current samples sizes are too small (CUH/CCHP); or (2) further sensitivity tests are needed to validate the models used for impact estimation (Denver Health and WIPH-PCMH).

Methods. We assess program impacts in three domains: (1) quality-of-care outcomes, (2) service use, and (3) spending. We use a core approach for estimating impacts that we tailored to the individual awardee. This core approach estimates impacts as the difference in outcomes for beneficiaries in a treatment group that received the program intervention and outcomes for matched comparison beneficiaries who are similar to the treatment beneficiaries but did not receive HCIA-funded services. For most awardees, we implemented a "difference-in-differences" model that estimates impacts as the regression-adjusted differences in outcomes between a treatment and comparison group during the intervention period minus the regression-adjusted difference in outcomes between a separately defined treatment and comparison group during a pre-intervention period. For the few awardees where this approach was not possible, we

used a "contemporaneous differences" model that estimated impacts as the difference in outcomes between the treatment and comparison group during the intervention period only, controlling for beneficiary characteristics at baseline (including baseline of study outcomes like all-cause inpatient admissions). The regression models accounted for the clustering of outcomes at the level at which treatment was assigned (for example, clustering at the primary care practice level if whole practices received the intervention) when determining the statistical precision of the impact estimates.

For each awardee, we also prespecified a limited number of primary tests—that is, the tests for which we (informed by the awardee) most strongly expected to find evidence of impacts if the program was indeed effective. We drew conclusions about impacts in each evaluation domain based on the results of these primary tests, as well as secondary tests (robustness and model checks) and the consistency of the impact findings with implementation evidence.

For six programs that served whole practices (CareFirst, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH-PCMH), we matched treatment practices to comparison practices, and defined the treatment and comparison groups to be all Medicare FFS beneficiaries served by these practices during four baseline quarters before the practices joined the intervention and up to eight intervention quarters after they joined. For the others (AGH, CSHP, CUH/CCHP, and Denver Health), the treatment group consists of individual people that we or the awardees identified as meeting program eligibility criteria, and the comparison group consists of Medicare FFS beneficiaries we matched to these treatment beneficiaries.

Characteristics of the treatment groups. In this section, we describe the size and characteristics of the treatment group at the start of the intervention. For the six programs where we matched practices, this means the characteristics of the beneficiaries assigned to the treatment practices before the practices joined the intervention. For the other awardees, this means the characteristics of the treatment beneficiaries when they first entered into the treatment group, which is either when they enrolled in the program (CSHP, CUH/CCHP) or when they first met program eligibility criteria (AGH, Denver Health).

The 10 awardees varied in the populations they targeted for services, which is reflected in differences in the sizes and characteristics of the treatment groups at the start of the intervention.

- Seven of the awardees (CareFirst, Denver Health, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH-PCMH) targeted all or many of the beneficiaries served by practices, panels, or health systems participating in the intervention. For these awardees, the samples sizes were relatively large (median sample size of 10,968 across the seven awardees), and the beneficiaries had hospitalization rates that were near the Medicare national average. Two of these awardees specifically enrolled practices that served low-income beneficiaries, as reflected in a large proportion of treatment group members who are dually enrolled in Medicare and Medicaid. CareFirst targeted services to the high-risk subset of the participating practices' patients. Accordingly, the hospitalization rate for their treatment group was about twice the national average.

- Two of the awardees (CSHP and CUH/CCHP) targeted beneficiaries who frequently use acute care facilities (hospitals or emergency departments) and have complex medical and social needs. The treatment groups for these awardees had hospitalizations rates in the year before enrollment that were 13 times national averages, and the percentage of beneficiaries dually enrolled in Medicare and Medicaid was two to three times the national averages. The samples sizes were small (115 for CSHP and 21 for CUH/CCHP), in part because these programs provided intensive care management services and so were resource-constrained in the number of people they could enroll (and also in part because they serve many Medicaid beneficiaries who, due to data availability, could not be included in the current treatment group).
- One awardee (AGH) targeted beneficiaries recently discharged from the hospital and who saw AGH primary care providers, but did not require beneficiaries to meet any further high-risk criteria. The beneficiaries had a very high hospitalization rate in the 3 months leading up to enrollment (because a recent admission was a required for program eligibility) but rates in the preceding 4 to 12 months that were near the national averages.

Preliminary conclusions about program impacts. As discussed, conclusions about program impacts in this report are preliminary because we have not yet analyzed Medicare FFS data beyond December 2014 or January 2015 (depending on the awardee) and because, in the future, we might choose to analyze Medicaid data or assess impacts on additional outcomes for some awardees. Nevertheless, we present preliminary conclusions about impacts for seven awardees:

- We find **statistically significant favorable impacts** (the highest level of evidence in our impact evaluation framework) on both service use and spending for one awardee, AGH (with an indeterminate impact on quality-of-care outcomes).
- We find a **statistically significant favorable impact** on service use for an additional awardee, TransforMED. We have not assessed impacts on quality-of-care outcomes or spending for this awardee because it did not anticipate impacts on outcomes in the quality-of-care domain and data are not yet available to cover the primary test period for spending.
- We find a **substantively large** (but not statistically significant) **favorable impact** on quality-of-care outcomes for the awardee PeaceHealth (and indeterminate impacts for that awardee in the other two evaluation domains). This means that the estimated impact for the quality-of-care outcomes domain was favorable and larger than a substantive threshold that we pre-specified based on the awardees' expected impacts (see section IV.C). The lack of statistical significance could be due to small sample sizes and, by extension, insufficient statistical power to detect effects. Conversely, the large favorable difference could also be due to chance (given the small sample sizes). For this reason, we consider substantively large favorable impacts to be a lower level of evidence than statistically significant favorable effects.
- We find a **substantively large but not statistically significant favorable impact** for CSHP on quality-of-care outcomes but a substantively large *unfavorable* impact on spending (and indeterminate impacts on service use). We are unable to say whether this unfavorable impact

estimate is statistically significant because, in consultation with CMMI, we decided to conduct one-sided statistical tests that test only for favorable effects. (This approach improves the ability to detect true favorable effects but means that the statistical significance of unfavorable impact estimates cannot be assessed).

- For the remaining three awardees for which we drew preliminary conclusions—CareFirst, FLHSA, and Sanford Health—we find indeterminate impacts in all domains. For CareFirst and Sanford Health, we have good statistical power to detect impacts on service use, so the lack of estimated impacts most likely means the programs did not have a substantive effect on the outcomes in this domain during the time period analyzed.

Characteristics of programs with favorable impact estimates. We find favorable impacts for several noteworthy characteristics of the HCIA-PCR programs, although it is premature to speculate *why* some programs were effective at this stage and others were not based on preliminary conclusions for just seven awardees. Most important, from the analysis completed so far, we find favorable impacts among a diverse group of programs and program components. The four programs for which we find evidence of impacts span different intervention types within the PCR award portfolio:

- The TransforMED program focused almost exclusively on health IT, providing population management software and cost reporting software to 90 practices in 15 states.
- The PeaceHealth program targeted just two practices in rural Alaska, but provided sweeping services, including (1) enhanced preventive care, (2) short-term care management for patients with a temporary medical or social hurdle, (3) long-term care management for patients with specific chronic conditions, and (4) transitional care for people discharged from the PeaceHealth hospital.
- The CSHP identified people with multiple complex medical and social needs, especially those with frequent inpatient services, and provided intensive care management via mobile care teams made up of nurses, social workers, behavioral health specialists, and others.
- The AGH program component we evaluated is a dedicated transitional care program for people discharged from the hospital.

These results suggest there is no single blueprint for a successful program to improve patient outcomes or decrease spending in primary care.

E. Next steps

Rigorous evaluation of the PCR programs is essential to understanding whether the tested interventions achieve HCIA's goals. Because findings about program effects on patients presented in this report are preliminary, it is premature to draw conclusions across the three core evaluation components (implementation effectiveness, program effects on clinicians' behavior and trainees' experiences with the program, and program impacts on patients' outcomes). We plan to present these conclusions in the evaluation's third annual report, which will synthesize and integrate the themes that emerged across these three evaluation components. To draw those

cross-cutting conclusions, data acquisition and analysis will be reported as an addendum to the third annual report.

I. INTRODUCTION

A. Background and purpose of the Health Care Innovation Awards

In July 2012, the Center for Medicare & Medicaid Innovation (CMMI) awarded cooperative agreements ranging from $1 million to $30 million to 107 programs that proposed a wide range of innovations designed to improve the quality and lower the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) enrollees. This initiative, part of the first round of the Health Care Innovation Awards (HCIA), requires organizations to build new models of care delivery and payment, and then to test whether broadening that experience to other patients, providers, or settings yields the desired improvements and efficiencies in delivering health care. The HCIA programs complement other initiatives that CMMI is testing to meet its overall objective of finding effective and efficient ways to achieve better quality of care, improved population health, and lower costs. These programs also seek to increase and improve the performance of the health care workforce through enhanced training and education, as well as to rethink the roles and functions of different types of health care workers.

Of the 107 Round 1 HCIA awards, 14 have been designated as primary care redesign (PCR) programs; together, they represent a broad range of intervention models, target populations, organizational settings, and health care markets.[1] CMMI selected Mathematica Policy Research to evaluate these PCR programs. CMMI's primary aim for the evaluation is to identify promising models that can be scaled to diverse settings and tested again among a larger sample to determine definitively whether they improve outcomes and reduce spending.

B. Evaluation goals and purpose of this report

The evaluation will assess whether and how the 14 programs are redesigning primary care and improving the coordination, efficiency, and quality of patients' care. To that end, evaluators are pursuing several goals to answer the key research questions:

- **Understanding the development, implementation, and reach of programs** and how they vary across awardees and over time
- **Describing workforce development and training programs** and their effects on enhanced duties, recruitment, job creation, and job satisfaction
- **Describing providers' experiences in the programs,** including their perceptions of changes in access to and coordination and patient-centeredness of primary care

[1] In May and July 2014, CMMI announced the second round of the HCIA awards. Round 2 funded an additional 39 awardees, which are organized into three groups of 13 models each: (1) models for specialty care and older populations, (2) models for younger and specialized needs populations, and (3) models for community-based care. These are being evaluated separately from the HCIA Round 1 awardees.

- **Estimating the impact of programs on patients' health, health care utilization, and expenditures,** and investigating differential effects across key subgroups
- **Explaining the relationships among program and beneficiary characteristics, delivery systems change, and observed outcomes,** as well as potential spillover effects and unintended consequences for other patients and providers

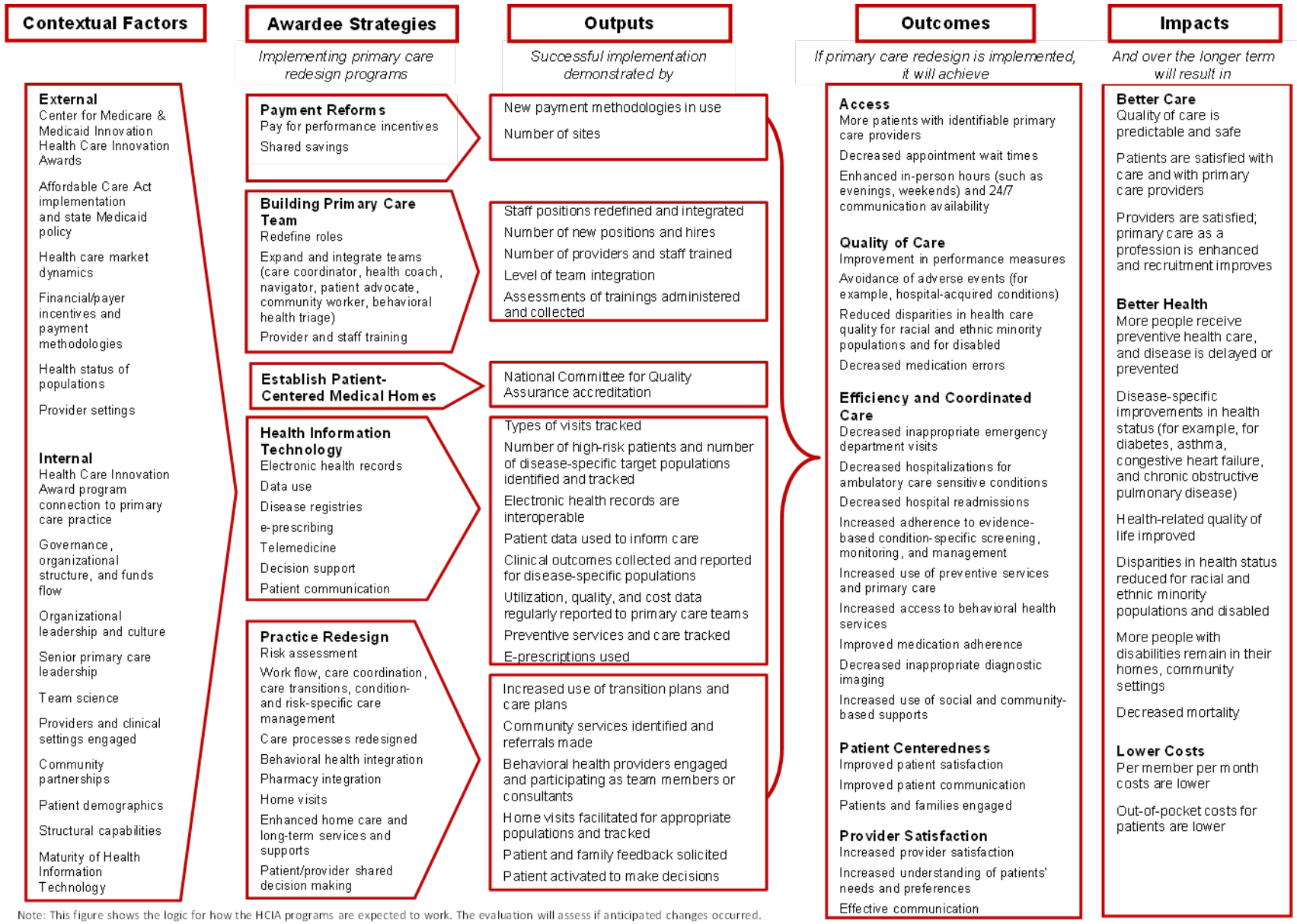
Mathematica's evaluation approach examines the PCR initiatives across four key areas of inquiry: (1) effectiveness of program implementation, (2) workforce development, (3) program effects on clinicians' behavior, and (4) program effects on patients' outcomes. We are using a mixed-methods approach, essential to conducting a comprehensive and policy-relevant evaluation of the HCIA initiative, and are tailoring the components of the general approach to reflect the specific details of each of the 14 programs. This approach addresses the complexity of the PCR programs and ensures that the analyses of impacts on patients' outcomes and implementation effectiveness feed into each other using techniques such as triangulation. We are using multiple data sources—such as program documents, implementation telephone calls and site visits, quarterly monitoring reports, clinician and trainee surveys, and Medicare and Medicaid claims data—to conduct analyses. Consistent with CMMI's goals, the impact evaluation is designed to identify programs that are promising in terms of improving patient outcomes and reducing spending, not only those that definitively met these aims.

This report, the second in a series of three planned annual evaluation reports, has three purposes: (1) to synthesize findings and draw conclusions, after two rounds of site visits and telephone calls, about the implementation experiences of the 14 PCR programs, identifying implementation barriers and facilitators and describing the determinants of effective program implementation across program settings and contexts; (2) to synthesize findings and draw preliminary conclusions from a first round of the HCIA Primary Care Redesign Clinician Survey about clinicians' experiences with the PCR initiative, including their perceptions of effects on clinicians' behavior and barriers and facilitators to implementation, across 11 PCR awardees; and (3) to present preliminary estimates of program impacts on four core and other relevant patient outcome measures, examining the impacts by type of target population for 10 PCR programs for which Medicare fee-for-service (FFS) and awardee data are available to construct relevant outcome measures. The report concludes with a brief discussion about future evaluation activities.

C. Evaluation framework

Figure I.1 shows the logic model we developed for the HCIA PCR programs. It depicts the range of outputs, outcomes, and potential impacts after the awardees employ one or more of five strategies for promoting PCR. The immediate short-term result or output of the strategies is to directly augment or redesign one or more features of primary care. The resulting successful PCR is expected to yield a variety of short-term outcomes related to access, quality, efficiency and

Figure I.1. Logic model for Health Care Innovation Awards (HCIA) Primary Care Redesign (PCR) programs



Note: This figure shows the logic for how the HCIA programs are expected to work. The evaluation will assess if anticipated changes occurred.

coordination, patient-centeredness, and provider satisfaction. Over the longer term, positive impacts achieved can support scalability and sustainability of the programs. Although the logic model describes a range of potential program effects and outcomes, our impact evaluation focuses on a subset of key outcome measures (see Chapter IV.C).

As of this writing, the implementation analysis, focused on the outputs shown in the center of the figure, is complete; final findings are described for the first time in this report. Evaluation activities related to effects on workforce development, clinician behavior, and patients are ongoing. For example, the analysis of the first round of the HCIA Primary Care Redesign Clinician Survey—which examines questions about outcomes related to providers' training, behavior, and satisfaction—is complete. However, data from the second round of the HCIA Primary Care Redesign Clinician Survey and the workforce trainee survey, which is a separate data collection effort that will provide insights into the effectiveness of workforce development, have been collected but not yet analyzed; the third annual report will chronicle these data. Finally, the impact analysis reports findings for 10 programs (or, in some cases, a component of the program), but only for Medicare FFS beneficiaries and only through December 31, 2014. For one program, complete awardee data were not available to conduct an impact analysis in time for this report; for two programs, administrative claims data are not yet available to calculate outcomes; and for one other program, the impact evaluation will not be conducted for reasons explained later. It is premature to compare across awardees to identify programs, or program features, associated with favorable impacts. Given that the three core evaluation components are at different stages of completion, it is also premature to draw conclusions across these various evaluation components; the third annual report will present crosscutting conclusions.

D. Road map for this report

Chapter II provides an overview of the 14 PCR awards, describing important awardee, program, and intervention characteristics. In Chapter III, we summarize the data and methods used in each of three evaluation components, as well as limitations of the analyses. Chapter IV summarizes findings and conclusions about each of the three evaluation components: implementation effectiveness, program effects on clinicians' behavior, and impacts on patients' outcomes. The report concludes by reviewing plans for future evaluation activities (Chapter V). Three technical appendices provide more comprehensive information about the methods used to assess program impacts.

In addition, Volume II consists of 14 individual program summaries, each as a standalone report. For each awardee, these summaries describe and synthesize the findings to date on implementation experiences, effects on clinicians' behavior, and impacts on patients' outcomes, along with a detailed summary of the methods and specifications for the impact analysis. As in the case of Volume I, described above, the same three technical appendices provide more comprehensive information about the methods used to assess program impacts. However, those appendices appear only once after the WIPH's program summary.

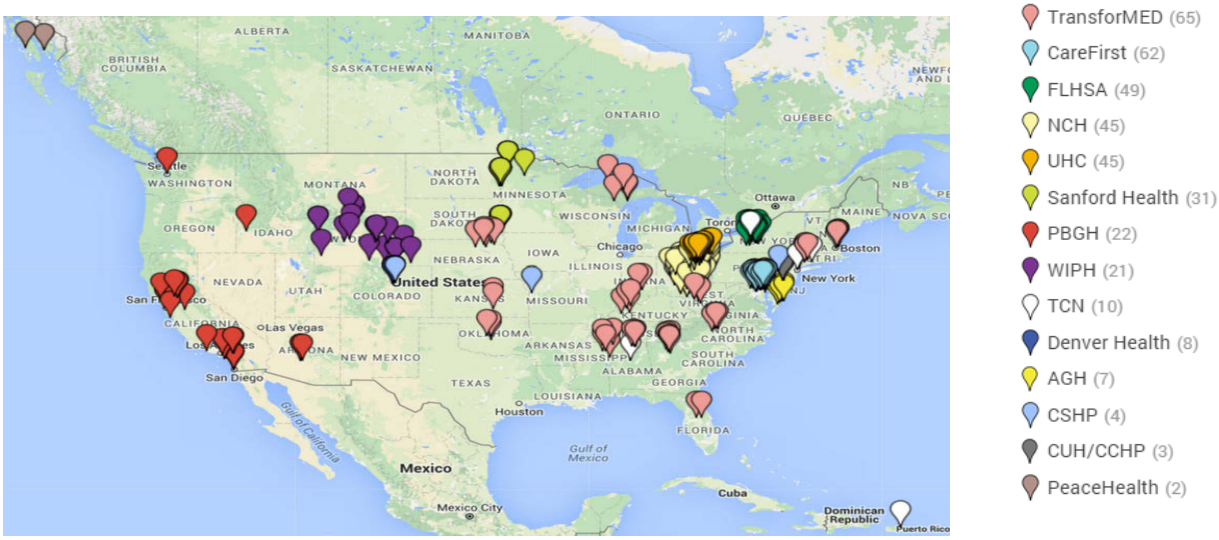
II. OVERVIEW OF PCR AWARDS

When granting the HCIA cooperative agreements, CMMI sought diverse intervention models, organizational settings, target populations, and health care markets in order to test a wide range of innovations. In this chapter, we provide a brief description of the PCR awardees and their programs to provide context for understanding implementation effectiveness and program impacts. We provide additional detail on each of these program characteristics in Section IV.A.

A. Awardees' characteristics

The 14 HCIA PCR awardees spanned the United States and implemented programs from Alaska to Puerto Rico, with number of sites ranging from 65 for TransforMED to two for PeaceHealth (Figure II.1). Eight awardees were health care providers, including hospitals, a hospital and community health organization partnership, an integrated health care system, and a hospital-based institute. Other awardees included a payer, a community health care planning organization, a foundation, a nonprofit business coalition, a nonprofit consultant, and a university research department. CMMI announced the awards in July 2012, and most awardees launched their initiatives within six months of the award, although two programs experienced delays and launched their programs more than six months after receiving the HCIA. Eight programs ended on schedule in June 2015; the other 6 awardees received no-cost extensions that will enable them to continue operational and/or administrative aspects of their programs as late as June 2016. Award amounts ranged from $1 million to $26 million (Table II.1).

Figure II.1. Program locations, sorted by number of sites for each awardee



Note: Figures beside each name in the legend indicate the number of implementing sites for each awardee.

AGH = Atlantic General Hospital; CareFirst = CareFirst Blue Cross Blue Shield; CUH/CCHP = Cooper University Hospital and the Camden Coalition of Healthcare Providers; Denver Health = Denver Health and Hospital Authority; FLHSA = Finger Lakes Health Systems Agency; TCN = Foundation for California Community Colleges and the Transitions Clinic Network; PBGH = Pacific Business Group on Health; PeaceHealth = PeaceHealth Ketchikan Medical Center; NCH = Research Institute at Nationwide Children's Hospital; CSHP = Rutgers Center for State Health Policy; UHC = University Hospitals of Cleveland Rainbow Babies and Children's Hospital; WIPH = Wyoming Institute of Population Health

Table II.1. Awardees' characteristics

Awardee	Awardee location	Type of entity	Implementation date	Funding amount
Atlantic General Hospital	Berlin, MD	Provider – hospital	January 2013	$1,097,512
CareFirst Blue Cross Blue Shield[a]	Baltimore, MD	Payer	August 2013	$20,000,000[c]
Cooper University Hospital and the Camden Coalition of Healthcare Providers[a]	Camden, NJ	Provider – hospital and community health organization	October 2012	$2,788,457
Denver Health and Hospital Authority	Denver, CO	Provider	October 2012	$19,789,999
Finger Lakes Health System Agency[a]	Greater Rochester area, NY	Community health planning organization	September 2012	$26,584,892
Foundation for California Community Colleges and the Transitions Clinic Network[a]	Sacramento, CA	Foundation[b]	August 2012	$6,852,153
Pacific Business Group on Health	San Francisco, CA	Nonprofit business coalition	August 2012	$19,139,861
PeaceHealth Ketchikan Medical Center	Ketchikan, AK	Provider	October 2012	$3,169,386
Research Institute at Nationwide Children's Hospital[a]	Columbus, OH	Provider – hospital	November 2012	$13,160,092
Rutgers Center for State Health Policy	New Brunswick, NJ	University research department	January 2013	$14,347,808
Sanford Health	Sioux Falls, SD	Provider – Integrated health care system	April 2013	$12,142,606
TransforMED	Leawood, KS	Nonprofit consultant	November 2012	$20,750,000
University Hospitals of Cleveland Rainbow Babies & Children's Hospital[a]	Cleveland, OH	Provider – hospitals	January 2013	$12,774,935
Wyoming Institute of Population Health, a division of Cheyenne Regional Medical Center	Cheyenne, WY	Provider – hospital-based institute	October 2012	$14,246,153

Note: The implementation date represents when programs began taking concrete steps toward launching their program components by hiring staff, establishing partnerships, investing in health information technology systems, and undertaking other operational activities.

[a] Denotes awardees that received a no-cost extension.

[b] The foundation acts as a fiscal agent for a college and two universities.

[c] CareFirst was originally awarded $20 million to expand its PCMH program to Medicare beneficiaries in Maryland. An additional $4 million was allocated for use if CareFirst could find a partner to expand the program outside of Maryland, which did not happen.

B. Program and market characteristics

Intervention focus. Awardees focused their interventions at different levels of the health care delivery system. Seven awardees worked at the practice level to transform primary care, five designed programs directly focused on individual patients, and two targeted both practices and individual patients (Table II.2). Programs focused on individual patients tended to actively recruit and enroll participants, whereas practice-based interventions tended to offer new and enhanced services without a formal enrollment process or explicit consent by participants. This passive approach to enrollment often resulted when awardees believed that all of their patients could benefit from the new approach to care.

Program settings. Although only eight awards were to provider organizations, nearly all (12) programs were implemented in provider-based health care settings, particularly primary care practices and hospitals. Two awardees implemented their programs in community-based settings, attempting to engage patients where they live—such as in their homes, in temporary or transitional housing, or in social service agencies.

Market characteristics. As described, awardees also implemented their programs across a variety of geographical locations. Within those geographical locations, four awardees focused their interventions locally (such as in a city), two implemented their programs statewide, and four worked across multiple states. One program targeted local areas in four states and three programs targeted concentrated geographical regions composed of multiple municipalities, one of which crossed a state border. Four programs were concentrated in urban areas and two programs were concentrated in rural areas. The remaining eight programs had representation in both urban and suburban or rural regions.

C. Intervention characteristics

Target populations. The initiatives targeted varied populations. As shown in Table II.3, 13 programs focused on patients with specific health conditions, such as chronic conditions or mental health disorders, and 8 focused on specific age groups, such as pediatric or elderly patients. Eight programs focused on frequent health care users, such as patients with more than two visits to the emergency department (ED) in the previous six months. Five programs offered services to all patients, although 4 of those programs also targeted specific populations. Some programs targeted different populations depending on the intervention. For example, Wyoming targeted patients ages 65 and older with certain conditions for its care transitions program, patients on Medicaid for its Medication Donation Program, and all patients at participating patient-centered medical homes (PCMHs). Awardees identified target populations using claims-based algorithms, referrals, reviews of medical records, and patient screening and assessment tools.

Program components. The 14 HCIA PCR programs incorporated a variety of intervention components. Four components were common across most programs and central to the aims of the transformation process. These include (1) care coordination (defined as a set of actions designed to help organize patient care activities among multiple providers [McDonald et al. 2007]); (2) care management (defined as a set of actions designed to improve medical practice

and assist patients and their support systems to manage their medical, social, and mental health conditions more effectively [Mechanic 2004]); (3) care transitions (defined as a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location [Coleman et al. 2003]); and (4) patient-centered care (defined as care that is respectful of and responsive to an individual patient's preferences, needs, and values, and ensuring that the patient's values guide all clinical decisions [Institute of Medicine 2001]). Eleven awardees offered care coordination as a primary intervention component, 10 offered care management, and 9 included transitional care. Seven programs focused on patient-centered care, incorporating elements such as integrated care teams, patient navigation, and transforming practices into PCMHs. Six awardees also focused their interventions on using health information technology (IT) to transform care delivery, contribute to care coordination, and support new models of care, and one program focused solely on health IT.

Core outcomes. The 14 PCR awardees focused on achieving some combination of the following four core outcomes: reducing the cost of care; reducing preventable hospital admissions and readmissions; reducing ED visits; and improving specific indices of patients' health outcomes, such as the percentage of patients with controlled blood pressure.

Intervention staff. To achieve improvement in core outcomes, awardees integrated nonclinician staff into the care teams, either hiring new staff or teaching new skills to existing staff. Common nonclinician positions included care coordinators, care managers, health coaches, and community health workers. Nurses, social workers, medical assistants, medical students, and laypeople generally staffed these positions.

Table II.2. Program and market characteristics of PCR HCIA programs

	Total	Atlantic General Hospital	CareFirst Blue Cross Blue Shield	Cooper University Hospital and CCHP	Denver Health and Hospital Authority	Finger Lakes Health System Agency	Foundation for California Community Colleges and the Transitions Clinic Network	Pacific Business Group on Health	PeaceHealth Ketchikan Medical Center	Research Institute of Nationwide Children's Hospital	Rutgers Center for State Health Policy	Sanford Health	TransforMED	University Hospitals of Cleveland Hospital	Wyoming Institute of Population Health
Program characteristics															
Intervention focus															
Practice	9	✓	✓		✓	✓			✓			✓	✓	✓	✓
Individual	7			✓			✓	✓		✓	✓			✓	✓
Program setting															
Provider-based	12	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Community-based	2			✓							✓				
Program site															
Practice-based	11	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓
Hospital-based	5	✓					✓			✓				✓	✓
Community-based	2			✓							✓				
Market characteristics															
Market area															
Local	5			✓	✓				✓		✓			✓	
Regional	3	✓				✓				✓					
Statewide	2		✓												✓
Multistate	5						✓	✓			✓	✓	✓		
Market location															
Urban	12		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Suburban	3		✓			✓		✓							
Rural	9	✓				✓		✓	✓	✓		✓	✓	✓	✓

Note: This table reflects our current best understanding of the awardees as of May 2015, and updates previous descriptions of awardees.

HCIA = Health Care Innovation Awards; PCR = primary care redesign.

Table II.3. Intervention characteristics of PCR HCIA programs

	Total	Atlantic General Hospital	CareFirst Blue Cross Blue Shield	Cooper University Hospital and CCHP	Denver Health and Hospital Authority	Finger Lakes Health System Agency	Foundation for California Community Colleges and the Transitions Clinic Network	Pacific Business Group on Health	PeaceHealth Ketchikan Medical Center	Research Institute at Nationwide Children's Hospital	Rutgers Center for State Health Policy	Sanford Health	TransforMED	University Hospitals of Cleveland Hospital	Wyoming Institute of Population Health
Intervention characteristics															
Target population															
Chronic conditions	13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Frequent users	8	✓	✓	✓	✓	✓		✓			✓			✓	
All patients	5				✓	✓			✓			✓	✓		
Mental/behavioral health disorders	6			✓	✓		✓			✓		✓		✓	
Children	4				✓					✓		✓		✓	
Elderly	4		✓			✓		✓							✓
Other	5			✓			✓			✓				✓	✓
Key components															
Care coordination	11	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓
Care management	10	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	
Care transitions	9	✓	✓	✓	✓	✓			✓	✓				✓	✓
Patient-centered care	7	✓	✓		✓	✓				✓		✓			✓
Health IT	6				✓					✓		✓	✓	✓	✓
Core outcomes															
Reduced cost of care	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reduced hospital admissions/ readmissions	10	✓		✓		✓	✓	✓	✓	✓	✓	✓			✓
Reduced avoidable ED visits	10	✓		✓		✓	✓	✓	✓		✓	✓		✓	✓
Improved health outcomes	7				✓		✓	✓		✓			✓	✓	✓

Note: This table reflects our current best understanding of the awardees as of May 2015, and updates previous descriptions of awardees.

ED = emergency department; HCIA = Health Care Innovation Awards; IT = information technology; PCR = primary care redesign.

III. OVERVIEW OF DATA, METHODS, AND LIMITATIONS

This chapter describes the data and methods we used for each major component of the evaluation: implementation effectiveness (Section A), clinician experience with the programs (Section B), and program impacts on patient outcomes (Section C). Each section also describes limitations in the data and methods used in that evaluation component.

A. Implementation effectiveness

1. Data

The implementation evaluation results presented in this report are based on a qualitative analysis of the implementation experiences of the 14 PCR programs through the end of their initial three-year award periods. We based our analysis on information collected through telephone interviews with program administrators and in-person interviews with clinic administrators and frontline staff at two to four sites from each award. We purposively selected the sites to visit in an effort to obtain a range of perspectives, to cover as many components of each innovation as possible, and to minimize travel time and expense. The first round of site visits lasted four days, on average, and were conducted from April to June 2014 (roughly two years after award). The second round of site visits occurred from March to May 2015 (roughly three years after award). To supplement the primary data, we also conducted a systematic review of self-reported quarterly program reports collected by the HCIA implementation and monitoring contractor for the three-year award period, including program narratives, operational plans, self-measurement and monitoring plans, and enrollment files.

2. Methods

We based our analysis of the factors associated with implementation effectiveness on the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al. 2009). The CFIR methodology uses a core set of constructs based on a comprehensive and systematic review of the implementation science literature. It provides a conceptual framework and a consistent typology, terminology, and set of definitions that can be used to identify the drivers of implementation effectiveness in specific contexts and settings. Our approach builds on the CFIR-based framework developed by RAND for the Centers for Medicare & Medicaid Services (CMS) to guide the evaluation of the HCIA-funded programs and refined by RTI International for its meta-analysis of the initiative.

Using the CFIR methodology tailored to the needs and circumstances of this study, we coded the qualitative information that we collected into three domains: (1) the underlying design features or characteristics of the program, (2) the facilitators and barriers commonly encountered during the implementation process, and (3) the internal and external environmental factors that can influence implementation effectiveness. Program characteristics reflect the underlying features of the program and are often determined during the design phase of the innovation. They can include such subdomains as adaptability, complexity, feasibility, perceived relative advantage, and frontline user control. Implementation process-related factors reflect the features

of the process through which the program or components of the program are implemented. The most common subdomains in this area are program resources, self-monitoring, and staff and stakeholder engagement. Finally, the characteristics of the inner and outer settings reflect the characteristics of the implementing organization and external environment, respectively, and are considered to be outside the control or influence of the program administrators, at least in the short run. Examples of inner setting characteristics include the culture and capacity of the host organization, the level of support and the style of the organizational leadership, and the type and structure of the implementing organization. Examples of outer setting characteristics include the structure of health care financing and organization within which the program operates, including Medicare and Medicaid programs and policies, the technological environment, and unanticipated patient's needs and resources.

We organize our implementation evaluation findings, summarized in Chapter IV Section A, into four broad areas: (1) a description of the key design features of primary care transformation, (2) a summary of the evidence on the effectiveness of program implementation, (3) an analysis of the factors associated with implementation effectiveness, and (4) a discussion of the issues related to sustainability and scalability of program innovations. Key operational design features discussed in this section include innovation components and protocols; identification, recruitment, assessment, and enrollment of patients at risk of misuse of health care services; innovative uses of patient data to improve care; and roles and responsibilities of nontraditional staff. For the purposes of our analysis, we measured implementation effectiveness mainly by the degree to which awardees met their enrollment targets, the timeliness with which they implemented the core components of their programs, and their ability to execute the service- and staffing-related inputs related to their innovations (such as meeting the requirements of their service delivery protocols and meeting their hiring and training goals). We also considered longer-term measures of implementation effectiveness related to sustainability and scalability of program operations.

Finally, we developed our overall analytic approach and methods during the first year of the evaluation, and used the same general approach and analytic codes for both the first and second rounds of data collection and analysis. The innovation components, implementation performance metrics, and determinants of implementation effectiveness remained largely unchanged between the first- and second-year evaluations.

3. Limitations

Because we visited only a small subset of sites and spoke only with selected staff at those sites, our findings might not be generalizable to all practices and providers engaged in the HCIA-funded transformation process for PCR awardees. In a few cases, we visited different sites in round two relative to round one to gain a broader perspective. We note in the individual program narratives when findings vary due to the change in the sites visited. In addition, although we asked respondents to describe the perceived effect of the innovation on providers' practice and patients' health, the purpose of the qualitative analysis was to evaluate implementation effectiveness, such as enrollment, timeliness of implementation, and service- and staffing-related inputs. Any findings in this report related to patients' effects are only suggestive of the perceptions of those we interviewed for this study.

B. Effects on clinicians' attitudes and beliefs

1. Survey development

The primary challenge related to developing the HCIA Primary Care Redesign Clinician Survey was ensuring the instrument was broadly relevant to clinicians across the 14 awardees, while also including items specific to each individual awardee. In the following section, we describe the survey design process used to ensure both relevancy to the overall population and specificity to individual HCIA awardees for the first round of the HCIA Primary Care Clinician Survey.

Survey items were drawn from previously validated instruments such as the Maslach Burnout Inventory, Medical Home Builder, Safety Climate Survey, and the Minimizing Error, Maximizing Outcome (MEMO) survey (Maslach 1996; Linzer, 2005; An 2009; American College of Physicians 2014; AHRQ, 2015). New content was developed based on initial telephone calls with awardees and implementation team feedback. In addition, we excluded NCH, whose program did not use primary care clinicians; therefore we determined that the survey was not appropriate for this awardee.

The survey instrument was pre-tested with 20 clinicians across 10 awardees. After agreeing to participate in the pre-test, the survey team sent clinicians the survey instrument and asked them to complete and return it. Upon return of the completed survey instrument, a member of the survey team conducted a cognitive debriefing interview that focused on the respondent's experience filling out the survey. The team revised the survey based on the pre-test findings and sent it to the awardees for review as a last step before fielding.

2. Survey sample

We obtained lists of clinicians involved in the HCIA award from each of the 13 awardees included in the HCIA Primary Care Redesign Clinician Survey. The sample comprised all clinicians, including physicians, nurse practitioners, and physician assistants. A small number of resident physicians in the sample were deemed ineligible because they did not have primary responsibility for a panel of patients, given their trainee status.

3. Survey first administration

The survey was in the field from September 15, 2014, to December 30, 2014. Clinicians received an advance letter inviting them to participate in the survey. This advance mailing included a $100 prepaid incentive to encourage participation. A subsequent email included a link to the online survey. In addition, we sent six reminder emails and three additional hard-copy mailings over the course of the field period to nonresponders to encourage participation. Finally, we made up to three reminder calls in total to practices to ensure that clinicians received the survey.

4. Response rates

We calculated the overall survey response rate as 64 percent (higher than our targeted response rate of 60 percent) according to the American Association for Public Opinion Research standards. Specifically, we used the following formula:

Response rate = (total number of completed surveys) / (total sample – ineligibles)

Clinicians were deemed ineligible for the following reasons: no longer employed at the practice location or by the awardee (n = 266); deceased (n = 1); or unavailable during the study period (n = 2).

Response rates varied across awardees from 87 percent at PeaceHealth to 54 percent at AGH. Table III.B.1 presents response rates for all awardees.

Table III.B.1. PCR clinician survey response rates for all awardees

Awardee	Total number of respondents	Response rate[a] (%)
PeaceHealth	—	87
WIPH	82	83
TCN	17	78
FLHSA	86	72
CSHP	16	70
TransforMED	319	69
UHC	84	68
CareFirst	86	68
Sanford Health	122	67
Denver Health	79	65
PBGH	304	64
CUH/CCHP	20	64
AGH	—	54
Total number of respondents and overall response rate	**1,231**	**64**

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

"—" indicates the table cell has fewer than 11 respondents. Data are not shown to preserve respondents' confidentiality.

[a] Response rate = (total number of completed surveys)/(total number of clinicians – ineligibles)

5. Limitations

Limitations to this survey methodology should be taken into account when interpreting the survey findings. First, although we did achieve a high response rate for the first round of the clinician survey, it is possible that clinicians responding to the survey differed systematically from those who did not respond. For example, if clinicians who were enthusiastic about the HCIA-funded program were also more likely to respond to the survey, our findings could overstate perceived positive benefits of the program. Second, it is possible that the survey could

have been completed by someone other than the clinician to whom it was addressed (that is, an office manager). This could affect our results, particularly those focused on the perceived effects of the program. We attempted to lessen the possibility that this would happen by including a prepaid incentive and directly emailing the clinician; however, we cannot completely discount this possibility. Third, as shown in Table III.B.1, several of the awardees had a small number of clinician respondents. Estimates based on a small number of respondents are inherently unstable, meaning that a small change in the number of respondents in a given response category will result in a substantial change in the estimate. For these reasons, the survey findings should be interpreted with caution and as one piece of the overall evaluation findings. Both in the individual program summaries and in the analyses reported in Chapter IV of this report, and in accordance with our agreement with CMMI, we have not included data gathered from awardees for whom we have fewer than 11 respondents. In addition, we have excluded specific response options from the tables in cases where the number of respondents selecting that option is fewer than 11.

C. Impacts on patient outcomes

This section describes the methods we use to estimate the impacts of the HCIA-PCR programs on patient outcomes. We begin (Section III.C.1) by summarizing the core methods we are using to estimate impacts across all awardees and how they align with CMMI's goals for the evaluation (Section III.C.2). Next (in Section III.C.3), we describe the status of the impact analyses across the 14 awardees. In Section III.C.4, we group awardees into three intervention types to facilitate further discussion of methods and, in Chapter IV, Section IV.C, for discussion of results. In Sections III.C.5 to C.11, we describe each component of the methods we used in this report to estimate impacts. Finally, Section III.C.12 describes limitations in the impact analyses.

1. Overview of impact designs

We use a core approach for estimating impacts that we tailor to each awardee. The core approach estimates impacts as the difference in outcomes for beneficiaries in a treatment group that received the program intervention and outcomes for matched comparison beneficiaries who are similar to the treatment beneficiaries but did not receive HCIA-funded services. Regression analyses control for differences between the treatment and comparison groups before the intervention began that remain after matching. The awardees vary in their specific treatment and comparison group definitions, outcomes, and regression methods.

For each awardee, we also prespecify a limited number of primary tests—that is, the tests for which we most strongly expect to find evidence of impacts if the program was indeed effective. The outcomes for these tests are drawn from a core set, measurable in claims data, and grouped into the three domains: (1) quality-of-care outcomes, (2) service use, and (3) spending. We draw conclusions about impacts in each domain based on the results of these primary tests, as well as those of secondary tests (robustness and model specification checks) and the consistency of the impact findings with implementation evidence.

When an awardee implemented multiple program components, each targeting a distinct patient population, we selected a single component to evaluate. In consultation with CMMI, we selected the component for which (1) the awardee invested significant resources, according to the implementation evidence; and (2) a rigorous impact evaluation is possible. The one exception is the WIPH program, for which we are separately evaluating two program components: (1) the PCMH program, and (2) the transitional care program.

2. Alignment of impact methods with CMMI's goals

The impact methods align with CMMI's goals for the evaluation in two ways. First, the methods estimate the marginal effect of the HCIA-funded programs, not all innovation activities an awardee may be engaged in. For example, CareFirst's HCIA-funded program extends an existing medical home program for commercial members to Medicare FFS beneficiaries. For this awardee, the evaluation estimates the marginal effect of extending the medical home program to Medicare FFS beneficiaries, not the combined effects of the commercial program that was previously developed and its expansion to Medicare beneficiaries.

Second, the methods identify promising programs, not necessarily ones that definitively improved patient outcomes. Following industry standards (Institute of Education Sciences 2014), we identify programs as promising if the impact estimates are favorable—meaning that the program is associated with improvements in patients' outcomes—and are either(1) statistically significant or (2) substantively large (even if they are not statistically significant). In either case, we also require the quantitative estimates to be plausible given implementation evidence, as described in Section III.C.11.

3. Status of analysis, by awardee

The current status of the impact analysis for the 14 awardees is as follows:

- **Stage 1: No analysis in this report (four awardees).** For four awardees, we have not yet conducted any quantitative analysis. For the two awardees that serve Medicaid children in Ohio (NCH and UHC), we are waiting to gain access to the Medicaid claims data needed for the analyses. For PBGH, we did not receive an adequately comprehensive list of treatment group beneficiaries in time to conduct analysis for this report. Finally, for TCN, we have determined—in consultation with CMMI—that it is not possible with the data available to develop a credible comparison group, so impact estimation is not possible.
- **Stage 2: Treatment and comparison groups established, but no regressions or conclusions (one awardee).** For CUH/CCHP, the sample sizes so far are too small to permit regression analyses. We calculated mean outcomes for the treatment and comparison groups, but did not implement regressions or draw conclusions about impacts.
- **Stage 3: Regressions run but no conclusions (two awardees).** For Denver Health and WIPH-PCMH, we have defined the treatment and comparison groups and conducted regression analyses. However, because additional robustness checks are needed to confirm the validity of the results, we have not drawn any conclusions about program impacts. For

WIPH, the impact analysis thus far includes only the PCMH program; future reports will include the transitional care program.

- **Stage 4: Preliminary conclusions (seven awardees).** For AGH, CareFirst, CSHP, FLHSA, PeaceHealth, Sanford Health, and TransforMED, we have defined treatment and comparison groups, estimated impacts using regressions, and drawn preliminary conclusions in one or more of the three outcome domains. The results are preliminary because they include Medicare FFS beneficiaries only and do not cover the full periods of program operations.

The rest of this methods section focuses on the methods we used to report findings in this annual report. Therefore, it focuses on the 10 awardees in stages 2 through 4. Future reports will include methods for the other three awardees (PBGH, NCH, and UHC) for which we expect to be able to estimate impacts.

4. Grouping interventions into types

We grouped the 10 awardees into three categories based on their intervention type to facilitate discussion of both methods and results (see Table III.C.1). Even though all the awardees fit broadly within the rubric of primary care redesign, variation exists across the awardees' programs, both in their target populations and in the mechanisms by which they expect to achieve impacts. These differences correspond to variations in anticipated service use and spending patterns among affected beneficiaries and, ultimately, in the rough magnitude of anticipated impacts. Because of this, our methodological approaches tend to be similar within each category. Furthermore, when we describe outcome patterns (in this report) or compare estimated impacts across the awardees (in future reports), it is helpful to consider similar awardees together.

Therefore, we use the following three categories to organize the awardees:

1. **Practice transformation (seven awardees)** covers awardee interventions that aim to improve patient outcomes by reorganizing primary care delivery—for example, by integrating previously disparate services into a single setting to function as a medical home, by integrating new staff into primary care teams such as care coordinators or patient navigators, or by upgrading health information technology (IT).
2. **Care management/care coordination of high-risk beneficiaries (two awardees)** covers awardee interventions with the primary aim to identify and manage care among people with extremely high service use, spending, or "risk" as defined by some other criteria. Care management/care coordination interventions typically recruit and enroll individual patients and provide intensive services to each one.
3. **Transitional care (one awardee)** covers awardees that manage patient care following an inpatient admission. While there is one awardee in this group for this report, we anticipate adding a second awardee (WIPH) to the group in future reports. The WIPH intervention included a transitional care component for which we plan to estimate impacts separately in future reports.

Table III.C.1. Methods used in this report for estimating impacts on patients' outcomes

Awardee (program component)	Status of analysis[a]	Domains for which we draw conclusions[b]	Treatment group definition (Medicare FFS)[c]			Target population includes Medicaid beneficiaries (not available for this analysis)[f]	Comparison group definition		Number of intervention quarters[j]	Regression model type[k]
			Treatment assignment unit[d] (number of units)	Method for identifying treatment beneficiaries[e]	Location		Matching level[g] (C:T matching ratio)[h]	Comparison regions[i]		
Intervention type: Practice transformation										
CareFirst	Preliminary conclusions	QOC, service use, spending	Panel[l] (14)	Attribution	Maryland	No	Panel (3:1)	Maryland	6	DID (v3)
Denver Health	Regressions, no conclusions	NA	Health system (1)	Awardee list	Denver, Colorado	Yes	Beneficiary (3.7:1)	Colorado, except Denver	9	DID (v2)
FLHSA	Preliminary conclusions	QOC, service use, spending	Practice (38)	Attribution	Finger Lakes, New York	Yes	Practice (2:1)	New York, outside Finger Lakes and New York City	6-8[m]	DID (v3)
PeaceHealth	Preliminary conclusions	QOC, service use, spending	Practice (2)	Attribution	Ketchikan and Craig, Alaska	Yes	Practice[n] (29:1)	Southeast Alaska, outside treatment regions	8	DID (v3)
Sanford Health	Preliminary conclusions	QOC, service use, spending	Practice (15)	Attribution	Minnesota, North Dakota, South Dakota	Yes	Practice (4:1)	Minnesota, North Dakota, South Dakota	7	DID (v3)
TransforMED	Preliminary conclusions	Service use	Practice (87)	Attribution	15 states[o]	Yes[p]	Practice (3.3:1)	15 treatment states	8	DID (v3)
WIPH (PCMH)	Regressions, no conclusions	NA	Practice (18)	Attribution	Wyoming	Yes	Practice (3.8:1)	Montana	8	DID (v3)
Intervention type: Care management for high-risk beneficiaries										
CSHP	Preliminary conclusions	QOC, service use, spending	Patient (115)	Awardee list	4 sites in California, Colorado, Missouri, and Pennsylvania	Yes	Beneficiary (8.7:1)	Treatment states	4	CD

Table III.C.1 *(continued)*

Awardee (program component)	Status of analysis[a]	Domains for which we draw conclusions[b]	Treatment group definition (Medicare FFS)[c]			Target population includes Medicaid beneficiaries (not available for this analysis)[f]	Comparison group definition		Number of intervention quarters[j]	Regression model type[k]
			Treatment assignment unit[d] (number of units)	Method for identifying treatment beneficiaries[e]	Location		Matching level[g] (C:T matching ratio)[h]	Comparison regions[i]		
CUH/CCHP	Unadjusted means, no conclusions	NA	Patient (21)	Awardee list	Camden, New Jersey	Yes	Beneficiary[q] (0.8:1)	Camden, New Jersey	1	NA
Intervention type: Transitional care										
AGH (care transitions)	Preliminary conclusions	QOC, service use, spending	Patient (460)	Attribution	Berlin, Maryland	Yes	Beneficiary (4.3:1)	Berlin and Salisbury, Maryland	2	DID (v1)

Source: Individual program summaries, available in Volume II of this report.

Note: This table summarizes the methods we used for estimating program impacts in this report. Therefore, it does not include the four awardees (NCH, PBGH, TCN, and UHC) for which we do not report quantitative results in this report. Further, the treatment group size, matching ratios, and number of intervention quarters all correspond to those actually used in this report. For most awardees, we expected treatment group sizes and the number of intervention quarters to grow in future reports, as more beneficiaries or practices enter the treatment group and the available claims period lengthens. The matching ratios might also change.

[a] The current status of the impact evaluation for this awardee. There are three options: (1) *preliminary conclusions,* which means we have defined the treatment and comparison groups (Medicare FFS beneficiaries only), run regressions to estimate impacts, and drawn preliminary conclusions about program impacts on patients' outcomes in one or more domains; (2) *regressions, no conclusions,* which means that we have defined the treatment and comparison groups and have run regressions; however, further robustness checks are needed to ensure the validity of model assumptions before we can draw conclusions about program impacts; and (3) *unadjusted means only, no conclusions,* which means that we have defined the treatment and comparison groups but the sample sizes are currently too small to support regression analysis or to enable us to draw conclusions about program impacts.

[b] The impact evaluations in this report draw conclusions in up to three domains (1) quality-of-care (QOC) outcomes, (2) service use, and (3) Medicare spending. For some awardees, we do not draw conclusions in a particular domain because the awardee did not expect to affect any of the outcomes measurable in Medicare claims within this domain or the awardee's expected effects were for a time period beyond that covered in this report.

[c] Due to limitations in data availability, the treatment and comparison groups for this report are limited to Medicare FFS beneficiaries.

[d] The treatment assignment unit is the level at which the awardee decided to implement its intervention (treatment) services. We consider the treatment to be assigned at a given level as long as all Medicare FFS beneficiaries at that level who met awardee eligibility criteria were eligible to receive treatment services (although the extent of services could vary by person, for example, by assessed risk level).

[e] The method we used to identify the beneficiaries in the treatment group. *Awardee list* means that the awardee provided a roster of beneficiaries it had determined were in the treatment group, which might include those offered treatment but who declined. *Attribution* means that we defined the treatment group as those we attribute to treatment practices or clinics based on service use at treatment practices, clinics, or hospitals, using administrative claims for a specific period.

[f] Due to limitations in data availability, Medicaid beneficiaries could not be included in the analyses in this report. Therefore, for some awardees, the treatment group for this report (limited to Medicare FFS beneficiaries) is considerably smaller than the full population (Medicare and Medicaid) for which CMS would like to know impacts.

[g] In patient-level matching, we matched each treatment beneficiary to one or more comparison beneficiaries based on their characteristics at the time they entered the research sample. In practice-level matching, we matched treatment practices to one or more comparison practices.

[h] The ratio of the number of comparison units matched to each treatment unit.

[i] The regions from which the matched comparison units were drawn.

Table III.C.1 *(continued)*

[j] The number of quarters for which we followed up the treatment and comparison beneficiaries in this report. The starting point for measuring quarters varied by type of intervention. For the practice transformation interventions, the quarters are defined relative to when the practices, panels, or health system first joined the intervention. For the other types of interventions (care management for high-risk beneficiaries and transitional care), the quarters are defined relative to when a treatment or comparison beneficiary first entered the sample, which is typically when he or she enrolled in the program (if in the treatment group) or his or her pseudo-enrollment date (if the in comparison group).

[k] We estimate program impacts using four types of regression models, described in the text. Three of these models are variations of a difference-in-differences model (1) one with pre- and post-intervention cohorts (DID, v1); (2) one with overlapping cohorts in the pre- and post-intervention periods (DID, v2); and (3) one with practices observed in both the pre- and post-intervention periods (DID, v3). The fourth model type is a contemporaneous differences model (CD) that estimates impacts as the regression-adjusted difference between the outcomes during the intervention period only for the treatment and comparison groups.

[l] Medical panels are groups of 5 to 15 primary care providers (physicians and nurse practitioners) that formed to participate in CareFirst's medical home program for its commercial patients. These panels can be existing medical groups (or subsets of them) or small or solo practices that have joined together to form so-called virtual panels. The 14 panels participating in the HCIA program include 52 practices and 141 primary care providers.

[m] For FLHSA, the analysis includes practices that joined in two cohorts. The first cohort of practices was followed up for eight quarters; the second cohort was followed up for six quarters.

[n] PeaceHealth practices were not matched to comparison practices. The PeaceHealth comparison group instead comprises all primary care practices in the comparison region. See text for details.

[o] The 15 states are Alabama, Connecticut, Florida, Georgia, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, North Carolina, Oklahoma, and West Virginia.

[p] Although the treatment practices serve Medicaid beneficiaries in addition to Medicare beneficiaries, one key component of the intervention—cost management software—applies only to Medicare FFS beneficiaries, because the software uses Medicare FFS claims data.

[q] For CUH/CCHP, we are using CUH/CCHP's randomized controlled trial—not matching—to define our comparison group. Specifically, the comparison group consists of Medicare FFS beneficiaries that CUH/CCHP randomly assigned to its control group as part of the randomized trial. We include CUH/CCHP in this cell (1) to indicate that the level of randomization (instead of matching) was the patient, and (2) to present the C:T ratio (0.8:1) that resulted from the randomization process so far. (This matching ratio might change in the future when the trial enrolls more patients.)

AGH = Atlantic General Hospital; C = comparison group; CCHP = Camden Coalition of Healthcare Providers; CD = contemporaneous differences; CMS = Centers for Medicare & Medicaid Services; CSHP = Rutgers Center for State Health Policy; CUH/CCHP = Cooper University Hospital and the Camden Coalition of Healthcare Providers; DID = difference-in-differences; FFS = fee-for-service; FLHSA = Finger Lakes Health System Agency; PCMH = patient-centered medical home; QOC = quality-of-care outcomes; T = treatment group; WIPH = Wyoming Institute of Population Health at Cheyenne Regional Medical Center.

NA = not applicable.

Some of the awardee programs in the PCR portfolio contain elements of several intervention types. For this report, we have categorized each awardee based on the intervention type that most strongly resembles the program component *for which we are able to conduct an impact evaluation*. For example, we categorize AGH as a transitional care intervention because we are evaluating impacts of the awardee's care transitions program, not its care coordination or other programs. If an awardee program has several program components that we are evaluating simultaneously, we then categorize the awardee into the broadest appropriate category. For example, the Denver Health program contains elements of practice transformation (integrating patient navigators and behavioral health specialists into primary care and upgrading health IT), as well as care management of high-risk beneficiaries (recruiting frequent users of acute care services and providing them with intensive services). In this case, we place the awardee in the practice transformation category because that is more inclusive than care management/care coordination.

5. Treatment group definitions

The definitions for the treatment groups varied by intervention type (see Table III.C.1 for summary).

For most **practice-based awardees** (all but Denver Health), we defined the treatment group as Medicare FFS beneficiaries assigned to the treatment practices during the 12 months before the practices joined the intervention (the baseline period) and during an intervention period after the practices joined. The length of the intervention period varied across awardees because practices joined at different times and so could be followed up for different lengths before the end of the available claims period (January 2015). We assigned beneficiaries to treatment practices by (1) attributing beneficiaries to the treatment practice that provided the plurality of their primary services in the prior 24 months (we adapted this slightly for CareFirst to fit its attribution methods); and (2) assigning beneficiaries to the first treatment practice they were attributed to in the period (baseline or intervention), and maintaining that assignment throughout the period. For Denver Health, we defined the treatment group as Medicare FFS beneficiaries (a) whom the awardee identified as meeting its program eligibility criteria at some point between May 1, 2011 (the start of an 18-month baseline period) and June 2014 (during the intervention period); and (b) who were observable in Medicare FFS claims for 12 months before they began receiving HCIA-funded services. We required 12 months Medicare claims history for each beneficiary at the time of entry into the analytic sample to facilitate matching to comparison beneficiaries.

For the two awardees (CSHP and CUH/CCHP) in the **care management for high-risk patients** category, the treatment group consists of Medicare FFS beneficiaries who (a) enrolled in the care management programs, according to lists provided by the awardee; and (b) were observable in Medicare FFS claims for 12 months before their program enrollment, to facilitate matching. For CUH/CCHP, we limited the treatment group beneficiaries who enrolled in the program after its randomized controlled trial began in March 2014 because we use that trial to define the comparison group as well.

For AGH, the one **transitional care** awardee for which we present quantitative results in this report, the treatment group consists of all Medicare FFS beneficiaries who (a) were discharged from the treatment hospital (AGH), (b) had seen one of the AGH primary care providers in the previous 12 months before discharge (as determined by claims data), and (c) had been observable in Medicare FFS claims for each of four quarters before discharge (to facilitate matching). We defined a treatment group in this way separately for a *post-intervention cohort* of beneficiaries discharged after the program was under way and for a *pre-intervention cohort*, discharged 6 to 18 months before the intervention began.

For all awardees, we placed additional restrictions for a beneficiary to be included in the analytic sample for regression analyses (described in Section III.C.8). The observations for those analyses are unique person-quarters, where the quarters are defined relative to when the practices or individuals enrolled in the program. To be included in a quarter, a beneficiary had to be observable in Medicare FFS claims during that quarter, which meant they had to be alive and enrolled in FFS Medicare Part A and B. Furthermore, the beneficiary had to enroll in the program early enough—or be assigned to treatment practice early enough—to be followed up for the whole quarter in Medicare claims.

6. Comparison group definitions

a. General principles and methods

In selecting comparison groups for each awardee, we aimed to:

- Match at the level at which treatment was assigned. For example, if whole practices joined the intervention, we matched treatment practices to comparison practices. If the program enrolled individual beneficiaries, we matched individuals to one another.
- Match treatment and comparison units on variables that (a) were defined for each treatment unit before the unit began receiving program services, and (b) were involved (explicitly or implicitly) in the units' selection into treatment and/or could affect evaluation outcomes.
- Reduce differences between the treatment and comparison groups on matching variables to within 0.25 standardized differences (SD) or less. The SD is the difference in means for the two groups (treatment and comparison) divided by the standard deviation for that variable. An SD < 0.25 is an industry standard because regression models—such as those we employ—should be sufficient in impact estimation to account for small differences of that magnitude that remain after matching (Institute of Education Sciences 2014).

As explained below, meeting all these criteria was not feasible for all awardees. When matching could not reduce the SD below 0.25 for a specific matching variable, we discussed the deviation with CMMI and received its approval before finalizing the comparison group.

For all awardees except CUH/CCHP, described below, we followed the same four basic steps to identify the comparison group. First, we identified a universe of potential comparison units—that is, potential comparison practices or beneficiaries. Second, we developed matching variables—from Medicare FFS claims, geographic data, and other sources—for all treatment

units and potential comparison units. Third, we matched the treatment units to the comparison units on these characteristics, using some combination of (1) exact matching, requiring the treatment and comparison unit to have the same value for a variable, such as gender; (2) caliper matching, requiring a treatment and comparison unit's value for variable to fall within a narrow range; and (3) propensity matching, requiring units to have a similar propensity score. The propensity score collapses multiple matching variables into a single continuous variable that can be used to compare how similar two units are. Fourth, we assessed balance between the resultant treatment and comparison groups after matching to see whether we had met the matching standards and, if not, to revise the matching algorithm until we did (or to discuss specific deviations from the standard with CMMI).

In general, we aimed to match at least three comparison units to each treatment unit, because matching at a ratio greater than 1:1 increases the statistical power to detect program impacts. However, this was not always possible without compromising the quality of the matches. Table III.C.1 shows the matching level and matching ratio achieved for each awardee.

b. Definitions

For most **practice-based awardees** (all but Denver Health), the comparison group consists of Medicare FFS beneficiaries assigned to matched comparison practices. The pool of potential comparison practices came from prespecified geographic regions (see Table III.C.1). We matched the treatment practices to comparison practices on characteristics of (1) the Medicare FFS beneficiaries assigned to the practices in the 12 months before they joined the intervention (for example, mean hospitalization rates, Medicare Hierarchical Condition Categories [HCC] risk scores, age, and dual enrollment in Medicare and Medicaid); (2) the zip code or county where the practices are located (for example, median income); and (3) the practice as a whole (for example, the number of providers and their use of electronic health records when they joined the intervention). For PeaceHealth, the matching process did not yield comparison practices that were markedly more similar to the treatment practices than the universe of all potential comparison practices. Therefore, we defined the comparison group as all Medicare FFS beneficiaries assigned to practices in the entire comparison universe (of 57 practices).

The methods for defining the comparison groups for the remaining four awardees were unique, so we describe the definitions for each one briefly here:

- For **Denver Health,** we were unable to match at the level of treatment assignment (the health system level) because there was no other health system that was similar in both population served and regulatory environment, so we matched at the beneficiary level instead. We matched treatment beneficiaries to beneficiaries in a pool drawn from Colorado (but outside the treatment region) and who were similar in demographics, the zip code of their residence, risk score, Medicare/Medicaid dual eligibility status, original reason for Medicare eligibility, and service use and spending in the 12 months before entering the sample.

- For **CSHP,** the comparison group consists of Medicare FFS beneficiaries drawn from four comparison regions (one for each treatment region) and who were similar to the treatment beneficiaries on matching variables similar to those used for Denver Health.
- For **CUH/CCHP,** the comparison group consists of Medicare FFS beneficiaries who CUH/CCHP enrolled in its randomized controlled trial and were randomly assigned to the control group (which was not eligible for treatment services).
- For **AGH,** the comparison group consists of Medicare FFS beneficiaries who (1) were discharged from the treatment hospital, but not assigned to the treatment group, or from a nearby comparison hospital; and (2) were similar to the treatment beneficiaries at the time of discharge on demographics, recent service use, risk scores, Medicaid eligibility, and specific reason for the hospitalization that qualified them for the treatment group or comparison pool. We matched separately for the pre and post-intervention cohorts, yielding two separate comparison groups (one for each cohort).

For all awardees, we also applied the same restrictions used for the treatment group to determine which beneficiaries entered the analytic sample in each study quarter.

7. Construction of outcomes and covariates

We used Medicare FFS claims for beneficiaries assigned to the treatment and comparison groups to develop two types of variables: (1) *outcomes,* defined for each person in each study quarter; and (2) *covariates,* which describe a beneficiary's pre-intervention characteristics and are used in the regression models for estimating impacts to adjust for any differences that existed before the intervention could have had impacts. Appendix 1 provides details on the methods to construct these variables.

a. Outcomes

We calculated six outcomes, each calculated at the quarterly level, grouped into three domains:

1. Domain: Quality-of-care outcomes

a. Inpatient admissions (number/quarter) for ambulatory care-sensitive conditions (ACSCs)

b. Number of inpatient admissions followed by an unplanned readmission within 30 days (number/quarter)

2. Domain: Service use
   a. All-cause inpatient admissions (number/quarter)
   b. Outpatient ED visit rate (number/quarter); outpatient ED visits are defined as ED visits or observational stays that do not end in a hospital admission.
3. Domain: Spending
   a. Total Medicare Part A and B spending ($/month)
   b. Medicare inpatient spending ($/month)

Four of these outcomes—all but inpatient spending and admissions for ACSCs—are outcomes that CMMI has specified as core for the evaluations of all HCIA programs. Our definition of the readmission measure, however, differs from CMMI's standard definition. CMMI typically defines readmissions as the proportion of inpatient admissions that end in an unplanned readmission. However, in this evaluation context that examines impacts over many months, using this measure risks introducing bias to the impact estimates. The intervention could affect the type of index stay, which could in turn influence the percentage of stays followed by a readmission—even if the intervention had no impact on the likelihood of readmission contingent on the type of stay. Instead, we analyze impacts on the *number* of these unplanned readmissions per beneficiary per quarter, which is not subject to the same potential bias.

b. Covariates

The specific covariates varied by awardee, but typically included (1) indicators of whether a beneficiary had specific chronic conditions (for example, congestive heart failure, chronic obstructive pulmonary disease, chronic kidney disease, or diabetes); (2) HCC risk scores; (3) demographics (age, gender, and race or ethnicity); and (4) original reason for Medicare entitlement (old age, disability, or end-stage renal disease).

8. Regression models

We used four types of regression models across the nine awardees for which we present impact results in this report (those awardees in analysis stages 3 or 4). These different regression models are specified to account for the awardees' different approaches to identifying treatment patients (for example, enrolling individual beneficiaries or entire practices), the availability of pre-intervention claims data, and the precise variables used to define the treatment group for the intervention. Nevertheless, the regression models across awardees share many essential features. In the rest of this section, we first describe our four model types used to estimate impacts. We then provide a plain-language explanation of how these models generate impact estimates.

a. Four basic model types

We used the following model types to estimate impacts across nine awardees:

i. A contemporaneous differences model

This is the simplest of the models we used, in which program impacts are estimated as the difference in outcomes between the treatment group and its matched comparison group, adjusting for differences ("regression adjusting") between the two groups when they were first matched. We used this model for one awardee, CSHP, which had no patient population similar to the treatment group before the intervention start date. We plan to use a similar model for CUH/CCHP, the other awardee in the care management category for high-risk beneficiaries group, after sample sizes are large enough to warrant regression modeling.

ii. A difference-in-differences model with pre- and post-intervention cohorts

We used this model for AGH, the one awardee in the transitional care group. Under this model, we estimate impacts as the difference in regression-adjusted outcomes between the HCIA

post-intervention cohort treatment group and a matched comparison group in the quarters directly after hospital discharge, minus the difference that existed in the corresponding quarters *before* the intervention began among similar, pre-intervention cohort beneficiaries discharged from the treatment hospital to treatment practices and their matched comparison beneficiaries.

iii. A difference-in-differences model with overlapping cohorts in the pre- and post-intervention periods

We used this model for the one practice transformation awardee, Denver Health, for which we matched at the beneficiary level, even though treatment assignment occurred at the health system level. Using this model, we estimate impacts as the difference in regression-adjusted outcomes between the treatment group and a matched comparison group during the intervention period, minus the average difference that existed between Denver Health beneficiaries and their matched comparison beneficiaries during the 18-month baseline period before the intervention began.

iv. A difference-in-differences model with practices observed in both pre- and post-intervention periods

We used this model type for six of the practice transformation awardees for which we estimate impacts in this report: CareFirst, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH-PCMH. Using this model, we estimate impacts as the difference in regression-adjusted outcomes between the treatment group and a matched comparison group during the intervention period, minus the average difference that existed between the treatment and comparison practices' beneficiaries before the intervention began.

b. Impact estimation

For each outcome in each quarter, the regression models estimate the relationship between the outcome and a series of predictor variables, assuming that each predictor variable has a linear (additive) relationship with the outcome. The predictor variables vary by awardee, including within model types, depending on the target population for the HCIA-funded intervention. In all cases, however, the predictor variables include covariates defined at the beneficiary level and an interaction of a beneficiary's treatment status (that is, membership in the treatment or comparison group) with each post-intervention quarter.

The estimated relationship between the interaction term and the outcome in a given quarter is the impact estimate for that quarter. It measures the average difference between outcomes for beneficiaries assigned to the treatment and comparison groups that quarter, adjusting for any residual differences that existed between the treatment and comparison groups at the time they were matched and—for the difference-in-differences models (model types 2, 3, and 4 above)—subtracting out any differences between these groups during the relevant baseline or pre-intervention period. By providing separate impact estimates for each intervention quarter, the models capture whether program impacts changed over time—that is, as beneficiaries or practices were enrolled in the program longer. We can also estimate the *average* impact over sets of quarters. Finally, the models quantify the uncertainty in the impact estimates, allowing for

statistical tests that determine whether observed differences in outcomes between the treatment and comparison groups are likely due to chance.

In calculating the statistical precision of the estimates, the regression models account for the clustering of outcomes at the practice, hospital, or health-system level, if appropriate. For example, many of the programs provide intervention services to whole practices, making it important to account for practice-level clustering (otherwise, the model could overstate the precision of the estimates; see Peikes et al. 2011). The models account for clustering by including dummy variables, also called "fixed effects", for practices (or hospitals or the health-system, if applicable) in the list of variables that predict beneficiary outcomes (Cameron and Miller 2015). The models also account for clustering of outcomes across multiple observations for a single beneficiary. Appendix 2 provides details on the regression methods, including descriptions of the weights each beneficiary receives in each model and how the regressions account for clustering of outcomes across quarters for a given individual and, as appropriate, across all individuals assigned to the same practice.

9. Primary tests

For each awardee evaluation, before beginning any regression analyses, we specified a series of primary tests—that is, the hypotheses we expected would provide the most robust evidence about program effectiveness. We specified one or more of these tests in each of our three evaluation domains—quality-of-care outcomes, service use, and spending—provided that impacts were anticipated in the domain. A primary goal of prespecifying these primary tests is to reduce the risk of drawing false conclusions about the each program's effects (either favorable or unfavorable) that can result from random fluctuations in the data when conducting many tests. We further reduced the risk of false conclusions due to chance events by adjusting the *p*-values from multiple tests within each domain (but not across domains or awardees) for the multiple statistical tests (see Appendix 2). At the same time, however, prespecifying a limited number of tests also focuses our analyses on the outcomes of greatest interest and enables us to draw tentative conclusions about effects, even when observed differences between treatment and comparison groups are not statistically significant. For each awardee evaluation, we provided the awardee and CMMI an opportunity to comment on the primary tests.

We selected primary tests specific to each awardee evaluation (see Appendix 3 for detail). Each primary test specified five components:

1. The population for which we estimated impacts
2. The outcome of interest, including its domain (quality-of-care outcomes, service use, or spending)
3. The time period for the analysis
4. The expected direction (sign) of the impact estimate
5. The threshold that we consider as a substantively important impact, expressed as percentage change from the counterfactual (that is, the outcome the treatment group members would have experienced in the absence of the intervention)

We selected thresholds for substantive importance, recognizing that impact estimates could be large enough to be meaningful (to CMMI and other stakeholders) even if they are not statistically significant. This is especially important because, as noted earlier, CMMI aims to identify *promising* interventions, but many of our evaluations have limited statistical power. We selected substantive thresholds based on each awardee's statement of anticipated impacts (from the application to CMMI for HCIA funding), and on published literature about the magnitude of impacts that could be expected for successful programs in primary care redesign (see Appendix 3 for detail).

Finally, in this report, due to limitations in available data, we have assessed the primary tests using Medicare FFS data through December 2014 (or January 2015 for CareFirst and Denver Health), even though the prespecified primary test periods for each awardee cover a later period as well. For example, if the primary tests for an awardee specified analyzing outcomes from the 7th through 10th intervention quarters, but we had data only through the 8th, in this report we present primary test results for the 7th and 8th intervention quarters only. Similarly, the primary tests for some awardees specify analyses among both Medicare and Medicaid beneficiaries, but in this report we present results only for the Medicare FFS population due to limited Medicaid data availability. We will present our final results in future reports.

10. Secondary tests

We conducted secondary quantitative tests to help corroborate the findings from the primary tests. This is important because some of the differences observed between treatment and comparison groups in the primary test results could stem from the nonexperimental design of our evaluations or random fluctuations in the data. In general, we have greater confidence in the primary results if they are consistent with the expected broader pattern of results.

Specifically, for most awardee evaluations, we selected one or more secondary tests that could refute the primary test results or shed doubt on their interpretation as impacts if the findings were not as hypothesized. For example, for many of the practice transformation awardees, these tests involved estimating regression-adjusted differences between treatment and comparison beneficiaries during the first 6 or 12 months after the program began—a period *before* the intervention was expected to have impacts because the practice redesign was still under way (so no difference in outcomes was predicted between the treatment and comparison beneficiaries). Unexpected secondary results could be a sign that the comparison group was not an appropriate counterfactual. In contrast, finding the anticipated results supported the comparison group and, ultimately, could give us greater confidence that the primary results represent true program impacts.

As with the primary tests, we selected secondary tests specific to each awardee evaluation. Each secondary test specified four components:

1. The population for analysis
2. The outcome of interest, including its domain (quality-of-care outcomes, service use, or spending)

3. The time period for the analysis
4. The expected result from the analysis, assuming the model and comparison group were sound

11. Synthesizing evidence to draw impact conclusions

For each awardee and within each domain, we drew one of four conclusions about program impacts, based on the primary test results, the results of secondary tests (if applicable), and the plausibility of those findings given the implementation evidence. The four possible conclusions are: (1) statistically significant favorable effect (the highest level of evidence), (2) substantively important favorable effect, (3) indeterminate effect, and (4) substantively important unfavorable effect. We cannot conclude that a program has a statistically significant unfavorable effect because, in consultation with CMMI, we decided to use one-sided statistical tests, which do not test for evidence of program harms.

To draw conclusions about program impacts, we used a set of decision rules adapted from the Institute of Education Sciences What Works Clearinghouse (2014), an industry standard in program evaluation. These decision rules are described in Appendix 3. In short, we concluded that a program had a statistically significant favorable effect in a domain if (1) at least one primary test result in the domain was favorable and statistically significant, after adjusting the statistical tests to account for multiple tests (if applicable) within a domain; or (2) the average impact estimate across all primary tests in the domain was favorable and statistically significant. (Consistent with CMMI's goals to identify promising programs, we used one-sided tests with a threshold of $p < 0.10$ for statistical significance.) In both cases, we also needed to determine that the primary test results were plausible given the secondary tests and implementation evidence. We concluded that a program had a substantively important favorable effect if the average impact estimate in the domain was substantively important but not statistically significant, and if the result was plausible given the secondary tests and implementation evidence. In contrast, if the average impact estimate was unfavorable (opposite the hypothesized direction) and larger than the substantive threshold, and unfavorable effects are plausible given the other evidence, we concluded the program had a substantively important unfavorable effect. Finally, if the tests in a domain did not meet any of these criteria, we concluded that the impact in that domain is indeterminate.

12. Limitations

Our impact estimation methods have some limitations. The first three of these will be addressed at least partially in future reports, but the others are inherent to the design of the HCIA-PCR interventions:

- **Medicare FFS beneficiaries only.** CMMI is interested in the impacts of the HCIA programs on Medicare, Medicaid, and CHIP enrollees, but so far our estimates are—due to data availability—limited to Medicare FFS populations only. We do not intend to add Medicare Advantage populations to our analyses due to insufficient data. As Table III.C.1 shows, nine of the 10 awardees included in this report also provide services to Medicaid

beneficiaries, and for some awardees (like Denver Health and CUH/CCHP), the program serves more Medicaid beneficiaries than Medicare beneficiaries. Therefore, our current analyses for these awardees do not reflect the full target population of interest to CMMI. We will add Medicaid beneficiaries to individual awardee evaluations in future reports as time and resources permit. However, Medicaid data typically lag substantially behind Medicare data, and the quality varies by state. It is unclear now whether it will be feasible to add Medicaid data to the evaluation of any given awardee.

- **Limited time windows.** The current impact estimates do not cover the full time periods over which awardees expected to see effects. This is particularly important for the practice transformation awardees for which impacts are expected to grow the longer the practices or health system are enrolled in the intervention. For these awardees, we currently do not include the time window with the largest expected impacts. In future reports, we will expand the time window to cover the full periods of program operations for Medicare beneficiaries and, if the data are available, for Medicaid as well.
- **Limited statistical power to detect effects.** The statistical power to detect true program effects is limited for many awardees. This is due either to a small number of Medicare FFS beneficiaries enrolling in the program or, for most of the practice transformation awardees, a small number of participating practices. Our methods compensate for low statistical power, to some degree, by permitting conclusions that a program's impacts are promising if the point estimates are large, even if they are not statistically significant. Although this increases the likelihood of detecting truly effective programs, it also increases the risk of finding "false positives"—that is, concluding that a program had a positive effect when it did not. This risk underscores the importance of testing promising programs again before scaling them broadly within Medicare or Medicaid programs. Statistical power will improve in future reports as we add Medicare treatment group members, add Medicaid members (if possible), and (for some awardees) add additional cohorts of treatment practices. For the awardees that enroll entire practices, power is driven largely by the number of practices—and less by the number of beneficiaries assigned to those practices, which can be quite high—because patient outcomes can be clustered within practices, and this clustering decreases the statistical precision of the impact estimate.
- **Nonexperimental designs.** For all awardees except one (CUH/CCHP), the intervention designs were not experimental, meaning we needed to construct a comparison group from claims data, rather than having beneficiaries randomly assigned to a control group at the start of the intervention. We have designed our impact methods to minimize the risk of bias resulting from nonexperimental designs. However, these designs raise the risk that some differences observed between the treatment and comparison groups—even after adjusting for baseline differences in outcomes through difference-in-differences models, where possible—are due to differences between the groups that are unrelated to treatment services.
- **Outcomes limited to those measurable in claims.** Claims data are highly appropriate for measuring service use and spending, which are key outcomes of interest to CMMI. However, they are less useful for measuring changes in patients' health or in processes of care that the awardees expected their programs to affect. For example, some awardees expected to increase health-related quality of life, which cannot be measured in claims. We

do aim to capture other aspects of health outcomes that can be reasonably identified in claims. For the third annual report, we might also add process-of-care measures that can be measured in claims, such as whether beneficiaries receive services recommended for their specific conditions.

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IV. SUMMARY OF FINDINGS

A. Implementation experience

1. Introduction

This section summarizes findings from a cross-cutting analysis of the implementation experience of the 14 PCR programs. The objective of this section is to provide CMMI with a summary of the key operational aspects of PCR, as well as a synthesis of the primary determinants of implementation effectiveness across different program settings and contexts. Such information—based on three years of implementation experience among the 14 HCIA PCR awardees—can help to guide policymakers, payers, providers, and other parties interested in adopting practices to improve the quality and efficiency of primary care.

First, we discuss key operational aspects of primary care transformation, including the primary components of PCR (Section IV.A.2.a), strategies for targeting high-risk patients (Section IV.A.2.b), strategies for using data to improve the delivery of care (Section IV.A.2.c), and the role of nonclinicians in transforming primary care delivery (Section IV.A.2.d). Second, we review the evidence of implementation effectiveness (Section IV.A.2.e), which includes measures of program enrollment, service- and staff-related outputs, and timeliness. Third, we discuss factors associated with implementation effectiveness, including both facilitators and barriers. Reflecting the CFIR approach, we review factors related to program characteristics, implementation process, and internal and external environments (Sections IV.A.2.f through IV.A.2.h). Finally, we summarize issues related to sustaining program investments and taking them to scale (Section IV.A.2.i).

2. Findings

a. Key components of primary care transformation

As noted in Chapter II, all 14 PCR programs included at least one of five key program components, including (1) care coordination, (2) care management, (3) care transitions, (4) patient-centered care, and (5) health IT. Awardees operationalized these components in different ways, often in combination, to meet the needs of unique target populations across different settings. In practice, activities relating to individual program components often overlapped. To assess the implementation of program components across awardees, we reviewed each awardee's key program activities using the descriptions shown in Table IV.A.1. We discuss each of these key components next.

Table IV.A.1. Key components of primary care transformation

Innovation component	Description of component	Awardees	Number of awardees
Care coordination	Deliberate organization of patient care activities and sharing information among stakeholders involved with a patients' care	AGH, CareFirst, CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PeaceHealth, TCN, UHC, WIPH	11
Care management	Interaction with patients directly to assist them in managing their medical, social, and mental health conditions more effectively	AGH, CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PBGH, PeaceHealth, TCN, UHC	10
Care transitions	Customized planning to ensure the coordination and continuity of care as patients transfer between settings, such as from the hospital to home	AGH, CareFirst, CUH/CCHP, Denver Health, FLHSA, NCH, PeaceHealth, UHC, WIPH	9
Patient-centered care	Care that responds to patients' needs, desires, and abilities and ensures that patients' values guide clinical decisions	AGH, CareFirst, Denver Health, FLHSA, NCH, Sanford Health, WIPH	7
Health information technology	Development, deployment, or enhancement of health information systems to improve coordination and management of patients' care	Denver Health, NCH, Sanford Health, TransforMED, UHC, WIPH	6

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015. See McDonald et al. (2007) for definition of care coordination, Mechanic (2014) for definition of care management, Coleman et al. (2003) for definition of care transitions, and Institute of Medicine (2001) for definition of patient-centered care.

Note: The total number of awardees for each component differs from that shown in the first annual report. In this report, we applied these definitions to identify the key components of each awardee's program based on a deeper understanding of each awardee's implementation activities.

Care coordination interventions supported communication and information-sharing among providers and other stakeholders involved in a participant's care to guide the delivery of safe, appropriate, and effective care. Eleven awardees implemented some form of care coordination intervention, which streamlined communication within practices and across providers, identified and filled gaps in care, and prioritized care for patients with immediate or complex needs. The type and intensity of care coordination services varied across awardees. For example, CareFirst, a large health insurer with experience in practice transformation, used its award to expand its commercial PCMH program to its Medicare population, providing access to registered nurse care coordinators. These nurses reached out weekly to high-risk patients to coordinate their care across caregivers, which could include other primary care providers, the patient's family and/or caregiver(s), and other specialists and providers as designated in patient care plans. FLHSA—a community health planning organization—provided guidance to practices on internal processes and the integration of care coordinators to conduct follow-up with patients, help set patients' goals, and interface with all of a patient's providers. In contrast, CUH/CCHP's community-based program focused on providing an intensive 90-day care management and care coordination intervention designed to stabilize participants' medical and social needs. Care team staff initially coordinated more care as participants built capabilities to coordinate their own care, focusing on independence and empowerment to meet their self-identified goals. Upon

graduation, care teams connected participants to health care providers and additional resources in the community for continued support.

Care management aimed to help participants navigate health and social service systems, overcome social and financial barriers to care, and effectively manage their conditions. Ten awardees implemented some form of care management intervention, including developing and refining care plans, monitoring chronic conditions, educating participants and caregivers, and connecting participants to appropriate medical and social services. For example, UHC, a hospital-based program in an urban setting, worked with families of children with complex chronic conditions to develop customized care plans and shared these plans with the children's primary care providers. In some programs, care managers offered patients disease management education and emotional support for making lifestyle changes. For example, PBGH, a nonprofit business coalition that offered practice facilitation to 20 medical groups, employed care managers to assess patients' medical, behavioral, social, and mental health conditions and to develop patient-driven action plans. Several other awardees also focused care management on helping patients address social and behavioral barriers to effective self-care, such as food and housing insecurity, lack of transportation, mental health disorders, and substance abuse.

The level of integration of care management services into the primary care delivery system varied by program setting. Awardees using community-based models (CSHP and CUH/CCHP) partnered with local primary care providers to assess participants' progress and readiness for graduation from the program. Otherwise, their program staff developed and implemented the care plans independently of providers. In contrast, provider-based programs (all other awardees) usually relied on care teams that were fully integrated into primary care practices. They held regular team meetings or huddles that enabled care managers and providers to communicate face to face and collaborate to develop and implement patients' care plans.

Care transitions programs provided customized planning and support to ensure the coordination and continuity of health care as patients transfer between different settings, particularly from the hospital to home. Nine awardees provided care transitions support to program participants. Services generally consisted of transition-planning support, comprehensive medication review and reconciliation, counseling and/or other self-management support, communication with patients' families and/or informal caregivers, assistance to ensure productive and timely interactions between patients and providers, and information to help patients identify additional health problems or deteriorating conditions.

Many care transitions interventions targeted patients during periods of transition from the hospital to home. Post-discharge support typically included a pre-discharge hospital visit, an in-home visit after discharge, and telephone or in-person follow-up contact for several weeks or months, depending on the program model and the patient's needs and preferences. For example, care teams at AGH—a community-based health care system—focused on patients' needs during the first 30 days after discharge, providing support including medication reconciliation, transportation, and follow-up care. PeaceHealth obtained lists of patients discharged from the local hospital and employed care coordinators in its two participating clinics to follow up with patients by telephone and assess their care transition needs. If necessary, a care coordinator

scheduled a clinic appointment and followed up directly with the patient's primary care provider. WIPH worked through nurses employed by hospital partners to offer care transition services to eligible patients being discharged, including in-home services. These nurses could also identify patients' primary care providers and notify them about important care transition issues.

Patient-centered care strategies involved identifying patients' needs and preferences, engaging patients in clinical decision making and collaborative care plans, and improving patient–provider communication. Although all awardees worked to design new approaches to delivery of primary care to better meet patients' needs, seven awardees implemented programs specifically designed to improve the patient-centeredness of their primary care by changing the dynamic between patients and providers. Designated care team members such as patient navigators or care managers were often primarily responsible for building relationships with patients and assessing their needs for support services. For example, care managers at FLHSA practices assessed (and periodically reassessed) each participant's needs for intensive care management, adjusting the frequency and intensity of follow-up services as participants became more capable of caring for themselves. Programs also used patient activation techniques, especially motivational interviewing, to help patients learn to self-manage their conditions, set goals, and organize their care among medical and behavioral health providers. In one case, CareFirst's local care coordinators reviewed participants' progress and updated care plans during weekly telephone follow-up calls. Furthermore, some programs used health coaches and transitional specialists to provide services in patients' homes, a convenience for patients and an opportunity to identify challenges that might not be evident in clinical environments. For example, AGH care transitions staff visited recently discharged patients at home and offered medication reconciliation services and assisted with connection to community resources to help meet patients' post-hospitalization care needs and prevent readmissions.

Patient-centered care initiatives also introduced new processes that affected all patients and aimed to increase access to customized care and improve communication with providers. Examples included offering same-day appointments, placing patients in a single exam room where they could visit with multiple clinicians and ancillary personnel, and promoting use of a patient portal. One awardee, Denver Health, created high-risk clinics to provide individualized care to specific target populations and introduced patient navigators in community health centers to expand patients' access to enhanced multidisciplinary primary care delivery teams, including clinical pharmacists, registered nurses, behavioral health consultants, and social workers.

Awardees leveraged health IT in different ways to improve primary care delivery, ranging from using it as a primary tool for population health management to a supportive tool for implementing other program components. For six awardees, health IT was the main strategy to redesign the delivery of primary care. For example, TransforMED and UHC implemented population management systems to identify patients' needs and help target care to meet those needs. NCH developed two applications aimed at improving behavioral health care, including an online therapy platform for recently hospitalized patients and outpatient treatment program participants, and a behavioral therapy smartphone application to improve access to resources and management plans for families participating in a clinical program. Sanford Health incorporated several tools into its electronic health record (EHR) system to help improve and

standardize care, including behavioral health screenings, participant synopses, registries, and clinical guidelines for managing chronic conditions. Awardees also used health IT in direct patient interactions, such as hosting telehealth consultations with remote behavioral health specialists (WIPH), sending text message reminders to patients between visits through an automated messaging system (Denver Health), and providing patients with blood pressure cuffs and scales that transmit vital signs taken remotely to the EHR (Sanford Health).

In addition, many awardees used health IT to facilitate care coordination, care management, or care transition interventions. Health IT helped program staff to identify patients' needs quickly and address gaps in care, and staff viewed it as particularly valuable when caseloads were high or when patients interacted with many different staff members in the course of care. For example, CSHP and CUH/CCHP adapted existing health IT systems to enhance their ability to identify patients eligible for their interventions and to track existing patients. Health coaches at Sanford Health reviewed the EHR system to support daily pre-appointment planning, and panel managers reviewed registries to identify patients for outreach and follow-up care. Care coordinators used health IT to facilitate care among several providers, such as by sharing patients' records.

Awardees adjusted and enhanced program components as they discovered gaps and identified opportunities to better serve participants and achieve program goals. After implementing new care delivery models, awardees continued to identify ways to adapt program components to better meet participants' needs. Some resulting modifications tried to improve care for patients with multiple complex care needs, including management of chronic conditions, mental and behavioral health issues, and social and financial barriers. For example, the two community-based programs, CSHP and CUH/CCHP, enhanced existing care management and care coordination components to address patients' behavioral health needs. CSHP made behavioral health screenings mandatory; CUH/CCHP hired a behavioral health consultant to train staff to manage participants' behavioral health and substance abuse issues. Other program improvements aimed to accommodate patients' needs for support after completing a care management, care coordination, or care transition intervention in order to maintain independence in managing their conditions and avoid acute exacerbations. For example, several CSHP sites and CUH/CCHP lengthened the duration of their interventions to beyond the originally planned 60 to 90 days to prepare patients for successful transitions out of the program and to increase their ability to self-manage their conditions. AGH developed the Keeping in Touch program to meet the needs of patients who no longer required weekly care coordination support, but who could benefit from continued, less intensive follow-up by a volunteer nurse. The volunteer nurse was able to help manage their health conditions and promptly respond to acute exacerbations. CSHP added a similar service, using volunteers to make weekly calls and in-person visits to help reinforce lessons and manage emerging needs of program graduates.

b. Strategies for targeting high-risk patients

High-risk patients are a priority subgroup for many awardees, given that program impacts often are expected to be concentrated among this group for patients' outcomes in three key domains: quality-of-care outcomes, service use, and spending. Although 4 of the 14 PCR awardees—CSHP, CUH/CCHP, NCH, and TCN—targeted *only* high-risk patients for their

programs (and therefore screened for severity *before* enrollment), the other 10 awardees either attributed or enrolled a broader sample of patients, then used identification strategies to target a high-risk subgroup for the program or program component(s). In this section, we describe (1) the high-risk patients targeted by the programs or program component(s) among all 14 awardees and (2) the strategies used to identify these high-risk subgroups among the 10 awardees targeting them separately after program enrollment.

Awardees primarily target high-risk patients, defined by having chronic conditions or high health care utilization. Several awardees focused on populations with particular chronic conditions. These included adults with congestive heart failure (CHF), diabetes, hypertension, high-risk pregnancies, asthma, or obesity, as well as children with asthma, attention deficit hyperactivity disorder, diabetes, and obesity. Sanford Health also had a behavioral health intervention targeted toward adults and children with anxiety, depression, and alcohol/substance abuse issues. In addition to UHC's overall PCMH program, which targeted patients with diabetes, hypertension, pediatric asthma, and high-risk lifestyle choices such as tobacco use, its other interventions provided clinical care and care coordination services for children with complex chronic conditions, such as significant neurocognitive impairment.

Other awardees focused on targeting participants with prior high health care utilization. For example, AGH targeted high utilizers, defined as having two or more ED admissions in six months, whereas Denver Health targeted participants with three or more urgent care visits, ED visits, or hospital admissions in the past 12 months. CUH/CCHP and CSHP enrolled *only* high-risk participants, defining program eligibility based on high utilization of inpatient services. In addition to several other program eligibility criteria based on severity, CUH/CCHP required participants to have had two or more inpatient admissions in the previous six months. CSHP also required participants to have multiple ED visits to enroll into the program, and allowed participating sites to determine the specific eligibility criteria. Related to targeting patients with high overall utilization, programs with a care transitions component focused on participants with a *recent* inpatient hospitalization. For example, PeaceHealth, WIPH, and CareFirst all included a care transitions component that targeted patients who were recently discharged from the hospital as one criterion for eligibility.

Awardees identify high-risk patients through several strategies: (1) claims-based algorithms, (2) review of discharge data or hospital records, (3) assessments, (4) referrals, and (5) varied criteria across participating sites. Table IV.A.2 describes the strategies used to identify high-risk patients, including examples of these strategies and awardees that use them.

Table IV.A.2. Strategies for identifying high-risk patients

Strategy used	Examples of strategies used	Awardees	Number of awardees
Claims-based algorithms	• Developed proprietary illness burden score, similar to hierarchical condition categories scores • Stratified patients into tiers based on cost and/or clinical data • Used Medicare FFS data in Milliman Advanced Risk Adjusters model	CareFirst, Denver Health, PBGH, PeaceHealth, TransforMED	5
Review of discharge data or hospital records	• Reviewed hospital census daily for high-risk patients • Incorporated hospital EHR data into health information exchange used to flag potentially eligible (high-risk) participants	CUH/CCHP, UHC, WIPH	3
Assessments	• Used behavioral health screener • Identified patients at high risk for readmissions using LACE index	AGH, FLHSA, Sanford Health	3
Referrals	• Referred patients either exclusively or to supplement other strategies for identifying high-risk participants	CareFirst, FLHSA, PBGH, UHC, WIPH	5
Varied criteria across participating sites	• Applied different criteria across participating practices, including screening tools, medical record review, and provider or patient self-referrals	FLHSA, TransforMED	2

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Five awardees attempted to use a claims-based algorithm to target high-cost or high-utilizer patients, most often using Medicare FFS claims. However, several awardees experienced challenges fully implementing a claims-based approach to identifying high-risk patients. The algorithms used enabled the awardees to assign participants to one of several risk-stratification tiers based on a combination of factors, including cost, utilization, and demographic characteristics. CareFirst targeted the highest-risk Medicare beneficiaries using a proprietary illness burden score. This score is based on CareFirst's own diagnostic cost grouper classification model and is similar to other hierarchical condition categories scores. Denver Health used in-house administrative and clinical data to assign participants to one of four risk-stratification tiers based initially on costs, and later on clinical data as well. For PeaceHealth's care transitions program, staff used hospital discharge data to identify patients discharged in the previous 24 hours. Although program staff called all patients on the list, they stratified discharges into three groups indicating their risk of rehospitalization, based on demographic and diagnostic information available from their medical records, including demographics, prior inpatient admissions, diagnoses, medications, Charlson Comorbidity Index, receipt of charity care, and ED visits (Charlson et al. 1994). PBGH and TransforMED both proposed using the Milliman Advanced Risk Adjusters (MARA) model to calculate risk scores using Medicare FFS claims (Milliman 2015). However, they ultimately supplemented this approach with other strategies due to the complexity of the claims reporting requirements and the varied quality of claims data available to them.

Several awardees reviewed hospital discharge, admissions, or ED data to identify high-risk participants. For example, WIPH nurses working in the care transitions program checked the hospital census daily for patients who met eligibility criteria, including having one of several chronic conditions. UHC used data from an ED triage system to help identify children who received care in the pediatric ED for behavioral health needs. CUH/CCHP incorporated hospital EHR data into a health information exchange that provided a daily data feed to program staff, who reviewed records to flag potentially eligible participants.

Three awardees used assessments or screening tools as part of their approach to identifying high-risk participants, which involved collecting data directly from participants or their medical records. Sanford Health used a Behavioral Health Screener 6-Item Questionnaire (BH-6), which it developed drawing from four psychometrically validated instruments. Sanford Health used this screener in combination with patients' medical records to identify high-risk participants. AGH and FLHSA used the LACE index scoring tool to identify participants with an elevated risk for readmission (Van Walraven et al. 2010). The LACE tool identified patients at risk for readmission or death within 30 days of discharge based on (1) length of inpatient stay; (2) acuity of admission; (3) comorbidities, using the Charlson Comorbidity Index; and (4) number of ED visits within the past six months.

Several awardees incorporated the use of referrals for patients who might be most appropriate for intervention services, either exclusively or to supplement other strategies. UHC, FLHSA, and WIPH relied on providers' referrals at least in part to identify high-risk participants. Although CareFirst used an objective claims-based algorithm that incorporated several parameters into the illness burden score, CareFirst providers supplemented this by referring patients who they thought could benefit most from intensive care coordination services. The reliance on referrals was due in part to the lag in claims data needed to calculate the illness burden scores. Because nearly half of all Medicare beneficiaries fell into the highest-risk tier, CareFirst providers did not perceive illness burden scores alone as useful for adequately targeting highest-risk Medicare beneficiaries. This integrated approach highlighted the importance of providers' clinical judgment when identifying high-risk participants because they often knew more about a participant's situation or social needs than claims-based scores alone might indicate. Similarly, PBGH also proposed using the MARA model to calculate risk scores based on Medicare FFS claims. However, it moved away from MARA due to complexities with implementing the approach. Direct referral by primary care physicians became an important alternative method for identifying high-risk patients for enrollment.

Two awardees allowed participating practices to determine which high-risk patients they targeted using separate criteria that varied by site. FLHSA care managers screened practice populations to identify high-risk patients in a variety of ways, such as a screening tool, medical record review, provider recommendation, or patient self-referral. TransforMED practices used various risk indicators to stratify their panels, including quality indicators, cost and utilization metrics, anecdotal patient information, and internally automated algorithms based on various criteria.

c. Strategies for using data to improve patient care

Data collection and analysis are key components of PCR: this is how awardees can identify areas for improvement and measure changes over time. All of the awardees acknowledged the importance of actively using data to guide quality improvement; they also recognize the need to adopt strategies to generate access to information that would facilitate care decisions and support program implementation. Awardees used data from EHR systems, administrative claims, custom data reporting tools, and internal documentation to generate results and reports to inform program design and follow-up activities and to improve patient care. In this section, we discuss three key ways awardees used data to improve patient care. These include using data to (1) prepare for a scheduled visit with a patient, (2) identify gaps in care, and (3) pursue broader population health management goals (Table IV.A.3). The section also discusses each of these strategies for using data to improve patient care.

Table IV.A.3. Data strategies to improve care

Data strategy	Description of strategy	Awardees	Number of awardees
Preparing for scheduled visits	Using medical records to deliberately plan for scheduled patient visits through daily or weekly team-based process activities such as scrub and huddle	Denver Health, FLHSA, PeaceHealth, Sanford Health, WIPH	5
Identifying gaps in care	Using patient data, commonly EHR systems, to identify missed appointments, gaps in care, or clinical indicators for patients with chronic conditions, such as A1C level above 7.0 percent	AGH, CareFirst, FLHSA, PeaceHealth, Sanford Health, TransforMED, WIPH	7
Improving population health management	Using administrative or health registry data for broader population health management to identify patients who would benefit from medical care	CareFirst, CUH/CCHP, FLHSA, Sanford Health, TCN, TransforMED, UHC	7

Source: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Visit planning strategies helped care teams improve practice efficiency and productivity. Five of the HCIA PCR awardees used patient data to prepare for scheduled visits, typically by implementing daily or weekly scrub-and-huddle activities. For example, PeaceHealth practices reviewed or scrubbed medical record data for all patients with scheduled appointments to identify any needs for follow-up services, such as laboratory tests, mammograms, immunizations, or colorectal screenings. Then, team members huddled in short meetings to prepare and plan for patient visits before the scheduled appointments for that day, making each visit as efficient and comprehensive as possible. PeaceHealth also provided training to facilitate the scrub-and-huddle process, focusing on how to read and interpret patient-level data. For example, they concentrated on the meaning of various lab tests, the target values for various lab results, and how to determine whether to order a specific lab test. Physicians with PeaceHealth reported that the scrub-and-huddle processes enabled them to focus on clinical care and often resulted in more comprehensive patient visits. Other awardees used less formal processes to prepare for patient visits. For example, at least weekly, Sanford Health panel managers reviewed schedules and patient records, and then conferred with health coaches who

brought the information to the team during formal or informal huddles. Similarly, WIPH and Denver Health practices reported informal huddles at the beginning of each day or week.

A common strategy for using data to try to improve patient outcomes was using EHR systems or custom internal reports to identify gaps in care, such as lists of patients who had missed appointments, as well as more comprehensive reporting of service gaps. Seven awardees reported using patient data or internally generated reports to identify gaps in care. Common strategies included identifying patients overdue for preventive screenings (such as mammograms or colorectal cancer screening), patients overdue for lab tests (such as A1c testing), and patients with uncontrolled chronic conditions (such as diabetes with A1C level above 7.0 percent or hypertension with blood pressure greater than or equal to 140/90 mm Hg). For example, CareFirst PCPs were able to access dashboard reports from an online data portal that helped them identify high-risk patients. PeaceHealth program staff used registries to identify patients overdue for mammograms and colorectal screenings, patients with uncontrolled high blood pressure, and patients with a positive tobacco use status who had not received counseling. PeaceHealth staff later shifted their focus to patients without scheduled diabetic follow-up appointments. To identify opportunities to improve the quality of patient care, AGH tracked National Quality Forum quality measures for blood pressure control, hemoglobin A1C control, tobacco use screening, influenza immunization, pneumonia vaccination, and body mass indices. AGH also used patient reports to identify low vaccination rates, and then implemented an intervention to increase them.

Some awardees also leveraged patient administrative data or health registry data for broader population health management data driven solutions, such as population health reports for patients with chronic conditions that were used to design proactive outreach efforts. Seven awardees reported a broader level of population health management activities to identify any patients who would benefit from medical treatment, including people who might not already be in care. For example, TCN worked with clinic staff to collect patient data using a cloud-based data platform and created dashboard reports to identify at-risk patients (for example, those who recently had an ED visit, lacked health insurance coverage, and experienced unstable housing) who might benefit from targeted interventions. TransforMED practices used population management software to target communications to patients based on their individual care needs, as measured by quality indicators.

Despite efforts by many programs to incorporate new sources and forms of patient data into ongoing quality improvement efforts, several programs noted barriers to doing so. For example, AGH, CSHP, and WIPH cited struggles with EHR functionality, records sharing challenges, and/or data extraction difficulties. Some awardees also cited time burdens associated with program monitoring and reporting. Several programs tried to mitigate these challenges by using dedicated staff to perform data analysis and optimize data processes and reports. At WIPH, clinics without dedicated staff said that extracting data from EHR systems was problematic, and a few WIPH clinics related challenges associated with transitioning to new EHR systems as a specific barrier associated with PCMH implementation. Some awardees reported logistical challenges with using data to improve care for scheduled visits. For example WIPH indicated that visit planning was harder to implement for smaller clinics, with fewer

nurses per physician. And a few physicians with PeaceHealth mentioned that if the scrub-and-huddle process was not executed accurately or completely by the medical office assistant, then the patient visit was inefficient because the physician spent additional time during the appointment reviewing patient charts.

NCH and PBGH also cited administrative challenges in obtaining data, and data quality issues. For example, because of reported issues with Medicaid data, NCH was unable to use claims data to measure rates of outpatient follow-up after behavioral health-related hospital discharges. PBGH reported that the varied quality of the claims data submitted by participating medical groups delayed development of risk-stratified patient lists. Both awardees established alternative reporting methods to support program implementation.

d. Nonclinicians' roles in primary care transformation

The incorporation of nonclinicians' roles can help make primary care services more accessible, efficient, and effective (Bodenheimer and Smith 2013). These roles can include providing services historically performed by clinicians—such as identification of preventive and chronic care needs or care coordination—or services typically absent from current health care settings—such as care navigation and peer-to-peer support. Nonclinicians' roles can be filled by a wide variety of licensed health care professionals, such as registered nurses and licensed clinical social workers, as well as unlicensed health care personnel, such as medical assistants and community health workers. All 14 PCR awardees incorporated new staff roles and positions into their programs (Table IV.A.4). In this section, we discuss the roles of these staff, the challenges awardees faced in integrating nonclinician roles, and the approaches used to address these challenges.

Awardees and individual implementation sites varied greatly in their definitions of these roles and how they staffed positions. In some cases, a single position covered several roles; in other cases, one role was divided across multiple positions. For example, PeaceHealth hired care coordinators and gave them responsibility for transitional assistance, chronic disease management, population health, and chart review, combining care coordination, care management, transitional care, and panel management into one position. In contrast, PBGH divided care management tasks among registered nurses, clinical pharmacists, social workers, and medical assistants.

Awardees and sites also varied in terms of the educational and training requirements for these positions. Many awardees used licensed personnel, especially registered nurses and licensed clinical social workers, to provide care coordination, care management, and transitional care services. Awardees frequently relied on the existing training and experience of these staff, and focused supplemental training on augmenting specific skills such as motivational interviewing. In contrast, lay people who shared the experiences of the awardee's target population often filled the roles of community health worker and patient navigator. For example, TCN hired people with a history of incarceration to serve as community health workers for patients with health care needs who were recently released from prison. Similarly, NCH hired parents whose children had significant behavioral health care needs to serve as peer-to-peer support providers for parents of children admitted to behavioral health care units. These lay

workers frequently required extensive training in their specific roles and in additional skills needed, such as working in formal medical settings, medical documentation, and motivational interviewing.

Table IV.A.4. Nonclinicians' roles used by PCR awardees

Roles	Responsibilities	Requirements[a]	Awardees	Number of awardees
Care coordinator	Organize patients' care activities among the patient (or caregiver) and various providers; exchange information; and integrate care activities	RN, LPN, or MSW	AGH, CareFirst, CSHP, CUH/CCHP, NCH, PBGH, PeaceHealth, UHC	8
Community health worker	Reach out to and enroll patients; interpret and translate services; provide culturally appropriate health education; provide informal counseling; advocate for patients and the community; and provide minor clinical services such as first aid and blood pressure measurement	Community members with similar background as targeted patients, might require high school diploma or bachelor's degree	CSHP, CUH/CCHP, FLHSA, PBGH, TCN, UHC	7
Care manager	Identify patients with high needs/potential high needs; assess patients' risk factors; develop care plans; educate patients to effectively self-manage medical, social and mental health conditions; monitor; and follow-up	RN or MSW	CSHP, CUH/CCHP, FLHSA, NCH, PBGH, UHC	6
Health coach	Educate, support, and mentor patients to set and achieve health care goals, often through healthier behaviors and lifestyle changes	BA, RN, dietician, or health educator	CSHP, CUH/CCHP, PBGH, Sanford Health, TransforMED	5
Transition specialist	Assist patients transitioning from or between health care settings, especially hospital to home; counsel patients about medication self-management; use patients' health records (managed by patients) to communicate and track care; follow up with primary care providers and specialists; and identify red flags	RN	CUH/CCHP, NCH, TransforMED, WIPH	4
Panel manager	Identify patients in the primary care organization's panel/population with medical needs; proactively reach out to patients with the goal of scheduling follow-up appointments, tests, assessments, screenings, and/or patients' education; and scrub or review patients' charts to plan for daily appointments and prepare care teams for scheduled patients	Medical assistants or medical students	PeaceHealth, Sanford Health, TCN, TransforMED	4
Patient navigator	Guide patients through and around logistical, linguistic, and financial barriers in the health care system to help ensure timely diagnoses and treatment	MSW or community members with similar background as targeted patients	Denver Health, NCH, PeaceHealth	3

Table IV.A.4 *(continued)*

Roles	Responsibilities	Requirements[a]	Awardees	Number of awardees
Practice facilitator	Work with primary care practices or other health care organizations to support quality improvement and other related activities to make meaningful changes designed to improve patients' outcomes	Master's degree or significant experience in practice-based research or quality improvement	FLHSA, UHC	2

Sources: Definitions adapted from the following sources: McDonald et.al. (2007), Agency for Healthcare Research and Quality (2011), Coleman and Boult (2003), New Jersey Division of Medical Assistance and Health Services (2015), Health Resources and Services Administration (2007), Neuwirth et.al. (2007), Bennet et.al. (2010), RTI Meta-Evaluation Domains for Qualitative Synthesis (based on original work from RAND), and review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Note: Individuals in a single position could perform multiple roles.

[a] Requirements varied by awardee and, in some cases, by awardee site.

BA = bachelor of the arts; LPN = licensed practical nurse; MSW = master's in social work; RN = registered nurse.

Despite the wide range of job responsibilities and credentialing requirements, awardees' administrators and staff identified a core set of skills that they believed were important for people hired in these positions to perform their jobs effectively. The core job's skill set included (1) flexibility and creativity in developing and adapting roles; (2) strong interpersonal skills; (3) communication and engagement approaches, such as motivational interviewing; (4) conducting needs assessments and goal-setting for participants; (5) use of IT; (6) data collection and management; and (7) safety practices, particularly in the setting of visits to homes and other nonclinical settings. Awardees addressed the need for these skills through hiring, formal training, and informal shadowing processes.

Nearly all awardees reported some challenges integrating these new roles; the most common challenge was garnering providers' buy-in. Many providers were hesitant to engage with staff in new roles, often because the providers were unclear about job responsibilities and skeptical about the benefits of new positions. Awardees addressed this challenge by using a combination of approaches that program administrators, staff, and providers felt were effective, including (1) engaging practices early in program development and recruiting practice champions; (2) providing clear guidance to providers on roles for new positions; (3) creating opportunities for people in new positions to interact directly with providers, including collocating nontraditional staff with existing clinicians; (4) presenting data or anecdotes to providers on the impacts of new roles on practices' operations and patients' outcomes; and (5) providing direct incentives to practices to engage with new care roles. For example, AGH administrators and care coordinators met with providers to share stories about the effects of the program on participants, and care coordinators communicated regularly with providers about specific participants through EHR messages and weekly in-person meetings. CareFirst scored panels of providers on their engagement with care planning and willingness to have care coordinators located in their practice, and these scores were part of the panels' financial

incentive program. Many awardee administrators and staff noted that successful implementation and time to demonstrate the effectiveness of the new positions were key to engaging providers, whom they felt were very responsive to demonstrable successes in improving care.

Many programs also faced challenges in clearly defining nonclinicians' roles and the specific tasks they were to perform. Administrators and staff described a tension between clearly defining tasks and maintaining flexibility in roles that were meant to respond to participants' needs and adapt over time. For example, WIPH protocols directed care transition nurses to coordinate with participants' primary care providers, but did not provide explicit processes for doing so, leading to inconsistent approaches across sites. Program administrators at AGH originally planned to develop detailed protocols to guide and standardize care coordinators work, but they moved to a more flexible approach in response to wide variation in participants' conditions and needs. In response to similar challenges, TCN developed a toolkit for participating practices that provided guidance on how the community health workers in the program were expected to spend their time and a list of key skills they were expected to develop. Several awardees found it particularly challenging to train community health and other lay workers to collect and manage patients' data, so they ultimately removed that responsibility from the nonclinicians' role and hired staff specifically dedicated to those tasks.

Developing program and workplace policies that supported the integration of new roles into existing settings was also a challenge for many awardees. Awardees had to develop and adapt policies for hiring, supervision, and work hours and absences. Several awardees noted relatively high turnover rates in nontraditional positions initially, which they attributed to the high emotional toll of working with high-needs populations, the challenge of finding people with the appropriate mix of skills for new roles, and highly motivated staff using these positions as stepping stones to other health care careers. Awardees adapted to these challenges in several ways: they revised job postings to try to attract the mix of skills needed for success in the position, had supervisors promote work-life balance and peer-to-peer support, and prepared for multiple rounds of hiring and training.

In addition, several awardees began programs with limited or no managerial support between the awardee administrators and staff working in new roles. Frontline staff and providers felt that lack of managerial support contributed to a lack of clarity about responsibilities and expectations for day-to-day work. In response, many awardees hired new staff to serve as supervisors for nontraditional roles or incorporated these roles into existing supervisory structures for other parts of the program or organization. Program staff and providers felt this improved program operations. Finally, several awardees had to adapt organizational policies about work hours and absences to fit the needs of workers in nontraditional roles. For example, NCH specifically recruited parents of children with behavioral health care needs to serve as peer support to other parents of children admitted with behavioral health conditions. As a result, these employees were at risk for frequent absences to manage the needs of their own children. Because this was inherent to the people NCH sought to recruit, program staff worked with their human resources department to develop more flexible work hours and absence policies.

Nearly all awardees used combinations of nonclinicians' roles and specialists in an effort to build multidisciplinary care teams and to address the broader psychosocial needs contributing to participants' health outcomes and health care use. In addition to the new nonclinicians' roles, many programs incorporated new specialist clinicians into the primary care teams to address perceived gaps in direct clinical care, particularly behavioral health providers, pharmacists, and dieticians. For example, Denver Health added clinical pharmacists and behavioral health consultants to its primary care teams to offer medication management therapy, care coordination to high-risk patients, and evaluation and referral for behavioral health concerns. UHC staffed licensed clinical social workers to be available in primary care offices and a pediatric ED to increase access to behavioral health evaluations, and included a dietician in its complex care team to provide direct clinical evaluation and ongoing nutrition care management.

e. Evidence of implementation effectiveness

Awardees collected a range of implementation effectiveness measures, including those related to program enrollment, service provision, staffing, and timeliness. All data were self-reported by the awardees and unverified by CMS or its contractors. In this section, we summarize the evidence available on these four measures. To understand how effective programs were at implementing their programs, we compared these measures to the targets established by awardees at the outset of the programs. When awardees did not set targets, we simply present the evidence.

Awardees used active and passive methods to enroll patients. Six awardees used active enrollment processes: eligible patients were actively recruited and enrolled into the program, usually by program staff (Table IV.A.5). For example, staff at both CSHP and AGH met prospective patients during an ED visit, hospital stay, or doctor visit, and enrolled the patients into the program during a subsequent encounter, either by telephone or in person. Six awardees used passive enrollment processes, in which eligible patients either received services from HCIA-funded staff or benefited from investments in other aspects of the health care delivery system (such as EHR systems and training), without a formal recruitment or enrollment process. Under passive enrollment, enrolled patients were not aware that they received intervention services. For example, at PeaceHealth, any patient who was part of an eligible provider panel and received services from an HCIA-funded position was considered a program enrollee. Two awardees (FLHSA and TransforMED) enrolled only practices, and two awardees (UHC and WIPH) enrolled both participants and practices.

Table IV.A.5. Enrollment strategies for patients and practices

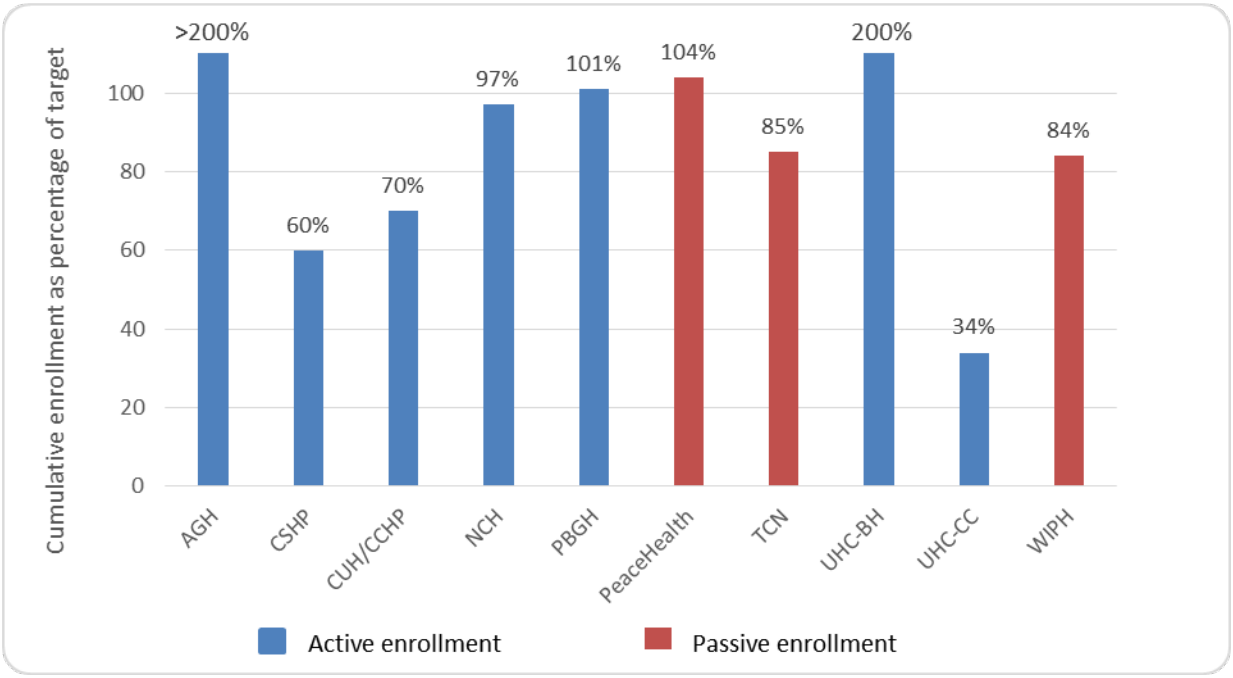
Enrollment strategy	Description of strategy	Awardees	Number of awardees
Active enrollment of participants	Eligible participants are actively recruited and enrolled into the program, usually by program staff.	AGH, CSHP, CUH/CCHP, NCH, PBGH, UHC	6
Passive enrollment of participants	Eligible patients either received services from HCIA-funded staff or benefited from investments in other aspects of the health care delivery system (for example, EHR systems or training), without any formal recruitment or enrollment process.	CareFirst, Denver Health, PeaceHealth, Sanford Health, TCN, WIPH	6
Practice enrollment	Programs conducted outreach to eligible practices and enrolled them in a program.	FLHSA, TransforMED, UHC, WIPH	4

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Note: UHC and WIPH enrolled both participants and practices.

Four awardees met or exceeded their patient enrollment goals; three others reached more than 80 percent of their enrollment targets. AGH, PBGH, PeaceHealth, and UHC's behavioral health services component exceeded their enrollment targets. As Figure IV.A.1 shows, more programs that actively enrolled patients met their enrollment targets compared with programs using passive enrollment. Among all awardees, the UHC complex care program was the furthest from reaching its enrollment target (reaching only 34 percent of its target goal). This program used a narrow set of criteria to identify patients eligible for the program; program staff also reported that they limited enrollment after realizing how much time was required to provide services to participants. All four awardees that enrolled practices either met (TransforMED) or exceeded (FLHSA, UHC, and WIPH) their targets for practice enrollment (data not shown).

Figure IV.A.1. Cumulative participant enrollment as a percentage of target



Sources: Quarterly awardee performance reports, June 2015 (for most awardees) and March 2015 (for UHC-CC).

Notes: UHC-BH refers to UHC's program component that provides integrated behavioral health services. UHC-CC refers to UHC's program component that provides clinical care and care coordination for children with complex chronic conditions. Programs that recruited practices are not shown. CareFirst, Denver Health, and Sanford Health did not report enrollment targets and are not displayed in this figure.

Common challenges to meeting enrollment targets included implementation delays, lack of staff capacity, and recruiting problems. First, delays in implementing programs prevented some awardees from enrolling participants in the beginning of their programs. For example, program staff at PeaceHealth were not prepared to provide program services until several quarters after the program launch date due to delays in hiring key staff and defining patient care protocols. External factors, such as long wait times for institutional review board approval or struggles in negotiating contracts with Medicaid managed care organizations (MCOs), delayed enrollment for TCN and NCH. Second, a lack of staffing capacity hampered enrollment in some programs. For example, as described earlier, UHC limited enrollment after realizing that the enrollment target for the complex care program underestimated the amount of time needed to provide services to the target population. TCN stopped enrolling patients in March 2015 after it reached 85 percent of its target enrollment to concentrate on collecting data for internal evaluation purposes instead of program operations. Third, some awardees struggled to recruit patients. For example, AGH and CUH/CCHP program staff encountered lower patient acceptance rates than anticipated. Both awardees found that enrolling patients who were not ready to make lifestyle changes to improve their health was difficult. AGH overcame this challenge by offering more training to staff in motivational interviewing. CUH/CCHP modified its recruiting approach by asking program staff to reduce the time they spent trying to persuade reluctant patients to join the program and instead to focus on patients who were ready to accept the benefits available to them.

The type of service measures tracked by awardees varied significantly, making comparisons across programs difficult. The kinds of service measures tracked by awardees and the way they defined these measures depended on the design and goals of each program. Although most awardees reported either the number of patient encounters in total or by component, even here we see variation. For example, TransforMED reported the number of office visits and follow-up telephone calls, whereas Sanford Health reported the number of encounters by type of staff. In addition, some awardees changed the definition of their measures over time. Although this may have been useful to awardees who collected data mainly for quality improvement, it made it difficult to assess trends in intermediate outcomes for purposes of the evaluation. For example, as its program matured, TransforMED eliminated several patient contact and process measures and replaced them with measures for assessing program effects on health outcomes. Finally, most awardees did not set specific service targets, and there are no standard benchmarks against which to compare implementation effectiveness across awardees.

Most patient encounters were by telephone, although there were exceptions. Table IV.A.6 presents one service measure reported by most awardees, the number of encounters in total and by program component. Reflecting the diversity in program characteristics, the total number of patient encounters reported by awardees ranged from 6,887 for AGH (a small program based in rural Maryland and Delaware) to 116,850 for PBGH (a large program with multiple providers across states). Most awardees that tracked the type of patient encounter as a service measure reported that at least 50 percent of encounters occurred via telephone. The exceptions are CUH/CCHP, TCN, and WIPH.

Eight awardees either met or exceeded their staffing goals. Of the 10 awardees that reported program staffing goals, 8 met or exceeded their goals (Table IV.A.7). Neither NCH nor TransforMED met their staffing goals, although both came close, meeting 75 percent or more of their staffing targets as of March 2015. Although UHC met its staffing target, staffing declined after spring of 2015 when program leaders combined two roles in an effort to more efficiently use their resources.

Only four awardees set training targets for staff. Of those four, PeaceHealth and Sanford Health met their training goals, whereas Denver Health and WIPH nearly met their goals as of March 2015 (Table IV.A.7). Some awardees reported other training measures, including percentage of program staff trained, total amount of time staff spent in training, and types of training sessions offered to and completed by program staff. For example, Sanford Health reported that as of December 2014, 105 staff had passed the Chronic Care Professional certification exam.

Recruiting and retaining staff was a common challenge. For example, the emotionally intense nature of staff responsibilities at CUH/CCHP made it difficult to hire and retain qualified applicants. WIPH faced similar challenges staffing small clinics and hospitals that did not have the resources to support program operations. Although Denver Health was able to recruit patient navigators for its program, the awardee experienced a high degree of turnover because high-performing patient navigators tended to leave the position to pursue higher levels of medical training.

Table IV.A.6. Number and type of participant encounters, by awardee

		Type of encounter	
	Number of encounters	In person	By telephone
AGH	6,887	18%	82%
CareFirst	47,450	7%	90%
CSHP	22,099	41%	57%
CUH/CCHP	10,869	54%	42%
Denver Health	66,507	28%	72%
NCH	26,812	44%	52%
PBGH	116,850	20%	76%
PeaceHealth	11,214	13%	87%
TCN	9,743	60%	37%
UHC	87,741	22%	72%
WIPH	52,470	59%	41%

Source: Quarterly awardee performance reports, June 2015.

Note: Total encounters indicate the cumulative number of participant encounters reported since the program launch date through March 2015. The breakdown by encounter type reflects only encounters occurring in the 11th quarter (from January through March 2015). Other types of encounters (not shown) include electronic communication, failed attempts to reach participants, or other unspecified ways. Because the table does not report other encounter types, the row percentages might not sum to 100 percent. FLHSA, Sanford Health, and TransforMED did not report these measures.

Table IV.A.7. Summary of staffing and training targets

	Awardees	Number of awardees
Reported staffing targets	AGH, CareFirst, Denver Health, FLHSA, NCH, PBGH, PeaceHealth, Sanford Health, TransforMED, UHC	10
Met or exceeded staffing target	Met: FLHSA Exceeded: AGH, CareFirst, Denver Health, PBGH, PeaceHealth, Sanford Health, UHC	8
Reported training targets	Denver Health, PeaceHealth, Sanford Health, WIPH	4
Met training target	PeaceHealth, Sanford Health	2

Source: Quarterly awardee performance reports, June 2015.

Note: CSHP, CUH/CCHP, and TCN did not report staffing or training targets or other training measures, and are therefore not shown in the table.

Implementing program components on schedule was positively associated with increased flexibility in operations and prior experience. For example, Denver Health and CSHP attributed their timeliness to the flexibility in their implementation design, which enabled participating sites to implement each program component on a different timeline. Eight awardees experienced delays of up to one year (although usually less) on minor components of the program (Table IV.A.8). For example, Sanford Health hired and trained staff and convened core teams on schedule, but faced delays in parts of its program operations, such as incorporating new screening tools and implementing remote monitoring devices. Sanford Health sites with prior experience in behavioral health integration reported fewer delays than sites that did not have this experience. In contrast to these programs' components with minor delays, CareFirst, PeaceHealth, and TransforMED experienced significant delays in program implementation, defined as delays of more than three months in more than half of the core program components. For example, TransforMED launched its program four months late while it awaited approval from CMMI for its final operational plan.

Common reasons for program delays included (1) disruptions caused by the adoption of new EHR systems or modules, (2) problems recruiting program staff, (3) difficulty negotiating new payment models with plans and payers, and (4) lags in obtaining data for patients' recruitment and screening. First, six awardees (AGH, PeaceHealth, Sanford Health, TCN, TransforMED, and WIPH) experienced delays in implementing new EHR systems. Of these, AGH and WIPH began offering other program services as part of their program goals without having a new, fully functioning EHR system. The other four awardees delayed implementation until the EHR was functional. Second, negotiating payment reform models with commercial insurers and Medicaid MCOs delayed program implementation for FLHSA, NCH, and UHC. For example, UHC expected to have shared-savings arrangements in place with the five Medicaid MCOs with which it contracted by the time it implemented its program. Although it was able to negotiate shared-shavings agreements with two MCOs close to its original schedule, agreements with two others took about one year longer and no agreement was reached with the fifth MCO. Third, CareFirst, PBGH, and UHC experienced delays due to difficulties in obtaining the data needed to recruit patients and assess their level of risk or eligibility for program services. All three of these awardees found other ways to assess risk and identify eligible patients without the data they had expected to use, although CareFirst was forced to delay all of its program components by more than a year. PBGH was able to implement its program on schedule by instead identifying eligible patients through direct referral by a primary care physician, transfer of patients from existing care management programs, and use of available hospital records. Finally, PeaceHealth, Sanford Health, and WIPH had trouble with recruiting and retaining qualified program staff. For example, PeaceHealth's two participating sites were located in remote island communities in southeastern Alaska, where recruiting and hiring was a challenge. WIPH faced difficulties hiring a program manager for its virtual pharmacy program due to hurdles related to hiring and contracting processes with the University of Wyoming.

Table IV.A.8. Degree of timeliness in program implementation

Degree of timeliness	Awardee	Number of awardees
Program implemented on schedule	CSHP, CUH/CCHP, Denver Health	3
Program experienced minor delays	AGH, FLHSA, NCH, PBGH, Sanford Health, TCN, UHC, WIPH	8
Program experienced significant delays	CareFirst, PeaceHealth, TransforMED	3

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015. Quarterly awardee performance reports, December 2012 through March 2015.

Note: Minor delays are defined as delays of up to one year (although usually less) on minor components of the program. Significant delays are defined as delays of more than three months in more than half of the core program components.

f. Key characteristics associated with effective program implementation

The characteristics of an intervention an organization is implementing, including the core design elements and adaptable peripheral elements, can have a significant effect on implementation effectiveness. Three program characteristics emerged as important drivers of implementation success among PCR awardees: (1) the ability to adapt program components to overcome implementation challenges, (2) the ability of frontline staff to tailor the intervention during implementation to maximize program effectiveness (user control), and (3) the perceived advantage of the program components relative to the standard delivery of care. At least one of these three program features emerged as a key facilitator in every PCR program, and in four programs, all three factors emerged as key facilitators. These features have been consistent over time; the same three characteristics emerged as the greatest facilitators during both rounds of site visits. However, in a few programs adaptability and user control created challenges for some staff. In this section, we discuss each characteristic in detail and provide examples from the 14 programs. Table IV.A.9 summarizes each of these program features and describes its importance in promoting implementation effectiveness.

The adaptability of program components to the local context is critical to overcoming implementation challenges and maximizing implementation effectiveness. Because awardees were encouraged to innovate, program adaptations were common across awardees. Three principal adaptations related to (1) eligibility requirements, identification, and enrollment of program participants; (2) staff roles and responsibilities; and (3) patient-centeredness.

First, several programs adapted their target populations and participant identification and enrollment strategies, usually to increase enrollment or focus resources on the highest-risk patients. For example, AGH expanded its disease categories from diabetes, chronic obstructive pulmonary disease, and chronic heart failure (CHF) to include all diagnoses that would benefit from PCMH-based services, including mental and behavioral health conditions. AGH also changed its approach to enrollment, offering the program to patients on the phone after hospital discharge rather than in person during hospitalization, when patients were often overwhelmed. Another example of adaptability occurred when PeaceHealth narrowed its transitional care target population from all patients discharged from the hospital to only those patients with CHF and diabetes, believing these two populations would benefit most.

Table IV.A.9. Summary of key program characteristics associated with effective implementation of PCR innovations

Program feature	Description	Importance for effective implementation	Awardees	Number of awardees
1. Adaptability	The innovation can be adapted and tailored to meet staff and participants' needs. Adaptability relates to the ability to define the intervention's core or critical elements, and not the soft periphery, which can be more readily adapted.	Program adaptations facilitated increasing or narrowing patients' enrollment, modifying staffing to increase efficiency and patient-centeredness, and aligning the program with the organizational structure of implementation sites.	AGH, CareFirst, CSHP, CUH/CCHP, FLHSA, NCH, PBGH, PeaceHealth, TCN, UHC	10
2. User control	Frontline staff are empowered to troubleshoot implementation challenges on their own and to modify how program components are applied in practice to meet patients' needs.	Giving frontline staff autonomy facilitated meeting patients' needs, modifying staff roles and workflows, and troubleshooting implementation challenges.	AGH, CareFirst, CSHP, Denver Health, NCH, PeaceHealth, Sanford Health, UHC	8
3. Perceived relative advantage	This innovation involves the perceived advantages by clinicians and other stakeholders of implementing the program versus the standard delivery of care.	Perceived relative advantage include fulfilling unmet patient needs and incorporating new data and processes that improve staff satisfaction, efficiency of patients' visits, and quality of care.	AGH, CSHP, CUH/CCHP, FLHSA, PBGH, PeaceHealth, Sanford Health, TCN, TransforMED, UHC, WIPH	11

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Second, program administrators adapted their staffing approaches in response to challenges as they arose, either adding new staff, changing existing staff roles, or changing staffing policies to better suit the program. For instance, CUH/CCHP added behavioral health staff to care teams to address participants' psychosocial needs, hospital-based staff to increase enrollment and improve the timeliness of post-discharge follow-up, and administrative support staff to improve efficiency. Similarly, UHC added ED case managers and community health workers to support its ED visit avoidance objective. UHC also merged the practice facilitator and chart reviewer roles to improve efficiency.

Third, program administrators adapted their interventions to better meet the needs of their participants after enrollment. For example, AGH developed the Keeping in Touch program to meet the needs of patients who no longer required care coordination services, but could benefit from less intensive follow-up care to manage their health conditions. CSHP also began offering services to graduated participants to help them transition out of the program and prevent regression. CUH/CCHP and some CSHP sites adapted the duration of their interventions to extend beyond the originally planned 60 to 90 days to prepare patients for successful transitions out of the program and to increase their ability to self-manage their conditions.

Giving frontline staff control over how they implement the intervention to meet an individual patient's needs, define staff roles and practice workflows, and address implementation challenges is an important facilitator in implementing PCR programs. Frontline staff most often tailored interventions in response to (1) participants' needs or (2) challenges unique to the practice setting. First, frontline staff often had flexibility to tailor the innovation in response to perceived gaps in participants' care. For example, NCH parent peer partners began administering their behavioral health assessments before family sessions rather than at admission, when families were often overwhelmed by paperwork. PeaceHealth's care coordinators had considerable flexibility to design care plans specific to patients, including the ability to schedule their own appointments and determine appropriate services for patients. In several programs, staff at practice sites independently determined which patients to target and how to identify and enroll them, within the programs' guidelines. For example, Sanford Health's program directed health coaches to target five conditions for adults and four for children, but staff at implementing sites chose which of these conditions to prioritize and often focused efforts on one or two conditions. In an effort to serve the patients most at-risk, CareFirst primary care providers (PCPs) developed their own processes for selecting and enrolling participants who met minimum eligibility criteria into care plans. Social workers at UHC modified their roles to better meet patients' needs, such as by traveling to homeless shelters or helping with college applications. Similarly, CSHP care team members cited their inability to modify target populations as limiting their ability to serve patients who could benefit from the respective interventions.

Second, several program administrators provided frontline staff the flexibility to customize workflows based on factors in their implementing practices. For example, PeaceHealth and Sanford Health practices varied in their implementation of team huddles, scheduling informal or formal huddles dependent upon staff preferences, time constraints, and spatial layouts. CareFirst PCPs and care coordinators worked together to determine their preferred approaches to team-based care, with some care coordinators meeting participants in the PCP's office and others conducting follow-up telephone calls. Providing physicians and other team members with autonomy over program implementation helped increase buy-in and improve programs' responsiveness to providers' and participants' needs and preferences.

The perceived relative advantage of PCR models over traditional delivery systems for primary care helped overcome frontline staff's resistance to adopting new practices and increased their motivation for program implementation. Across programs, respondents at all levels perceived their respective programs to have advantages over the standard delivery of patients' care. The most prominent perceived relative advantages of PCR programs were (1) fulfilling previously unmet needs for specific populations and (2) using health IT and new care team members to streamline clinical processes.

First, respondents perceived the programs to have a relative advantage over the standard of care because previously unmet patients' needs were being met, particularly psychosocial needs related to behavioral health conditions or participants' home environments. In several programs—including FLHSA, PBGH, PeaceHealth, Sanford Health, TCN, and UHC—stakeholders discussed the advantages of implementing a staffing structure that enabled ancillary

providers (such as nurse care managers, social workers, or community health workers) to provide care that was more patient-centered compared with the standard care delivered to high-risk patients. These new care team members were viewed as valuable for developing relationships with patients, building trust between patients and clinicians, and understanding and meeting individual patients' needs. Respondents from many programs noted how new staff helped address participants' psychosocial needs, which previously might have gone untreated. For example, TCN's community health workers were seen as invaluable to easing transitions for recently incarcerated participants and Sanford Health's behavioral health triage therapists helped identify, treat, and refer patients with anxiety and depression. Four programs that incorporated home visits— CSHP, PBGH, PeaceHealth, and WIPH— consistently noted advantages of home visits over office visits and telephone encounters, such as the ability to mitigate risks in the home and conduct thorough medication reviews.

Another perceived relative advantage of PCR programs over standard models of care was the increased efficiency of patients' visits and clinical workflows. For example, staff participating in TransforMED's initiative cited the actionability of new patient data reports, which informed providers' quality improvement efforts and enabled providers to drill down into patients' records to inform care plans. PeaceHealth's medical office assistants began scheduling lab tests before patients' appointments to improve the efficiency of visits for patients and providers. Staff at FLHSA cited improvements related to team-based care, noting that huddles with the physician, nurse, and care manager led to more efficient and effective pre-visit planning.

Although most awardees cited adaptability and user control as aiding program implementation, too much adaptation and flexibility on the front lines could function as a barrier to effective implementation. For example, some staff at CSHP cited rapid adaptations and frequent changes to care team roles as a barrier to program implementation, making the program feel "chaotic." AGH identified frontline staff's ability to tailor the intervention as both facilitating and challenging program implementation. AGH providers expressed frustration with inconsistency among care coordinators' approaches to care planning, and care coordinators similarly reported inconsistent expectations from providers. Taken together, these experiences suggests that there is a limit to the amount of adaptability and flexibility appropriate for frontline users and that some amount of consistency and standardization benefits implementation.

g. Process-related factors that were important determinants of implementation effectiveness

Among the 14 PCR awardees, we identified three common process-related factors that emerged as important for program implementation in both assessment years: (1) engaging clinical and nonclinical staff; (2) engaging other stakeholders, including participants; and (3) monitoring progress to guide program improvements. Although our first-year assessment identified a fourth factor, program resources, as important, it did not emerge as a critical factor in our second round of site visits. In this section, we discuss each factor and provide examples from the implementation experiences of the 14 PCR awardees. Table IV.A.10 describes these three factors and provides examples of how each facilitated and challenged program implementation.

Awardees engaged staff by integrating nonclinical staff into existing clinical practice and building capacity to facilitate program implementation. Some awardees also experienced challenges initiating or maintaining engagement among clinical and nonclinical staff because it was difficult to integrate new staff or engage busy clinicians. Awardees developed several strategies to facilitate engagement among frontline staff. First, several awardees (including CareFirst, FLHSA, PBGH, and WIPH) noted the importance of integrating nonclinical staff into existing clinical practice, largely to build trusted relationships with clinicians. They also acknowledged that integrating new staff and generating clinician buy-in takes time. Second, several awardees described the importance of building capacity by providing additional supports to clinical staff as a way to engage them in the HCIA programs. For instance, CUH/CCHP supported program staff through morning huddles, guidance from program managers, and additional trainings. WIPH reduced workloads to make time for the HCIA initiatives and supported staff via learning collaboratives. Sanford Health formed a leadership coalition that fostered political and financial support within the organization. Third, holding clinicians financially accountable for performance can also facilitate engagement, although we saw only one example of this: CareFirst scored providers on their engagement, which then affected their overall annual outcome incentive awards.

Many awardees experienced challenges initiating or maintaining engagement among clinician and nonclinician staff, though the reasons for this varied. First, several awardees did not fully understand the new nonclinician roles and had difficulty or were hesitant integrating them into existing care teams. For instance, Denver Health reported challenges integrating patient navigators into existing care teams and PeaceHealth clinical teams were initially hesitant to accept the new scrub-and-huddle process. Second, it was sometimes challenging to engage busy physicians in new initiatives. For example, WIPH reported that provider engagement was a challenge for some PCMH practices, especially those that did not have a designated physician champion to advocate for and lead transformation efforts. CSHP had difficulty engaging hospital physicians because the implementing sites were unaffiliated with these hospitals. Third, programs targeting high utilizer, high-needs populations (CSHP and CUH/CCHP) reported a risk of burnout for frontline staff, given the demanding nature of working with this high-needs population. Fourth, as discussed above, NCH and UHC found it difficult to implement changes that disrupted existing service contracts. The Medicaid managed care organizations (MCOs) already contracted with NCH were reluctant to implement new capitated contracts in support of the development of an accountable care organization (ACO) by a children's hospital partnering with NCH on the award. For UHC's program, providers were reluctant to implement intervention changes that might reduce the number of FFS visits—such as allowing telephone triage nurses to call in prescriptions for low-risk acute conditions—because they were concerned about a negative financial impact on their practices due to a decreased volume of patients with these conditions.

Table IV.A.10. Summary of important process-related factors in program implementation

Process factor	Description of process factor	Examples of process-related facilitators	Examples of process-related barriers	Number of awardees
Staff engagement	Recruiting and including appropriate staff in the implementation and use of the intervention	• Integrating nonclinical staff into existing clinical practice • Building capacity by providing additional supports to clinical staff, through morning huddles, trainings, and a leadership coalition • Holding clinicians financially accountable for care	• Integrating new nonclinician roles into existing care teams • Engaging busy clinicians • Risk of burnout for programs working with high utilizer populations • Implementing changes that disrupted existing service contracts	Facilitator: 8 Barrier: 8
Stakeholder engagement (including program participants)	Including individuals not directly staffed on the program, but important for effective program implementation (including program participants)	• Fostering relationships with diverse range of community partners to build robust network • Forming financial arrangements • Focusing on engagement of patients	• Engaging external stakeholders without direct involvement in the HCIA program, who might have had little incentive to participate • Experiencing turnover in staff among program partners • Difficulty engaging program participants weekly via telephone	Facilitator: 6 Barrier: 5
Self-monitoring	Reflecting and evaluating using quantitative and qualitative feedback about the progress and quality of the implementation	• Collecting, reporting, and analyzing a range of quality-of-care process and outcome metrics • Developing a data infrastructure to track workflows, program operations, and process/outcome measures • Reporting and analyzing metrics on a rapid-cycle time line • Providing technical assistance with self-monitoring data to practices and clinicians	• Obtaining necessary data to evaluate program effects • Anticipating that data would be of higher quality than were actually available • Lacking customary 90-day claims run-out in data • Investing more time than anticipated for data collection and reporting efforts • Requiring additional staff training to properly use online data platform	Facilitator: 9 Barrier: 5

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Note: Process-related factors might have emerged as both a facilitator and barrier for some awardees, as detailed in the individual program narratives.

Awardees engaged a range of other stakeholders, both external and internal to the programs—such as program participants—to facilitate implementation. Awardees also faced challenges engaging other stakeholders who did not have direct involvement in the program or when program partners experienced turnover among their staff. Most awardees had to engage external stakeholders—including hospitals, post-acute care facilities, social service organizations, primary care offices, political leaders, and other community-based organizations—to facilitate program implementation. First, awardees actively fostered relationships with a diverse range of external stakeholders to build a robust professional network of partners to ensure that they were aware of intervention services and would refer eligible patients to the program when appropriate. Second, some programs engaged external stakeholders in formal financial arrangements to encourage their support and buy-in. For example, UHC engaged four Medicaid MCOs in shared savings agreements and is pursuing a value-based payment contract with all five Medicaid MCOs in the state. Also, CUH/CCHP became certified to form a New Jersey Medicaid ACO with external partners and holds existing ACO agreements with other payers in the state. Third, awardees increasingly focused on patient engagement approaches to facilitate program implementation. For example, Sanford Health used motivational interviewing techniques to help patients set goals, and CUH/CCHP introduced a framework to ensure that intervention goal-setting was patient-driven.

Some awardees also faced challenges engaging external stakeholders. First, because they were not directly involved in the initiative, external stakeholders had little incentive to participate or might not have had objectives that fully aligned with those of the HCIA-funded organization. Second, one program, AGH, faced turnover in staff from its local health department partner, which resulted in an implementation delay during the program's first year. Finally, participant engagement was challenging for some awardees, particularly depending upon the mode and frequency of communication. For instance, CareFirst's intervention was delivered to patients almost exclusively through weekly telephone communication between care coordinators and Medicare participants. However, the program experienced challenges maintaining the expected frequency of telephone contact with patients because a weekly telephone connection was challenging, particularly at the beginning of the care plan when trust between the participant and the local care coordinator was being built, as well as toward the end of the care plan as the participant became more self-reliant.

Awardees collected and reported a range of self-monitoring metrics to guide program improvements, though they also experienced challenges related to data availability and quality. Several awardees integrated self-monitoring data into their programs, providing performance feedback on a regular basis or adjusting their operational plans or intervention models as needed. First, awardees collecting and reporting a range of quality of care process and outcome measures—including patient enrollment, hospitalization admissions and readmissions, ED visits, total costs, and number of care team hours spent treating patients—facilitated program implementation. Second, several awardees, such as CUH/CCHP and UHC, developed a data infrastructure to track workflows and program operations, as well as the measures described earlier. Third, two awardees used rapid-cycle reporting to adjust program operations as necessary. For example, FLHSA provided quarterly reports to help practices monitor progress, which included clinical, quality, and cost data. PeaceHealth's program administrators reviewed

program operations data on a weekly basis to make adjustments, and CUH/CCHP program staff reviewed dashboard data daily. Finally, technical assistance with self-monitoring data also facilitated program changes. For example, CareFirst program consultants met quarterly with panels to help identify care patterns among Medicare participants, aiming to increase quality and cost savings.

Incorporating data into PCR programs also brought challenges, including data availability and quality, time delays, intensive data collection and reporting efforts, and necessary training. Some awardees reported that available data were of lower quality than they expected for their programmatic purposes. For example, UHC obtained Medicaid data from the state vendor, but it had missing fields and other errors that took time to identify and correct. The data also lacked the necessary cost information. CareFirst and TransforMED reported that the customary 90-day run-out for Medicare FFS claims made their use for program improvement purposes problematic. CareFirst had difficulty using these data to accurately identify patients who could benefit most from receiving a care plan, and TransforMED practices were unable to use the data to evaluate when to make implementation and program improvements. AGH reported that the data collection and reporting efforts necessary for its self-monitoring purposes took a significant amount of staff time. NCH was unable to obtain state Medicaid data to evaluate program effects on outcomes, forcing it to refine its performance metrics. Finally, TCN clinic staff were initially unfamiliar with their online data platform and required additional training to collect baseline data correctly. PCR program administrators reported that clinicians and frontline staff benefited from developing an understanding and appreciation of the need for self-monitoring data to inform program implementation and progress because these data have not traditionally been used to provide clinical care.

h. Common internal and external factors that can facilitate or impede implementation effectiveness

The characteristics of the organization implementing a program and the features of the environmental context within which an organization operates can facilitate or impede program implementation. Given the relatively short implementation time frame, PCR programs had only limited influence on environmental factors that were external to their organizations. However, program administrators and staff took steps to help maximize the facilitators and minimize the barriers presented to program implementation by internal factors. The four most common internal and external factors that either facilitated or impeded program implementation were (1) team characteristics, (2) leadership of practice and organization administrators, (3) health IT, and (4) the needs of patients with complex conditions and limited patient and community resources. Table IV.A.11 describes these four factors and lists the awardees that cited them as facilitators or barriers. We discuss each factor in detail, and provide examples from the awardees funded under the PCR initiative.

Table IV.A.11. Summary of internal and external factors that can facilitate or impede effective implementation of primary care redesign innovations

Internal and external factors	Description of factor	Awardees	Number of awardees
1. Team characteristics	The extent to which those responsible for and affected by implementation communicate and collaborate	Reported as a facilitator: AGH, CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PBGH, PeaceHealth, Sanford Health, TCN, UHC	11
		Reported as a barrier: CSHP	1
2. Leadership	The extent to which organizational and practice leaders who were not directing the program affected implementation through support and leadership style	Reported as a facilitator: CSHP, CUH/CCHP, Denver Health, FLHSA, NCH, PBGH, UHC, WIPH	8
3. Health IT	The extent to which internal technological infrastructure or capacity and external technological trends influenced implementation of the innovation	Reported as a facilitator: CareFirst, PeaceHealth, TransforMED, UHC, WIPH	5
		Reported as a barrier: AGH, CareFirst, CSHP, Denver Health, PBGH, PeaceHealth, TransforMED, UHC, WIPH	9
4. Patients' needs and resources	The extent to which the needs and preferences of the target patient population affected implementation	Reported as a facilitator: UHC	1
		Reported as a barrier: AGH, CareFirst, CSHP, CUH/CCHP, Denver Health, NCH, TCN, UHC	8

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Effective teamwork, as evidenced by strong communication and collaboration among team members, was the most widely mentioned internal facilitator. All but three awardees cited positive team interaction as a key component of implementation success. In particular, providers and staff in both practice- and participant-focused programs described how communication eased what might have otherwise constituted barriers to team-based care. For example, PeaceHealth providers noted that communication on the part of newly hired care coordinators helped the providers to overcome initial concerns about collaboration. Other awardees described a sense of collective efficacy resulting from collaboration among care team members with diverse backgrounds. For example, physicians at TCN noted that community health workers helped the physicians to improve their responsiveness to patients. The only awardee that found team characteristics to be a barrier to effective implementation, CSHP, cited a structural cause. Specifically, frontline staff at one of CSHP's four implementation sites found that a fragmented supervisory structure, in which care team members working within separate disciplines all had separate clinical supervisors, inhibited team cohesion. Denver Health staff also mentioned the need for centralized clinical oversight, although this was not seen as a barrier to implementation due to improvements in supervision over the course of the award period.

Active support from practice, organization, and corporate leaders was critical to successful program implementation. Staff at both participant- and practice-focused programs noted that leaders' commitment to the interventions was a key factor in implementation success. Active support from leaders and practice champions was particularly important when program implementation required significant changes to normal clinical practice. For example, staff at FLHSA pointed to practice champions as drivers of the changes to work flows and team structures that were necessary to implement the intervention. Practice and organization leaders also supported program implementation by engaging staff and fostering staff morale. Frontline staff at both Denver Health and CUH/CCHP noted that supervisors supported and solved problems with them. CUH/CCHP staff saw this supportive relationship as leading to improved staff satisfaction and operational efficiency. Program leaders also promoted clinical excellence by contributing care coordination and care management expertise (CSHP), ensuring consistency of intervention activities across disparate settings (WIPH), empowering staff to seek ways to improve program quality (UHC), and encouraging team communication (FLHSA).

Health IT showed great promise but was often difficult to implement or did not have needed functionality, causing the need for workarounds. EHR implementation and use constituted a particular challenge for provider-based, practice-focused programs, including AGH, PeaceHealth, TransforMED, UCH and WIPH. These awardees described multiple problems with EHR functionality and integration. For example, staff at AGH, PeaceHealth, TransforMED, and UCH were challenged by the lack of linkages between separate EHR systems or between EHRs and other data systems. The absence of software interconnectivity and limited functionality forced program staff to resort to time-consuming manual data extraction or use of paper-based data systems. CSHP, a participant-focused, community-based program, struggled in a similar manner with specialized reporting software. Staff at one CSHP site double- and triple-coded participants' data into this program-specific software, an EHR, and Microsoft Excel spreadsheets. Similarly, staff at TransforMED found that integrating program-specific software was too time-consuming for an award period limited to three years. However, not all views of health IT were negative. For CareFirst, a statewide health information exchange facilitated program implementation, and for PeaceHealth, implementation of a new EHR in the primary care clinics facilitated several process improvements, even though there was a temporary loss of shared EHR functionality between hospital and clinics.

Programs struggled to meet the complex medical and social needs of many target populations, even when the programs were designed to do so. In general, awardees created their programs specifically to help people with complex or significant needs. However, staff in several programs encountered challenges in delivering care to such participants. For example, AGH was unable to engage some participants with complex behavioral health issues and ultimately discharged them from the program. Staff at CareFirst reported that it was challenging to develop care plans for Medicare participants, many of whom had multiple chronic diseases and more complex needs than CareFirst's less complex commercially insured patients. Likewise, programs had difficulty delivering effective care to participants with serious social needs. This was true even for those programs that included social workers or community health workers on care teams. Frequently cited social issues included unstable housing, lack of transportation, telephone and Internet connections, criminal records, and low literacy and education levels.

Multiple awardees described the negative effect of these issues on intervention efficacy. For example, Denver Health struggled to connect with participants without reliable telephone numbers. Staff at CSHP, CUH/CCHP and TCN remarked on the lack of stable housing for their participants and the way housing instability limited participants' ability to remain engaged in their care.

i. Sustainability and scalability of innovative models to transform the delivery of primary care

Two key factors in affecting lasting change in the health care delivery system will be the continuation of health care innovations after an initial start-up period and scaling up of the innovations to serve a larger population. In this section, we discuss awardees' plans and key strategies to sustain and scale their programs, or portions of their programs, after the end of HCIA funding (Table IV.A.12). There are several definitions for sustainability in the literature. For the purposes of this analysis, we define it as "the continued use of program components and activities for the continued achievement of desirable program and population outcomes" (Scheirer and Dearing 2011). Our analysis is based on information on awardees' plans for sustaining their programs without HCIA funding available as of June 2015.

Table IV.A.12. Sustainment of HCIA PCR award activities

Sustainment plans	Awardees	Number of awardees
All program activities with no or minor changes	CUH/CCHP, TCN	2
Some program activities with no or minor changes	AGH, Denver Health, FLHSA, NCH, Sanford Health, UHC, WIPH	7
Some program activities with significant changes	CSHP, NCH, PBGH, TransforMED, UHC, WIPH	6
Discontinue specific program activities	Denver Health, Sanford Health, UHC, WIPH	4
Unclear for some program activities	AGH, Denver Health, FLHSA, Sanford Health, UHC, WIPH	6
Unclear for all program activities	CareFirst, PeaceHealth	2

Source: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Note: An awardee can adopt multiple sustainment plans.

Nearly all of the awardees (12 of 14) planned to sustain at least one program activity beyond the HCIA funding period. Two awardees (CUH/CCHP and TCN) planned to sustain their entire programs as implemented. Seven awardees planned to sustain some activities of their programs largely as implemented. As shown in the table, 6 awardees planned to sustain activities with significant modifications, most commonly with reduced staffing or fewer sites compared to during the award. For example, at least one CSHP site planned to decrease staffing in its care management and coordination team, and NCH's partner hospital planned to decrease staffing in its behavioral health parent peer support intervention and decrease intensity of interactions in its complex care coordination intervention. Four programs had clear plans not to sustain certain program activities. All of these discontinued components were health IT-related, which had

limited adoption by providers, low demand by participants, or were start-up positions planned for phase out. Many awardees (6 of 14) had unclear plans for the sustainability of at least one activity of their programs. For example, many practices participating in FLHSA's program had plans for maintaining activities within their practices, but funding sources were less clear for central FLHSA staff serving multiple practices, such as practice improvement advisors. Two awardees (CareFirst and PeaceHealth) had considered several options for continued funding of their programs but had no concrete plans for continuing any specific services after the award.

Awardees used several, and sometimes multiple, strategies to promote program sustainability. We identified five main strategies: (1) planning for sustainability at the beginning and throughout the award, (2) integrating activities into existing programs or departments, (3) leveraging new payment models, (4) using new opportunities for FFS billing, and (5) developing partnerships and other mechanisms for sustainability (Table IV.A.13). Although many awardees focused on identifying new funding streams for their program activities, some successfully integrated at least some activities into the budgets of existing programs or departments in their organizations. Several awardees planned to sustain program activities by incorporating them into an existing ACO or including them in a newly formed ACO. Some awardees considered the potential to support activities using new Medicare billing codes for care management and transitional care, but they also expressed significant reservations due to documentation requirements and expected reluctance among participants related to required copays. Administrators at Sanford Health specifically planned not to use these codes because they felt the costs outweighed the benefits.

Sustainability was also influenced by providers' commitment to changes in care delivery and the challenge of transitioning to newer payment models. Several awardees noted that efforts to sustain award-funded activities would be driven in large part by a culture change among providers, including enthusiasm for the changes in care that occurred during the award and an increased focus on high quality, high-value care. Although many programs continued to describe challenges with culture change among providers, some also noted an unwillingness by providers to return to prior approaches to care. For example, Sanford Health initially faced reluctance to adopt the program from some physicians and difficulty integrating some new positions into practices, but by the end of the award, physician buy-in was sufficiently strong to motivate the organization's leadership to create plans for sustainability.

Many awardees expected to continue to face significant challenges in transitioning from older FFS-based payment models to newer quality-, cost-, or value-based models, particularly when there is resistance among payers to move to newer payment models. For example, NCH's partner children's hospital spent the course of the award negotiating with Medicaid MCOs for contracts similar to existing agreements with NCH's partner ACO, but the hospital was unable to establish these new contracts during the award due to MCOs' reluctance. Several respondents in Sanford Health's program noted a tension between the development of partially risk-based revenue streams for the organization overall and the continued use of primarily FFS compensation for individual providers.

Table IV.A.13. Strategies for sustainability among HCIA PCR awardees

Strategies	Examples
1. Planning for sustainability throughout the award	• PBGH incorporated sustainability planning from the beginning of its award and ran a sustainability academy series to provide technical assistance and training to participating medical groups during the last year of its award. • TransforMED worked with participating practices to identify billing opportunities and payment models available in the practices' regions. • NCH partnered with an existing pediatric Medicaid ACO and another children's hospital to build a new ACO in another region of its state. • UHC included negotiations with Medicaid MCOs in its planning and throughout its award.
2. Integrating activities into existing programs or departments	• Some CSHP sites integrated award-funded care teams into existing care coordination programs. • By the end of the award, Denver Health had integrated funding for two-thirds of award-funded staff into the health system's internal operational budget. • Most clinics participating in the TCN award plan to continue program activities by continuing to incorporate community health workers into primary care teams with modified responsibilities, such as more general case management. • NCH and its partner children's hospital integrated many award-funded positions into existing clinical departments or NCH's partner ACO.
3. Leveraging new payment models	• Sanford Health's status as a large, integrated health care system with its own health plan has enabled it to explore several payment models, including moving from volume-based to salary- and incentive-based compensation for employed physicians and risk-based contracts with nonemployed physicians. • Many practices participating in the FLHSA award joined one of two regional ACOs, which will support embedded care managers for the short term and then reevaluate. FLHSA worked with two commercial insurers to develop shared savings models that could be used by practices that are not part of an ACO. • During the award, CUH/CCHP entered into ACO agreements with one Medicaid MCO and a commercial insurer. In summer 2015, the state of New Jersey certified CUH/CCHP to form its own Medicaid ACO. • NCH was able to transition many positions to its partner ACO, which has existing capitated contracts with Medicaid MCOs. • During the award, UHC developed shared savings contracts with several Medicaid MCOs and explored opportunities for more comprehensive value-based contracts with Medicaid MCOs and commercial payers. • AGH joined an ACO in 2015 and expects financial incentives from Maryland's global payment model to support award-funded activities.
4. Using new opportunities for FFS billing	• WIPH encouraged sites to use new billing codes for Medicaid and private insurers for telehealth. • UHC developed plans for direct billing for several award-developed activities, including ED crisis intervention, telehealth hub visits, after-hours clinic visits, and care coordination. • Denver Health was able to begin to bill for behavioral health visits on the same day as physical health visits after a reform of Medicaid payment in Colorado.
5. Developing partnerships and other mechanisms for sustainability	• One CSHP site created an independent foundation to take over management and financial responsibility for award-funded activities and, in turn, contract with other provider groups to provide care management. • CUH/CCHP is conducting a randomized controlled trial with external support to test the effectiveness of the program and build support from funders. • The WIPH medication donation program will continue as a partnership with the Wyoming Department of Health.

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

Of the 14 HCIA PCR awardees, 10 were able to scale up program activities during the award or had concrete plans to do so following it (Table IV.A.14). Scaling up, and the related concept of spread, can be defined as "deliberate efforts to increase the impact of health service innovations successfully tested in pilot or experimental projects as to benefit more people and to foster policy and program development on a lasting basis" (Simmons et al. 2007). The scale-up and spread of awardee activities was achieved through one or a combination of three approaches: (1) direct internal, (2) direct external, and (3) indirect. Direct internal scaling up refers to the expansion of activities in settings directly under the control of the awardee organization. Direct external scaling up refers to expansion of activities in settings not directly under the control of the awardee organization. Indirect scaling up refers to the creation of models and resources that support the adoption of activities by other organizations.

Table IV.A.14. Approaches to scale-up and spread of HCIA PCR awardee activities

Approach	Number of awardees	Awardees	Examples
1. Direct internal	6	AGH, CSHP, Denver Health, NCH, PBGH, UHC	• Denver Health planned to expand its care coordination activities to its geriatric and HIV clinics. • NCH increased the scope of its behavioral health parent peer partners program to include caregivers of children with behavioral health needs admitted to hospital medical units.
2. Direct external	5	AGH, FLHSA, NCH, TCN, TransforMED	• FLHSA noted that the larger medical groups and health systems of participating practices began to adopt many similar PCMH and care management processes based on the perceived benefits of these efforts.
3. Indirect	3	CUH/CCHP, NCH, TCN	• CUH/CCHP and TCN made training materials, job descriptions, and other resources freely available online to other provider and community organizations interested in learning how to implement their models.

Sources: Review of program documents and telephone and in-person interviews with program administrators and frontline staff during site visits, March - May 2015.

B. Effects on clinicians' attitudes and beliefs

1. Introduction

The goal of the HCIA Primary Care Redesign Clinician Survey was to collect data on certain aspects of program implementation effectiveness and contextual factors, including those endogenous to the organization such as leadership and physician buy-in to the program, as well as exogenous factors such as the larger policy context. Information gathered from interviews with program leadership and frontline staff at selected practices or satellite offices through site visits provided important insights into the implementation process. Although these in-person interviews provide a rich source of data, views from the leadership and staff are limited to a small number of practice locations and might not reflect the perspectives of clinicians practicing at other sites. In order to assess perspectives of clinicians more broadly, we administered the HCIA Primary Care Redesign Clinician Survey to clinicians in fall 2014, the third year of the

HCIA-funded program. Data from the survey provide additional insights into the implementation process and experience, as well as the contextual factors that might affect implementation effectiveness.

The survey questions focused primarily on day-to-day clinician work experiences, familiarity with HCIA program interventions, and perceptions of program facilitators and barriers.

In this section, we summarize the HCIA Primary Care Redesign Clinician Survey findings related to program familiarity (Section IV.B.2.a), training (Section IV.B.2.b), implementation barriers and facilitators (Section IV.B.2.c.), and perceived effects on patients' care (Section IV.B.2.d). The data presented come from the first round of the survey, conducted in fall 2014; additional, awardee-specific data are available in the individual program summaries in Volume II of this report. Future reports will describe a second round of the survey, conducted in spring and summer 2015.

To protect respondents' confidentiality, we report findings only when the denominator is greater than 11 respondents. As a result, we are not presenting data from two awardees, AGH and PeaceHealth. In addition, we have excluded data from some tables when the total number of clinicians in a given table cell was fewer than 11 respondents. Finally, due to the nature of their HCIA programs, clinicians from NCH were not surveyed, and clinicians associated with CSHP and CUH/CCHP were not asked survey questions about training and program implementation barriers and facilitators.

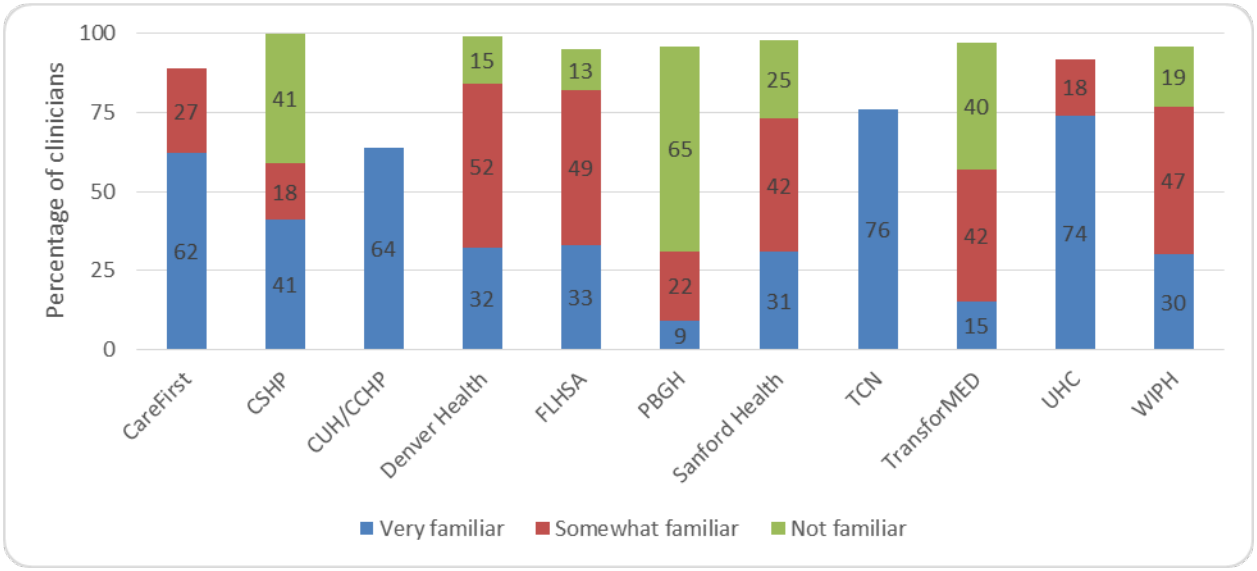
2. Findings

a. Program awareness

More than half of responding clinicians from 10 PCR programs were somewhat or very familiar with the HCIA initiative being implemented. Clinicians responding that they were very familiar with the program ranged from 9 percent (PBGH) to 76 percent (TCN) (Figure IV.B.1). Respondents unfamiliar with the HCIA program ranged from 13 percent (FLHSA) to 65 percent (PBGH). Some awardees that directly employ clinicians, such as Denver Health and Sanford Health, had high levels of clinician familiarity with the HCIA program, although we also see high levels of familiarity at CareFirst, FLHSA, UHC, and WIPH, awardees that do not directly employ all the clinicians that participate in their PCR programs.

PBGH, CSHP, and TransforMED had the highest percentages of clinicians reporting that they were unfamiliar with the program (65, 41, and 40 percent, respectively). Both PBGH and TransforMED are large, external organizations that work with many medical groups and associated practice locations but do not employ the responding clinicians. These results suggest it is possible that that information about the programs did not filter down to the clinician level, or that the clinicians were unaware that changes occurring at their practice sites were related to the HCIA program interventions. For the PCR program implemented by CSHP, the program was

Figure IV.B.1. Familiarity with HCIA initiative



Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: This figure excludes AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Totals do not sum to 100 percent because of rounding or not reported cells with fewer than 11 cases.

aimed at changing care through community-based approaches, and not necessarily changing the way practices operate; as a result, clinicians surveyed may not have experienced changes at their practice sites. As a result, many of the subsequent analyses presented in Sections IV.B.2.b through IV.B.2.d exclude responses from these clinicians, because those who were not at least somewhat familiar with the program were not asked follow-up questions about training, implementation and effects (and as noted earlier, CSHP clinicians were already excluded from many of these questions because of the nature of that HCIA program).

b. Training

More than half of responding clinicians from seven awardees received training related to the program. Respondents who reported they were somewhat or very familiar with the HCIA intervention answered a series of follow-up questions about training they might have received related to the program. The percentage of clinicians reporting receipt of training ranged from a low of 29 percent of clinicians from Denver Health to a high of 91 percent of clinicians from UHC (Table IV.B.1). Likewise, the number of hours of training varied among awardees: clinicians from CareFirst and Denver Health reported 5 hours of training on average, whereas clinicians from TCN and WIPH reported close to 20 hours of training on average. The variation in the amount and type of training received by clinicians is likely to be an important factor in explaining the differing levels of clinician buy-in and the perceived effect of the program on patient care.

Table IV.B.1. Percentage of clinicians who received training and mean number of training hours, by awardee

Awardees	Percent of Clinicians Who Received Training (%)	Mean Number of Hours
CareFirst	63	4.8
Denver Health	29	5.5
FLHSA	71	13.5
PBGH	31	11.0
Sanford Health	79	9.6
TCN	75	19.6
TransforMED	57	10.5
UHC	91	9.9
WIPH	66	17.9

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: This table excludes AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Clinicians from CSHP and CUH/CCHP were not asked the survey questions about receipt of training.

c. Implementation facilitators and barriers

To assess perceptions of facilitators of and barriers to program implementation, we asked about elements that affect program implementation related to (1) level of funding, program documentation requirements, time commitment, and personnel; (2) availability of community resources, relevant patient and evidence-based care information, and required use of technology; and (3) intrapractice and external communication. We asked respondents to rate these factors on a scale from one to five, where one equaled a very positive impact on program implementation and five equaled a very negative impact on program implementation. Respondents also could answer *not applicable* or *don't know.* For ease of data presentation, we have combined the responses *very positive* and *positive* into *positive* impact and *somewhat negative* and *negative* into *negative* impact categories.

Across programs, clinicians were the most positive about the effect of personnel on program implementation, and most negative about the amount of time and documentation programs required. The percentage of clinicians rating the impact of personnel availability on program implementation as positive or very positive ranged from 22 percent (WIPH) to 79 percent (TCN) (Table IV.B.2). More than half of clinicians responding from five awardees—CareFirst, Denver Health, FLHSA, TCN, and UHC—rated the availability of personnel as positive or very positive. More than half of clinicians from four awardees—CareFirst, Denver Health, FLHSA, and UHC—rated the level of program funding as positive or very positive. However, across all awardees, about one-quarter to one-half of clinicians reported that they did not know the effect of program funding on implementation. This low level of knowledge could indicate a lack of involvement or awareness among responding clinicians of the overall structure of the PCR program.

Across awardees, many clinicians either were neutral on, or negatively rated, the amount of time and the amount of required documentation the HCIA programs required. Both factors might be sensitive subjects for clinicians who have many demands on their time. Comparing these results with those of the second round of the clinician survey will help us to understand if clinicians adjusted to these new demands, or if they continue to feel burdensome.

Table IV.B.2. Perceptions of the impact on HCIA program implementation: Funding, time and documentation requirements, and availability of personnel

		Level of program funding		Amount of required documentation		Amount of time required		Availability of personnel	
Awardee	Rating	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
CareFirst	Positive	42	55%	26	32%	11	34%	52	68%
	Neutral	11	15%	24	32%	28	38%	14	19%
	Negative	-	--	12	16%	11	15%	--	--
	Don't know/n.a.	19	26%	--	--	--	--	--	--
Denver Health	Positive	38	56%	--	--	12	18%	45	66%
	Neutral	--	--	23	35%	19	29%	--	--
	Negative	--	--	--	--	13	19%	--	--
	Don't know/n.a.	23	35%	32	49%	22	33%	12	18%
FLHSA	Positive	49	67%	17	23%	16	22%	53	59%
	Neutral	--	--	30	41%	18	25%	13	18%
	Negative	--	--	17	23%	23	32%	11	15%
	Don't know/n.a.	16	22%	--	--	15	21%	--	--
PBGH	Positive	33	33%	28	28%	22	22%	46	46%
	Neutral	15	13%	26	26%	24	24%	15	15%
	Negative	--	--	--	--	18	18%	--	--
	Don't know/n.a.	44	44%	34	34%	31	68%	27	27%
Sanford Health	Positive	31	35%	13	15%	15	17%	38	44%
	Neutral	14	16%	39	45%	23	26%	25	29%
	Negative	--	--	19	22%	34	39%	11	13%
	Don't know/n.a.	41	47%	16	18%	16	18%	13	15%
TCN	Positive	--	--	--	--	--	--	11	79%
	Neutral	--	--	--	--	--	--	--	--
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	--	--	--	--	--	--	--	--
TransforMED	Positive	51	28%	29	16%	26	14%	52	28%
	Neutral	34	18%	78	42%	52	28%	61	33%
	Negative	12	6%	43	23%	74	40%	34	18%
	Don't know/n.a.	84	45%	33	18%	31	17%	36	29%
UHC	Positive	46	58%	21	27%	18	23%	49	60%
	Neutral	11	14%	37	47%	26	3%	16	20%
	Negative	--	--	--	--	33	41%	--	--
	Don't know/n.a.	21	26%	--	--	--	--	--	--
WIPH	Positive	--	--	--	--	--	--	14	22%
	Neutral	11	17%	17	27%	13	20%	15	24%
	Negative	--	--	33	52%	41	64%	27	43%
	Don't know/n.a.	33	52%	--	--	--	--	--	--

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: -- indicates that the number of respondents in the cell is fewer than 11. This table excludes AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Clinicians associated with CUH/CCHP and CSHP were not asked survey questions about program implementation. Positive responses include very positive and positive; negative responses include very negative and negative. Row totals do not sum to 100 percent because of rounding or unreported cells.

n.a. = not applicable.

Across awardees, clinicians were most positive about the availability of community resources and relevant patient information, and least positive about evidence-based clinical information at the point of care and the use of health IT. The survey asked clinicians to rate the effect of the availability of community resources, relevant information about patients, evidence-based clinical information at the point of care, and required use of health IT on overall program implementation. Across awardees, perceptions of positive or very positive effects about the availability of community resources ranged from 30 percent (WIPH) to 64 percent (FLHSA) (Table IV.B.3). More than half of clinicians associated with five awardees—CareFirst, Denver Health, FLHSA, PBGH, and UHC—rated the availability of community resources as positive or very positive, and nearly half of clinicians at Sanford Health also rated this factor positively. Many clinicians also were positive about the effect of having patients' information available at the point of care; across awardees, perceptions of positive or very positive effects ranged from 41 percent (Denver Health) to 69 percent (TCN).

Fewer clinicians rated the availability of evidence-based information at the point of care as having a positive impact on program implementation. Positive responses on this factor ranged from 21 percent at Denver Health to 57 percent at UHC; UHC was the only awardee for which the percentage of clinicians rating this factor positively exceeded 50 percent. It is worth noting that the percentage of clinicians who were unable to give a response to this question ranged from 17 percent at Sanford Health to 44 percent at Denver Health. Finally, like most of the factors included in the survey, when clinicians were asked about whether the required use of HIT had a positive or negative effect on how the program was implemented, their responses varied. Positive ratings on required use of health IT ranged from 29 percent at Denver Health to 49 percent at CareFirst. Many clinicians were neutral about the required use of health IT; neutral responses on this factor ranged from 20 percent at PBGH to 35 percent at UHC.

In general, clinicians had the most positive ratings about the general quality of communications with other allied health professionals not necessarily related to other HCIA interventions. However, there were fewer positive views on the general quality of communications with other primary care providers and specialists not connected with HCIA. This pattern was true for nearly every awardee (Table IV.B.4). There were some exceptions: for example, at UHC, clinicians rated the quality of communications with specialists slightly more positively than communications with allied health professionals (54 versus 49 percent); at Sanford Health, clinicians rated communications with allied health professionals and primary care providers the same (both had positive ratings of 51 percent); and at WIPH, where more clinicians positively rated communications with primary care providers (32 percent) and specialists (27 percent) than communications with other allied health professionals (24 percent). At TCN, 88 percent of responding clinicians reported that the quality of their communications with allied health professionals had a positive or very positive impact on program implementation. This was the highest positive percentage seen on any of the communication measures included in the survey. Across all of these communications measures and all awardees, negative and neutral responses accounted for less than 40 percent of responses. However, many clinicians also answered *don't know/not applicable* to this series of questions. These results might indicate that it was too early to know what the impact of these factors on program

Table IV.B.3. Perceptions of the impact on HCIA program implementation: Community resources, information, and required use of health IT

Awardee	Rating	Availability of community resources		Availability of relevant patient information		Availability of evidence-based information at the point of care		Required use of health IT	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
CareFirst	Positive	45	59%	42	55%	28	38%	36	49%
	Neutral	15	20%	19	25%	22	30%	21	29%
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	11	15%	11	15%	22	30%	--	--
Denver Health	Positive	37	54%	27	41%	14	21%	19	29%
	Neutral	11	17%	21	32%	22	33%	21	32%
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	16	25%	18	27%	29	44%	24	37%
FLHSA	Positive	47	64%	38	52%	29	40%	33	45%
	Neutral	15	21%	23	32%	26	36%	22	30%
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	--	--	--	--	14	19%	--	--
PBGH	Positive	53	53%	50	50%	37	37%	38	38%
	Neutral	16	16%	14	14%	21	21%	20	20%
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	26	26%	28	28%	36	36%	30	30%
Sanford Health	Positive	41	47%	38	43%	42	48%	33	38%
	Neutral	22	25%	28	32%	26	30%	27	31%
	Negative	--	--	--	--	--	--	16	18%
	Don't know/n.a.	18	20%	16	18%	15	17%	12	14%
TransforMED	Positive	66	36%	77	42%	71	38%	77	42%
	Neutral	62	34%	53	29%	66	36%	44	24%
	Negative	15	8%	17	9%	--	--	33	18%
	Don't know/n.a.	40	22%	36	20%	33	18%	27	15%
TCN	Positive	--	--	11	69%	--	--	--	--
	Neutral	--	--	--	--	--	--	--	--
	Negative	--	--	--	--	--	--	--	--
	Don't know/n.a.	--	--	--	--	--	--	--	--
UHC	Positive	46	57%	42	52%	46	57%	27	34%
	Neutral	12	15%	24	30%	18	23%	28	35%
	Negative	--	--	--	--	--	--	12	15%
	Don't know/n.a.	20	25%	11	13%	14	18%	13	16%
WIPH	Positive	19	30%	27	43%	30	48%	24	38%
	Neutral	21	33%	17	27%	15	24%	14	22%
	Negative	--	--	--	--	--	--	17	27%
	Don't know/n.a.	15	24%	8	16%	14	22%	--	--

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: -- indicates that the number of respondents is the cell is fewer than 11. This table excludes awardees AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Clinicians associated with CUH/CCHP and CSHP were not asked the survey questions about program implementation. Positive responses include very positive and positive; negative responses include very negative and negative. Row totals do not sum to 100 percent because of rounding or not reported cells.

n.a. = not applicable.

Table IV.B.4. Perceptions of the impact on HCIA program implementation: Communication with allied health professionals and other providers

Awardee	Rating	Quality of interpersonal communications with other allied health professionals		Quality of interpersonal communications with other primary care providers		Quality of interpersonal communications with specialists	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
CareFirst	Positive	39	51%	34	46%	29	39%
	Neutral	18	24%	17	--	--	27%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	13	18%	20	27%	--	21%
Denver Health	Positive	33	53%	27	42%	22	33%
	Neutral	17	27%	19	29%	23	35%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	12	19%	19	29%	21	32%
FLHSA	Positive	48	67%	37	51%	26	37%
	Neutral	13	18%	22	30%	27	37%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	--	--	10	14%	16	22%
PBGH	Positive	47	47%	43	43%	39	39%
	Neutral	20	20%	17	17%	22	22%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	26	26%	29	29%	32	32%
Sanford Health	Positive	44	51%	42	51%	41	47%
	Neutral	21	24%	25	24%	26	30%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	16	19%	17	19%	16	18%
TCN	Positive	14	88%	--	--	--	--
	Neutral	--	--	--	--	--	--
	Negative	--	--	--	--	--	--
	Don't know/n.a.	--	--	--	--	--	--
TransforMED	Positive	83	45%	75	41%	62	34%
	Neutral	44	24%	59	32%	66	36%
	Negative	--	--	--	--	--	
	Don't know/n.a.	46	25%	40	22%	48	26%
UHC	Positive	38	49%	30	38%	44	54%
	Neutral	21	27%	21	27%	19	24%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	14	18%	24	30%	13	16%
WIPH	Positive	15	24%	20	32%	17	27%
	Neutral	24	39%	21	33%	23	37%
	Negative	--	--	--	--	--	--
	Don't know/n.a.	15	24%	15	24%	15	24%

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: -- indicates that the number of respondents is the cell is fewer than 11. This table excludes awardees AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Clinicians associated with CUH/CCHP and CSHP were not asked the survey questions about program implementation. Positive responses include very positive and positive; negative responses include very negative and negative. Row totals do not sum to 100 percent because of rounding or not reported cells.

n.a. = not applicable.

implementation would be at the time of the survey (about two years after the programs were implemented).

d. Clinicians' perceptions of HCIA's effects on aspects of patients' care

A majority of clinicians from eight awardees had positive perceptions of the programs' effect on quality of care. Clinicians reported on their perceptions of the effect of the HCIA program on five aspects of patient care: quality, timeliness, efficiency, safety, patient-centeredness, and equity (Table IV.B.5). In general, many clinicians rated effects on quality of care and ability to respond in a timely way to patients' needs positively. For example, at the high end of the range, 100 percent of TCN clinicians reported a positive impact on quality of care and 88 percent of TCN clinicians reported a positive impact on ability to respond to patients' needs in a timely way. TransforMED and WIPH were the only awardees for which fewer than half of clinician respondents rated these two measures positively.

Across awardees, more than half of clinicians reported positive effects of the HCIA program on the patient-centeredness of the care they provided. The percentage of clinicians reporting a positive impact on patient-centeredness ranged from 51 percent among UHC clinicians to 94 percent among TCN clinicians. About one-fifth to one-quarter of clinicians at PBGH, TransforMED, and WIPH responded that it was too soon to tell the impact on patient-centeredness.

Compared with the other measures of patients' care, clinicians were less positive about program effects on efficiency, safety, and equity, although there were exceptions. Exceptions included TCN, where most clinicians responding rated all of these measures positively, and CUH/CCHP, where nearly three-quarters of clinicians reported a positive effect on equity (small samples sizes prevented responses from CUH/CCHP on the other two measures). In general, positive ratings on efficiency and equity hovered between 30 and 40 percent for most awardees. Across these three measures, the survey found more positive effects reported on safety issues, with more than 40 percent of clinicians at most awardees positively rating program implementation effects on safety.

e. Conclusion

The HCIA Primary Care Redesign Clinician Survey results suggest significant variation in clinician experiences with and attitudes toward the HCIA awards. Despite this variation, there are several notable patterns in the data. First, at the time the survey was taken, a majority of clinicians anticipated the award would have a positive effect on patient care. Second, many clinicians experienced the program implementation as burdensome in terms of the amount of time and documentation required. Finally, clinician attitudes were consistent within awardees. For example, clinicians from TCN were consistently positive about the award, while those at WIPH generally gave the most negative ratings across all items. This speaks to a larger issue with burnout and culture among the awardees. As discussed in the individual program summaries, these findings are generally consistent with the implementation site visit findings. The second round of the HCIA Primary Care Redesign Clinician Survey, conducted in 2015, will

Table IV.B.5. Five perceptions of the HCIA program impact on aspects of care

		Quality of care		Ability to respond in a timely way to patients' needs		Efficiency		Safety		Patient-centeredness		Equity of care for all patients	
Awardee	Rating	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
CareFirst	Positive	52	69%	54	71%	28	37%	36	47%	57	75%	29	38%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	--	--	--	--	22	29%	23	31%	--	--	19	25%
	Too soon	13	17%	12	16%	19	25%	13	18%	11	15%	24	32%
CUH/ CCHP	Positive	13	72%	13	72%	--	--	--	--	11	65%	13	72%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	--	--	--	--	--	--	--	--	--	--	--	--
	Too soon	--	--	--	--	--	--	--	--	--	--	--	--
Denver Health	Positive	46	68%	45	66%	27	40%	28	42%	47	69%	27	40%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	--	--	11	16%	20	30%	19	29%	--	--	15	22%
	Too soon	15	22%	--	--	15	22%	18	27%	12	18%	23	34%
FLHSA	Positive	48	65%	44	59%	28	38%	40	54%	52	70%	33	45%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	--	--	19	26%	19	26%	17	23%	--	--	27	37%
	Too soon	17	23%	--	--	17	23%	17	23%	13	18%	13	18%
PBGH	Positive	52	52%	53	53%	41	41%	44	44%	53	53%	32	32%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	13	13%	18	18%	21	21%	18	18%	14	1%	26	26%
	Too soon	32	32%	25	25%	32	32%	33	33%	28	29%	37	37%
Sanford Health	Positive	49	56%	47	53%	32	36%	38	43%	51	58%	30	34%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	17	19%	24	27%	24	27%	26	30%	20	23%	31	35%
	Too soon	20	23%	16	18%	21	24%	22	25%	15	17%	23	26%
TCN	Positive	16	100%	14	88%	11	69%	11	69%	15	94%	15	94%
	Negative			--	--	--	--	--	--	--	--	--	--
	No impact			--	--	--	--	--	--	--	--	--	--
	Too soon			--	--	--	--	--	--	--	--	--	--
TransforMED	Positive	86	47%	62	34%	58	31%	76	41%	102	56%	49	26%
	Negative	--	--	--	--	21	12%	--	--	--	--	--	--
	No impact	38	21%	60	33%	45	25%	55	30%	30	17%	68	38%
	Too soon	57	31%	56	31%	58	32%	47	26%	45	25%	58	32%
UHC	Positive	61	75%	41	51%	27	33%	35	43%	41	51%	37	46%
	Negative	--	--	--	--	--	--	--	--	--	--	--	--
	No impact	34	43%	27	33%	34	49%	36	44%	27	33%	32	39%
	Too soon	--	--	--	--	--	--	--	--	--	--	--	--
WIPH	Positive	24	38%	18	28%	13	20%	24	38%	34	55%	14	22%
	Negative			--	--	25	39%	--	--	--	--	--	--
	No impact	15	23%	18	28%	11	17%	17	27%	13	21%	28	44%
	Too soon	18	28%	19	30%	15	23%	19	30%	13	21%	18	29%

Table IV.B.5 *(continued)*

Source: HCIA Primary Care Redesign Clinician Survey Round 1.

Note: -- indicates that the number of respondents is the cell is fewer than 11. This table excludes awardees AGH and PeaceHealth due the small size of their respondent groups, and NCH, which was excluded from the HCIA Primary Care Redesign Clinician Survey because of the nature of its program. Row totals do not sum to 100 percent because of rounding or not reported cells.

n.a. = not applicable.

provide data on whether clinician attitudes remain consistent over time, or change as they become more accustomed to the programs.

C. Impacts on patient outcomes

1. Introduction

In this section, we summarize findings from the impact evaluation for the 10 awardees with quantitative results. In Section IV.C.2, we describe the characteristics of the treatment groups across awardees, grouped by the type of intervention introduced in Section II.C.4. In Section IV.C.3, we summarize the preliminary conclusions about program impacts in three domains: (1) quality-of-care outcomes, (2) service use, and (3) spending. In the final section, IV.C.4, we briefly describe the characteristics of the interventions for which we conclude, based on the evidence available thus far, that the program had a favorable impact on patient outcomes in at least one domain. More information is available about each individual awardee in Volume II of this report (individual program summaries).

As noted previously, the results in this report are preliminary because they cover only Medicare FFS beneficiaries and do not include claims data beyond December 2014 (or January 2015 for CareFirst and Denver Health). More recent data are needed to cover the final months of each HCIA-funded intervention. In addition, in the future we might assess program impacts on Medicaid beneficiaries if Medicaid claims or encounter data become available. Results for some awardees are likely not generalizable to the full program population served because of the current limitations in data availability. Finally, future analyses might also add new outcomes (particularly quality-of-care measures) and further assess the robustness of results to model assumptions. The third annual report, due in 2016, will update our impact conclusions for all awardees. That report will also compare impact estimates across awardees, analyzing why some programs might be more effective than others.

2. Characteristics of the treatment groups at the start of the intervention, by intervention type

We present information on the size and characteristics of each awardee's treatment group (Table IV.C.1) at the start of the intervention because this demonstrates the extent to which awardees differed in their populations served and provides context for interpreting the results of impact analyses. These differences in the treatment groups stemmed from (1) fundamental differences in the intervention, as captured by the three intervention types; and (2) within each intervention type, substantial variation in the scope of the intervention and specific target populations. For these reasons, we describe the treatment group characteristics for each intervention type, highlighting similarities and differences within each one. We focus on characteristics at the start of the intervention, rather than after the intervention began, so that our descriptions of the populations are not confounded by any impact the program had on beneficiary characteristics. The exact time period that counts as the start of the intervention varies by type of awardee. For example, for some awardees we set the start of the intervention to the date that primary care practice joined the program and for others we set it to the date that individual beneficiaries enrolled in the program or otherwise first entered the treatment group. See Volume II (individual program summaries) for full definitions and further characteristics of each

Table IV.C.1. Characteristics of the treatment group (Medicare FFS beneficiaries) at the start of the intervention, by awardee and intervention type

Awardee (program component)	Number of Medicare FFS beneficiaries in treatment group at the start of the intervention[a]	Number of practices	Medicare FFS beneficiary pre-intervention characteristics			
			Disability as original reason for Medicare entitlement (%)	Mean HCC risk score	All-cause inpatient admissions, mean in prior year unless noted (#/1,000 patients/quarter)	Percentage dually enrolled in Medicare and Medicaid
Medicare FFS average, 2012	n.a.	n.a.	16.7[b]	1.00	74[c]	21.7[d]
Intervention type: Practice transformation						
CareFirst	10,550	14[e]	15.0	2.00	161	0[f]
Denver Health	6,199	8[g]	68.9	1.34	168 (prior 3 months)	71.0
FLHSA	13,391	38	42.7	1.12	76	30.7
PeaceHealth	846	2	23.4	1.04	70	25.4
Sanford Health	12,413	15	18.0	1.17	89	11.6
TransforMED	86,314	87	25.2	1.12	79	19.7
WIPH (PCMH)	10,968	18	21.5	0.95	73	17.5
Intervention type: Care management for high-risk beneficiaries						
CSHP	115	n.a.	80.9	3.9	1,043	72.2
CUH/CCHP	21	n.a.	57.1	3.8	1,130 (prior 6 months)	38.1
Intervention type: Transitional care						
AGH (transitional care)	460	n.a.	18.9	2.61	1,109 and 86 (prior 3 and 4–12 months)	13.0

Source: Individual program summaries, available as Volume II of this report. See table notes for sources of Medicare FFS averages.

Note: For the practice transformation awardees that we matched at the practice level, the mean values for beneficiary characteristics are based on practice-level (not beneficiary-level) averages, in which the value for each practice is the mean for all Medicare FFS patients attributed to the practice in the year before the start of the intervention. For all other awardees, the averages are calculated at the beneficiary level.

AGH = Atlantic General Hospital; CSHP = Rutgers Center for State Health Policy; CUH/CCHP = Cooper University Hospital and the Camden Coalition of Healthcare Providers; FFS = fee-for-service; FLHSA = Finger Lakes Health System Agency; HCC = Hierarchical Condition Category; PCMH = patient-centered medical home; WIPH = Wyoming Institute of Population Health at Cheyenne Regional Medical Center.

[a] For CareFirst, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH (PCMH), this number represents the number of Medicare FFS beneficiaries attributed to treatment practices when these practices first joined the HCIA-funded intervention . For AGH, it represents the number of treatment beneficiaries in the post-intervention cohort, which includes beneficiaries whose enrollment or pseudo-enrollment dates were from February 1, 2013, to September 30, 2014. For the other awardees (CSHP, CUH/CCHP), it represents the total number of Medicare FFS beneficiaries who enrolled in the program through September 30, 2014. For Denver Health, it represents the total number of Medicare FFS beneficiaries ever attributed to the treatment group in the baseline or intervention periods. See Volume II for detail.

[b] Chronic Conditions Warehouse (2014, Table A1).

Table IV.C.1 *(continued)*

[c] Health Indicators Warehouse (2014a).

[d] Health Indicators Warehouse (2014b).

[e] For CareFirst, we include the number of panels rather than practices. Medical panels are groups of 5 to 15 primary care providers (physicians and nurse practitioners) that formed to participate in CareFirst's medical home program for its commercial patients.

[f] The CareFirst program explicitly excludes beneficiaries dually eligible for Medicare and Medicaid.

[g] Denver Health is a unified health system, which included eight Federally Qualified Health Centers (FQHCs) at the time it began its HCIA-funded program and three additional clinics that opened during the intervention period.

NA = not available.

n.a. = not applicable.

treatment group, as well as information about matching the treatment groups to relevant comparison groups.

a. Intervention type 1: Practice transformation

The treatment groups for the seven practice transformation interventions (CareFirst, Denver Health, FLHSA, PeaceHealth, Sanford Health, TransforMED, and WIPH-PCMH) tended to share two features:

- **Large sample sizes.** All but one awardee (PeaceHealth) had more than 6,000 Medicare FFS beneficiaries included in the treatment group. For all practice transformation awardees except Denver Health, this number represents Medicare FFS beneficiaries attributed to the treatment practices when the practices first joined the intervention. For Denver Health, it represents all distinct beneficiaries attributed at any time during the baseline or intervention periods.
- **Risk scores and all-cause admission rates near the Medicare FFS national average.** Except for two awardees (CareFirst and Denver Health), the mean Medicare risk scores (HCC scores) and recent hospitalization rates before receiving intervention services were very close to the Medicare FFS national averages. For CareFirst and Denver Health, scores and hospitalization rates were somewhat higher, but still lower than for any awardees in the other intervention types, described below.

The practice transformation interventions are similar along these dimensions because (aside from the exceptions already noted of CareFirst and Denver Health) they share a core feature: their treatment group includes all Medicare FFS beneficiaries the practices serve. Because the practices serve many patients, the sample sizes are usually large. Furthermore, because the treatment group is not filtered to a subset of patients at high risk of utilization, the mean risk scores and utilization rates are near the Medicare average. CareFirst and Denver Health are exceptions largely because their treatment groups are not everyone the practices serve. For CareFirst, we limited the sample to those beneficiaries in the top third by risk score because we anticipated that program effects, and thus statistical power to detect effects, would be greatest among this group. For Denver Health, the treatment group includes all beneficiaries its primary care clinics serve, but also beneficiaries with frequent visits to Denver Health's acute care facilities.

Variation in sample sizes across the awardees is due mostly to differences in the number of participating practices. For PeaceHealth, only two practices participated in the intervention, so the sample size is relatively small (846 beneficiaries). In contrast, TransforMED's intervention included 87 practices spread across 15 states, and the sample size is correspondingly large (86,314 beneficiaries).

Despite these broad similarities across practice transformation awardees, the awardees do vary substantially in their target populations, as shown by the two other metrics presented in Table IV.C.1:

- **Dual enrollment in Medicare and Medicaid.** The treatment groups for four of the awardees were near the national averages. However, for Denver Health, which is a safety net provider in Denver, Colorado, 71 percent of the treatment group members were enrolled in both Medicare and Medicaid (versus a national average of 22 percent). FLHSA targeted practices with a large share of Medicaid beneficiaries to participate in its intervention, so its target population also includes a substantial share of dually enrolled beneficiaries (31 percent). In contrast, CareFirst excludes dually enrolled beneficiaries from its program, so none of the treatment group members is dually eligible.
- **Disability as the original reason for Medicare entitlement.** Wide variation also exists in the percentage of treatment beneficiaries who were originally entitled to Medicare due to disability (ranging from 15.0 for CareFirst to 68.9 for Denver Health). This was highly correlated with the percentage of beneficiaries dually enrolled in Medicare and Medicaid.

b. Intervention type 2: Care management for high-risk beneficiaries

The treatment groups for the two care management interventions were relatively small (21 people for CUH/CCHP and 115 for CSHP). These sample sizes include all Medicare FFS beneficiaries who ever enrolled in the HCIA-funded programs and met sample eligibility criteria (for example, were alive and observable in claims data for at least part of the first quarter after enrolling in the program). The treatment groups for these two awardees had very high mean risk scores and hospitalization rates in the year before enrolling in the program. The risk scores were almost four times the national average, meaning that—at program enrollment—the beneficiaries were, based on recent claims history, predicted to have Medicare expenditures in the following year that were four times the national average. Their hospitalization rates in the 6 or 12 months before enrollment were more than 13 times the national average. A very high proportion of treatment group members (57 to 81 percent) had disability as their original reason for entitlement. Similarly, 38 to 72 percent of beneficiaries were dually enrolled in Medicare and Medicaid.

These characteristics are driven by the programs' target populations, which are similar across CUH/CCHP and CSHP. Both programs target beneficiaries living in poor areas and who are high utilizers of acute care, with multiple hospital admissions or ED visits in the 6 to 12 months before enrollment. The sample sizes are small for three reasons: (1) the programs actively enrolled individuals and provided intensive services to them, so were resource constrained in the number of people they could serve in this way; (2) the programs serve many Medicaid beneficiaries and, likely, uninsured patients, who are not captured in our treatment group (currently limited to those enrolled in Medicare FFS); and (3) for CUH/CCHP, we only include the Medicare FFS beneficiaries who enrolled after CUH/CCHP's randomized trial began in 2014.

c. Intervention type 3: Transitional care

The treatment group for AGH, the one transitional care intervention analyzed in this report, included 460 beneficiaries. This includes all Medicare FFS beneficiaries who we, based on data provided by the awardee, attributed to the treatment group for the post-intervention period (starting September 2013). These beneficiaries had a high mean risk score (2.6 times the

national average) and very high hospitalization rates in the 3 months before enrollment (13 times the national average), but hospitalization rates in the period 4 to 12 months before enrollment that were close to the national average (for AGH, we say that everyone in the treatment group had an "enrollment date"; however, due to our intent-to-treat approach, not everyone in the treatment group actually enrolled in the transitional care program [see Volume II for details]). The percentage of enrollees with disability as the original reason for Medicare entitlement was near the national average, but the percentage dually enrolled in Medicare and Medicaid was considerably below it.

These patterns are consistent with AGH's target population. AGH enrolled Medicare FFS beneficiaries when they were in the hospital, which explains the very high hospitalization rate in the quarter before enrollment. That is, by definition, the rate had to be at least one admission per person in that quarter (or, in Table IV.C.1, at least 1,000 admissions per 1,000 beneficiaries per quarter) because an admission was a prerequisite for each beneficiary's program enrollment. The relatively low hospitalization rate in months 4 through 12 before enrollment suggests that AGH enrolled beneficiaries who, except for the hospital stay that qualified them for the program, were not particularly high utilizers compared to a typical Medicare beneficiary.

3. Program impacts

Table IV.C.2 summarizes our preliminary conclusions about program impacts among the HCIA-PCR awardees. As described in Section III.C.1, we drew conclusions about program impacts at the domain level—that is, assessing outcomes within the three distinct domains of quality-of-care outcomes, service use, and spending—rather than at the level of individual outcome measures. Overall, we have drawn 19 domain-level conclusions among seven awardees: AGH, CareFirst, CSHP, FLHSA, PeaceHealth, Sanford Health, and TransforMED. The 19 conclusions are as follows:

- 3 conclusions of statistically significant favorable impacts
- 2 conclusions of substantively important (but not statistically significant) favorable impacts
- 13 conclusions of indeterminate impacts
- 1 conclusion of substantively unfavorable impacts

Each of these conclusions is described below, in the context of what these conclusions mean about the likely impacts of each *individual* awardee program. We also describe and provide interpretation of results for the two awardee programs—Denver Health and WIPH-PCMH—for which we conducted regression analyses but have not yet drawn preliminary conclusions. The detailed rationales for how we arrived at each of these conclusions are provided in the individual program summaries in Volume II of this report, along with information about how well each treatment group was matched to its respective comparison group.

Table IV.C.2. Preliminary conclusions about program impacts on patient outcomes in three domains, by awardee

Awardee (component)	Domains[a]		
	Quality-of-care outcomes	Service use	Spending
Awardees with statistically significant favorable effects in at least one domain			
AGH	Indeterminate effect	Statistically significant and substantively important favorable effect	Statistically significant and substantively important favorable effect
TransforMED	Not assessed[b]	Statistically significant and substantively important favorable effect	Not assessed[c]
Awardees with substantively important (not statistically significant) favorable effects in at least one domain			
CSHP	Substantively important (but not statistically significant) favorable effect	Indeterminate effect	Substantively important unfavorable effect
PeaceHealth	Substantively important (but not statistically significant) favorable effect	Indeterminate effect	Indeterminate effect
Awardees with indeterminate effects in all domains, but good statistical power to detect effects in at least one domain			
CareFirst	Indeterminate effect	Indeterminate effect with good statistical power[d]	Indeterminate effect
Sanford Health	Indeterminate effect	Indeterminate effect with good statistical power[d]	Indeterminate effect
Awardees with indeterminate effects in all domains, and poor or marginal statistical power to detect effects in all domains			
FLHSA	Indeterminate effect	Indeterminate effect	Indeterminate effect
Awardees for which we report some quantitative results in this report, but no conclusions			
CUH/CCHP	Not assessed[e]	Not assessed[e]	Not assessed[e]
Denver Health	Not assessed[b]	No conclusion drawn[f]	No conclusion drawn[f]
WIPH-PCMH	No conclusion drawn[f]	No conclusion drawn[f]	No conclusion drawn[f]

Source: Preliminary conclusions presented in the individual program summaries in Volume II of this report.

Notes: We drew conclusions about impacts using a set of decision rules adapted from the Institute for Education Sciences What Works Clearinghouse (2014). In short, we prespecified a set of *primary tests*, which were the statistical tests for which we most strongly anticipated evidence of impacts if the program was indeed effective. For most awardees, we also prespecified one or more *secondary tests* as robustness test or model specification checks. We concluded that a program had a statistically significant favorable effect in a domain if (1) at least one primary test result in the domain was favorable and statistically significant, after adjusting the statistical tests to account for multiple tests (if applicable) within a domain; or (2) the average impact estimate across all primary tests in the domain was favorable and statistically significant. In both cases, we also need to determine that the primary test results were plausible given the secondary tests and implementation evidence. We concluded that a program had a substantively important favorable effect if

Table IV.C.2 *(continued)*

the average impact estimate in the domain met a prespecified threshold for substantive importance but was not statistically significant, and if the result was plausible given the secondary tests and implementation evidence. In contrast, if the average impact estimate was unfavorable (opposite the hypothesized direction), larger than the substantive threshold, and unfavorable effects are plausible given the other evidence, we concluded the program had a substantively important unfavorable effect. Finally, if the tests in a domain did not meet any of these criteria, we concluded that the impact in that domain is indeterminate. We cannot conclude that a program has statistically significant unfavorable effects because, in consultation with CMMI, we are using one-sided statistical tests, testing only for favorable effects.

[a] See Volume II of this report (individual program summaries) for detail on the outcomes, time periods, and populations covered by the primary tests for a given awardee in a given domain. Outcomes in the quality-of-care outcome domain could include (1) admissions for ambulatory care-sensitive conditions and/or (2) 30-day unplanned hospital readmissions. Outcomes in the service use domain could include (1) all-cause inpatient admissions and/or (2) the outpatient emergency department visit rate. Outcomes in the spending domain could include (1) Medicare Part A and B spending and/or (2) Medicare inpatient spending.

[b] We did not estimate impacts because the awardee did not expect to affect the outcomes in this domain.

[c] Data are not yet available to analyze the time period specified in the primary tests.

[d] We found no measurable effects on outcomes in this domain. Because the statistical tests were well powered to detect true effects that were the size of the prespecified substantive threshold, these results mean the program likely did not have substantively large impacts for the outcomes and time period covered.

[e] Impact estimates are not yet available because of limited sample size.

[f] Before drawing conclusions about program impacts, we will conduct additional analyses to determine whether the primary test results are plausible given the secondary test results and the implementation evidence.

AGH = Atlantic General Hospital; CMMI = Center for Medicare & Medicaid Innovation; CSHP = Rutgers Center for State Health Policy; CUH/CCHP = Cooper University Hospital and the Camden Coalition of Healthcare Providers; FLHSA = Finger Lakes Health System Agency; PCMH = patient-centered medical home; WIPH = Wyoming Institute of Population Health at Cheyenne Regional Medical Center.

We find statistically significant favorable impacts in at least one domain for two awardees. First, the AGH care transitions program had a statistically significant impact on both service use and spending (that is, a statistically significant impact on two distinct domains). The favorable impact on service use was driven by a large reduction (26.5 percent; $p = 0.098$)[2] in inpatient admissions during the primary test period, which was defined as the six months following the hospital discharge that qualified the beneficiary for program services. (However, the program had no measurable effect on outpatient ED visits, the other outcome in the domain.) The statistically significant impact on spending reflects an estimated reduction in total Medicare Part A and B spending of $1,443 per beneficiary per month, or 31.4 percent of the counterfactual ($p = 0.002$), over the same primary test period. The AGH program had an indeterminate effect on quality-of-care outcomes, although power to detect effects on the one outcome in the domain (unplanned readmissions within 30 days of the program-qualifying discharge) was low.

Second, TransforMED, a practice transformation intervention focusing on health IT, had a statistically significant impact on service use. Specifically, that program reduced inpatient admissions by an estimated 7.1 percent ($p = 0.08$) and outpatient ED visits by 5.9 percent ($p = 0.06$) for the full treatment group during the primary test period (19 to 24 months after the practices joined the intervention). These estimated impacts are both larger than the substantive threshold of 5 percent. The secondary tests increased our confidence in these primary findings because they found no differences between the treatment and comparison groups in the service use outcomes in the first 12 months of practices participating, when no or very small differences were expected (large differences that early would have signaled the selected comparison group might not be the appropriate counterfactual). We did not assess TransforMED's impacts on quality-of-care outcomes or spending in this report because the awardee did not expect to affect the outcomes we defined for the quality-of-care outcomes domain (ACSC admissions or 30-day unplanned readmissions) and expected to affect spending only in a period beyond the outcome period measurable for this report. We will assess impacts in the spending domain in future reports.

For two additional awardees, we find impacts that are substantively important and favorable, but not statistically significant. Both CSHP and PeaceHealth had substantively important impacts on quality-of-care outcomes. This means that both programs show promise in the quality-of-care outcomes domain. However, we cannot make strong claims about program impacts for either awardee, largely because the low sample sizes result in poor statistical power to detect true effects. (That is, although our estimated impacts are meaningfully large, there is a nontrivial chance they are the result of chance events.)

Specifically, CSHP, which provided intensive services to people with a history of extremely high service use, had an estimated 20.0 percent impact on quality-of-care outcomes ($p = 0.13$). This impact was calculated as the mean of a 29.6 percent estimated impact on 30-day unplanned hospital readmissions and a 10.6 percent estimated impact on ACSC admissions, both measured over a primary test period of the first year following program enrollment. PeaceHealth's practice

[2] All p-values are for one-sided tests, testing for a reduction relative to the counterfactual, and adjusted (if applicable) for the multiple statistical tests within the domain. See Appendix 2 for details.

transformation program, in contrast, had an estimated 64.6 percent impact ($p = 0.15$) on the one outcome specified for that evaluation in the quality-of-care outcomes domain: 30-day unplanned readmissions, measured among beneficiaries with congestive heart failure (CHF), starting in the second year of the program. (The PeaceHealth program included intensive transitional care services [post-discharge] for people with CHF.)

Neither of these two awardee programs—CSHP or PeaceHealth—had a measurable impact on service use (outpatient ED visits or hospital admissions), although, as with AGH in quality-of-care outcomes, the statistical power to detect effects in this domain was poor. For PeaceHealth, there was an also indeterminate effect on spending, with similarly low power. This was not true for CSHP, as we discuss next.

For one awardee, we find a substantively important *unfavorable* impact in one domain. In addition to having a substantively important favorable impact on quality-of-care outcomes, CSHP had an unfavorable impact on spending. We estimated the program led to an *increase* in total Medicare Part A and B spending of $512 per beneficiary per month and $466 per beneficiary per month in inpatient spending—a difference of 11.6 and 18.2 percent, respectively, relative to the estimated counterfactual. This means there is some evidence the CSHP program increased total spending relative to what would have happened in the absence of the intervention. However, we cannot determine whether it is statistically significant (and do not provide a *p*-value for this test), because, as explained previously, in consultation with CMMI we are using one-sided statistical tests, testing only for favorable effects of each program. We thus interpret our findings to mean the program had potentially deleterious effects on spending, although it is not certain.

For three awardees, we find indeterminate effects in all domains analyzed. For CareFirst, Sanford Health, and FLHSA, none of the impact estimates during the primary test periods was statistically significant or substantively large for any outcome in the three domains. For two of these awardees—CareFirst and Sanford Health—we have good statistical power to detect effects in the service use domain, so the absence of measurable effects means the programs most likely did not have substantively important impacts on outcomes in this domain during the time periods tested. However, analyses for CareFirst and Sanford Health in the other two domains (quality-of-care outcomes and spending) had only poor or marginal statistical power, as did analyses for all three domains of the FLHSA evaluation. Therefore, the indeterminate effects in these domains for which we had lower statistical power could mean one of two things: (1) the program in question did not have a substantively important impact on outcomes in the domain; or (2) it did, but our analyses had insufficient power to detect the effect. All three of the awardees for which we found indeterminate effects in all domains—CareFirst, FLHSA, and Sanford Health—are practice transformation awardees that expected their impacts to grow over time. It is possible, therefore, that we might detect impacts in our future analyses, which will cover the final period of the awards, when the impacts (if any) are expected to be largest.

For two awardees, we have opted not to draw any conclusions about program impacts at this time. For Denver Health and WIPH-PCMH, the results of the primary tests suggested

substantively important unfavorable impacts in all domains analyzed. However, the results of the secondary (robustness) tests were not as expected, showing, for example, that the programs were already associated with unfavorable outcomes at a time when the program had just started and was not yet expected to have impacts and, for Denver Health, that there could have been differences in outcomes trajectories between the treatment and comparison groups before the intervention began. These results mean it is difficult to be sure whether we can interpret primary test results as evidence of program impacts, as we initially envisioned. For Denver Health and WIPH-PCMH, we plan to conduct additional sensitivity checks before drawing conclusions about program impacts. We will draw conclusions in our subsequent reports to CMMI.

Finally, it is important to note that across the 19 domains for which we drew conclusions, **we would expect to find roughly two statistically significant primary test results as a result of chance alone,** if the tests across domains were independent and in fact none of the programs were effective but the evaluations were well designed (that is, if the secondary test results and implementation evidence did not suggest problems with the model assumptions). In our statistical analyses, we have used one-sided tests and a threshold for statistical significance of 10 percent. Therefore, with 19 tests, we would expect, on average, about 1.9 statistically significant favorable primary test results if the domains were independent. In fact, we have found three: one for AGH in service use, one for AGH in spending, and one for TransforMED.

4. Characteristics of programs with impacts

Although it is premature to say which HCIA-PCR programs are effective and which are not, based on preliminary conclusions for just seven awardees, the HCIA-PCR programs for which we find impacts so far have several noteworthy characteristics. Most important, from the analysis completed so far, **we find favorable impacts among a diverse group of programs and program components.** There are four programs for which we find evidence of impacts in at least one evaluation domain, and these programs span all three intervention types we have identified within the PCR award portfolio: (1) practice transformation, (2) care management of high-risk beneficiaries, and (3) transitional care. This suggests there is no single blueprint for a successful program to improve patient outcomes or decrease spending. Rather, it is possible that several distinct program designs could achieve the desired outcomes.

Among the awardees with practice transformation programs—as noted above—we find a statistically significant (and substantively important) impact on service use for TransforMED and a substantively important but not statistically significant impact on quality-of-care outcomes for PeaceHealth. These two practice transformation programs, however, differed substantially in scope, target population, and expected mechanisms to achieve outcomes. The TransforMED program, for example, reached 90 practices (of which 87 were included in the impact analysis) and focused almost exclusively on health IT: upgrading practices' population management software and cost management reporting tools, and providing technical support in using the new technology. These IT upgrades were expected to improve outcomes by helping providers identify care gaps and respond strategically. In contrast, PeaceHealth's program touched just two practices, one of which was very small (with about 25 Medicare FFS beneficiaries). However, the HCIA funding provided a much broader, more comprehensive primary care redesign at PeaceHealth's clinics than at the typical practices participating in TransforMED's program.

PeaceHealth's sweeping program comprised four components: (1) renewed focus on preventive care for population health management, (2) short-term care management for patients with a temporary medical or social hurdle, (3) long-term care management for patients with specific chronic conditions, and (4) transitional care for people discharged from the PeaceHealth hospital. Therefore, the PeaceHealth HCIA funding provided direct patient services in many cases, whereas the TransforMED funding did not.

Moreover, both these awardees differ from the AGH transitional care program, for which we find statistically significant impacts on service use and spending, and from CSHP's program of care management among high-risk beneficiaries, for which we find substantively important favorable impacts on quality-of-care outcomes and unfavorable impacts spending. Under the AGH program, each program participant was assigned a care coordinator, who assessed the patient's post-discharge needs, scheduled follow-up appointments with providers, made referrals for home visits if appropriate, and generally managed the patient's transition for the 30 days post-discharge. The CSHP program instead identified people with multiple complex medical and social needs, especially those with frequent of inpatient services, and aimed to improve patient outcomes and reduce spending by using mobile care teams. These care teams could include not just nurses and community health workers, but also social workers, behavioral health providers, and others (both clinical and nonclinical), who would help program participants tackle social challenges and medical problems before "graduating" the participants to a PCMH.

In short, the four programs with impacts used a range of conceptual approaches and program strategies for reducing service use or spending. In our third annual report, after we have completed the implementation evaluation, clinician and trainee surveys, and impact analysis for awardees that did not receive no-cost extensions, we will provide further analysis of which components, in particular, might be most promising for CMMI to test on a broader scale, along with potential barriers and facilitators for doing so.

V. NEXT STEPS FOR EVALUATION

Rigorous evaluation of the PCR programs is essential to understanding whether these interventions achieve HCIA's goals. Because findings about program effects on patients are preliminary, it is premature to draw conclusions across the three core evaluation components (implementation effectiveness, program effects on clinicians' behavior and trainees' experiences with the program, and program impacts on patients' outcomes). We plan to present these conclusions in the evaluation's third annual report, to be prepared in summer 2016, which will synthesize and integrate the themes that emerged across these three evaluation components. Given the complexity of this report, we will begin planning it in the first months of 2016. The key activities are (1) identifying the goals of the report; (2) preparing detailed outlines of each chapter of the synthesis report, the individual program reports, and the technical appendixes; and (3) a detailed time line for writing, editing, and producing each component of the report. From our experience with the second annual report, the considerable lead time for planning it is necessary to address CMMI's information requirements with timely, high quality reports.

In order to draw those cross-cutting conclusions, data acquisition and analysis will continue through early summer 2017. Next steps for each of the three components are detailed below.

A. Implementation effectiveness

Although primary data collection is complete for the implementation effectiveness component, secondary data—the Lewin quarterly program monitoring documents—will be reviewed and analyzed to provide further insights about the final months of operations for each program. The third annual report will use the findings from this analysis in three ways: (1) to update the implementation evaluation findings in the individual program summaries, (2) to prepare the implementation synthesis chapter, and (3) to help interpret the impact results.

B. Effects on clinicians' and trainees' experiences

The fielding of the second round of the clinician survey and the trainee survey are both complete. Future work includes creating the analytic data files for both surveys and developing and populating table shells so that these data can be analyzed. As with the implementation findings, the third annual report will use these survey findings in three ways: (1) to update the individual program summaries to include findings about program effects on clinicians' behavior and trainees' experiences with the program in the third year of the award, (2) to prepare the synthesis chapter on program effects on clinicians' behaviors and trainees' experiences, and (3) to help interpret implementation and impact results.

C. Program impacts on patients' outcomes

Future work for the impacts evaluation component consists of two distinct tasks, both of which will feed into two future quarterly reports as well as the third annual report and an addendum to this report.

1. Conduct new impact analyses for five awardees

Five awardees will require new impact analyses, as described here, by program:

- **CUH/CCHP.** Given very small sample sizes, in this annual report, we report unadjusted means for the treatment and control group only (see Volume II: Individual program summaries). The sample is defined as Medicare beneficiaries who enrolled in CUH/CCHP's randomized trial and were randomly assigned to either receive the intervention (treatment) or not (control). Future work includes (1) expanding the treatment and control groups, including Medicare beneficiaries who enrolled in the randomized trials after the cutoff for inclusion in the second annual report; and (2) estimating impacts using regression analysis.
- **NCH and UHC.** For both awardees, we must finalize agreements with the Ohio Department of Medicaid and the Government Resources Center to receive Medicaid claims data (FFS and managed care). When that is complete, we then must review and process those claims to develop analytic variables and implement the evaluation designs described in evaluability memos for each program, which use matched comparison groups and a difference-in-differences regression model.
- **PBGH.** Future work includes matching Medicare beneficiaries enrolled in the program to comparison beneficiaries drawn from comparison regions and estimating impacts on core outcomes using a regression model.
- **WIPH—transitional care component.** We have already matched treatment hospitals to comparison hospitals. Future work includes matching Medicare beneficiaries enrolled in the program to similar beneficiaries discharged from the comparison hospitals and estimating impacts using regression models.

2. Update impact analyses for most awardees

Using the following processes, we will extend the impact analyses for most awardees:

- **Extend the follow-up period for Medicare FFS beneficiaries.** We will use more recent Medicare claims data to extend the follow-up periods for the treatment and comparison groups already defined. For most awardees, the follow-up period will run through June 2015 (the end of the award for awardees that did not receive no-cost extensions to continue program operations).
- **Add cohorts of practices for three awardees.** For FLHSA, Sanford Health, and WIPH PCMH, we will add outcomes for cohorts of practices that joined the intervention too late to be included in this second annual report. For FLHSA, this work will include another round of practice-level matching for its third cohort of practices.
- **Conduct one more round of patient-level matching for three awardees.** For AGH, CSHP, and Denver Health, we will conduct another round of matching—that is, matching new treatment group beneficiaries (beyond those included in this second annual report) to comparison beneficiaries.

- **Conduct sensitivity tests.** To test the robustness of the preliminary results reported in this report to key regression model assumptions, we will conduct sensitivity tests. This is especially critical for awardees for which results to date suggest that findings might be particularly sensitive to assumptions.
- **Add Medicaid beneficiaries for one or more awardees.** In summer 2016, we plan to assess the status of Medicaid data availability and add Medicaid beneficiaries to the treatment and comparison groups for one or more awardees for which the analysis of the Medicaid target population would add significant value for improving how well our treatment group represents the target population and/or improving statistical power to detect program impacts. We are delaying this until summer 2016 because it is currently uncertain what data will be available in a year or, when the data are available, they are not current enough to use for selected awardees.
- **Add process-of-care outcomes.** We plan to add a few process-of-care outcomes, such as the percentage of beneficiaries with diabetes who received recommended hemoglobin testing. The impact analysis of this set of outcomes will enhance our understanding of the impacts of the programs on important outcomes beyond the set of core outcomes we analyzed in this report.

As noted previously, we will prepare two additional quarterly reports, to be submitted in December 2015 (eighth quarter) and March 2016 (ninth and final), respectively. These reports will present streamlined findings that show treatment and comparison group mean outcomes and regression-adjusted differences in means, for each awardee, by quarter.

For the third annual report, we will update the individual program summaries, the impacts synthesis chapter, and the technical appendixes, if needed. For awardees that did not receive no-cost extensions, we will draw conclusions about program impacts on outcomes in three domains: quality of care; service use; and Medicare spending, Medicaid spending, or both. For awardees that received extensions, we will draw interim conclusions, with final conclusions reserved for an addendum to the third annual report due at a date yet to be determined by CMMI. If Medicaid data are available, this addendum could also update results for one or more awardees that did not receive an extension, but for which we have been able to obtain Medicaid data. Finally, we will use findings from the implementation and surveys components to help explain why we do or do not find program impacts on patients' outcomes, drawing cross-cutting conclusions across the three evaluation components.

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REFERENCES

Agency for Healthcare Research and Quality. "Care Coordination Measures Atlas." Rockville, MD: AHRQ, January 2011. Available at http://archive.ahrq.gov/professionals/systems/long-term-care/resources/coordination/atlas/chapter2.html. Accessed September 14, 2015.

Agency for Healthcare Research and Quality. "Medical Office Survey on Patient Safety Culture. Rockville, MD: AHRQ, 2015. Available at www.ahrq.gov/professionals/quality-patient-safety/patientsatfetyculture/medical-office/index.html. Accessed September 8, 2015.

American College of Physicians. "Medical Home Builder 2.0." Philadelphia, PA: American College of Physicians, 2014. Available at www.acponline.org/about_acp/chapters/fyn_mhb_brochure.pdf. Accessed September 8, 2015.

An, P.G., J.S. Rabatin, L.B. Manwell, M. Linzer, R.L. Brown, and M.D. Schwartz. "Burden of Difficult Encounters in Primary Care: Data from the Minimizing Error, Maximizing Outcomes Study." *Archives of Internal Medicine,* vol. 169, no. 4, 2009, pp. 410–441.

Bennett, H.D., E.A. Coleman, C. Parry, T. Bodenheimer, and E.H. Chen. "Health Coaching for Patients with Chronic Illness." *Family Practice Management,* vol. 17, no. 5, 2010, pp. 24–29.

Bodenheimer, T.S., and M.D. Smith. "Primary Care: Proposed Solutions to the Physician Shortage Without Training More Physicians." *Health Affairs,* vol. 32, no. 11, 2013, pp. 1881–1886.

Cameron, A.C., and D. L. Miller. "A Practitioner's Guide to Cluster-Robust Inference." *Journal of Human Resources,* vol. 50, no. 2, 2015, pp. 317-373.

Charlson, M., T.P. Szatrowski, J. Peterson, and J. Gold. "Validation of a Combined Comorbidity Index." *Journal of Clinical Epidemiology,* vol. 47, no. 11, 1994, pp. 1245–1251.

Chronic Conditions Data Warehouse. "Table A.1. Medicare Beneficiary Counts for 2003 – 2012." Baltimore, MD: Centers for Medicare & Medicaid Services, 2014. Available at https://www.ccwdata.org/cs/groups/public/documents/document/ccw_website_table_a1.pdf. Accessed November 19, 2014.

Coleman, E.A., and C.E. Boult, on behalf of the American Geriatrics Society Health Care Systems Committee. "Improving the Quality of Transitional Care for Persons with Complex Care Needs." *Journal of the American Geriatrics Society,* vol. 51, no. 4, 2003, pp. 556–557.

Coleman, E.A., and C.E. Boult, on behalf of the American Geriatrics Society Health Care Systems Committee. "Improving the Quality of Transitional Care for Persons with Complex Care Needs." *Journal of the American Geriatrics Society,* vol. 51, no. 4, 2003, pp. 556–557.

Health Indicators Warehouse. "Hospital Inpatient Medicare Admissions (per 1,000 beneficiaries)." Hyattsville, MD: National Center for Health Statistics, HIW, 2014a. Available at http://www.healthindicators.gov/Indicators/Hospital-inpatient-Medicare-admissions-per-1000-beneficiaries_2001/Profile/ClassicData. Accessed August 13, 2014.

Health Indicators Warehouse. "Medicare Beneficiaries Eligible for Medicaid (percent)." Hyattsville, MD: National Center for Health Statistics, HIW, 2014b. Available at http://www.healthindicators.gov/Indicators/Medicare-beneficiaries-eligible-for-Medicaid-percent_317/Profile/ClassicData. Accessed August 4, 2015.

Health Resources and Services Administration. "Community Health Worker National Workforce Study." Washington, DC: U.S. Department of Health and Human Services, Health Resources and Services Administration, 2007. Available at http://bhpr.hrsa.gov/healthworkforce/reports/chwstudy2007.pdf. Accessed March 2, 2011.

Institute of Education Sciences. "What Works Clearinghouse: Procedures and Standards Handbook, Version 3.0." Washington, DC: U.S. Department of Education, IES, 2014. Available at http://ies.ed.gov/ncee/wwc/DocumentSum.aspx?sid=19. Accessed September 15, 2014.

Institute of Medicine. "Crossing the Quality Chasm: A New Health System for the 21st Century." Washington, DC: IOM, March 2001. Available at http://iom.edu/Reports/2001/Crossing-the-Quality-Chasm-A-New-Health-System-for-the-21st-Century.aspx. Accessed October 15, 2014.

Linzer M., L. Baier-Manwell, M. Mundt, E. Williams, A. Maguire, J. McMurray, and M.B. Plane. "Organizational Climate, STree, and Error in Primary Care: The MEMO Study." *Advances in Patient Safety: From Research to Implementation*, vol. 1, 2005, pp. 65 – 77.

Maslach, C., S.E. Jackson, M.P. Leiter, W.B. Schaufeli, and R.L. Schwab. "Maslach Burnout Inventory." 1996. Available at www.mindgarden.com/117-maslach-burnout-inventory. Accessed September 8, 2015.

McDonald, K.M., V. Sundaram, D.M. Bravata, R. Lewis, N. Lin, S.A. Kraft, M. McKinnon, H. Paguntalan, and D.K. Owens. "Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies. Volume 7—Care Coordination." Rockville, MD: Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, June 2007.

McDonald, Kathryn M., Vandana Sundaram, Dena M. Bravata, Robyn Lewis, Nancy Lin, Sally A. Kraft, Moira McKinnon, Helen Paguntalan, and Douglas K. Owens. "Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies. Volume 7—Care Coordination." Rockville, MD: Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, June 2007.

Mechanic, Robert. "Will Care Management Improve the Value of U.S. Health Care?" Background paper for the 11th Annual Princeton Conference. Available at http://healthforum.brandeis.edu/research/pdfs/CareManagementPrincetonConference.pdf. Accessed October 15, 2014.

Milliman Advanced Risk Technologies. "Milliman Advanced Risk Adjusters 3.0." Available at http://www.millimanriskadjustment.com/Solutions/Mara-3.0/. Accessed September 17, 2015.

Neuwirth, E.B., J.A. Schmittdiel, K. Tallman, and J. Bellows. "Understanding Panel Management: A Comparative Study of an Emerging Approach to Population Care." *The Permanente Journal,* vol. 11, no. 3, 2007, pp. 12–20.

Peikes, Deborah, Stacy Dale, Eric Lundquist, Janice Genevro, and David Meyers. "Building the Evidence Base for the Medical Home: What Sample and Sample Size Do Studies Need?" White paper (prepared by Mathematica Policy Research under contract no. HHSA290200900019I TO2). AHRQ Publication No. 11-0100-EF. Rockville, MD: Agency for Healthcare Research and Quality, October 2011.Scheirer, M.A., and J.W. Dearing. "An Agenda for Research on the Sustainability of Public Health Programs." *American Journal of Public Health,* vol. 101, no. 11, 2011, pp. 2059–2067.

Simmons, R., P. Fajans, and L. Ghiron (eds.). "Scaling up Health Service Delivery: From Pilot Innovations to Policies and Programmes." Geneva: World Health Organization, 2007.

The New Jersey Division of Medical Assistance and Health Services. "Care Management Workbook." Revised July 2015. Available at http://www.nj.gov/humanservices/dmahs/news/Care_Management_Workbook.pdf. Accessed Sept 14, 2015.

Van Walraven, C., I.A. Dhalla, C. Bell, E. Etchells, I.G. Stiell, K. Zarnke, P.C. Austin, and A.J. Forster. "Derivation and Validation of an Index to Predict Early Death or Unplanned Readmission After Discharge from Hospital to the Community." *Canadian Medical Association Journal,* vol. 182, no. 6, April 6, 2010, pp. 551–557.

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