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Evaluating the Impact of a Team-Based Model of Primary Care on Provider Burnout and Patient Experience

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Abstract

Background: To assure high quality, safe, affordable, and accessible health care, organizations are embarking on quality improvement initiatives to work toward the triple aim of patient satisfaction, improving the health of populations, and reducing the cost of care.

Description of the Problem: Primary care is the backbone of the health care system, but it is a challenging environment with high rates of clinician burnout. Clinician burnout undermines the ability of organizations to meet the triple aim. Innovative new care delivery models are needed that can meet the triple aim while also mitigating burnout.

Available Knowledge: A PRISMA review of the literature examined care delivery models which improve quality of care. The most promising strategy identified was the advanced team-based model of care.

Specific Aims: The specific aim of this project was to implement an innovative, team-based model of primary care. The primary objectives were to describe patient satisfaction with the care model, to maintain patient experience, and to reduce provider burnout while maintaining or improving productivity.

Context: The project was implemented in a small family practice clinic in a semi-rural community in Wisconsin. The practice is within one of nine regions of one of the largest health systems in the United States.

Intervention: An advanced team-based model of care was implemented, which involved nurses taking on a broader set of clinical care tasks as care-team coordinators, to achieve a fuller scope of practice, with staffing model change from 1 NP:1 MA: 0.75RN to 1 NP:1 MA: 1.75 RN.

Results: In the first three months of a team-based care implementation, patient experience as measured by Press Ganey surveys was either maintained or improved. Patient acceptance of the model on a brief post-encounter survey showed significant improvement in patient perception of the visit when a care-team coordinator was involved in the visit. Provider burnout was measured with "work after clinic" hours and chart closure time, surrogate measures for burnout, with both factors decreasing in the three months post-implementation. Productivity was measured using work RVUs per contact hour and panel risk adjusted score, both of which showed increases in the first 3 months of implementation.

Discussion: The design of this project included a comparison group to evaluate measures with and without care team coordinator involvement which established statistically significant improvements with patient overall satisfaction with care. While previous team-based care studies have demonstrated improvement in patient satisfaction, provider burnout, and revenue potential in months or years after implementation, this work suggests that benefits may occur much sooner. Immediate return on investment may help remove barriers to implementation.

Introduction

Description of the Problem

Primary care is the backbone of the health care system and serves as the gateway to health care for most patients. Primary care clinicians face a daunting array of daily challenges including complex clinical scenarios, increasing numbers of patients with complex needs followed in the community setting, rapid pace of scientific advancement, the need to coordinate care with an array of specialists, health system fragmentation, wide variability in payor reimbursement policies, and greater attention to the role of the social determinants of health. Revenue pressures and patient access issues mean that the myriad of challenges must be addressed with less time allotted for each patient encounter. Those challenges include escalating costs, the need to demonstrate clinical quality and patient satisfaction (Institute of Medicine Committee on Quality Health Care in America, 2001), provider shortages relative to demand (Association of American Medical Colleges, 2020), and additional administrative burden associated with documenting within electronic health record systems (Gesner et al., 2019). Taken together these individual role and system challenges contribute to stress and burnout in the traditional primary care delivery model.

In 2006, John Whittington and Tom Nolan of the Institute for Healthcare Improvement (IHI) developed "the triple aim which includes improving the patient experience of care (including quality and satisfaction), improving the health of populations, and reducing the per capita cost of care" (Berwick, 2019). This concept has become a guiding principle of healthcare quality since it was published (Berwick et al., 2008). As cost pressures and provider shortages increase, workload also increases and primary care providers of all training backgrounds struggle

to balance work and life (Goetz Goldberg et al., 2020). This may lead to burnout, attrition from practice, addiction, mental health problems, and even suicide (Singh et al., 2019).

Burnout may be defined as "a work-related syndrome involving emotional exhaustion, depersonalization, and a sense of reduced personal accomplishment" (Maslach, 1996). Burnout is likely not a phenomenon restricted to physician led teams (Goetz Goldberg et al., 2020) but there is a gap in the literature to confirm this (Abraham et al., 2020). The cost of physician burnout has been estimated at a staggering cost to the U.S. healthcare system of $4.6 billion annually (Han et al., 2019).

Provider and clinical team health are inextricably tied to safety, clinical quality, and patient experience (Williams, et al., 2007). Rabatin, et al. (2016) noted that quality tends *not* to suffer as result of burnout but that maintaining care standards in an environment with increasing demands occurs at great personal cost to providers. There is a movement toward innovation and transformation to redesign care delivery to address these problems. Two of the nine elements contained in the Institute for Healthcare Improvement's (IHI) Framework for Improving Joy in Work are "camaraderie & teamwork" and "wellness & resilience" (Perlo et al., 2017). An American Academy of Nursing position statement emphasized issues of burnout within the nursing profession and argued for an emphasis on "true interprofessional teams," and reduction of health record documentation burden as the key needed changes (Boyle et al., 2019). Others have proposed that the IHI triple aim be revised to the "quadruple aim," with the fourth component emphasizing the work life balance of health care providers and clinical staff (Bodenheimer and Sinsky, 2014; Epperson et al., 2016).

Local Problem

Primary care providers (PCPs) at the site, a family medicine clinic in the midwestern U.S., experience the same challenges in their day-to-day practice as are reported in the literature. During the second quarter of 2021, primary care providers at the clinic spent on average 17.7 hours per month working in the health record system outside of working hours. This exceeds pre-pandemic levels of 13.2 hours per month even though visit volumes have only reached 90% of pre-pandemic levels (Anonymous, 2021). A 2021 burnout survey of providers, nurses, and medical assistants conducted within the regional health system found that all groups are experiencing some form of burnout. As a whole they care deeply about patients (91%) and found their work to be emotionally satisfying (61% providers and 51% clinical staff) but did not find the workload manageable (31% providers and 41% clinical staff) (Clevidence, 2021).

Regional leadership has endeavored to address issues of clinician burnout but struggled to implement the transformative change that is needed. Previously an in-room scribe model was piloted but failed to gain enough traction to move to broader implementation. The reasons for this are not clear, but probably involve difficulty attaining support from corporate leadership due to concerns over implementation costs and competing priorities. Local leadership and PCPs are aligned around the need to find a new model for delivering primary care that leverages their assets, reduces workload burden, and aspires to meet the goals of the quadruple aim. There is disagreement about what form it should take, given the development of artificial intelligence and virtual scribe models. The rapid systemic change in payment models and concerns that departure from a fee for service model would eliminate the additional revenue needed to support the program has been another concern.

Available Knowledge

A systematic literature review was performed, guided by the PRISMA model, to investigate primary care delivery models that show promise to address this complex multi-dimensional issue (Page et al., 2021). CINAHL, MEDLINE, and PubMed databases and an internet search were used to identify 811 relevant articles which were screened for inclusion, and 151 full text articles were reviewed. Of these, 109 articles were excluded, with a total of thirty-nine quantitative studies and three qualitative studies from the U.S., Canada, Australia, and Spain selected for inclusion in the more detailed review. Participants in the studies were either recipients of care, providers of care, or care settings and ranged in size from single provider or clinic site to large cohorts of 171,000 patients and multi-state health systems. A number of categories of primary care design innovation emerged. The evidence was sorted by thematic area as illustrated in the evidence synthesis table (Appendix A).

Care Delivery Innovation Themes

A wide variety of care delivery models were presented in the literature as outlined in the synthesis table. Many models emphasized provision of care in non-traditional settings such as home-based care, nursing home-based care, and worksite clinics. Some delivery models utilized technology to bring care to patients. Other models utilized group visits to efficiently provide care to patients with similar health concerns, such as pregnancy or chronic pain. The most common theme was that of expanding provision of care from physician-centric to team-based care in a variety of forms. It was common to integrate additional clinical disciplines into primary care, most commonly mental health, clinical pharmacy, and/or physical therapy, often within a patient centered medical home. Delivery of social services was combined into the primary care delivery model through shared physical space or shared communication systems. Often the work

of patient care was divided among more members of the clinical team. Various ways of delivering care utilizing advanced practice clinicians were proposed, including nurse-led clinics. The role of scribe was created to simplify aspects of care within the electronic health record and allow the clinician to return their focus of attention to the patient.

Team-based care models sought to divide the work of patient care among more members of the clinical team. Most studies evaluated use of medical assistants or nurses in new or expanded roles. Medical assistants or nurses sometimes scribed as a portion of their responsibilities but not their sole responsibility. In team-based care models they were also involved in many other patient care tasks as a fully engaged member of the care team.

The Advanced Team-Based Care model (aTBC) is one such model, pioneered by Peter Anderson (Anderson & Halley, 2008) and Christine Sinsky (Hopkins & Sinsky, 2014), and later adopted by numerous health systems, including the Cleveland Clinic and Bellin Health. Similar versions of the model are called Primary Care 2.0 (Brown-Johnson et al., 2019), Care by Design (Egger et al., 2012), Primary Care Redesign (Lyon et al., 2018) or TEAM Primary Care (Milford et al., 2018). In this type of care model, a clinical assistant, often a medical assistant, provides pre- and post-visit care, as well as in room support doing documentation and order entry throughout the visit. Two or three of these assistants generally work with one provider, allowing them to participate in alternating visits with one provider. Patients reported feeling greater engagement within their primary care setting and higher satisfaction with their care (Jerzak et al., 2019). Under the aTBC model, the care team coordinator (CTC) may be a certified medical assistant (CMA), license practical nurse (LPN) or registered nurse, and is an integrated member of the patient care team. In room support including scribing is one of the CTC's responsibilities.

Numerous publications reported an increase in provider productivity (Hopkins & Sinsky, 2014) or decreases in cycle time (Milford et al., 2008; Blash et al., 2011). A decrease in cycle time means that more patients can be seen in the same amount of time and thus is directly related to productivity. Jerzak et al. (2019) were also able to add RN billable visits to improve productivity of the overseeing provider. RVU potential increases with the number of additional team members, with a revenue potential of six RVU per hour with a traditional one CTC to one provider model, compared with nine RVU per hour with a three CTC to one provider ratio (Sinsky & Bodenheimer, 2019). Providers can be 11.5% more productive, with RVU per provider FTE increasing by 20% under the team-based care model (Hopkins & Sinsky, 2014). Per member per month costs can be reduced under such models (Jerzak et al., 2019)

Literature supports patient acceptance of the model (Hopkins & Sinsky, 2014). It also supports the fact that patient experience is improved. Hopkins and Sinsky reported that a set of six indicators of patient satisfaction increased from 5% to 22% in the first year of implementation. A modest but statistically significant improvement in the perception of provider communication is seen with team-based care (Nguyen et al., 2020). CG-CAHPS patient experience scores in top box domains related to provider communication quality, recommending the provider office, provider listening, and fully answering questions were improved (Lyon et al., 2018). In a well-designed and measured team-based care quality improvement project from University of Utah Community Clinics (UUCC), patient experience metrics significantly improved in five of the major metrics on twice annual patient surveys (Blash et al., 2011).

The UUCC project also found that providers were more likely to agree that they had more time for family personal life, and that panel size was reasonable under the team-based care model (Blash et al., 2011). Lyon et al. (2018) found that symptoms of burnout decreased from

56% to 28%. In the report on the Bellin aTBC model Jerzak, et al. (2019) reported that 83% of providers were moderately or very satisfied with their experience in 2018, and 90% in 2019, compared to 70% participating in the traditional model at baseline. Other researchers have used work time after hours as a measure of burnout and found that team-based care reduced time worked within the EHR system after hours (Hopkins & Sinsky, 2014; Lyon, et al., 2018).

The RN co-visit model (Funk & Davis, 2015), utilizes a similar model. The model is similar to aTBC except it emphasizes nurses independently seeing patients to conduct the majority of the visit and documentation with provider oversight. This model increased access to care by 12% at one pilot site and 17% at the other by shifting patient care tasks and documentation for these visits from provider to nurses. Patients were more satisfied with co-visits than provider visits, job satisfaction of all team members improved, and the additional revenue exceeded extra staffing costs.

The care model that is supported by the evidence, determined to be the best fit for the clinic site as the most promising overall approach to meet local needs is the Advanced Team-Based Care model as described by Jerzak et al., combined with elements of the Funk & Davis co-visit model.

Rationale

Team-based care was selected as the most promising intervention for study because numerous previous studies and quality programs have supported its effectiveness in addressing the quadruple aim. The National Academy of Medicine's (NAM) framework of clinician wellbeing and resilience (Brigham et al., 2018) was considered to guide selection of the intervention (Appendix B). While scribe models are also promising they do not offer the same

potential as aTBC to build support and resilience in caregivers nor to build satisfaction among patients who feel supported by an entire team rather than just one individual.

The aTBC model has the potential to build teamwork skills, improve team structure and function, allow performance at full scope of practice, achieve reasonable and sustainable workload and work-life balance for all team members, and support healthy professional relationships and power dynamics, concepts which are woven throughout the NAM model.

Wagner's model of the medicine wheel as a change model was used throughout planning and implementation (Figure 1). Wagner postulated that the principle of the medicine wheel is not only an appropriate tool for conceptualizing and guiding both the healing process and the nursing process, but also the process of change (Wagner & Huber, 2003). Supporting body, mind, emotions, and spirit *with change* was central to selecting the project objectives in terms of evaluating patient and clinician reactions to change. Supporting these facets *throughout the change process* will be woven through the implementation via team huddles and through communication with patients about the initiative.

Figure 1

The Medicine Wheel as a Change Model

Note. Wagner & Huber, 2003

Specific Aims

The purpose of this project was to improve patient care and improve provider well-being in the primary care setting. The overarching aim of this project was to evaluate the impact of a team-based model of primary care on provider job satisfaction while ensuring the patient experience was not negatively impacted. In order to achieve this aim, the objectives of the project were:

- Those patients experiencing team-based care will score as well or better on a post visit

survey to acceptance of the model, with >95% of patients in the intervention group indicating a score of 4.0 or better on a 5 point scale (agree or strongly agree).

- Selected scores from the Press Ganey survey representing patient experience will either be maintained or improved.
- Provider burnout as measured by time spent in the EHR system outside of normal work hours and time to close charts will decrease, while maintaining productivity as measured by work RVU and panel normalized adjusted risk score.

Methods

The Plan, Do, Study, Act (PDSA) framework (Langley, 2009) was used to plan and implement this project and will be used for and ongoing evaluation.

Context

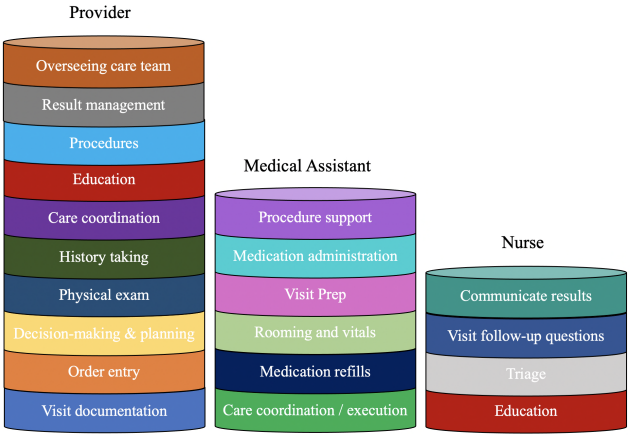
The setting for the project was a small semi-rural family practice, with one physician PCP and one nurse practitioner PCP, two care team nurses, and two medical assistants. The clinic is part of a large multi-state health system. The regional organization includes five primary care clinics with thirty primary care providers, nine of whom are autonomously practicing advanced practice clinicians with their own patient panels. There has been significant growth in the regional advanced practice provider (APP) group in recent years, and there is a culture of respect and support of autonomous APP practice by physician colleagues.

Primary care providers at the clinic struggle with burnout in much the same manner as do primary care providers in practices across the country. Most providers within the health system work well over their compensated hours level and have great difficulty balancing demands of documentation, non-billable inbox management work, and face-to-face patient care. These issues are magnified within a small practice, since the absence of one provider causes the care of

the entire population to fall to one provider who must temporarily lead multiple teams. Each provider has 24 twenty-minute blocks per clinic day, and on average see about 16 patients per day for management of acute issues, chronic diseases, and basic procedures.

Figure 2

Current task assignment schema at clinical site



An external mapping tool (Appendix C) was used to depict and analyze the primary care microsystem of the clinic. The population being cared for in the clinic are individuals and families across the lifespan and across the wellness-illness spectrum. There is a full array of services at the clinic to support primary care. The current practice model is centered around the provider and all patient-specific communication and most tasks flow to the provider (Figure 2). The intervention will alter interactions between the clinical staff team members with the patient, with each other, and with the other members of the microsystem. The new patterns of interaction and communication will be team-centric rather than provider-centric as they are now.

Root causes of patient and clinician dissatisfaction with the delivery of primary care at the clinic were considered using a cause-and-effect diagram (Appendix D). Heavy workload is a key root cause impacting provider burnout and heavily influences the other diagramed factors associated with low satisfaction. Many of the causes were determined to be broad and systemic, arising from difficult to alleviate factors such as poverty, health inequity, fragmented and confusing reimbursement system, an aging population, the increasing cost of care, and an undersupply of primary care providers. Because of the need to maintain revenue, when health

systems try to address burnout they tend to focus on building resilience among providers rather than on reducing workload. While building resilience is important, interventions are needed to address heavy workload, long hours, and issues of team dynamics. This is therefore a primary premise of the proposed intervention.

A force field diagram (Appendix E) was created to highlight the factors driving and restraining successful implementation of the intervention. Regional leadership have a strong interest in devising solutions to issues of burnout that are sustainable from a business perspective. A similar model has been in use at one of the neighboring regions within the same health system since 2008. The ability to compare organizations through standardized quality metrics, increased transparency in reporting, and the local practice of tying provider and clinical staff compensation to quality outcomes are all facilitating factors. This region is increasingly reimbursed for a portion of its' patient care through population-based reimbursement, therefore, innovation that helps drive better outcomes may be worth additional investment expenditure.

In the year leading up to implementation, clinical teams had been through unprecedented change and stress due to COVID-19, and they were understandably wary of more change that would require them to grow and adapt. However, the literature tells us that teams are generally happy with the model and feel more valued, engaged, and mentored, and that the sense of shared responsibility for patients improves satisfaction with team dynamics and role (Jerzak et al., 2019, Milford et al., 2018, Chapman & Blash, 2011). This was therefore felt to be not only a restraining force but also a potential driving force if staff are engaged as not only as team members but as project team contributors. Overall, the driving forces were felt to outweigh risks or barriers presented by restraining forces.

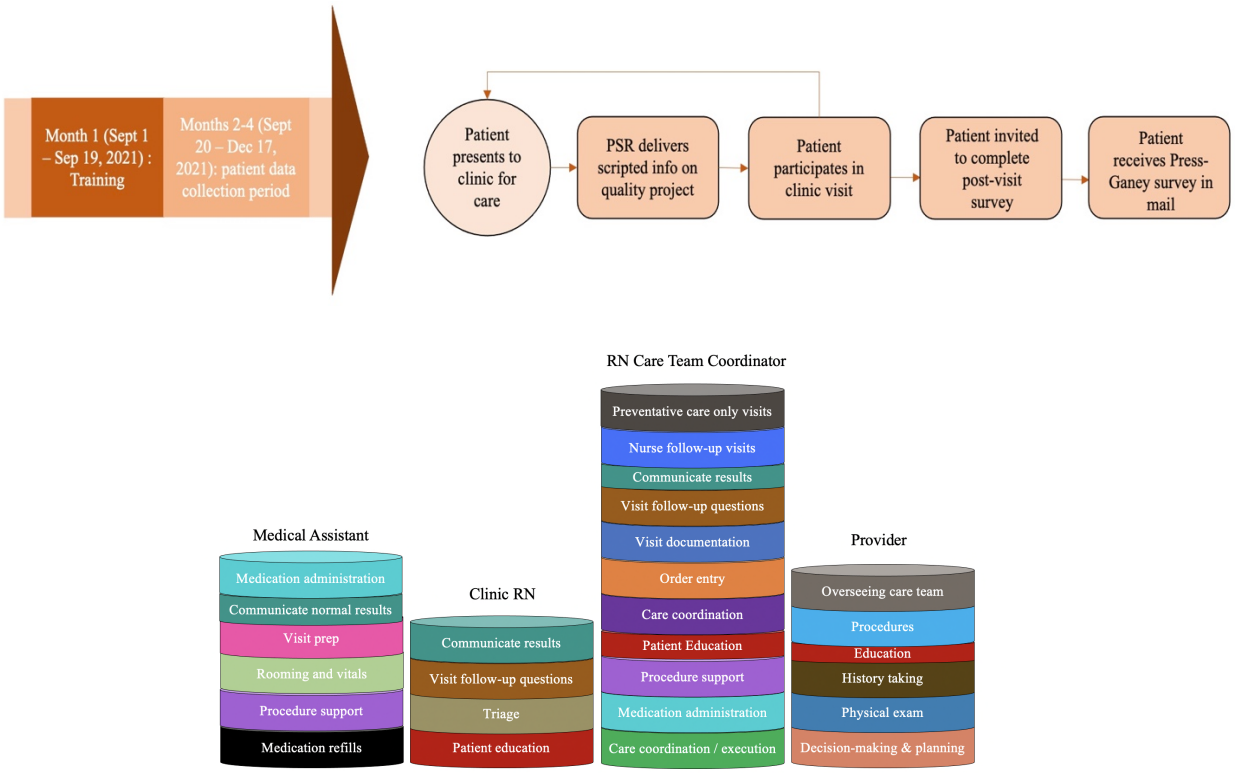
Intervention

The Team-Based Care Model

Under the new team-based care model implementation (Figure 3), responsibilities were reapportioned to allow each clinician to work to the top of their scope of practice as shown (Figure 3). Using team-based care principles, some of the current provider responsibilities described in the context section were shifted to the "care team coordinator" (CTC) under the new model. The principal task areas shifted to the CTC were documentation, order entry, education reinforcement, communication of normal results, reinforcement of education, questions or issues arising after the visit, and aspects of EHR in basket operations. Since this would result in a larger task burden on the CTC, the work of CTC was to be divided between two individuals.

Figure 3

Intervention Flow Chart



The intervention was planned to expand the role of the registered nurse in which they took on much of the responsibility of preventative care visits. This included Medicare wellness annual exams for older adults without significant chronic disease, and much of the assessment and anticipatory guidance associated with well child visits. In addition, nurses would see patients independently for follow-up visits and basic complaints that can be handled via protocol, such as uncomplicated upper respiratory infections (URI), urinary tract infections, and genital infections. Nurses would also participate in co-visits, in which the nurse presents the case to the provider, the nurse continues to support the provider in data collection, order entry, and documentation, while the provider is responsible for decision making. Overall, the staffing model changed from 1 NP:1 MA: 0.75RN to 1 NP:1 MA: 1.75 RN.

Each morning, in a team huddle, the provider and CTC decided for which visits the CTC would provide in room support. The decision was driven by prioritizing the most complex patients and problems but staff availability and work hours were also factors, such that the CTC tended to work with alternating patients and saw more patients earlier in the day as she arrived and departed earlier than the medical assistant. In between patients, the provider edited and finalized visit documentation started by the CTC and took care of other responsibilities such as preparing for upcoming visits and processing incoming paperwork, advice, and refill requests.

Implementation of the Improvement

Seed funding for implementation of this model was granted by the local hospital system foundation to support the two extra positions needed to implement team-based care at the family

practice clinic. Project resources in the form of quality personnel, trainers, and nursing leadership were requested by the regional VP of operations and granted by other business units.

The implementation phase began September 20, 2021 and will run through the end of 2022. The goal of the funded one-year pilot project is to assess feasibility within the regional health system. The described quality improvement project focused on outcomes of the initial implementation phase, with data collection for the sub project occurring from September 20, 2021 through December 17, 2021. A logic model (Appendix G) was developed to facilitate planning activities.

In the setting of the COVID-19 pandemic, medical assistant shortages made it impossible to recruit medical assistants for the project. When current staff expressed dissatisfaction with their roles being changed for the project, leadership became concerned that staff would leave and not be replaceable. As a result, only one of the two providers had begun implementation as of the end of the initial three-month implementation period, with the second provider potentially implementing in the months following. Additional funding was obtained to cover the additional personnel costs of two nurses rather than two medical assistants. The job responsibilities of current staff were not changed. A new graduate nurse was hired for CTC position, and this individual has spent a portion of her time providing in room support and a portion of her time performing the expanded nurse responsibilities outlined in the flow chart. This change created a situation in which some patients had a CTC involved in their care and some did not, creating an opportunity to compare outcomes between groups for the patient acceptance and experience measures.

The team underwent training in the care model. A detailed training outline and schedule was developed. The first session involved all clinical staff in the RN, MA, and CTC roles and

consisted of a high-level overview of the model. A series of mini trainings were designed for the RN CTCs to train them in provider documentation templates and workflow. A library of EHR templates was created so members could produce consistent documentation, and staff were oriented to the use of these templates. Nurses received training on problem focused complaint protocols, well-child anticipatory guidance, and Medicare wellness exam requirements prior to incorporating each of these functions, which was done in a phased fashion over several months.

Evaluation of the Intervention

Deming's model for improvement, based upon repeated cycles of the Plan, Do, Study, Act methodology was utilized to rapidly refine and evolve the innovation (Langley, 2009). The project team met weekly to biweekly, and an issue tracking log was maintained. Clinical team huddles occurred daily to facilitate flow from operations back into the evaluation and planning phases. The project director, in collaboration with members of the regional leadership team and the project steering committee, have been assessing success using the objectives defined in the logic model on an ongoing basis.

Measures

Multiple outcomes were expected from the innovation project. These are summarized in the measurement and analysis framework (Table 1 and Appendix H). The primary objectives of the project were to maintain or improve patient experience measures and to establish acceptability of the model to patients. The secondary objective was to reduce provider burnout while maintaining provider productivity.

To determine how the intervention impacted *patient experience*, selected Press Ganey patient experience metrics including three provider measures from Consumer Assessment of Healthcare Providers and Systems (CAHPS) were analyzed. All metrics were scored on either a

10-point Likert scale, a three-point scale of "no," "yes, somewhat" and "yes, definitely," or a 5-point Likert scale of "very poor, poor, fair, good, or very good." Press Ganey surveys were mailed to all patients after a visit per usual organizational procedure. Surveys received from patients who experienced team-based care during the intervention period were compared to those from patients who received the standard care model.

Table 1

Measurement Framework

Measures	
Objectives	How to operationalize and measure the objective
Patients accept the model	Post-encounter patient paper survey administered 9/20 – 12/17 3 item 5 point Likert scale UCSF Center for Excellence in Primary Care
Patient experience is improved or maintained	Post-encounter Press Ganey survey mailed to homes following all encounters 9/20 – 12/17
Provider burnout is reduced while productivity is maintained	Hours spent in work outside of clinic hours (WAC) Days to chart closure Work RVUs billed Risk adjusted score from HCC coding

Patient acceptance of the model was evaluated using a three question Likert scale survey (strongly disagree to strongly agree) designed by the UCSF Center for Excellence in Primary Care (UCSF, 2014) to assist teams in collecting patient feedback when implementing team-based documentation programs. A notecard containing the three questions, visit date, and respondent gender and age was distributed to all patients regardless of CTC involvement and completed privately at the conclusion of the visit. The survey did not contain identifying information and was collected using a locked slotted drop box upon completion.

Press Ganey is a well-known vendor utilized by hospitals and health care systems to measure and report patient experience data for over 40 million patients annually (Press Ganey, n.d.). The content of surveys is selected by the organization. Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey data must be reported by accountable care

organizations (ACOs) who receive reimbursement from Medicare as it allows them to compare patient experience across different care settings (CMS, 2021). The CAHPS program is administered by the Agency for Healthcare Research and Quality (AHRQ) and is part of a broader effort to ensure greater transparency in healthcare quality (CMS, 2022). The healthcare system in which this project took place uses a Press Ganey survey to administer CAHPS questions as well as a battery of other questions to evaluate patient experience. To evaluate *patient experience* for this project, responses from selected applicable questions from the Press Ganey post visit surveys were compared to responses from those who did not experience team-based care during the same period. The patient experience questions analyzed from the Press Ganey survey are summarized in Appendix I.

Provider work time spent outside of clinic and the amount of time it takes to complete and close encounter charts were used as surrogate measure of *provider burnout* in the initial months of implementation. Work outside of work time correlates with the construct of exhaustion in the Maslach Burnout Inventory (Adler-Milstein et al., 2020). Given that the initial phase of the project came to involve only one provider, who is also the project leader, subjective measures of provider burnout would likely be biased and were not tracked.

Decrease in burnout measures would not be as significant or palatable if productivity and *financial performance* were not maintained. Total work RVUs was selected to measure productivity and financial performance under a fee for service model. Normalized adjusted risk score, derived from HCC diagnosis codes assigned to visits, is a measure that represents reimbursement potential under population-based reimbursement. Since the normalized adjusted risk score is only available on a quarterly basis, this measure may not be useful when looking at data from the first three months of implementation.

Analysis

The percentage of UCSF patient survey respondents selecting “agree” or “strongly agree” were determined for each question for the patient group that had an in-room CTC involved in their care. The response rate was determined by dividing the number of surveys received by the number of patient encounters. In addition, the distribution of responses along the Likert scale for each of the three questions were compared for the CTC group and the non-CTC group and the mean ranks were compared using the Mann Whitney U test.

Responses to Press Ganey patient surveys were analyzed per response for each question in each survey received as described in Appendix H. The response rate was calculated by dividing the number of surveys received by the number of patient encounters. Medical record numbers were used to track which respondents experienced team-based care and which did not. The mean ranks between the CTC group and non-CTC groups were compared using the Mann Whitney U test. Response rate was determined by dividing the number of results by the total number of encounters in the same period.

Time spent working in the health record system (referred to as WAC time) outside of clinic hours of 7 am to 6 pm was tracked using a report that draws login time from the health record system. Daily totals for seven-day weeks were summed to determine a weekly WAC value. The change in WAC time was measured from the pre-study baseline period of the beginning of 3rd quarter (Q3) to the last workday prior to intervention start on 9/20/2021. Three methods were used to look at the change over time. The method felt to be most accurate was calculation of a trendline from the beginning the baseline period to the end of the intervention period. Change was also examined by comparing weekly WAC time for the first week of the

intervention to the last week of the intervention, and the mean WAC time during the baseline period (start of Q3 to the last week prior to implementation) to the implementation period.

The number of days to chart closure was determined from a system report that subtracts the date of the encounter from the date the chart was signed and closed. Individual totals were summed to produce a weekly value for all encounters that occurred in that week. Days to chart closure was plotted on a run chart to determine trends in variation. Unusual variation was detected leading to outlier analysis using SPSS software. Extreme outliers were identified through this exercise, prompting elimination of nine of 597 charts from the data set. Mean weekly values were compared to the baseline period (start of Q3 to the last week prior to implementation) and percent change was calculated. The independent samples t-test was used to determine the significance of change.

Work RVUs (wRVU) were determined by summing each individual billing code per patient per day to determine wRVU per day. Since scheduled contact hours ranged from two to eight per day, daily total was divided by the number of scheduled contact hours per day to determine the number of RVU per scheduled contact hour. Clinic time consumed by cancellations, no shows, and unbooked slots was not eliminated thus the full number of available scheduled hours was counted. The work RVU totals were analyzed by run chart to better understand sources of variability.

Ethical Considerations

This project is supported by the regional leadership team including the Regional Vice President Medical Director and Vice President of Clinic Operations. The Medical Director has championed the project and the VP of operations has secured personnel resources. Regional

leadership is committed to identifying and testing solutions to address issues of provider burnout and quality improvement and see this model as a potential means to address both.

There were no conflicts of interest around the project. No ethical issues impacted involved patients or personnel. It was considered that the presence of an existing team member in the exam room for a great portion of discussion or exam could impact patient perception of privacy. Since team members already review the same patient information in written form that they will be privy to in discussion or exam, the scope of PHI access is not increased. Since it is standard practice to involve chaperones in patient exams for both the protection of patients and providers, the presence of a care team coordinator functioning in the dual role of scribe and chaperone was not a substantial change in access to sensitive information or exams.

The UMB clinical quality improvement checklist was completed (Appendix K) and it was determined that the project meets criteria for quality improvement rather than clinical research. The project or innovation proposed is quality improvement and does not meet the definition of human subjects' research because it is not designed to generate generalizable findings but rather to provide immediate and continuous improvement feedback in the local setting in which the project is carried out. The University of Massachusetts Boston IRB has determined that quality improvement projects do not need to be reviewed by the IRB.

The local Institutional Review Board also regards quality improvement work as exempt from IRB review. The project was discussed with local IRB personnel to confirm it qualified for exempt status. There were no other personnel, committees, or boards that needed to review and approve the project. All patient and data collected for this project was de-identified. Medical record numbers of patients experiencing team-based care were coded by an individual not

involved in the analysis. This format of this project report was guided by the SQUIRE 2.0 Guidelines (Ogrinc et al., 2016).

Results

Population characteristics and response rates from the post visit and Press Ganey surveys are summarized in table 2. The percentage of female versus male respondents was similar to that of the providers' patient panel which is predominantly female.

Patient Acceptance

Patient acceptance of the team-based care model was evaluated using a three question post-visit survey. The survey results indicated that greater than 97% of patients responded either agree or strongly agree to all three questions. Patient surveys indicated that patients felt better about their medical visit when a CTC participated in their care (98.97%, p = 0.036). Patients who had a CTC involved in their care were also more likely to report they received the full attention of the provider (98.71%) and were able to say everything they needed to their provider (99.23%).

Table 2

Patient survey summary data

	Post-visit survey	Press Ganey survey
Days of data collection	55	55
Percent female	70.4%	62.7%
Percent male	29.6%	37.3%
Average age	46.6	57.92
Age range	7m to 90	64 to 92
Number of encounters	595	595
Number of surveys collected	389	51
Response rate	65.5%	8.6%
Percent with CTC involved in care	36.0%	23.5%

Patient Experience

Responses of patients who experienced team-based care were compared to those who didn't on selected Press Ganey questions including three CAHPS questions. The response rate

was low during the implementation period, which is typical of organizational experience with this survey.

When the groups were compared using a Mann-Whitney U test, very similar response distributions along the Likert scale were seen. All three key CAHPS measures were either the same or better in team-based care visits versus traditional visits.

Press Ganey questions concerning experience with the provider, experience with the nurse or assistant, and concern for patient privacy were very similar. Ratings were slightly better when a CTC was involved in care for some questions, and slightly worse when a CTC was involved in care for other questions. Responses to all patient survey results are summarized in Appendix J. No findings were determined to be statistically significant due to the small response rate.

Provider Burnout

Provider burnout was measured using two proxy measures which represent provider management of workload. Time spent outside of the usual clinic hours of 7 am to 6 pm, or WAC time, decreased from the baseline period (beginning of third quarter up to the last day prior to implementation) to the implementation period. Three methods were used to calculate the change, and depending upon the method used, the decrease ranged from 18.0% to 31.6%.

The ability of the provider to complete documentation and close the chart was compared from the baseline period to the intervention period. After removal of nine extreme outlier records from the data set, the percentage of charts remaining open after five days decreased from 9.60% to 8.21%, a decrease of 1.39% compared to baseline.

Financial Measures

Organizational reimbursement as measured by wRVUs produced per scheduled contact hour increased from 2.3 in the same period in the year prior to intervention and 2.5 in the

baseline period to 2.78 in the intervention period. The difference in productivity in the intervention period was statistically significant ($p < 0.001$) compared to both prior year and the baseline period. Reimbursement potential under population-based billing (HCC/risk adjusted score) increased from 0.7618 at baseline to 0.7756 at the end of the intervention period.

Discussion

Patient Acceptance of the Model

The post-visit survey was administered to all patients seen in the project period of 9/20/2021 through 12/17/2021 using a paper survey. The first aim of the quality improvement project was that > 95% of patients would respond "agree" or "strongly agree" to all three questions related to patient acceptance and this goal was met (Table 3).

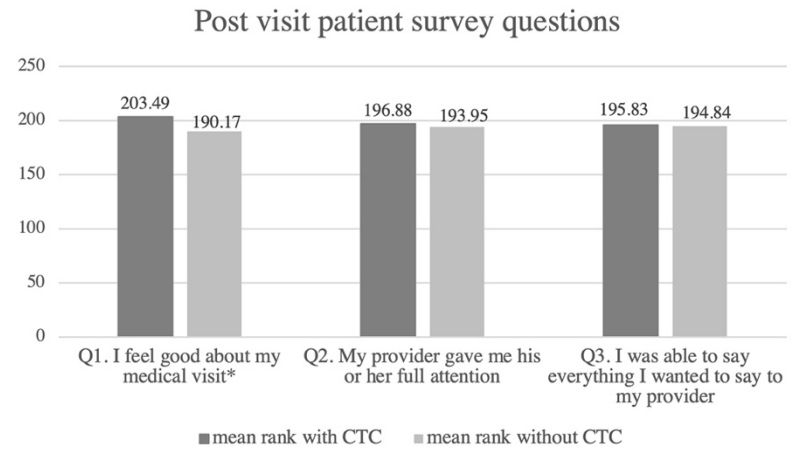
Table 3

Post-visit survey results

	Agree or strongly agree
I feel good about my medical visit	98.97 %
My provider gave me his or her full attention	98.71 %
I was able to say everything I wanted to say to my provider	99.23 %

Responses from patients who did not have a CTC involved in their visits were compared to those that did. The Mann-Whitney U test was used to determine if the distribution of responses along the 5-point Likert scale was the same for each group. As seen in Figure 4 the distribution was more favorable with CTC than

Figure 4

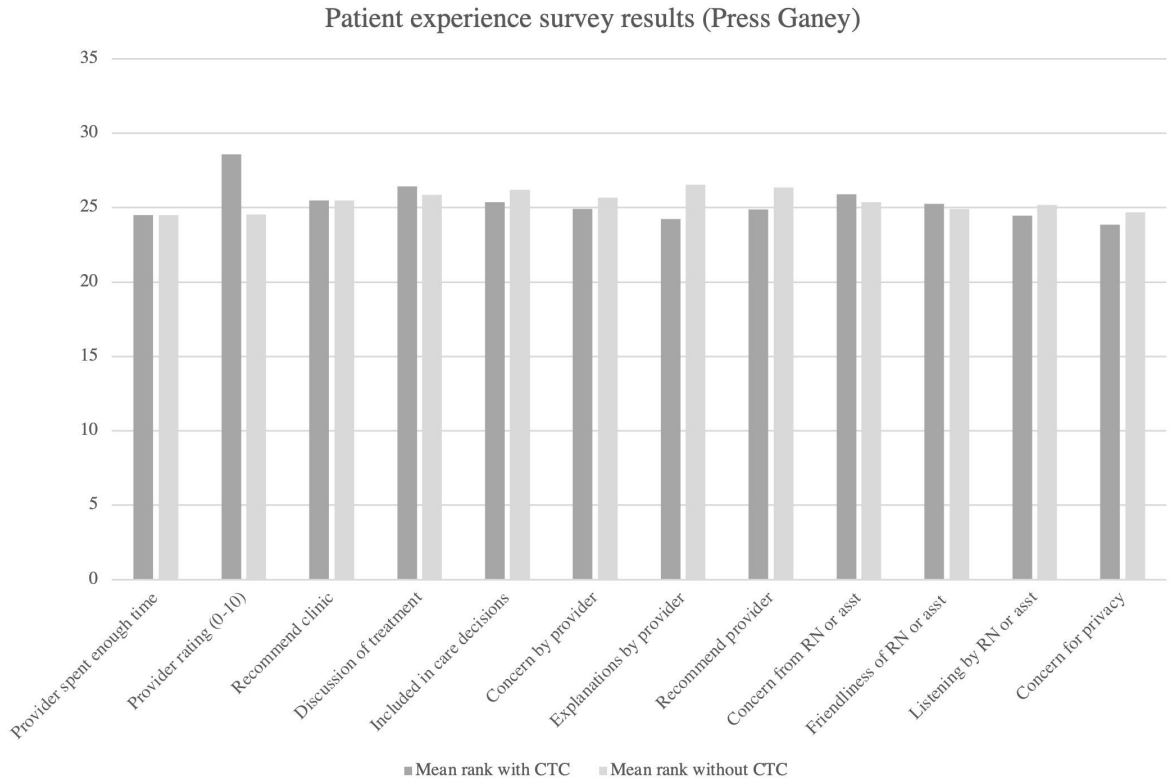


without for all three questions. There was significantly higher response distribution ($p = 0.036$) for question one, one, "I feel good about my medical visit."

Patient Experience

For the subset of pertinent Press Ganey questions analyzed for the project period of 9/20/2021 through 12/17/2021 the Mann-Whitney U test mean ranks were very similar for all questions as seen in Figure 5. Sometimes the distributions were more favorable, and sometimes less favorable, with CTC involvement in the visit. The most pronounced variation was seen in the CAHPS provider rating question, with the provider rating improved when CTC was involved. Due to the very low response rate, no results were statistically significant.

Figure 5



Provider Burnout and Productivity

The third specific aim of the quality improvement project was to decrease provider burnout while maintaining productivity. Work outside of clinic hours and number of days to

chart closure were selected as proxy measures for provider management of workload and therefore burnout. Unfortunately, the project launch was delayed until fourth quarter of 2021. The need to spend time in Epic on year end quality metrics, and the Thanksgiving and Christmas holidays both resulted in unusual days in chart closure and an increase in work after clinic hours. In addition, the need to devote time to the project itself caused changes in the behavior of the participating provider that may have impacted results. Even so, the provider burnout measures improved, while productivity was not just maintained, but was increased by both measures.

Work After Clinic Hours

Work after clinic (WAC) time decreased from baseline to intervention period. WAC trends were analyzed using three different methods and all three showed substantial reduction.

Table 4

Work after clinic time trend

	Start hours	End hours	Change Hours	% Change
Intervention week 1 to week 13 mean	7.07	4.46	-0.97	-18.0 %
Mean baseline period vs mean intervention	5.99	4.93	-1.06	-17.7 %
Trendline method (y = -0.0819x + 6.5681)	6.49	4.43	-2.05	-31.6 %

The run chart in Figure 6 shows that there was greater WAC variability in the baseline period than in the implementation period. This decreased variability may itself be an indication of more manageable workload. It is hypothesized that a downward trend in WAC time will continue as the team becomes more efficient, and indeed, reports in the literature from similar interventions consistently indicated that provider burnout measures do not improve until about one year after implementation given the time it takes to train and form efficiencies within the team.

Figure 6

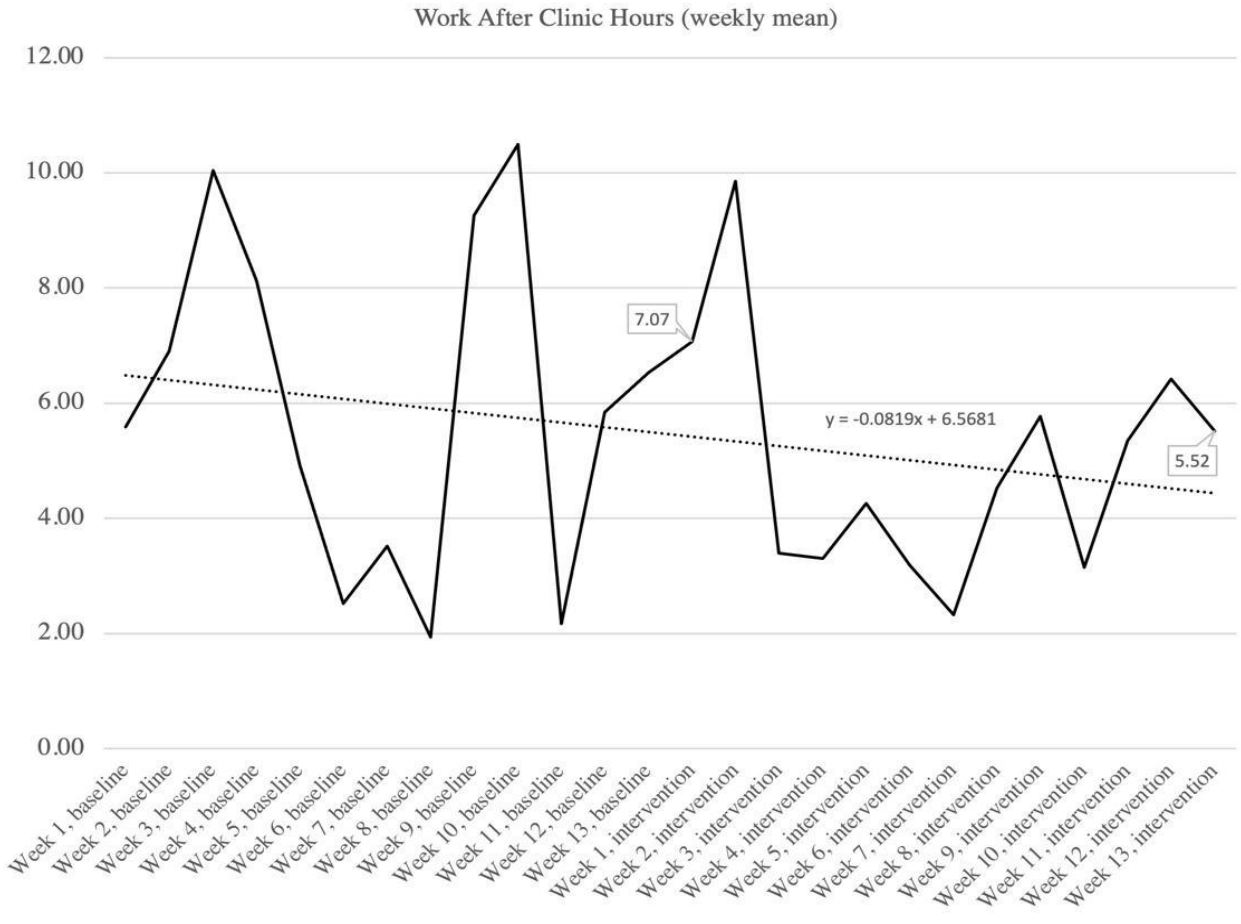


Chart Closure

The chart closure objective was to improve chart closure time overall, and specifically to increase the rate of closure within 5 days by 1%. This goal was met, with chart closure within 5 days increasing by 1.359%, from 90.40% during the baseline period to 91.79% during the intervention (Table 5). This occurred despite a spike in mean chart closure time as the end of 2021 as seen in Figure 7. Prompt chart closure is partially driven by metrics used to determine provider compensation for the following year. Charts not closed beyond a certain threshold maximum no longer impact compensation, so providers are incentivized to delay work on those charts until more urgent matters are addressed. In this case, the provider reasoned it was too late

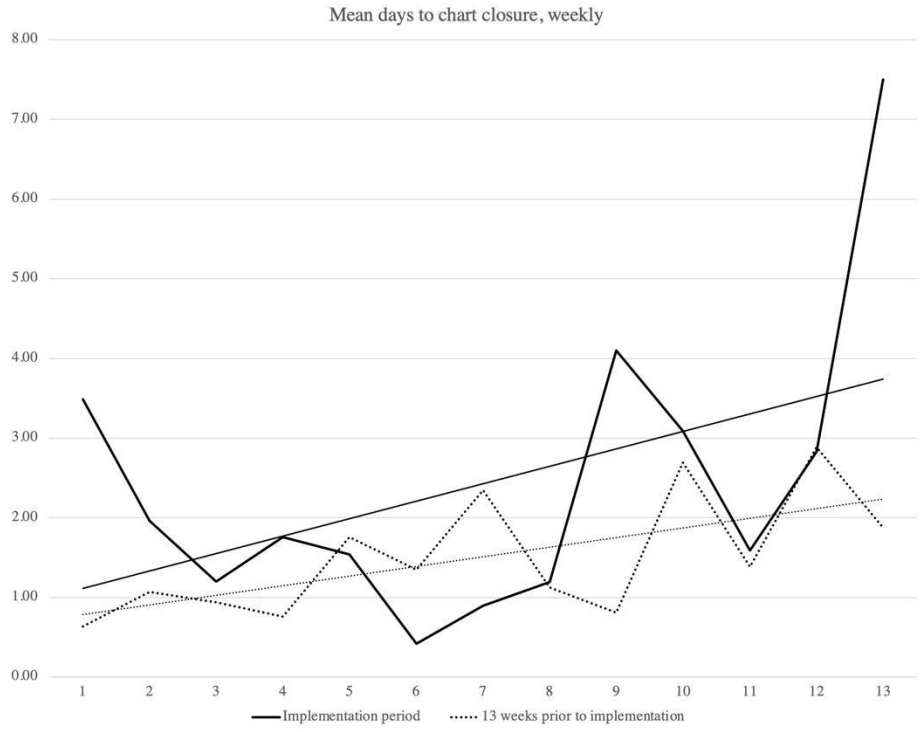
Table 5

Chart closure within 5 days

	Closed within 5 days	Total charts	Percent
Intervention period	548	597	91.79 %
Baseline period	692	765	90.40 %

In the year to meet the compensation-based chart closure metric and focused instead on meeting the compensation-based quality metrics, which resulted in unusual outlier data points at year end.

Figure 7



Analysis of outlier cases was completed with SPSS. The highest 10% of outlier cases, a total of nine charts left open for either 23 or 29 days, were eliminated from the data set. No similar outliers occurred during the baseline period. In an independent samples t-test, mean chart closure rate improved from 2.47 days points to 1.95 days (p=0.001).

Productivity

Given the financial pressures on the health care industry and primary care in particular, a care model that results in reduced organizational reimbursement is unlikely to gain acceptance. The industry is shifting gradually from fee for service to population-based reimbursement therefore reimbursement measures must show improvement under both reimbursement models.

Previous team-based care implementations in other organizations have found that a return on investment does not typically occur in the initial months after implementation because of the learning curve for providers and CTCs.

Work RVUs. Work RVUs was selected to reflect reimbursement under fee for service model. HCC code capture as represented by panel normalized risk score was selected to demonstrate reimbursement potential under a population-based billing model in which reimbursement is based on patient complexity or acuity (Yeatts & Sangvai, 2016).

Similar variability in wRVU, expressed as both a daily total and in RVUs per scheduled contact hour, was seen in the baseline period and the intervention period as shown in Figure 8. A significant increase in wRVU per contact hour was observed in comparison to both the baseline period and the same period in the previous calendar year (Table 6). This was examined because of the phenomenon of seasonal variation. Provider panel size and both increased demand for appointments and greater number of unaddressed problems per visit in the post COVID-19 period are other potential contributing factors.

Figure 8

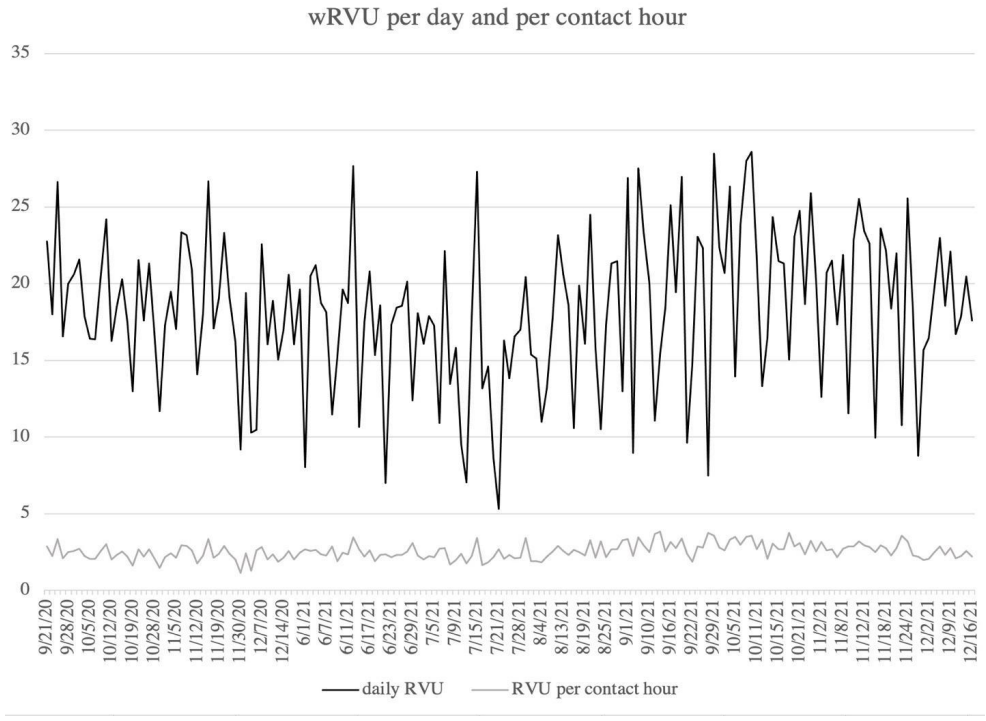


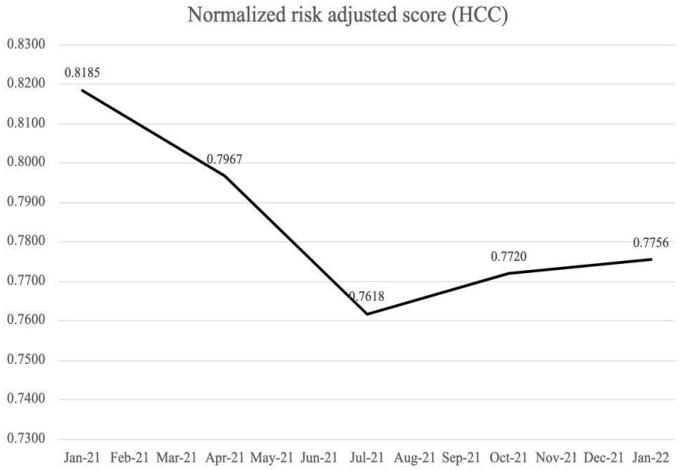
Table 6

Work RVUs per contact hour

	wRVU	Significance of change from comparison to implementation
Implementation period	2.78	
Same period in prior year (9/21/20 – 12/18/20)	2.33	< 0.001
Baseline period (6/1/2021 – 9/19/21)	2.50	< 0.001

HCC Code Capture. Capturing the complexity of a patient case for reimbursement purposes is important in ensuring appropriate reimbursement under population-based billing models. HCC diagnosis codes in Medicare claims are used to calculate a risk adjusted score for the population. The more HCC diagnoses addressed in an encounter the higher the panel risk adjusted score will be, and the greater the reimbursement the organization may receive for a member under an accountable care organization model in which complexity or acuity is taken into account (Yeatts & Sangvai, 2016). Increased timeliness of charting and a medical professional with a moderate scope of practice within the room focused on documentation may facilitate better capture of all diagnoses addressed in a visit.

Figure 9



Panel normalized adjusted risk score data is reported on a quarterly basis. The normalized adjusted risk score has increased slightly at each measurement since the intervention began (Figure 9). It is not clear what led to the downward trend in the earlier part of 2021 leading up to this. It is also unclear if the intervention led to the increase, particularly since only a few data points were available. Since the quality improvement project will continue for an additional nine months, trends may become

clearer over time. Since nurse practitioners in this organization do not receive compensation incentives based on normalized adjusted risk scores but physicians do, patterns of change could be either more or less pronounced in a physician practice.

Limitations

Conclusions from this quality improvement project should be interpreted with the understanding that outcomes from only one provider practice were evaluated. The data collected was from the project leaders own practice, creating potential for bias. The provider practice is about five years old and still a growing practice, meaning that productivity might have increased even without the intervention. Since data collection occurred in the second year of the COVID-19 pandemic, patients likely adjusted their patterns of seeking care. This might have led to increases in productivity or greater number of problems to be addressed per visit because of latent needs that needed to be addressed.

While this project provided a comparison of CTC and non-CTC visits, selection of visits was not randomized. CTC involvement in visits was driven by staff availability, schedule, and selection of alternating visits primarily, and where possible, patients anticipated to have more complex care needs or more data to capture were prioritized.

WAC was selected for convenience and to align with organizational tradition but is not as accurate as work outside of work (WOW). WAC underestimates time in the EHR captured by Epic Signal (Sinsky et al., 2020) and it is hypothesized that WOW may improve more than WAC before and after a team based care implementation. Furthermore, data specifically demonstrates that WOW is correlated with burnout (Adler-Milstein, 2020).

The model was adjusted in response to organizational and staffing challenges such that the CTC was not involved in all visits. While this provided an opportunity to compare CTC and

non CTC groups directly, it undermined the success of the model by reducing the documentation assistance for the provider substantially. However, the ability to train a nurse CTC using this method will likely produce greater long term benefits than would training a medical assistant CTC, since an RN may either independently or in a co-visit format increase performance of services. These benefits may be seen in domains not evaluated, such as patient access to care and improved population-based quality metrics.

Low response rate to Press Ganey surveys was another limitation. Press Ganey surveys are delivered via US Mail and are quite lengthy. This has led the organization to end its' partnership with Press Ganey and change to a new survey vendor at the beginning of 2022. This vendor offers a shorter survey which is delivered electronically. Response rates are expected to be much higher and represent a larger variety of patients including younger patients. It will also mean that baseline data will not be available and that future analysis will need to examine change over time rather than comparison to baseline.

Conclusions

This work looked for models that supported moving from triple aim to quadruple aim to address burnout. The triple aim eliminated health care provider and team member needs from the definition of healthcare quality, resulting in a work environment that is not sustainable, and which is indirectly leading to harms in patient care due to provider and team member attrition and other complex factors. Given that this fourth aim must be met in an environment of intense financial pressure, care models that provide increased team satisfaction while also improving financial performance are highly relevant.

It is a big challenge to organizations to recruit both CMA and RN staff in an environment with shortages. The investment in increased salaries creates a barrier to initial implementations

of team-based care models. Both present sustainability challenges. Phased implementations in which organizations can test the potential benefits of the model while having an exit strategy of return to normal operations can address this. Similarly, as found in this implementation, recruitment and retention of clinical team members who work in these models offsets and likely even helps with staffing challenges, especially as word of the model and availability of these types of roles gets out in the community. The promise of a path to attaining competency in ambulatory nursing as well as preparing for a future role in advanced practice will also address these challenges. The increase in reimbursement potential under both fee for service and population-based billing models, via billing of nurse visits and capture of patient complexity respectively, demonstrates that this model actually creates revenue and likely also improves patient access to care.

Recommended next steps are to implement the project in a physician practice within the same organization. A practice will be selected in which MAs are open to role change and communication from leadership about the forthcoming change will be designed differently to avoid problems experienced with the first implementation. The current pilot has funding to support the pilot through the end of 2022, and the measures evaluated in this project will be reevaluated at year end for both practices. Analysis of additional data including patient access to care, per member per month cost of care, population-based quality metrics, and WOW time will be completed at the end of 2022 and it is anticipated that these metrics will provide further evidence in support of team-based care.

Co-location of provider and clinical staff have been difficult to implement within the existing clinic space. Our work with this model has led us to conclude that co-location is indeed an important efficiency driver when clinical staff work this closely with the provider.

Reorganization of existing workspace to allow co-location will be an important step if the model is operationalized at the site long-term.

Prior reports on team-based care models have emphasized physician led teams. Nurse practitioners have full practice authority in over half of all U.S. states. Further exploration is needed to determine how the model works in advanced practice provider practices. It is hypothesized that it will be as effective if not more effective in NP practices due to anticipated ease of recruiting RNs interested in gaining on the job experience and training in ambulatory nursing or to prepare for future advanced practice. This is significant since RN career growth and education trajectory tends to occur over time rather than in one stage before embarking upon professional practice as it does for physicians. At the time of writing, legislation appears to be imminent that will provide full practice authority in the midwestern state in which this project is occurring, the last of the three states covered by the health system to achieve this milestone, thus creating an opportune time to look at this.

Longer term, the goal is to support the model within the normal operational budget for those practices that wish to utilize the method within the local region. The organization is also beginning to offer access to a virtual scribe service paid for on a per encounter basis, and it seems feasible that providers could select their preferred method or use a combination of both. One approach might be to use virtual scribes for visits in which a large volume of historical or interview data is collected but which are expected to have a fairly basic assessment and plan and teaching needs (eg mental health visits) while utilizing CTCs for medically complex patients with multiple problems and teaching needs. As has happened with other organizations, utilization of the model is expected to gain momentum locally, then spread to other regions, and finally become the prevalent model within the organization.

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Appendix A

Literature Synthesis

Category	Intervention/Publication	Summary of Findings	LOE/Quality/Sample
Team-based care	Advanced team-based care		
	A. Jerzak, et al. (2019)	A. The aTBC model improved quality metric performance and health screening guideline adherence compared to controls within a large health system.	A. 5B (n=148 providers at 29 sites)
	B. Hopkins & Sinsky (2014)	B. The advanced team-based care model improved quality, patient satisfaction, access, and clinician satisfaction while increasing revenue.	B. 5B (sample not enumerated)
	RN co-visit model		
	C. Funk & Davis (2015)	C. RN co-visits are an effective way to increase RN scope of practice and job satisfaction, increase access, reduce triage demand, while providing quality patient care.	C. 5B (n=14 providers at 5 sites)
	New roles for medical assistants		
	D. Chapman & Blash (2017)	D. Medical assistants were utilized effectively in a variety of new roles in team-based models with a number of positive patient outcomes and role satisfaction. Extensive training is needed for success.	D. 3A (n=173 key informants at 5 sites)
	Stanford Primary Care 2.0		
	E. Levine, et al. (2018)	E. Medical assistant role was successfully expanded to improve quality of care, patient satisfaction, and reduce provider burnout.	E. 5B (sample not enumerated)
	F. Brown-Johnson, et al. (2019)	F. Primary care facilities were designed using Lean methodology and ethnography within the Stanford Health System, some practices evaluated health used team-based care.	F. 5A (non-research evidence)
	TEAM (Together Each Person Achieves More)		
	G. Milford, et al. (2018)	G. TEAM approach increased quality and patient satisfaction, as well as team member satisfaction, reduced work time, cycle time, and wait time.	G. 5B (sample not enumerated)
	H. Misra-Hebert, et al. (2018)	H. Extent of adoption of the model was determined by practices' responsiveness to change and flexibility.	H. 5B (n=75 key informants at 9 sites)
	Team-based dyad model		
	I. Wodinski, et al. (2015)	I. Increased patient access was created with a dyad model of (MD + MA/LPN) particularly for complex patients with comorbidities, patients highly satisfied with care.	I. 5B (n=843 patients in 42 provider practices)
	Various team-based care models		
	J. Nguyen, et al. (2020)	J. Review of team-based care versus traditional practices in MA indicated improved performance on only A1c, other quality, patient experience measures, and preventative care screening adherence were unchanged.	J. 2B (n=40 providers at multiple sites)
Scribe model	In-room scribe		
	A. Danak, et al. (2011)	A. No difference in satisfaction of quality of care per quantitative measures, qualitative data indicated scribes enhance clinician patient interaction.	A. 1C (n=34 patients from three providers at one site)
	B. Heckman, et al. (2020)	B. Similar levels of patient satisfaction with shorter visits, improved provider experience, and increased revenue and wRVU.	B. 2B (n=13 providers at one site)
	C. Sattler, et al. (2018)	C. Charting efficiency and style, clinic operations, EHR, extension of the scribe role, non-patient-facing work, teamwork/partnership, quality of life, connection with patient, and patient satisfaction were themes that emerged from this qualitative evaluation of provider experience.	C. 3A (n=4 providers at one site)
	D. Howard, et al. (2012)	D. Patients were either equally or more satisfied with overall experience and provider communication under the scribe model. Coding accuracy improved, revenue increased, provider satisfaction increased. Attributes of effective scribes were identified.	D. 5B (n=220 patients and 6 providers at one site)
	E. Martel, et al. (2018)	E. Medical scribe implementation increased patient satisfaction, capture of patient complexity for reimbursement, improved provider wellbeing, and was "transformative" to the provider's practice.	E. 5A (n=37,849 encounters for 16 primary care providers)
	Virtual scribe		
	F. Benko, et al. (2020)	F. Virtual scribes can be used to cut documentation time while preserving clinical quality in orthopedics practice.	F. 1A (n=50 patients at one site)
Home-based care	Home-based primary care for seniors		
	A. Wajnberg, et al. (2010)	A. Statistically significant decrease in hospitalizations after enrollment in the program	A. 3B (n=179 patients among multiple providers at one site)

Literature Synthesis

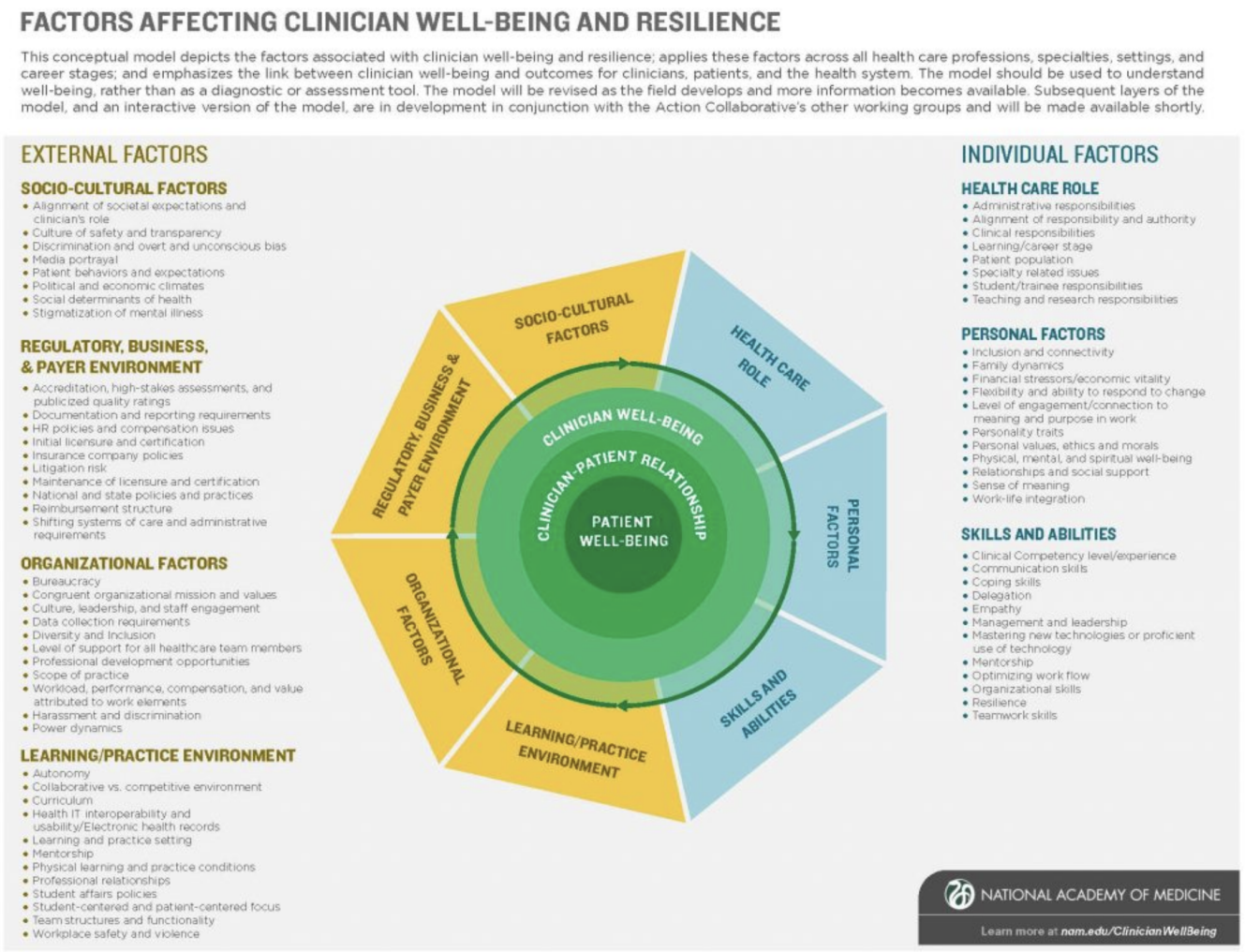
Category	Intervention/Publication	Summary of Findings	LOE/Quality/Sample
	B. Sairenji, et al. (2016)	B. Based on analysis of CMS claims, home-based primary care is increasing, driven by cost savings and need-based, as well as new billing infrastructure to support it	B. 3B (n=22,186 providers)
Worksite care	Worksite primary care clinic		
	A. Shahly, et al. (2014)	A. Systematic review indicates worksite clinics can provide accessible quality health care and provide favorable cost-benefit for sponsoring employers	A. 1B (sample not enumerated)
Group medical visits	Group medical visits for chronic pain management		
	A. Moitra, et al. (2011)	A. Group visits may not be well suited to the chronic pain population	A. 5B (n=50 patients)
	Centering Pregnancy prenatal care model		
	B. Tilden, et al. (2014)	B. A meta-analysis of group appointments for prenatal care showed that there is consistent benefit to primary outcomes such as low birth weight, and satisfaction among participants	B. 1A (9 studies)
Nurse led care	Nurse led patient centered medical home		
	A. Frasso, et al. (2017)	A. Nurse led practice model is already aligned with the PCMH principles	A. 3A (n=32 key informants)
	DNP nurse led care		
	B. Lathrop & Hodnicki (2014)	B. DNP nurses are qualified and prepared as full partners with physicians and other disciplines to fill the gap in primary care.	B. 5A (non-research evidence)
	Virtual nurse led community health		
	C. McNeal (2019)	C. Virtual nurse led model was effective and cost-effective in underserved community	C. 5B (n=477 patients)
	Nurse led care		
	D. Riley & Janosky (2012)	D. Allows increasingly efficient use of licensed and appropriately trained PCPs to full scope of practice.	D. 5A (non-research evidence)
Telehealth	Telehealth, aka "home online health consultation		
	A. Almathami, et al. (2020)	A. Consistent themes of facilitators and barriers to telehealth utilization were identified across a large body of research.	A. 5B (non-research evidence)
	B. Koonin, et al. (2020)	B. Teleheath service utilization has greatly expanded in the setting of COVID-19	B. 5A (non-research evidence)
Direct primary care	Direct primary care		
	A. Cole (2019)	A. The author argues that there is theoretical support for such a model of care and that it may address burnout. However, further research on outcomes of care is needed since evidence is limited.	A. 5A (non-research evidence)
	B. Eskew & Klink (2019)	B. This descriptive paper defined direct primary care and how it differs from concierge care. Authors found that clinical quality data on this model does not exist.	B. 5A (non-research evidence)
Integrated care model	Integrated behavioral health		
	A. Pomerantz, et al. (2010)	A. Co-located mental health with primary care resulted in 99% patient satisfaction, PCPs were satisfied, there was increased adherence to practice guidelines for identification and management of depression	A. 5B (non-research evidence)
	B. Reiss-Brennan, et al. (2016)	B. Team-based care including mental health clinicians resulted in higher quality on some measures, lower rates of acute care utilization, and lower payments received	B. 5B (n=113,452 patients in 150 practices)
	Integrated behavioral health for cardiometabolic patients		
	C. Druss, et al. (2017)	C. Integrated behavioral health associated with improved cardiometabolic quality of care and preventative care guideline adherence	C. 1A (n=447 patients at one site)
	Integrated social services		
	D. Gavaldà-Espelta, et al. (2020), Spain	D. Integrated social and health care services is a promising model of care, with improvements in treatment adherence, patient experience, and reduced caregiver strain	D. 5B (non-research evidence)
	E. Plescia & Dulin (2017)	E. Accountable care community approach is a promising form of integrated community care combining health and social resources	E. 5B (non-research evidence)
	Integrated clinical pharmacists		
	F. Kennedy, et al. (2015)	F. Integrated clinical pharmacists facilitated population health management. Major barrier is that RPh services are not reimbursable.	F. 3B (n=8 pharmacists at 7 practice sites)
	Clinical pharmacy setting for primary care screening procedures		
	G. Robbins, et al. (2013)	G. Med reconciliation, obesity screening, and follow-up planning at the pharmacy site was an effective strategy for population management.	G. 5A (n=1725 patients of 715 providers)

Literature Synthesis

Category	Intervention/Publication	Summary of Findings	LOE/Quality/Sample
	Accountable care organizations		
	H. Janosky, et al. (2012)	H. Proposed care model that forms a collaborative, integrated approach to community health.	H. 5A (non-research evidence)
Patient Centered Medical Home	Patient centered medical home/Accountable care organization		
	A. Cook, et al. (2015)	A. Patient survey indicates the PCMH model of care is associated with high quality patient experience, particularly those measures related to patient centeredness.	A. 2B (n=488 patients from five sites)
	B. Fandre, et al. (2014)	B. Use of the PCMH model reduces ER utilization compared to usual care control group.	B. 2B (n=1127 patients at two sites)
	C. Gilfillan, et al. (2010)	C. ProvenHealth Navigator PCMH enrollment was associated with significantly decreased hospital admissions and readmissions.	C. 3A (n=11 providers)
	D. Jaén et al. (2010)	D. PCMH improved quality measures of prevention and chronic care scores, but patient experience did not improve.	D. 1B (n=377-963 patients depending on measure of 36 providers)
	E. Lieberthal, et al. (2017)	E. A number of factors that enhanced transformation of traditionally modeled practices to successful PCMHs were identified through qualitative analysis	E. 2B (n=12,411 patients of 158 providers at 9 sites)
	F. Rittenhouse, et al. (2011), USA	F. Small practices don't fully implement PCMH, only achieving about 1/5 procedures and approaches.	F. 2A (n=1,325 providers)
	G. Garber (2020)	G. Integrated PT services within the PCMH primary care setting increases patient satisfaction, improves quality and saves inappropriate use of costly resources such as imaging.	G. 5B (n=179 patients)
	H. Ryan, et al. (2015)	H. Clinicians generally felt that PCMH was positive. ACO responses were less positive or unknown. There was dissatisfaction about use of quality metrics for performance assessment. Advanced practice providers were generally more satisfied than physicians.	H. 5B (n=1149 providers)

Appendix B

Factors Affecting Clinician Well-Being and Resilience



Note. Brigham, et al. (2018). From *NAM Perspectives*.

Appendix C

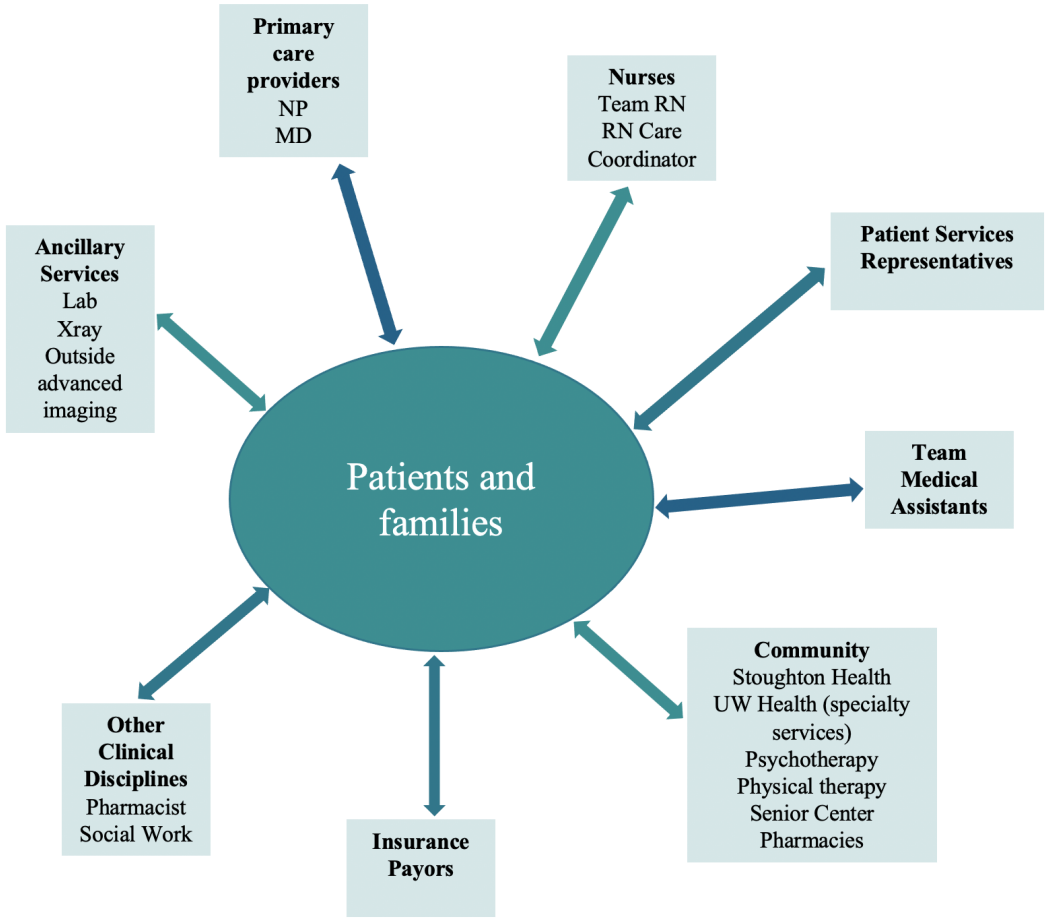
Clinical Microsystem Map

Clinical microsystem

Small semi-rural family practice clinic

UPH Stoughton Clinic

Patient subpopulation: Families and individuals across the lifespan



Specific health care needs

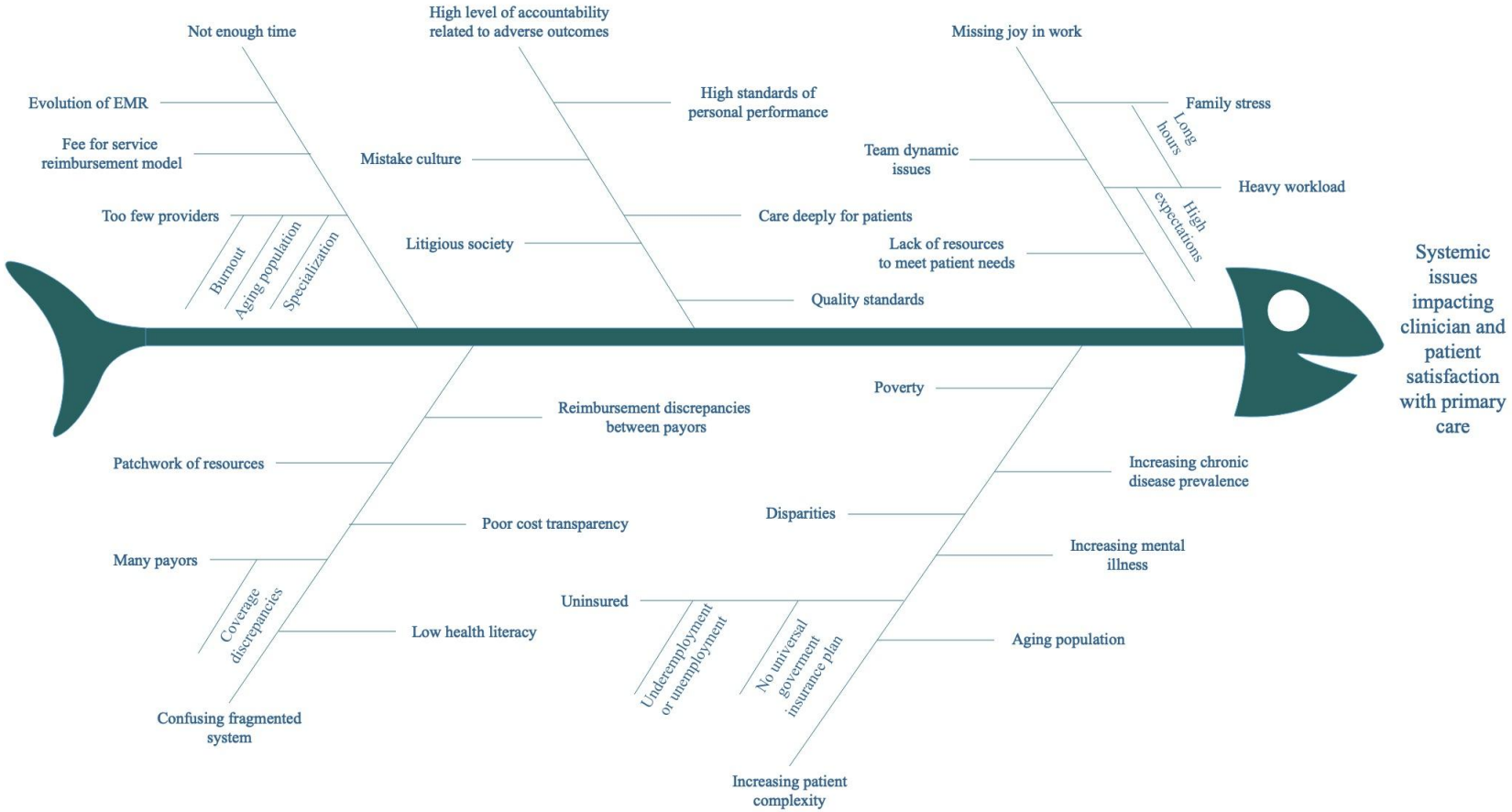
- All needs identified and addressed
- Supported and engaged in setting and achieving health and well-being goals
- Team of clinicians working together to ensure all needs are met
- Preventative care services completed
- Providers that are able to provide care because they are themselves cared for

Implementation ideas

- Team of individuals cares for the patient rather than the patient being cared for by the provider with a support team behind the scenes
- Redistribute both work of care and administrative work among team members so that all individuals are working up to full scope of practice

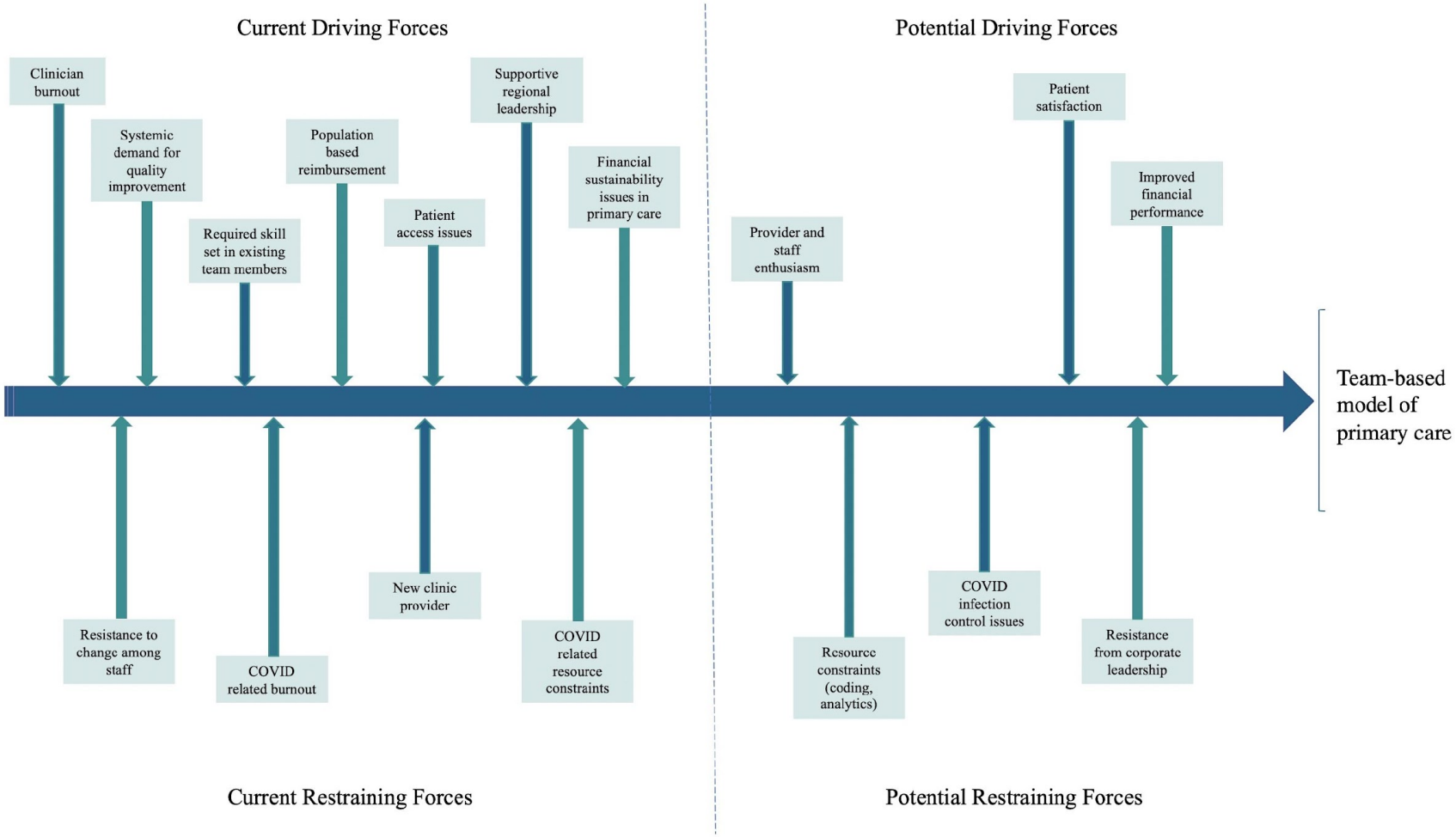
Appendix D

Ishikawa Cause and Effect Diagram



Appendix E

Force Field Analysis



Appendix F

Redistribution of Clinical Care Tasks Under Team Based Care Model

Figure F1

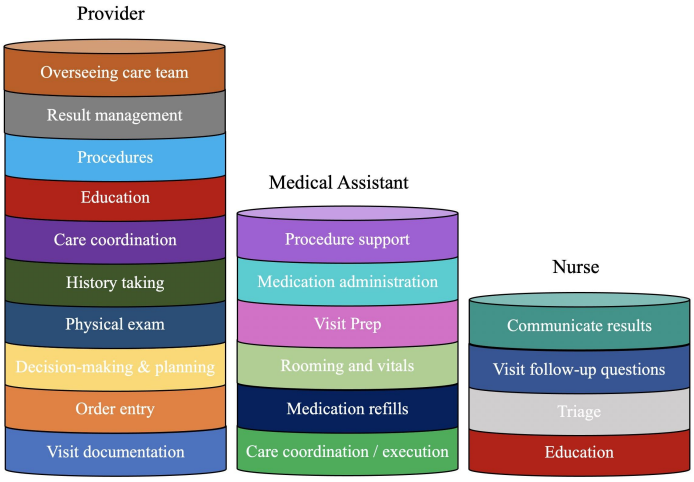


Figure F2

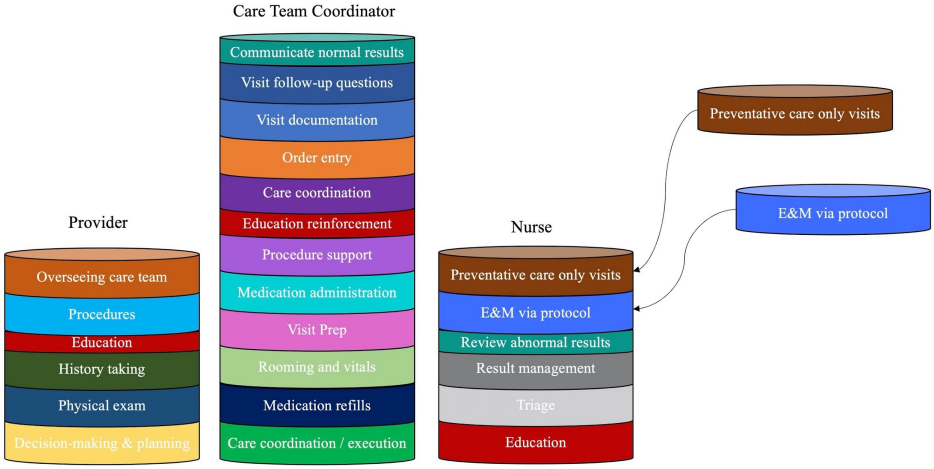
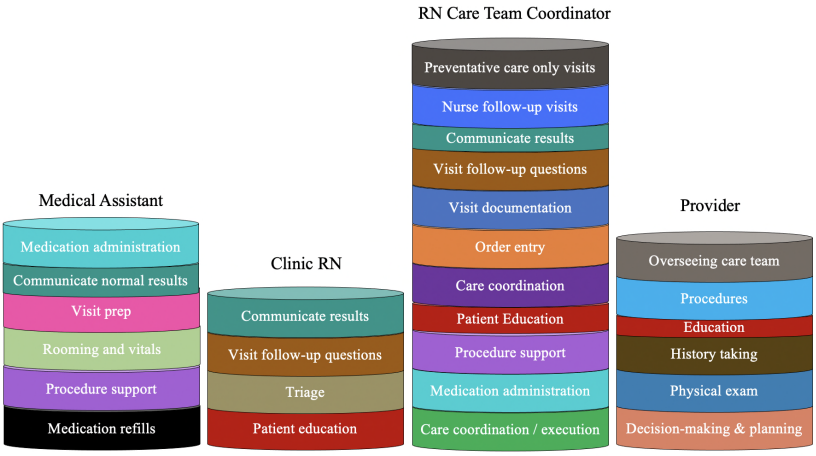
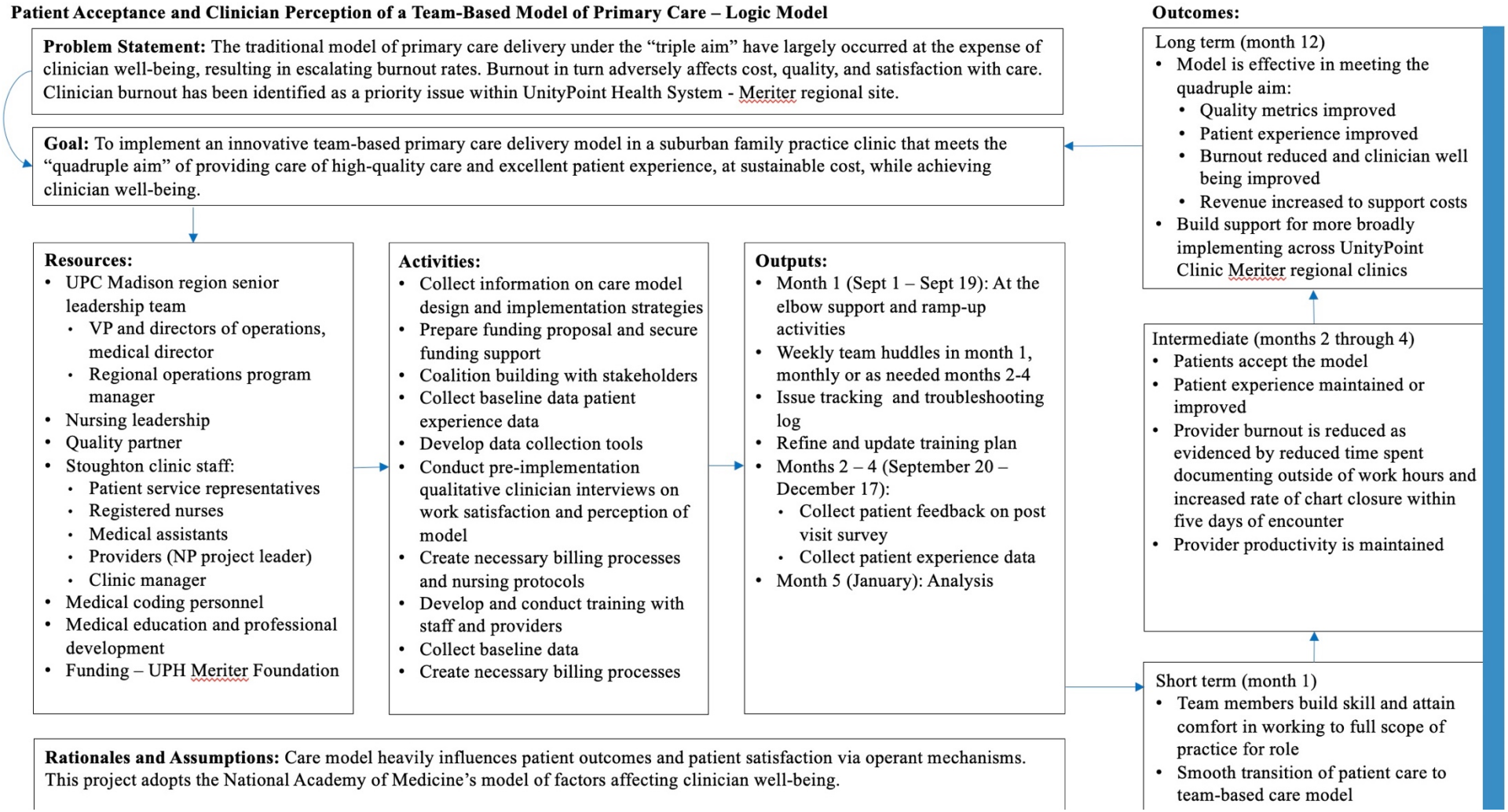


Figure F3



Appendix G

Logic Model



Appendix H

Measurement and Analytical Framework

Measures				Analysis
Objectives	How to operationalize and measure the objective	Where to find the information	Is there a comparison?	
Patients accept the model	Post-encounter patient paper survey administered 9/20 – 12/17 3 item 5-point Likert scale Developed by the UCSF Center for Excellence in Primary Care	Paper surveys Encounter counts: Epic information system	No	Quantitative No identifying information Overall survey response rate: % [# of survey responses]/ [#of patient encounters] Proportion of patients selecting either agree or strongly agree will be >95% for each of three questions
Patient experience is improved or maintained	Post-encounter Press Ganey survey mailed to homes following all encounters 9/20 – 12/17 <u>CAHPS questions</u> Provider Rating Provider Communication quality Recommend provider office Provider spent enough time <u>Press Ganey questions</u> Nurse or assistant listened Concern showed by nurse or assistant Friendliness or courtesy of nurse or assistant Concern showed by provider about problem or condition Explanations given by provider about problem or condition Provider included patient in decisions about care	Press Ganey portal	Yes Compare patients who did not experience the model to those that did during the same time period	Quantitative Deidentified Response rate: % [#of survey responses]/[# of patient encounters] Mean rank P value determined to evaluate significance Descriptive statistics of demographic characteristics of patients seen during the study period Each question tabulated weekly and evaluated in a run chart to understand variation

	Providers discussion of proposed treatment Organizations concern for patient privacy See Appendix H, table 1			
Provider burnout is reduced	Work after clinic (WAC) time, or time spent in health record system outside the hours of 6 pm to 7 am gradually decreases and is reduced by 20% by December Rate of chart closure within 5 days of encounter is increased by 1% compared to prior year baseline by December 2021	BI Launchpad application WAC: Report AMB0129 Chart closure: Report AMB0151	Yes	Quantitative Reported by individual provider Tabulated weekly and evaluated in a run chart to understand variation
Provided productivity is improved or maintained	Work RVU Risk adjusted score	BI Launchpad application Report PB0098	Yes Compare to the same weeks in the prior year, Sept 21 – Dec 18, 2020	Quantitative Reported by individual provider Tabulated weekly and evaluated in a run chart to understand variation.

Note. Quality metric performance will be tracked but not analyzed nor outcomes conclusions drawn as part of this project phase.

Appendix I

Supplemental Measures Information

Evaluation of Patient Experience and Acceptance of the Model Using Press Ganey surveys

CAHPS questions
Using any number between 1 and 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider? 0 – 10
Would you recommend this provider's office to family and friends? Yes, definitely; Yes, somewhat; No
During this visit, did the provider spend enough time with you? Yes, definitely; Yes, somewhat; No

Press Ganey questions (all items scored 1 – 5 for very poor, poor, fair, good, very good)
How well the nurse/assistant listened to you
Concern the nurse/assistant showed for your problem
Friendliness/courtesy of the nurse/assistant
Concern the care provider showed for your questions or worries
Explanations the care provider gave you about your problem or condition
Care provider's efforts to include you in decisions about your care
Care provider's discussion of any proposed treatments (options, risks, benefits, etc.)
Likelihood of your recommending this care provider to others
Our concern for your privacy

Note. From Press Ganey's primary care patient experience survey.

Appendix J

Patient satisfaction and acceptance of the model

		N			
Overall satisfaction	Source	CTC	No CTC	Significance	Better outcome
I feel good about my medical visit	Visit survey	140	249	0.036	CTC
Would you recommend this provider's office to your family and friends?	CAHPS	12	38	1.000	Same
Likelihood of your recommending this provider to others	Press Ganey	12	39	0.373	Same
Time spent					
During your most recent visit, did this provider spend enough time with you?	CAHPS	12	36	1.000	Same
Privacy					
I was able to say everything I wanted to say to my provider	Visit survey	140	249	0.782	CTC
Our concern for your privacy	Press Ganey	11	37	0.642	No CTC
Provider relationship					
My provider gave me his or her full attention	Visit survey	140	249	0.546	CTC
Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?	CAHPS	12	38	0.296	CTC
Provider's discussion of any proposed treatment (options, risks, benefits, etc.)	Press Ganey	12	39	0.830	CTC
Provider's efforts to include you in decisions about your care	Press Ganey	12	39	0.683	No CTC
Concern the provider showed for your questions or worries	Press Ganey	12	38	0.699	No CTC
Explanations the provider gave you about your problem or condition	Press Ganey	12	39	0.365	No CTC
Nurse relationship					
Concern the nurse/assistant showed for your problem	Press Ganey	12	38	0.827	CTC
Friendliness/courtesy of the nurse/assistant	Press Ganey	11	38	0.891	No CTC
How well the nurse/assistant listened to you	Press Ganey	12	37	0.716	No CTC

Appendix K

Quality Improvement Checklist

CLINICAL QUALITY IMPROVEMENT CHECKLIST		
Date: **4/6/2021**	**Project Leader:** **Kimberly Moreland**	
Project Title: **Implementation of Team-Based Primary Care to Improve Patient Experience and Clinician Satisfaction**		
Institution where the project will be conducted: **UnityPoint Health Meriter Stoughton Clinic**		
Instructions: Answer YES or NO to each of the following statements about QI projects.	**YES**	**NO**
The specific aim is to improve the process or deliver of care with established/ accepted practice standards, or to implement change according to mandates of the health facilities' Quality Improvement programs. There is no intention of using the data for research purposes.	**X**	
The project is **NOT** designed to answer a research question or test a hypothesis and is **NOT** intended to develop or contribute to generalizable knowledge.	**X**	
The project does **NOT** follow a research design (e.g. hypothesis testing or group comparison [randomization, control groups, prospective comparison groups, cross-sectional, case control]). The project does **NOT** follow a protocol that over-rides clinical decision-making.	**X**	
The project involves implementation of established and tested practice standards (evidence based practice) and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	**X**	
The project involves implementation or care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	**X**	
The project has been discussed with the QA/QI department where the project will be conducted and involves staff who are working at, or patients/clients/individuals who are seen at the facility where the project will be carried out.	**X**	
The project has **NO** funding from federal agencies or research-focused organizations, and is not receiving funding for implementation research**.**	**X**	
The clinical practice unit (hospital, clinic, division, or care group) agrees that this is a QI project that will be implemented to improve the process or delivery of care.	**X**	
The project leader/DNP student has discussed and reviewed the checklist with the project Course Faculty. The project leader/DNP student will **NOT** refer to the project as research in any written or oral presentations or publications.	**X**	
ANSWER KEY: If the answer to **ALL** of these questions is **YES**, the activity can be considered a Clinical Quality Improvement activity that does not meet the definition of human research. **UMB IRB review is not required**. **Keep a dated copy of the checklist in your files.** If the answer to ANY of these questions is NO, the project must be submitted to the IRB for review.		