

# FY12 Medical Home Port Evaluation

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A handwritten signature in black ink, reading "R. Mark Gritz". The signature is written in a cursive style with a long, sweeping underline that loops back under the name.

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This document contains the best opinion of the authors at the time of issue.  
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## Executive Summary

In Fiscal Years (FYs) 2010 and 2011, the Bureau of Medicine and Surgery (BUMED) tasked CNA with evaluating its first patient-centered medical home (PCMH) at the Walter Reed National Military Medicine Center (WRNMMC). These evaluations show that the WRNMMC Medical Home has improved access and quality while controlling costs. Since the WRNMMC Medical Home started, the Assistant Secretary of Defense for Health Affairs (ASD/HA) issued a policy to implement PCMH models of primary care in all military treatment facilities (MTFs). Similarly, BUMED issued an instruction (6300.19) to implement its PCMH model—Medical Home Port (MHP)—across its enterprise by 30 June 2011.

Given this system-wide implementation, BUMED tasked CNA with evaluating the effectiveness of MHP in clinical settings other than a medical center such as WRNMMC and in specialties other than internal medicine. To that end, we evaluated the family medicine and pediatric MHPs at Naval Hospital (NH) Pensacola, NH Oak Harbor, Naval Health Clinic (NHC) Charleston, and NHC Quantico. These MTFs are all different in capability and in the populations they serve.

## Approach

PCMHs should impact access, quality, and cost; however, this evaluation focuses principally on cost because access and quality are best measured by patient surveys in addition to various outcome measures of quality such as HEDIS (Healthcare Effectiveness Data and Information Set). Conducting a patient survey is outside of our tasking. Further, the Military Health System (MHS) is continuously surveying patients so we did not want to duplicate those efforts. In addition, the MHS assesses outcomes based on HEDIS metrics through Population Health Portal.

Our approach to evaluating the impact of MHP at these sites predominately involves statistically estimating the change in utilization and cost metrics from before MHP implementation to after. The analysis statistically controls for demographic differences between pa-

tients to estimate expected costs and utilization. We supplemented this statistical analysis with site visits to each of the four sites. These site visits provided context for our statistical analysis, as well as providing lessons learned and common themes about MHP implementation that may be useful to other commands.

## **Findings**

### **Common themes/lessons learned**

All sites transitioned to MHP teams, with varying approaches to clinic hours and office/team “pod” configurations, as well as expanded access through secure electronic communications (i.e., through the vendor RelayHealth) and after-hours nurse lines. Note that from a qualitative perspective we cannot judge which of these varying approaches is best. However, our discussions with MHP staff left us with several common themes.

First, the biggest change associated with MHP implementation from prior practice patterns was a focus on provider continuity. This focus was universal across sites.

Second, at the time of our site visits, the MHPs were generally at the beginning stages of identifying three conditions or diseases as a focus, consistent with current National Committee for Quality Assurance (NCQA) standards. Any potential for MHP to impact disease prevention will rely on a systematic approach to ensure that the clinic identifies each panel member for testing/screening as efficiently and timely as possible. Disease registries hold much promise in this area.

Third, reporting all test results—whether normal or abnormal—is consistent with NCQA standards, but most MHP clinics continued the policy of only contacting patients with abnormal test results.

### **Cost and utilization**

The results show that the MHP has significantly impacted various cost and utilization metrics. For example, utilization of inpatient services as well as emergency room or urgent care services is significantly less after MHP implementation. As for cost, the results show that all sites had decreases in per member per month (PMPM) costs for both family medicine and pediatric clinics.

When we looked separately at enrollees with or without chronic conditions, the results show PMPM decreases for all sites with the exception of a small increase for non-chronic enrollees at NH Oak Harbor. However, because patients with chronic conditions have two to three times as much cost or utilization of healthcare services, the dollar reductions in PMPM for chronic patients are also two to three times greater than for non-chronic patients. In other words, the four MHPs have improved control of near-term costs for patients with and without chronic conditions but substantially greater cost reductions are associated with chronic patients.

### **Access and quality**

From a qualitative perspective, it appears that access has increased at these four sites. All now have secure electronic communications through the vendor RelayHealth and provide access through after-hours nurse lines. The common access metric used across the system for access is third-next available, but this metric is inherently flawed in that it is provider-centric not patient-centric. As for quality, HEDIS measures indicate high values in these metrics before and after MHP implementation. In addition, under the assumption that quality is positively correlated with provider continuity, it appears that quality has improved by this metric as well. Hence, we conclude that MHP at these sites has improved access and quality while reducing costs.

### **Recommendations**

Given the results of the study, we have the following recommendations. First, because the near-term benefits for MHP are greatest for patients with chronic conditions, we recommend that BUMED make an explicit enrollment policy to target patients with chronic conditions for enrollment. Note that we are not recommending that clinics not enroll active duty or their family members. Rather, we recommend that BUMED make an explicit enrollment policy about targeted enrollment for open panel space. Navy Medicine goals for recapture of purchased care or complexity required for graduate medical education may benefit from targeting chronic patients for enrollment.

Second, we recommend that all MHPs increase their focus on three conditions and diseases of the clinic's choice, not just to be more in

line with NCQA standards, but to focus on improving the quality of care and reducing variation in care patterns across MTFs.

Third, we recommend that Navy Medicine work to develop a link between secure messaging (through RelayHealth) and the electronic medical record so that the clinic staff can use secure messaging to automatically report normal test results to patients.

Finally, while this report is primarily about utilization and cost, the impact of MHP on access is of interest. Given that access to care is broader than the provider-patient visit, we recommend that Navy Medicine discontinue use of third-next available as an access metric because it is a poor metric when comparing across sites and it is a flawed metric relative to patient-centered principles for access. Navy Medicine should replace this metric with a composite metric that assesses patients' perceptions of all forms of access—in-office visits, telephone consultations, nurse lines, and secure messaging—through patient satisfaction surveys.



# Introduction

In June 2008, Navy Medicine implemented its first patient-centered medical home (PCMH) team in the internal medicine department at the Walter Reed National Military Medicine Center (WRNMMC). In September 2009, the Assistant Secretary of Defense for Health Affairs (ASD/HA) issued a policy to implement a PCMH model of primary care in all military treatment facilities (MTFs). Accordingly, the Military Health System (MHS) has been systematically implementing and applying PCMH principles system-wide.

The purpose of the ASD/HA policy was to improve upon “current standards” that “overlook the importance of the patient-provider relationship in assuring continuity of care, and as a major driver of patient satisfaction and better outcomes” [1]. The policy further specified that it would assess the effectiveness of PCMHs through (1) assignment of every patient to a primary care manager by name (PCMBN) and (2) by PCM continuity. Additionally, it will assess PCMH effectiveness through “measures of access, ...patient satisfaction with care, patient satisfaction with provider communication, and patient satisfaction with technical health care quality.”

To implement PCMH principles, the Bureau of Medicine and Surgery (BUMED) formally developed its PCMH model—Medical Home Port (MHP)—and is in the process of implementing MHP across its enterprise. BUMED’s stated purpose is, “To implement a new model of patient and family-centered health care delivery for primary care that is team-based, comprehensive, and designed to fully meet the complete primary care health and wellness needs of our patients” [2].

BUMED has focused MHP on a “primary care team model which [provides] better access, continuity, wellness, and disease management” and enhances a patient-provider team partnership that “focuses on sustaining and enhancing wellness in [its] patients as well as optimal efficient delivery of comprehensive health care services” [2].

The first step of BUMED's implementation of MHP required that each medical center and teaching hospital implement MHP in at least one clinic by 30 June 2010. The second step required all primary care clinics in Navy Medicine to transition to MHP by 30 June 2011. The purpose of this phased transition was to facilitate lessons learned and best practices for application across all MTFs [2].

## Tasking

Beginning in FY 2010, BUMED tasked CNA with evaluating the impact of the WRNMMC Medical Home on access, quality, and cost. We evaluated access and quality primarily through a patient survey that assessed patient perceptions of various aspects of access to care and satisfaction. The results showed that the WRNMMC Medical Home enrollees had significantly higher perceptions of both access to care and satisfaction than enrollees in the comparison clinic [3]. We also assessed staff satisfaction (another quality aspect) at the WRNMMC Medical Home [4]. Other measures of access and quality that we examined include third-next available and various HEDIS (Healthcare Effectiveness Data and Information Set) metrics (see [5]). Overall, the WRNMMC Medical Home was associated with higher access and quality.

We assessed the impact of the WRNMMC Medical Home on cost through common metrics of utilization and cost. Ideally, a PCMH will reduce costs while at least maintaining if not improving access and quality. We found this to be the case at the WRNMMC Medical Home [5, 6]. Of particular interest, the results show substantial differences in the impact of the WRNMMC Medical Home on use and costs between patients with and without chronic conditions.<sup>1</sup>

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<sup>1</sup> These results are near-term impacts. It is certainly possible that in the long run, substantially greater cost avoidance may be realized if a PCMH is successful in changing patient behavior such that the rate at which chronic conditions manifest in patients declines. Hence, the largest immediate cost impact of the PCMH stems from better management of patients with chronic conditions, but the largest long-term impact is not known. Either way, cost impacts associated from the PCMH are tied to better managing chronic conditions or preventing chronic conditions from manifesting.

With the evaluation of the WRNMMC Medical Home as a basis, BUMED directed CNA to begin evaluating MHP at other sites. A reason for this expanded evaluation is that although PCMHs are expected to reduce utilization and costs, the PCMH literature shows that it is by no means a certain outcome with several studies showing cost reductions associated with PCMH implementation [7, 8, 9] and several studies that did not [10, 11, 12].

The intention was to determine whether the MHP model was effective in other locations and clinical settings where patients are different demographically than the WRNMMC Medical Home patients. To that end, the sites the BUMED MHP Office selected for this evaluation are the following:

- Naval Hospital (NH) Pensacola (NHP)
- NH Oak Harbor (NHOH)
- Naval Health Clinic (NHC) Charleston (NHCC)
- NHC Quantico (NHCQ)

These sites are distinctly different from WRNMMC and each other. NH Pensacola is a family medicine teaching hospital, NH Oak Harbor is a small community hospital, NHC Charleston is a clinic serving a Navy training base, and NHC Quantico is a clinic serving a Marine Corps base. Demographically, all have different patient populations.

Note that while we are concerned with the impact of MHP on access, quality, and cost, this report principally focuses on utilization and cost. Perceptions of access and many aspects of quality, like satisfaction, can only be measured through surveys. Conducting these surveys was not in our tasking. We note, however, that TRICARE Management Activity (TMA) is assessing patient satisfaction system-wide. Hence, we are generally not addressing access and quality in this report. That said, we examined PCM continuity and looked at HEDIS metrics for these sites.

## Study questions

This study is focused on the impact of MHP on utilization and cost. The specific questions we considered are the following:

- What is the utilization and cost impact of MHP on patients of all ages?
- What is the utilization and cost impact of MHP in pediatric and family medicine clinics or clinics of combined specialties?
- Are the findings from the WRNMMC PCMH regarding utilization and cost for patients with and without chronic conditions consistent in other clinical settings and with different patient demographics?
- For what patient populations is the MHP model having the most impact?

As discussed in the previous section, MHP should also impact access and quality. We will not address access in this report except for a discussion of appropriate access measures. As for quality, this report looks at various HEDIS measures over the MHP implementation periods to see trends. This report does not address other quality measures such as satisfaction. Trends in these measures should be available over time through the periodic staff and patient satisfaction surveys that TMA currently conducts.

## Approach

Our approach to evaluating the impact of MHP at NH Pensacola, NH Oak Harbor, NHC Charleston, and NHC Quantico predominately involves statistically estimating the change in utilization and cost metrics from before MHP implementation to after. These metrics include inpatient admissions, inpatient days, non-emergent emergency room (ER) visits or urgent care visits, specialty care encounters, primary care encounters, pharmacy costs, ancillary costs, and per member per month (PMPM) costs. The analysis statistically controls for demographic differences between patients to estimate expected use and costs.

We have supplemented this analysis with qualitative information obtained through site visits to each MHP. The purpose of these site visits was to understand how and when each site implemented MHP and the unique aspects of each site, and to gather common themes or lessons learned that could be applicable to other sites implementing MHP. This approach is consistent with the objective of BUMED In-

struction 2 pertaining to MHP to facilitate lessons learned and best practices for application across all MTFs [2].

## **Organization of this report**

The chapters of this report address each of the major components of our approach. The next chapter summarizes the common themes or lessons learned from four site visits. Note that the common themes do not necessary reflect all of the views expressed at each site. Rather they represent commonalities or areas of greatest distinction between the sites.

The next chapter documents our utilization and cost analysis. Again note that MHP should impact access, quality, and cost. The utilization and cost analysis only addresses cost (utilization being a component of cost). As discussed previously, this report does not address access and patient satisfaction.

Because satisfaction is not the only measure of quality, the chapter following the utilization and cost analysis focuses on HEDIS and continuity metrics. It also includes a discussion of access metrics. The last major chapter covers some supplemental analysis on the WRNMMC Medical Home as a follow-on to our 2011 report [6]. Specifically, we evaluated the degree to which the WRNMMC patients were more in conformance with clinical practice guidelines (CPGs) for diabetes as measured by specific HEDIS metrics. This chapter also includes an analysis of pharmacy and ancillary utilization patterns to understand specifically what changed in these services.

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## Common themes/lessons learned

Before detailing the results of the utilization and cost analysis, this chapter presents common themes or lessons learned gleaned from visiting the four MHPs that are the focus of this evaluation. We visited these MTFs during the December 2011 to February 2012 period. The following are brief descriptions of each site:

- **NHC Quantico** – 15 December 2011. NHC Quantico has approximately 23,000 enrollees, supporting primarily local active duty (AD) and active duty family members (ADFMs) of U.S. Marine Corps personnel. NHC Quantico began implementing the MHP model in their family practice and pediatric clinics in October 2010.
- **NHC Charleston** – 10 January 2012. NHC Charleston's MHP teams have integrated family practice, internal medicine, and pediatrics. Eighty percent of the more than 14,000 enrollees are AD and ADFMs. About one-third of the enrollment at NHC Charleston turns over every 18 months as Naval Nuclear Power Training Command (NNPTC) and Nuclear Power Training Unit (NPTU) (aka prototype) students cycle through various training curriculums. MHP implementation at NHC Charleston began in May 2010.
- **NH Pensacola** – 18 January 2012. NH Pensacola is a comprehensive inpatient hospital with 10 branch medical clinics across five states serving approximately 47,000 enrollees. NH Pensacola is also home to a family medicine residency training program. The hospital began implementing MHP concepts in the family practice clinic in November 2009, pediatric and internal medicine clinics in October 2010, and the Branch Medical Clinics (BMCs) by October 2011.
- **NH Oak Harbor** – 9 February 2012. NH Oak Harbor is a small community hospital serving approximately 20,000 enrollees. While some MHP concepts were implemented in the family medicine and pediatrics clinics as early as October 2008, the

command has indicated that comprehensive implementation did not begin until April 2011.

Each site visit included a tour of the facility, discussions with staff working directly in the MHP, and discussions with other directorates within the MTF. At each site, we spoke with department heads, providers, nursing staff, senior and junior enlisted personnel, administrative support staff, as well as the Director of Medical Services, Director of Healthcare Business Operations, and clinic/template managers.

We used the information gathered during the site visits to develop the common themes or lessons learned discussed in this chapter. The intention of documenting these is to provide Navy Medicine leadership and participating commands with useful feedback in the development of MHP practices, which is consistent with an aim of BUMED Instruction 2. This chapter is not intended to single out perceived deficiencies in any command, clinic, or primary care team, but rather to serve as a contrasting vehicle to relay some of the qualitative themes stemming from these MHP site visits.

In conducting site visits to these MHPs, the team identified the following common themes:

1. **Clinic Operations**—Each MHP had a distinct model of service delivery that varied, to some extent, by hours of operation, office configuration, appointing/scheduling, template management, and telephone access.
2. **Proactive health screening**—Initiatives for disease prevention and proactive health screening are still in their developmental stages at all four sites.
3. **Inconsistent test result notification**—All sites are notifying patients of abnormal test results; some sites communicate all test results, regardless of whether they are normal or abnormal. Sites are exploring methods of communicating all patient test results in ways that minimize the burden on clinic staff.
4. **Navy MHP team composition**—MHP team structure in terms of provider specialties varied by site.



5. **Visibility of MTF enrollee care in local network**—MHP providers have varying degrees of visibility into network care provided to their enrolled patients.
6. **BMC/AD Clinic MHP implementation**—Implementation of MHP at BMCs is being considered but lags behind parent site primary care clinic implementation.
7. **Operational training requirements**—The MHP model has implications for the operational training of all staff types (corpsmen, nurses, residents, and providers). Likewise, the demands for operational training and contingency support requirements of staff have implications for MHP implementation and sustainment.

We discuss each of these common themes in more detail in the sections that follow.

## MHP clinic operations

While sites had a somewhat consistent approach to panel size for each primary care provider, we observed numerous distinctions in clinic operations with respect to hours of operation, office configuration, appointment scheduling and templates, and telephone access. Most facilities retained operating hours of 0730-0800 to 1630-1700 as they had before MHP implementation. Medical home principles point to expanding opportunities to access care, but facilities must balance these business decisions with resource constraints. In particular, one site stopped offering access on nights and weekends when MHP was implemented, thereby reducing the range of opportunities for patients to see their primary care manager (PCM) in the clinic and possibly increasing emergency room (ER) or network utilization for clinic enrollees. The facility based its decision on the low percentage of its enrollees it saw in after-hours care; however, access is much more than in-office visits. Access at all sites includes some form of healthcare advice line in place for after-hours care, and all sites now have access through secure messaging (i.e., RelayHealth).

Some office configurations appeared to remain similar to former primary care settings with other facilities attempting to create larger “team pods” to encourage provider/support staff interactions and to

reinforce work flow changes driven by MHP. Other sites used multiple approaches for office configurations.

Patient appointment scheduling practices alternated between a central booking model where patients phoned a regional call center for appointments and local/clinic-specific booking processes completely within the MHP. All sites reported some form of frustration with clinic telephone service, including inconsistent base support, unreliable service, frequent dropped calls, or poor equipment. All sites reported making changes to their appointment templates during MHP implementation. Some sites felt that open access (OPAC) appointments work well for their population, whereas others converted from OPAC to acute and established appointment types. The length and mix of appointments and the frequency of changes to templates varied from site to site. Each site reported that, since MHP implementation, clinic staffs, in conjunction with the Business Manager, take a greater role in template design and management. See Table 1 for a summary of the advantages and disadvantages of various characteristics of clinic operations.

All sites reported having space available in their panels for additional enrollment (i.e., not at full capacity). While many of the operational constraints imposed on an individual clinic may be beyond the control of the MHP staff, such as facility layout, all sites appeared to be evaluating internal processes to improve work flow. Staff complaints centered most often on work flow changes, lack of administrative time,<sup>2</sup> and clinic integration issues (most often involving pediatrics). Staff consistently emphasized improved patient/provider continuity as a positive result of MHP implementation.

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<sup>2</sup> Although new templates do allow additional administrative time for providers, many providers noted that open access appointments often resulted in them seeing patients during their designated administrative time.

Table 1. Advantages and disadvantages of various clinic operations characteristics

Characteristic	Advantages	Disadvantages
Extended Clinic Hours	<ul style="list-style-type: none"> <li>Improved access, patient satisfaction</li> <li>May provide staff schedule flexibility</li> </ul>	<ul style="list-style-type: none"> <li>Staff dissatisfaction with staggered schedules</li> <li>Additional operating costs</li> </ul>
Office Configuration	<ul style="list-style-type: none"> <li>“Team Pods” can improve internal communication and back office functions</li> </ul>	<ul style="list-style-type: none"> <li>Can work against team morale if configured too closely, lack outlets for personal space, be too loud for conducting patient calls, and leave limited space for patient counseling</li> </ul>
Centralized Appointment Practice	<ul style="list-style-type: none"> <li>Efficient and specialized, removes burden from clinic staff</li> </ul>	<ul style="list-style-type: none"> <li>Doesn't support TCON intervention to manage demand</li> <li>Can't accommodate HEDIS (Healthcare Effectiveness Data and Information Set) record screening</li> <li>Patients aren't able to book follow-up appointments before leaving the clinic; they must call at a later time for an appointment</li> <li>Prone to dropped handoffs</li> <li>Appointment clerks don't get to know patients and providers</li> </ul>
Telephone Support		<ul style="list-style-type: none"> <li>All sites reported problems in base support, service reliability, and/or outdated equipment</li> </ul>

## Proactive health screening

Only a few MHPs had initiated proactive identification of patients requiring preventive screenings (mammogram, cancer, low-density lipoprotein (LDL), hemoglobin A1c (HbA1c), etc.) at the time the appointment was made or during the physician encounter. Any potential for MHP to impact disease prevention (early identification or avoidance) in support of population health goals will rely on a systematic approach to ensure that the clinic identifies each panel member for testing/screening as efficiently and timely as possible. Disease registries hold much promise in supporting the MHP team for tracking and identifying patients for appropriate testing, but their development and application are in an early stage at these sites. See Table 2 for the advantages and disadvantages as well as noted practices associated with proactive health screenings.

Table 2. Advantages and disadvantages of proactive health screening

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Early identification of disease leads to better outcomes</li> <li>• Improved population health</li> <li>• Potential cost avoidance and long-term cost savings for chronic patients</li> </ul>	<ul style="list-style-type: none"> <li>• Requires substantial level of effort from MHP provider and support staff</li> <li>• May drive higher costs/utilization in the short term</li> <li>• Registries can add additional burden to already sluggish IT system</li> </ul>
<p><u>Noted Practices</u></p> <ul style="list-style-type: none"> <li>• Designated place in the MHP for a leaderboard showing progress for HEDIS metrics by team</li> <li>• Business cards listing preventative screens due or past due handed out at the immunization clinic</li> </ul>	

Some sites had begun to explore registry utilization, but none had put in place a systematic or comprehensive effort to identify patients for the full range of health screening tests prior to a clinic appointment. Among the efforts towards proactive screening were a practice to hand out a list of the patient’s past-due preventive screenings at the immunization clinic and posting team metrics for HEDIS and other measures to a leaderboard to foster friendly competition and improvement among teams.

Of the initial early screening efforts undertaken by some MPH teams, most appeared to target only a single condition within the HEDIS measures. None had implemented a comprehensive approach across all measures. Acquisition of the necessary IT tools for proactive health screenings is an MHS-wide issue rather than a clinic issue. Improvements to the automation supporting disease registries and maturity of MHP practices should focus on comprehensive preventive screening.

## **Inconsistent test result notification**

Practices for patient notification of test results were inconsistent among MHP sites. While all facilities acknowledged the medical home tenant of notifying patients with every test result, few had implemented patient notification of all test results. Most MHP clinics continued the policy of only contacting patients with abnormal results as had been a common practice before MHP implementation. Under the current practice, the patient is to assume everything is okay unless he or she is contacted by MTF staff. Although convenient from an operational perspective for the clinic, this practice may leave the patient wondering whether the result was ever obtained, contact

information is invalid, or follow-up action was dropped between staff handoffs. Table 3 lists some advantages and disadvantages of contacting patients with all test results.

Table 3. Advantages and disadvantages of contacting patients with all test results

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Patient is not left uncertain of test results</li> <li>• Patient will inquire back to the facility if contact not made ensuring receipt of results</li> <li>• Patient can receive more granular information regarding result in the range of possible outcomes (i.e., “not out of range yet, but very close to abnormal threshold”)</li> <li>• Patient contact with results allows team to begin planning follow-up care/referral immediately if necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Requires additional provider/staff level of effort to follow up on each test result</li> <li>• May require additional staff resources such as office space, telephones and/or computer support</li> </ul>

We do not want to understate the extra effort required of the staff to follow up on each test result. However, the advantages of patient notification for all results as stated above are equally important. Secure online messaging through RelayHealth is currently available to all clinics which may provide an opportunity to achieve notification and provide relevant patient education information. With the development of an automated interface between RelayHealth and electronic medical records, the staff level of effort for notification of all test results could be decreased. Test results through secure messaging may also encourage more patients to utilize RelayHealth, which could provide additional efficiencies elsewhere in clinic operations (appointment scheduling, refills, etc.). TRICARE Online is another opportunity for patients to view test results, but that may be an insufficient default for test result notification.

## Navy MHP team composition

The composition of primary care teams naturally varied across the sites. At one end of the spectrum was a fully integrated multidisciplinary team made up of providers from family practice, internal medicine, and pediatric specialties. Additional support personnel such as pharmacists, dieticians, behavioral health providers, and/or case managers were easily accessible to MHP teams, either as integrated team members or as a separate team within MHP. This team relationship enabled team members to provide immediate consults among

themselves. At the other end of the spectrum were facilities where primary care teams remained separate and distinct by specialty. For example, a family practice clinic would be renamed over previous clinic identifiers to become a MHP “Blue” clinic with no change in provider membership.

All sites appeared to place more emphasis on provider/patient continuity with the implementation of MHP, regardless of team composition. While we make no judgment as to the best team composition or whether different circumstances dictate different team structures, this is an important decision with numerous advantages and disadvantages to an integrated team structure, as Table 4 shows.

Table 4. Advantages and disadvantages of MHP provider integration

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Ease of specialty consults among primary care specialties on the team while patient is present</li> <li>• Diversified panel assignment potentially broadens experience base for corpsmen</li> </ul>	<ul style="list-style-type: none"> <li>• Stiff resistance from providers for integration due to stated need for specialized support staff or specialty practice patterns</li> <li>• Residency training program requirements may present unique challenges for staff integration as integration would require pediatricians and internal medicine attending physicians to be Family Practice Residency faculty</li> <li>• Benefits for providers and support staff are unidirectional with the benefits of integration flowing mainly to family medicine</li> </ul>
<p><u>Noted Practices</u></p>	
<ul style="list-style-type: none"> <li>• Some sites integrated pharmacists, nutritionists, case managers, and behavioral health resources either directly into MHP teams or into their own separate team located close to the MHP</li> </ul>	

Our assessment is that most sites faced provider and/or support staff resistance to forming multidisciplinary teams, with particular reluctance from pediatric and internal medicine providers. Although facility leadership at most (but not all) sites believed that an integrated primary care team was best, most providers and staff members disagreed and noted that any benefits to integration were unidirectional for family medicine but not for pediatrics or internal medicine. Sites backed down from demanding full integration because too many aspects of the primary care model were changing simultaneously. A common response from staff was that they suffered from “change fatigue” in MHP implementation. In the future, it may prove useful to contrast teams of fully integrated provider disciplines with those not integrated to discern any performance differences.

## Visibility of MTF enrollee care in local network

The ability to quickly receive information regarding private sector care provided to MTF enrollees was inconsistent among facilities. While most facilities did receive information from one source or another (i.e., regional contractor at time of bill payment or through central TMA information systems) at some point, few received immediate information from local network providers that was timely enough to act on with the patient. Facilities that were able to obtain timely information were able to do so because they held established relationships with the network providers or one of the providers at the MTF also practiced in local network medical facilities that gave them real-time access to those information systems. From a clinical perspective, there are no disadvantages to receiving records of network care provided to MTF enrollees. We list the associated advantages in Table 5.

Table 5. Advantages and disadvantages of access to the local MCSC provider IT systems

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Improved follow-up care for MTF enrollees</li> <li>• Proactive case management</li> <li>• Avoidance of future network visits</li> <li>• Better identification of drug seeking behavior</li> <li>• Improved patient history for MTF care</li> <li>• Improved staff efficiency as staff does not have to seek out network reports</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>
<p><u>Noted Practices</u></p> <ul style="list-style-type: none"> <li>• Some sites reported that they were able to negotiate access for certain providers to local health system databases. Access via these providers was used to follow up with patients using network resources.</li> </ul>	

MTF Commanders need help from the TRICARE Regional Offices (TROs) to obtain timely/real-time access to the information systems of local network providers in their respective areas. Although many commands have had success in requesting direct access to local network outlets of care, the TROs could do more to encourage these network providers to share timely information and/or real-time access to their local systems. TROs could provide a mechanism for MTF commanders to influence network providers reluctant to share real-time treatment information. The ability of MTF providers to have a complete picture of both MTF and network care is crucial to achiev-

ing quality patient outcomes, improved population health, and cost containment initiatives in the MHS.

## BMC/AD clinic MHP implementation

Many sites were in the initial stages of implementing MHP concepts to either supported branch medical clinics or active duty readiness clinics. While the site visits may have come on the heels of the initial phase of MHP implementation at some commands, significant time had passed since initial implementation for many others.

The 2011 report *Impact of the Walter Reed National Military Medical Center Medical Home on Utilization and Costs* reported significant cost savings for the entire population, with 88 percent of those cost savings being attributable to patients with chronic conditions. Although there are benefits to extending MHP concepts to the more healthy active duty population, as described in Table 6, it is understandable that implementation to BMCs and active duty clinics has lagged behind implementation at larger clinics and hospitals with a higher percentage of patients with chronic conditions. Table 6 presents advantages and disadvantages of implementing MHP at BMCs and active duty clinics.

Table 6. Advantages and disadvantages of MHP implementation at BMCs and AD duty clinics

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• All the advantages of MHP principles (improved population health, outcomes, access, decreased ER and urgent care utilization, etc.) for AD service members</li> <li>• Consistent care practices for all primary care patients (AD, ADFM, and retirees) at the facility and across locations as service members move</li> <li>• Increased Individual Medical Readiness (IMR) for AD population</li> </ul>	<ul style="list-style-type: none"> <li>• If resources are a binding constraint, there is a greater near-term benefit from applying the MHP model to populations with more chronic conditions</li> </ul>

Most all commands indicated that BMCs would eventually become MHPs. Because these clinics serve as the foundation for primary care management of Navy’s active duty population, leadership may need to emphasize the importance of employing MHP principles to all nodes of primary care including BMCs if resources allow.



## Operational training requirements for staff

MHP tenants of continuity, improved access, and care coordination can be negatively impacted by the training requirements of MTF staff. Constant rotations of active duty corpsmen into and out of various MHP supporting roles can contribute to inefficiencies within the MHP team due to constant training of new members. At family medicine teaching hospitals where residents are required to take on a progressively larger patient panel during each year of residency, long-term provider/patient continuity is negatively affected because patients are reassigned to new providers more frequently in this training environment. Active duty providers and support staff are also subject to frequent, unexpected deployments to support overseas contingency operations, further interrupting MHP team and patient continuity. While most all training activities for active duty MTF staff are absolutely necessary to support operational medicine requirements/objectives, the removal from or disruption to the work center may have a negative impact on MHP principles.

Conversely, the increased demands placed on support staff and the expectations of provider continuity in MHP can have negative implications for the training/operational preparedness of MTF staff. Corpsmen are an integral part of the MHP team; when they are taken out of the clinic to complete other training requirements, the team does not function as intended. In settings where support staff is in limited supply, corpsmen reported feeling constrained in their ability to capitalize on training opportunities outside of the clinic. At the same time, they felt they benefited from a more robust in-clinic training experience as a result of their increased responsibilities in MHP. See Table 7 for a list of advantages and disadvantages the MHP model presents for operational training.

Because active duty members of Navy Medicine need to be prepared to deploy at any time, the negative impact of operational training/deployment activities to the MHP will never be completely removed. However, a stable and consistent approach to staff rotations, corpsman competencies, and deployment readiness will allow non-active duty medical home core staff to mitigate the negative effects through better planning/forecasting of staff availability. Most patients understand the dual role of active duty medical personnel in support

of contingencies, but every effort should be made to reduce the negative impacts of deployment/operational training wherever possible.

Table 7. Advantages and disadvantages of MHP model on operational training

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Robust care experiences for providers and support staff to be applied in operational settings</li> <li>• May provide for “healthy” turnover of staff and/or patient panels</li> <li>• In situations where provider continuity cannot be met, team continuity is still enforced</li> </ul>	<ul style="list-style-type: none"> <li>• Disruption to provider/support staff continuity</li> <li>• Destabilizing effects to MHP team coherence (changing roles/responsibilities due to turnover)</li> <li>• Patient frustration with constantly seeing “new” members of the primary care team</li> </ul>
<p><u>Noted Practices</u></p> <ul style="list-style-type: none"> <li>• Distributing active duty and civilian providers across teams ensures some team continuity.</li> <li>• Protocols/competencies for junior and senior corpsmen are documented and shared between providers and teams.</li> </ul>	

Regardless of the impact MHP implementation may have on operational training readiness, most all senior enlisted members expressed concern regarding the constraining of training opportunities for junior corpsmen. Specifically cited was the transfer of base ambulance service to federal fire departments, which denies junior corpsmen training opportunities as Emergency Medical Technicians (EMTs) or Emergency Vehicle Operators (EVOCs) with the attendant real-life experiences that aid in preparing/developing corpsmen for operational medicine.

# Utilization and cost analysis

With the common themes or lessons learned as a background, this chapter presents the results of the utilization and cost analysis. But first, the next sections detail our methodology, the timeline of MHP implementation at the various sites, and the demographics of the patient population at each site.

## Methodology

### Analytic database

To facilitate our analysis, we designed and constructed person-month level analytic databases for each MHP at each site. Sites with separate family medicine and pediatrics clinics have a separate database for each, while NHC Charleston, the only site with integrated family practice (FP), pediatrics (peds), and internal medicine (IM), has one analytic database including enrollees to all three. To build each database, we first determined the dates for the pre-implementation, transition, and post-implementation time periods at each site. Second, we selected enrollees in a consistent manner across the sites. This is not as straightforward as it might seem because patients are enrolled to providers (not clinics) so we could not just say we will use all enrollees of the family practice or pediatrics clinics. To identify enrollees, (1) we identified provider types working in the Medical Expense and Performance Reporting System (MEPRS) family practice (BG) and pediatrics (BD) clinics at each site, (2) we identified all patients enrolled to these provider types, and (3) we assigned enrolled patients to MHP clinics based on the clinic where their PCM saw the majority of their encounters during the FY.

### Utilization and cost metrics

Using these criteria, we pulled monthly patient-level data for use and cost from the Military Health System Management Analysis and Reporting Tool (M2). In these extracts, we gathered data on all of the workload for these enrollees in both the direct care and purchased care systems. This included workload for outpatient care, inpatient

care, ancillary services, and pharmacy, as well as their associated costs. For these data, we constructed the following utilization metrics:

- Inpatient days or inpatient admissions—all inpatient care, including obstetrics.
- Emergency room (ER) and urgent care clinic (UCC) visits—includes all visits to the ER or a UCC that are not coded with diagnosis codes in the “Injury and Poisoning” and “Supplemental Classification of External Causes of Injury and Poisoning” chapters of the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM)
- Primary care encounters—all care in the primary care product line, regardless of whether the encounters are in the direct or purchased care system. Product line is determined by third level MEPRS code in the direct care system and by provider specialty in the purchased care system. Primary care encounters includes obstetrical care provided within family practice clinics.
- Specialty care encounters—all encounters in the direct and purchased care systems that are not ER, primary care, or obstetrics provided in family practice clinics. Encounters during inpatient stays are also excluded from the specialty care encounter total.
- Pharmacy costs—all costs for any prescriptions filled by enrollees.
- Ancillary costs—all costs for any laboratory and radiology services received by enrollees.

To measure the impact of MHP implementation on cost, we are using a per-member-per-month (PMPM) cost measure. This cost measure includes all inpatient and outpatient services, as well as pharmacy and ancillary costs. The costs for providing a specific service may vary across sites; therefore PMPM costs are not comparable across sites included in this analysis. The summary section of this chapter presents a comparison of PMPM costs across sites.

## **Chronic conditions**

The impact of the PCMH model may be quite different for the chronically and non-chronically ill. In order to evaluate the effects on

both populations, we conducted all analysis of utilization and cost separately on each population. Previous analysis of MHP at WRNNMC included 13 chronic conditions: diabetes, hypertension, congestive heart failure, heart disease, hyperlipidemia, chronic pain, osteoarthritis, asthma, chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD), depression, anxiety, and sleep disorders. This analysis includes all 13 of these chronic conditions along with 4 additional conditions more prevalent in the pediatric population: epilepsy, tic disorders, attention deficit disorder/attention deficit hyperactivity disorder (ADD/ADHD), and learning and developmental disorders (including autism and other autism spectrum disorders).

We identified enrollees with chronic conditions using the Agency for Health Research and Quality (AHRQ) Clinical Classifications Software (CCS) categories. If an enrollee has two or more outpatient encounters or one or more ER or inpatient stays with an ICD-9 diagnosis code in one of the AHRQ classifications for a chronic condition during the period of analysis, the enrollee is flagged as having that condition. In addition, if an enrollee fills two or more pharmacy scripts for either asthma or diabetes medication, he or she is flagged as having asthma or diabetes. Table 8 shows the percentage of enrollees at each site that meet the above criteria for having each of the 17 chronic conditions.

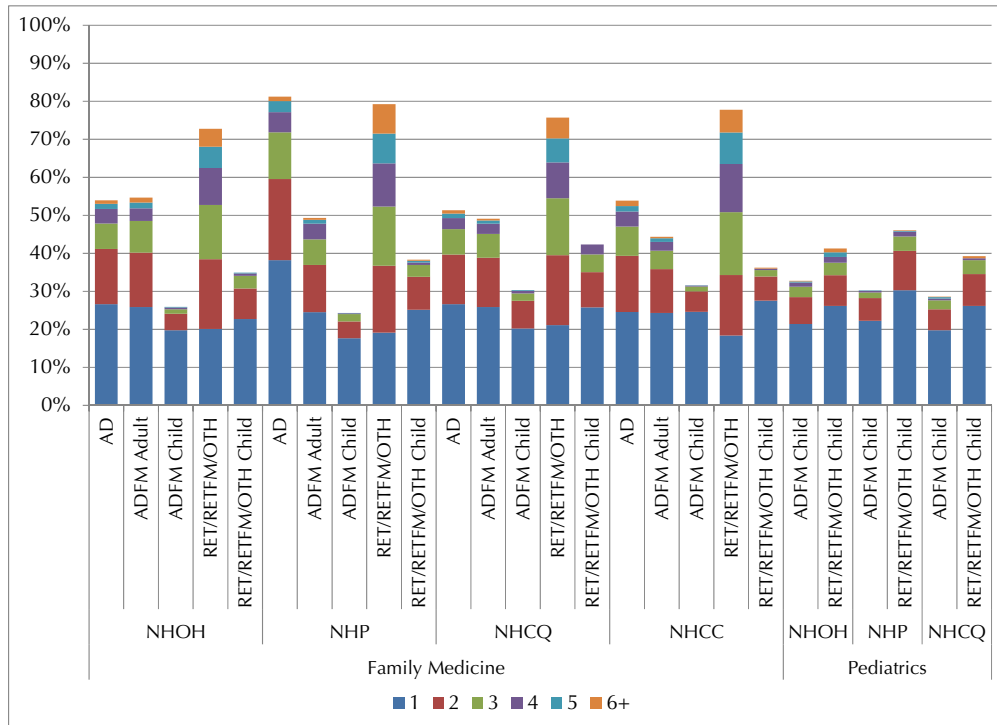
Table 8. Percentage of enrollees by chronic condition by clinic (FY12, FM1)<sup>a</sup>

Chronic condition	NHOH	NHP	NHCQ	NHCC	NHOH	NHP	NHCQ
	FM	FM	FM		Peds	Peds	Peds
Diabetes	8.0	12.7	4.6	9.4	0.7	0.3	0.3
Hypertension	14.9	24.1	13.2	15.0	0.6	0.3	0.1
CHF	0.1	0.5	0.1	0.1	0.0	0.0	0.0
Heart disease	12.1	16.9	12.0	10.9	5.4	3.4	3.2
Hyperlipidemia	16.4	28.0	17.5	15.5	0.4	0.4	0.2
Depression	9.6	6.5	6.7	5.0	1.1	0.7	0.5
Chronic pain	19.7	20.1	21.6	13.9	2.3	2.9	2.3
Osteoarthritis	2.7	5.1	3.1	1.4	0.0	0.0	0.0
Asthma	11.5	11.6	9.1	16.0	16.2	18.5	14.2
COPD	7.9	10.8	8.3	5.9	3.5	3.8	4.3
Coronary artery disease	0.9	2.0	1.1	1.1	0.0	0.0	0.0
Anxiety	10.0	9.2	8.9	6.7	1.8	1.9	2.1
Sleep disorder	3.6	4.8	3.7	2.8	1.7	0.9	1.0
ADD/ADHD	3.5	3.3	2.5	3.5	8.2	8.9	6.3
Learning and developmental disorders	0.8	0.7	0.8	1.2	6.5	2.6	5.3
Epilepsy	0.6	0.9	0.7	0.6	1.5	1.5	1.3
Tic disorders	0.4	0.3	0.4	0.4	3.3	1.7	2.4

a. Estimated using enrollees in fiscal month 1 (FM1) of FY12.

Enrollees can be classified as having more than one chronic condition. Figure 1 shows the percentage of enrollees at each site that have one or more chronic conditions by beneficiary category (with “Other” referring mainly to retirees and retiree family members). When there is little variation by site, approximately 25 percent of the enrollees meet the criteria for having a single chronic condition, while 45 percent have at least one chronic condition. Between 40 and 50 percent of the active duty enrollees at the MHP clinics have one or more chronic conditions. Chronic conditions that are most prevalent in the active duty population are chronic pain, asthma, and hyperlipidemia. The majority of active duty enrollees are enrolled either to active duty or branch medical clinics. Only those who work in the clinic or have a chronic condition best managed within the family medicine clinic would be enrolled to MHP.

Figure 1. Percentage of enrollees by number of chronic conditions by clinic and beneficiary category



## Control variables

In our statistical models for estimating the impact of the WRNMMC Medical Home, which the next section of this report details, we controlled for various factors to account for differences across patients. Specifically we controlled for the following:

- Demographics—age, gender, and beneficiary category.
- Number of chronic conditions.
- Continuous enrollment.
- Seasonality.

The population demographics at each of the four sites vary considerably. Active duty enrollment is much higher at NHC Quantico and NHC Charleston, while retiree enrollment is higher at NH Oak Harbor and NH Pensacola. Accordingly, the demographic variables allow us to account for these differences to make fair comparisons.

Similar to demographics, we controlled for the number of chronic conditions that a patient has as somewhat of a surrogate for patient

health. Patients with more chronic conditions are generally more resource intensive, so this is an essential control when looking at use and cost differences across clinics.

In our initial evaluation of the WRNMMC Medical Home [5], we limited our review to patients who were continuously enrolled. The reasoning behind this was that it takes time to change patient behavior so we focused the analysis on those patients who had been associated with their clinic for an extended period. However, this is not an assumption that we can continue to use going forward in a long-term evaluation because the continuously enrolled population gets smaller each year. Additionally, because Navy beneficiaries and medical staff rotate on a periodic basis, particularly at sites like NHC Charleston where a third of the enrollment turns over every 18 months, we needed to evaluate MHP given that reality. Although we included a variable for continuous enrollment as a control variable, the coefficients for this variable are highly significant with implications of their own in terms of the beneficial impact consistent enrollment with a facility has on utilization and costs.

We also controlled for seasonality in medical care demand in our models based on the change in the level and type of demand for healthcare services throughout the year. We controlled for seasonality by controlling for the month patients received a particular service. For the analysis, seasonality is not a variable of interest, but we include it because it is an important predictor of healthcare services that is controlled in the model.

## **Statistical methods**

Now that we have described our general approach, comparison sites, and analytic data, this section discusses the statistical methods we have employed to answer the research questions. The literature studying the impact of PCMHs on use employs a multivariate regression methodology to determine the utilization impact. Econometrically, that approach is problematic because the distribution of the dependent variable—use—has a heavy weight on zero (no use) and is highly skewed (has a long right tail). Such data do not satisfy the assumptions of normality, homoscedasticity, and independence required by ordinary least squares regression [13]. With sufficient data, this ap-



proach will provide unbiased estimates, but the standard errors may be too small, thus overestimating the significance [13].

An approach that overcomes these limitations is a two-step model in which the first equation estimates the probability of use of a particular healthcare service and the second equation estimates the amount of use for users [14].<sup>3</sup> Not only is this approach econometrically sound, it provides additional information that the standard multivariate regression approach cannot. With multivariate regression, the results provide an estimate of the amount of use, but they do not tell us anything about the underlying composition of this use.

For example, suppose that the regression results show that inpatient use is less for PCMH enrollees relative to comparison groups. Is the use less because patients are less likely to have an inpatient stay or because those who do have an inpatient stay use fewer services during those stays, or some combination of the two? The two-step methodology allows us to answer these questions. Knowing the answers to these questions may be particularly valuable in evaluating PCMHs by providing a measure of the PCMH's ability to effectively manage patients so that they are less likely to need care. In addition, when patients do need care, our methodology provides a measure of how much care they use. Such information may allow PCMHs to better understand whether they are succeeding and where they may want to focus their efforts for further improvement.

With the two-step use process, we can still estimate the overall utilization impact in a manner similar to what multivariate regression provides. We do this by multiplying the estimated probability of use (step 1) by the estimated amount of use for users (step 2). This is the methodology and approach we have followed in this study. Note that our data are patient-month-level use data. This means that we are es-

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<sup>3</sup> Alternative statistical methodologies are using a Poisson or negative binomial distribution, both of which are appropriate models for count data. Such models may work for primary care or specialty care encounters, but would likely be problematic for inpatient admissions, which would be zero for almost all individuals and one for most of the remainder. We may consider this modeling approach as the evaluation continues into a third year. Given these challenges and because the cost data are not count data, we used the two-step approach.

timating the probability of being a user in a given month, and for those that are users in a given month, we estimate the amount of use in a month. Hence, the product of these two steps yields the estimated average monthly use per enrollee.

To estimate the probability of being a user in a given month, we use logit regression. By design, logit models estimate the probability of a particular outcome—in this case, being a user or not—for a binary choice model. Mathematically, we represent this as

$$Y_i = x_i \beta^P \text{ and } P_i = F(Y_i) = F(x_i \beta^P)$$

where  $Y_i$  equals 0 or 1 (non-user or user) and  $P_i$  represents the estimated probability of being a user. The vector  $\mathbf{x}$  represents the explanatory variables we used to predict whether an individual was a user in a particular month and  $\beta^P$  represents the estimated coefficients for the impact of the various explanatory or control variables on the estimated probability of being a user. Similarly, we mathematically represent the amount of monthly use per user in a given month as

$$y_i = x_i \beta^U \text{ if } Y_i = 1.$$

Here,  $y_i$  represents the amount of use for those who were users in that month ( $Y_i = 1$ ). We estimated this model using ordinary least squares regression using the same explanatory variables as we used in the logit model. Note that  $\beta^U$  (the estimated coefficients for the impact of various explanatory variables on the amount of use for users) is not the same as  $\beta^P$  even though the explanatory variables are the same.

In both steps of our analysis, we include binary variables for the implementation (transition) and post-implementation periods. Initial (pre-implementation) model estimates are calculated with both the implementation and post-implementation period variables set to zero, while post-implementation model estimates are calculated with the implementation period variable set to zero and the post-implementation period variable set to one. The coefficients ( $\beta^U$  and  $\beta^P$ ) for the post-implementation period variable are the difference in the pre- and post-implementation model estimates and are reported as the marginal post-implementation effect. Where one or both of these coefficients are significant, we calculate and report the change in the product of the estimates or the average monthly use per enrol-

lee. Also note that when we modeled whether someone was a user in a given month, we did this separately by type of use. This means when we modeled ER visits, for example, we only considered an individual to be a user if he or she had an ER visit in a given quarter. If an individual used inpatient care, specialty care, or primary care in a given quarter but not ER care, this individual was not considered a user of ER care in that quarter. The same pattern holds for all of the use measures we modeled.

We also modeled PMPM costs using this same two-step methodology. Being a user in the PMPM sense is having non-zero costs in a given month [13].

## MHP implementation timeline

Dates of implementation varied both in length of implementation and chronology at each of the four sites. NH Oak Harbor was the earliest to begin the implementation of medical home concepts in FY 2009, but they, along with NHC Charleston, have the shortest post-implementation periods. Implementation at NHC Charleston and NH Oak Harbor was not complete until June 2011, leaving less than a year of post-implementation data to study. NHC Quantico did not have an explicit implementation period (where only part of the clinic converted to MHP), simply converting from their prior clinic configuration to a MHP in October 2010. The time periods of implementation for each site are shown in Table 9. One should note that although we chose a specific date to begin the post-implementation period, the sites continue to evolve their MHP by making changes to templates, provider-mix, management of chronic patients, and considering integration of internal medicine and pediatric clinics.

Table 9. MHP implementation date by site

Site	Pre-Implementation	Implementation Phase	Post-Implementation	MHPs
NH Oak Harbor	10/07-09/08	10/08-05/11	06/11-05/12	FP, Peds
NH Pensacola	10/08-10/09	11/09-09/10	10/10-05/12	FP, Peds
NHC Quantico	06/08-09/09	NA	10/10-05/12	FP, Peds
NHC Charleston	05/09-04/10	05/10-05/11	06/11-05/12	Integrated FP, IM, Peds

Dates for implementation were determined during site visits to each clinic and were based on when the sites made changes in either appointing practices or team composition. Our analysis compares pre- and post-implementation predictions to determine changes in use between the two periods.

## Demographics

Demographic attributes of enrollees were vastly different across the four family practice MHP clinics. Table 10 shows the percentage of enrolled population in each MHP clinic by beneficiary category. NHC Quantico serves largely active duty and active duty dependents, while NH Pensacola’s population is largely retirees and includes a very small active duty component. For simplicity, we include NHC Charleston with the family practice clinics, but note that the MHP at NHC Charleston includes integrated internal medicine and pediatrics, resulting in a more diverse population of enrollees.

Table 10. Beneficiary category by MHP clinic

	Active Duty	Active Duty Dependents		Retirees, Retiree Family Members, and Others		Total
		Adult	Child	Adult	Child	
Family Practice						
NH Oak Harbor	20%	30%	14%	31%	5%	10,391
NH Pensacola	7%	21%	15%	51%	6%	10,965
NHC Quantico	43%	24%	9%	22%	1%	10,795
NHC Charleston	11%	26%	31%	27%	5%	9,040
Pediatrics						
NH Oak Harbor	0%	0%	89%	0%	11%	3,598
NH Pensacola	0%	1%	73%	2%	24%	4,216
NHC Quantico	0%	0%	95%	0%	5%	3,529

As the population varies across beneficiary category at the four sites, the age distribution also varies. NHC Charleston, with integrated family medicine, internal medicine, and pediatrics clinic has the most age-diverse population. NHC Quantico serves a younger population, with over 40 percent of the family medicine clinics falling in the 18-34 age range. The pediatric clinic at NH Pensacola serves a higher percentage of teen and pre-teen patients than either of the other two pediatric clinics, which have very similar age distributions.

Table 11 shows the average age and age distributions for each MHP clinic.

Table 11. Average age and age distribution by MHP clinic (FY12, FM1)<sup>a</sup>

	Family Medicine				Pediatrics		
	NHOH	NHP	NHCQ	NHCC	NHOH	NHP	NHCQ
Average age	31.5	36.8	34.0	26.6	6.3	7.8	6.6
Age distribution							
Under 2	2.6	1.8	0.5	5.5	17.2	14.1	17.5
2-6	4.4	5.1	1.7	12.1	39.1	31.1	35.9
7-10	3.0	4.2	1.9	7.0	22.9	22.2	22.5
11-17	9.0	9.4	6.8	11.1	20.4	29.4	24.2
18-24	16.3	14.7	16.8	15.1	0.4	3.2	
25-34	24.7	12.7	25.6	16.8			
35-44	15.8	11.8	22.6	10.9			
45-54	14.8	18.8	14.5	10.2			
55-64	8.7	12.2	9.7	11.2			
65-74	0.5	5.3	0.0	0.1			
75 and over	0.1	3.9		0.1			

a. Estimated using enrollees in fiscal month 1 (FM1) of FY12.

The prevalence of chronic conditions also varies across demographic groups and sites. In Table 12, we display the percentage of MHP enrollees in each clinic by chronic condition. Inclusion in chronic condition categories is not mutually exclusive; many patients have more than one chronic condition. For the family medicine clinics, we include the total (overall) enrolled population as well as the active duty population. NH Pensacola’s family medicine enrollees include a higher percentage of enrollees with diabetes, hypertension, heart disease, hyperlipidemia, COPD, and CAD than the other sites. Because NHC Charleston is the only clinic with an integrated pediatrics clinic, it is difficult to interpret their total population in context with the other clinics; however, the active duty populations are comparable, and we note that the percentage of active duty enrollees with a chronic condition at NHC Charleston is either comparable or slightly higher than that of the other sites for most conditions.

Table 12. Chronic conditions by beneficiary category and MHP clinic (FY12, FM1)<sup>a</sup>

	NH Oak Harbor			NH Pensacola			NHC Quantico			NHC Charleston Integrated	
	Fam Med		Peds	Fam Med		Peds	Fam Med		Peds	Total	AD
	Total	AD	Total	Total	AD	Total	Total	AD	Total		
Diabetes	8.0	6.8	0.7	12.7	5.2	0.3	4.6	1.3	0.3	9.4	4.6
Hypertension	14.9	9.4	0.6	24.1	9.1	0.3	13.2	6.5	0.1	15.0	11.5
CHF	0.1	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Heart Disease	12.1	9.4	5.4	16.9	13.3	3.4	12.0	9.5	3.2	10.9	11.1
Hyperlipidemia	16.4	14.9	0.4	28.0	18.4	0.4	17.5	14.5	0.2	15.5	15.6
Depression	9.6	8.0	1.1	6.5	4.8	0.7	6.7	6.9	0.5	5.0	10.9
Chronic Pain	19.7	24.5	2.3	20.1	26.0	2.9	21.6	27.2	2.3	13.9	24.3
Osteoarthritis	2.7	1.8	0.0	5.1	1.7	0.0	3.1	2.7	0.0	1.4	2.0
Asthma	11.5	5.1	16.2	11.6	6.1	18.5	9.1	4.7	14.2	16.0	7.4
COPD	7.9	4.8	3.5	10.8	6.6	3.8	8.3	5.4	4.3	5.9	4.5
CAD	0.9	0.3	0.0	2.0	0.0	0.0	1.1	0.4	0.0	1.1	0.2
Anxiety	10.0	9.6	1.8	9.2	11.9	1.9	8.9	9.8	2.1	6.7	9.4
Sleep Disorder	3.6	5.0	1.7	4.8	10.1	0.9	3.7	5.3	1.0	2.8	5.2
ADHD	3.5	3.9	8.2	3.3	2.2	8.9	2.5	1.2	6.3	3.5	2.4
Developmental Disorders	0.8	0.2	6.5	0.7	0.1	2.6	0.8	0.2	5.3	1.2	0.0
Epilepsy	0.6	0.2	1.5	0.9	0.3	1.5	0.7	0.5	1.3	0.6	0.1
Tic Disorders	0.4	0.1	3.3	0.3	0.0	1.7	0.4	0.0	2.4	0.4	0.0

a. Estimated using enrollees in fiscal month 1 (FM1) of FY12.

## Utilization and cost results

As we begin our discussion of utilization and cost, we first look at each site individually, showing separate results for family medicine and pediatric clinics overall and then for both chronic and non-chronic patients in each clinic. In the summary, we compare results across the four sites and provide results for specific chronic conditions.

### NH Pensacola

NH Pensacola began implementing MHP concepts in its three family practice teams in November 2009 and completed implementation in October 2010. It is unique among the four sites we examine here in that it is the home of a family practice residency training program. The residency program places additional demands on the clinic to maintain a broad case-mix of patients, with specific age and condition

requirements, as well as meet encounter or workload requirements for its residents.

In the first three rows of Table 13, we show the estimated monthly probability of use for the pre-implementation period—in the case of NH Pensacola this is FY09, the marginal post-implementation effect—FY11 through FY12FM08 at NH Pensacola, and the percent change when the change is statistically significant. The next three rows show the estimated monthly use for enrollees that used the system for that particular measure in the pre-implementation period, the marginal post-implementation effect, and the percent change, if statistically significant. The last three rows combine the probability of use and the amount of use into an estimated average use and again show the pre-implementation estimate, the post-implementation marginal effect, and the percent change if either the probability of use or the amount of use effects were statistically significant.

Table 13. Use and cost impact of NH Pensacola FM Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0063	0.0063	0.0367	0.1671	0.3182	0.3976	0.1691	0.5104
Marginal post-impl. effect	-0.0009 <sup>a</sup>	-0.0009 <sup>a</sup>	-0.0049 <sup>a</sup>	-0.0020	-0.0132 <sup>a</sup>	-0.0060 <sup>a</sup>	-0.0113 <sup>a</sup>	-0.0156 <sup>a</sup>
Change	-14.9%	14.9%	-13.3%		-4.2%	-1.5%	-6.3%	-3.0%
Estimated use for users	1.0792	6.3241	1.43819	2.7388	1.7287	\$164	\$190	\$1132
Marginal post-impl. effect	0.0190	-0.7373 <sup>c</sup>	-0.0466	-0.1320 <sup>a</sup>	0.0211 <sup>b</sup>	\$9 <sup>a</sup>	\$3	-\$165 <sup>a</sup>
Change		-11.7%		-4.8%	1.2%	6.0%		-14.6%
Estimated average use <sup>e</sup>	0.0068	0.0398	0.0508	0.4577	0.5502	\$62	\$34	\$596
Marginal post-impl. effect	-0.0010	-0.0099	-0.0068	-0.0220	-0.0164	\$3	-\$2	-\$102
Change	-14.9%	-24.8%	-13.3%	-4.8%	-3.0%	4.4%	-6.3%	-17.1%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

At NH Pensacola, we see a 13 percent decrease in the probability of use for ER and UCC visits and a 15 percent decrease in the probability of using inpatient services. There are slight increases in pharmacy costs, but the overall PMPM costs have decreased by 17 percent.

In our previous study of MHP implementation at WRNNMC, we found that there were significant cost savings for all enrollees, but greater savings were realized in the chronic population [6]. In Table 14 we show the estimated average use for chronic and non-chronic patients. Chronic patients at NH Pensacola show a decrease in PMPM costs of 18 percent, whereas the non-chronic patients show a 15 percent decrease in PMPM; however, the magnitude of that change for chronic patients is much greater at \$144 for chronic patients and \$45 for non-chronic patients.

Table 14. Use and cost impact of NH Pensacola FM Medical Home by chronic status

Measure	IP adms	IP days	ER/ UCC Visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0060	0.0290	0.0400	0.4560	0.5571	\$91	\$43	\$662
Marginal post-impl. effect <sup>a</sup>	-0.0008	-0.0106	-0.0055	-0.0084	-0.0082	\$4	-\$3	-\$144
Change <sup>a</sup>	-11.6%	-26.7%	-12.1%	-1.8%	-1.5%	4.7%	-6.5%	-17.9%
Without chronic condition: avg. use	0.0059	0.0380	0.0604	0.4054	0.4864	\$24	\$15	\$295
Marginal post-impl. effect <sup>a</sup>	-0.0006	-0.0032	-0.0055	-0.0008			\$0	-\$45
Change <sup>a</sup>	-11.7%	-11.7%	-10.3%	-3.9%			0.5%	-15.2%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

NH Pensacola has one pediatric MHP team that began implementation in August 2010. Among the changes noted by staff were an increased focus on provider continuity and a revised ER triage system used during business hours that sends non-critical patients to the pediatric clinic rather than see them in the ER. In Table 15, we show a decrease in ER and UCC visits of nearly 14 percent for the pediatric clinic; however, staff in the pediatric clinic indicated that this number may actually be even greater because patients that are sent to pediatrics from the ER still record an ER encounter. Along with the reduction in ER and UCC visits, we also see 20 percent reductions in inpatient admissions and days and 21 percent decrease in PMPM costs.



Table 15. Use and cost impact of NH Pensacola Peds Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0064	0.0064	0.0367	0.1689	0.3202	0.2112	0.0753	0.3572
Marginal post-impl. effect	-0.0011 <sup>a</sup>	-0.0011 <sup>a</sup>	-0.0049 <sup>a</sup>	-0.0008	-0.0163 <sup>a</sup>	0.0022	0.0052 <sup>b</sup>	0.0013
Change	-17.1%	-17.1%	-13.5%		-5.1%		6.9%	
Estimated use for users	1.0746	3.5709	2.4301	2.2079	1.5182	\$108	\$82	\$598
Marginal post-impl. effect	0.0013	0.6492	-0.1631	0.0013	-0.0128	-\$1	\$0	-\$125 <sup>a</sup>
Change								-21.0%
Estimated average use <sup>e</sup>	0.0069	0.0229	0.0892	0.3730	0.4862	\$23	\$7	\$213
Marginal post-impl. effect	-0.0012	-0.0039	-0.0120		-0.0248		\$0	-\$45
Change	-19.7%	-19.7%	-21.7%		-5.1%		6.9%	-21.0%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

Table 16 shows that among chronic pediatric patients at NH Pensacola, we find average decreases very similar to those in the overall pediatric population. Non-chronic pediatric patients show increases in specialty care encounters, pharmacy, and ancillary costs, but an overall decrease in PMPM costs. Once again, we note that while the percentage change for non-chronic patients is higher than for chronic patients, 31 percent and 13 percent, respectively, the actual cost savings for chronic patients is equal to that for non-chronic patients at \$45 each.

Table 16. Use and cost impact of NH Pensacola Peds Medical Home by chronic status

Measure	IP adms	IP days	ER/UCC Visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0068	0.0224	0.0851	0.4116	0.5095	\$52	\$10	\$342
Marginal post-impl. effect <sup>a</sup>	-0.0011	-0.0036	-0.0105		-0.0204			-\$45
Change <sup>a</sup>	-15.9%	-15.9%	-12.3%		-4.0%			-13.2%
Without chronic condition: avg. use	0.0065	0.0231	0.0892	0.2995	0.4541	\$8	\$4	\$145
Marginal post-impl. effect <sup>a</sup>	-0.0006	-0.0022	-0.0086	0.0371	-0.0048	\$2	\$0	-\$45
Change <sup>a</sup>	-9.7%	-9.7%	-9.7%	12.4%	-1.1%	21.5%	10.7%	-30.8%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

## NH Oak Harbor

NH Oak Harbor was the first of the four sites to begin implementing MHP concepts in October 2007 but among the last two sites to complete implementation in June 2011. The family practice MHP consists of two teams with approximately five FTE providers per team. Implementation at NH Oak Harbor focused on three concepts related to appointing practices: (1) a change to fourth level MEPRS codes, (2) a change in the appointment model, and (3) a change in provider expectations to protect open appointments and limit cross-booking. Table 17 shows the change in predicted use and cost for all enrollees in the family practice clinic at NH Oak Harbor. Similar to NH Pensacola, we see a decrease in inpatient utilization, ER and UCC visits, and overall PMPM costs. Although the decrease in PMPM costs are as a result of a decrease in cost per user, the decreases in inpatient utilization and ER/UCC visits are attributable to a decrease in the probability of use.

Table 17. Use and cost impact of NH Oak Harbor FM Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0035	0.0035	0.0080	0.1568	0.2743	0.3195	0.1598	0.4492
Marginal post-impl. effect	-0.0009 <sup>a</sup>	-0.0009 <sup>a</sup>	-0.0019 <sup>a</sup>	-0.0008	0.0013	-0.0080	-0.0113 <sup>a</sup>	0.0028
Change	-25.2%	-25.2%	-23.0%				-7.1%	
Estimated use for users	1.0898	4.5183	6.3076	3.0315	1.6406	\$119	\$154	\$777
Marginal post-impl. effect	0.0142	-0.7550	-0.2665	0.0745	0.0145	\$11	\$11 <sup>a</sup>	-\$54 <sup>b</sup>
Change							6.9%	-6.9%
Estimated average use <sup>e</sup>	0.0038	0.0156	0.0507	0.4755	0.4500	\$38	\$25	\$349
Marginal post-impl. effect	-0.0010	-0.0039	-0.0117				\$0	-\$24
Change	-25.2%	-25.2%	-23.0%				-0.7%	-6.9%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

Staff at NH Oak Harbor indicated that use of the on-site UCC had been a problem and that systems were being put in place to better control the use of the UCC by enrollees during clinic hours. While these results indicate positive changes as a result of MHP implementation, we caution that they, as with all results from NH Oak Harbor,

are based on a relatively short 11-month post-implementation period; further prolonged study will be required to determine the sustainability of these results.

Overall estimated PMPM cost savings in the family medicine clinic at NH Oak Harbor are attributable to a 10 percent decrease in PMPM costs for chronic patients. Table 18 shows estimated use and cost impacts for chronic and non-chronic patients. While there are significant decreases in use for chronic patients consistent with those for the entire population, the non-chronic population shows an increase in pharmacy costs and PMPM costs. The increases in pharmacy costs are increases in costs per user not in the probability of use and appear to be the result of a general increase in pharmacy costs at NH Oak Harbor.

Table 18. Use and cost impact of NH Oak Harbor FM Medical Home by chronic status

Measure	IP adms	IP days	ER/ UCC Visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0038	0.0156	0.0563	0.4934	0.4597	\$55	\$33	\$477
Marginal post-impl. effect <sup>a</sup>	-0.0009	-0.0038	-0.0129		0.0091		-\$1	-\$46
Change <sup>a</sup>	-24.4%	-24.4%	-22.9%		2.0%		-2.2%	-9.7%
Without chronic condition: avg. use	0.0034	0.0151	0.0450	0.3964	0.4055	\$14	\$14	\$189
Marginal post-impl. effect <sup>a</sup>	-0.0007	-0.0029	-0.0100	0.0242	0.0351	\$4		\$5
Change <sup>a</sup>	-19.3%	-19.3%	-22.3%	6.1%	8.7%	27.8%		2.5%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

The pediatrics clinic at NH Oak Harbor consists of one MHP team with four providers that implemented MHP in June 2011 along with the family medicine clinic. The overall results for pediatrics, shown in Table 19, show reductions in use of inpatient, ER/UCC services, ancillary costs, and PMPM costs, but an overall increase in specialty and primary care and pharmacy costs.

Table 19. Use and cost impact of NH Oak Harbor Peds Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0035	0.0035	0.0080	0.1573	0.2746	0.1942	0.0660	0.3627
Marginal post-impl. effect	-0.0009 <sup>a</sup>	-0.0009 <sup>a</sup>	-0.0019 <sup>a</sup>	-0.0028 <sup>c</sup>	-0.0002	-0.0009	-0.0123 <sup>a</sup>	-0.0147 <sup>a</sup>
Change	-25.9%	-25.9%	-23.1%	-1.8%			-18.6%	-4.0%
Estimated use for users	1.0463	5.7011	7.8119	2.8992	1.4821	\$83	\$78	\$521
Marginal post-impl. effect	0.1246 <sup>c</sup>	1.0970	0.1328	0.7150 <sup>a</sup>	0.0671 <sup>a</sup>	\$60 <sup>a</sup>	\$12 <sup>b</sup>	\$106
Change	11.9%			24.7%	4.5%	72.5%	15.1%	
Estimated average use <sup>e</sup>	0.0036	0.0198	0.0628	0.4559	0.4069	\$16	\$5	\$189
Marginal post-impl. effect	-0.0006	-0.0051	-0.0145	0.1023	0.0184	\$12	\$0	-\$8
Change	-17.0%	-25.9%	-23.1%	22.4%	4.5%	72.5%	-6.4%	-4.0%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

The results for chronic and non-chronic pediatric enrollees given in Table 20 appear to be in conflict with the results presented in Table 19 for PMPM costs. In Table 19, we showed an estimated 4 percent decrease in PMPM costs, while when we separate chronic and non-chronic patients, we show an increase in PMPM costs for both. The probability of use decreased for the overall population and for non-chronic patients and did not change for chronic patients. While both chronic and non-chronic patients show an increase in PMPM for users, the increase was statistically significant only for the non-chronic group.

Table 20. Use and cost impact of NH Oak Harbor Peds Medical Home by chronic status

Measure	IP adms	IP days	ER/UCC Visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0037	0.0243	0.0723	0.4932	0.4167	\$35	\$8	\$317
Marginal post-impl. effect <sup>a</sup>	-0.0009	-0.0061	-0.0166	0.1806	0.0058	\$13	-\$1	\$0
Change <sup>a</sup>	-25.1%	-25.1%	-22.9%	36.6%	1.4%	36.7%	-12.5%	
Without chronic condition: avg. use	0.0033	0.0133	0.0545	0.3537	0.3833	\$5	\$3	\$116
Marginal post-impl. effect <sup>a</sup>	-0.0000	-0.0025	-0.0122	-0.0204	0.0459	\$11	\$0	\$80
Change <sup>a</sup>	-0.6%	-18.6%	-22.4%	5.8%	12.0%	205%	0.9%	68.6%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

## NHC Quantico

NHC Quantico converted to MHP in October 2010; there was no implementation period, simply a pre-implementation state and post-implementation state. The family practice clinic started with three MHP teams, but consolidated to two teams in October 2011. Providers at NHC Quantico reported that the biggest changes they saw in medical home were in demand management, with nurses taking a more active role in triage and schedule scrubbing.

During our site visit, staff indicated that ER and UCC utilization is a problem for active duty at The Basic School (TBS) and Officer Candidates School (OCS), and these results are echoed in Table 21. ER and UCC use increased by 6 percent after MHP implementation. There are other increases in specialty care, pharmacy costs, and ancillary costs, but there are also decreases in inpatient services and PMPM costs of 12 and 5 percent, respectively.

Table 21. Use and cost impact of NHC Quantico FM Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0040	0.0040	0.0178	0.1589	0.3010	0.3090	0.1646	0.4780
Marginal PCMH effect	-0.0005 <sup>b</sup>	-0.0005 <sup>b</sup>	0.0027 <sup>a</sup>	0.0186 <sup>a</sup>	-0.0109 <sup>a</sup>	0.0028 <sup>c</sup>	-0.0101 <sup>a</sup>	-0.0225 <sup>a</sup>
Change	-12.4%	-12.4%	15.3%	11.7%	-3.6%	0.9%	-6.1%	-4.7%
Estimated use for users	1.0861	6.0244	3.3110	3.1059	1.7198	\$135	\$228	\$892
Marginal post-impl. effect	0.0000	0.3531	-0.3039 <sup>c</sup>	0.0415	0.0551 <sup>a</sup>	\$14 <sup>a</sup>	\$23 <sup>a</sup>	-\$15
Change			-8.4%		3.3%	10.3%	10.3%	
Estimated average use <sup>e</sup>	0.0044	0.0201	0.0679	0.5440	0.4989	\$47	\$39	\$406
Marginal post-impl. effect	-0.0005	-0.0028	0.0036	0.0570	-0.0022	\$5	\$1	-\$20
Change	-12.4%	-12.4%	5.6%	11.7%	-0.4%	11.3%	3.5%	-4.7%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

Unlike the other sites we visited, NHC Quantico no longer has a full-time internal medicine provider. Their IM clinic is staffed by a visiting provider. Many of the chronic patients that were enrolled to the internal medicine clinic were enrolled to purchased care when they lost their full-time Internal Medicine provider. Table 22 shows

results for the chronic and non-chronic patients enrolled to the family medicine clinic at NHC Quantico. There were decreases in inpatient services for chronic patients and PMPM costs in both groups, with PMPM costs dropping by \$42 for chronic patients and \$18 for non-chronic patients.

Table 22. Use and cost impact of NHC Quantico FM Medical Home by chronic status

Measure	IP adms	IP days	ER/ UCC Visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0044	0.0234	0.0548	0.5048	0.5192	\$62	\$53	\$611
Marginal post-impl. effect <sup>a</sup>	-0.0005	-0.0026	-0.0008	0.0687	0.0024	\$7	\$0	-\$42
Change <sup>a</sup>	-11.2%	-11.2%	-1.4%	13.5%	0.5%	11.9%	0.0%	-6.9%
Without chronic condition: avg. use	0.0041	0.0186	0.0940	0.4740	0.4685	\$18	\$22	\$190
Marginal post-impl. effect <sup>a</sup>			0.0142	0.0697	0.0162		\$3	-\$18
Change <sup>a</sup>			17.8%	17.2%	3.6%		16.4%	-8.7%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

When MHP was implemented at NHC Quantico, there was discussion of integrating the family medicine and pediatric clinics, but the pediatric clinic remains a separate entity with one MHP team of three providers. In Table 23, we show decreases in inpatient admissions, ER and UCC visits, and PMPM costs for the overall population of pediatric clinic enrollees.

Table 23. Use and cost impact of NHC Quantico Peds Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0043	0.0043	0.0178	0.1591	0.3010	0.1964	0.0635	0.3703
Marginal post-impl. effect	-0.0008 <sup>b</sup>	-0.0008 <sup>b</sup>	0.0027 <sup>a</sup>	0.0182 <sup>a</sup>	-0.0109 <sup>a</sup>	0.0037	-0.0023	-0.0149 <sup>a</sup>
Change	-18.3%	-18.3%	15.3%	11.4%	-3.6%			-4.0%
Estimated use for users	1.1008	5.2856	6.9706	2.0558	1.7032	\$103	\$127	\$724
Marginal post-impl. effect	0.0115	-0.4634	-1.0496	0.2513	-0.0459	\$3	\$9	-\$199
Change			-15.1%	12.2%	-2.7%			-27.5%
Estimated average use <sup>e</sup>	0.0048	0.0229	0.1240	0.3270	0.5126	\$20	\$8	\$268
Marginal post-impl. effect	-0.0009	-0.0042	-0.0025	0.0820	-0.0318			-\$82
Change	-18.3%	-18.3%	-2.0%	25.1%	-6.2%			-30.4%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

During our site visit to NHC Quantico, staff expressed concerns over their chronic pediatric patients. Active duty service members with category 4 beneficiaries in the Exceptional Family Member Program (EFMP) can be assigned to NHC Quantico because of their proximity to the robust network of Washington, DC and the resources available at WRNNMC and the DeWitt Army Medical Center at Fort Belvoir. The category 3 and 4 pediatric patients enrolled at NHC Quantico are a small group of chronic patients with very high demand. Results for the chronic and non-chronic population at NHC Quantico are displayed in Table 24. Non-chronic patients show a 2 percent decrease in ER and UCC visits and a 30 percent decrease in PMPM costs, while chronic patients show a decrease in inpatient admissions and days, primary care encounters, pharmacy costs, ancillary costs, and PMPM costs. The 29 percent decrease in PMPM costs for chronic patients is a reduction in PMPM costs of \$138 (compared to the \$52 reduction for non-chronic patients).

Table 24. Use and cost impact of NHC Quantico Peds Medical Home by chronic status

Measure	IP adms	IP days	ER/ UCC visits	Spec. care enc.	Prim. care enc.	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0046	0.0211	0.1317	0.4824	0.4817	\$48	\$15	\$478
Marginal post-impl. effect <sup>a</sup>	-0.0005	-0.0023	0.0025	0.1055	-0.0369	-\$3	-\$2	-\$138
Change <sup>a</sup>	-10.9%	-10.9%	2.0%	28.0%	-7.1%	-7.2%	-14.8%	-28.9%
Without chronic condition: avg. use	0.0040	0.0204	0.1195	0.2442	0.4982	\$8	\$5	\$170
Marginal post-impl. effect <sup>a</sup>			-0.0029	0.0719		\$2	\$1	-\$52
Change <sup>a</sup>			-2.4%	29.4%		23.3%	20.3%	-30.4%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

### NHC Charleston

NHC Charleston is the only site in our study that has family practice, internal medicine, and pediatrics providers integrated into one MHP. The MHP at NHC Charleston consists of two teams, each with family practice and pediatric providers and sharing an internal medicine provider. Along with implementing MHP concepts and integrating family medicine, pediatrics, and internal medicine in FY11, NHC Charleston moved to a new physical location. Before moving to the new facility, pediatrics and family medicine were co-located in a different facility closer to the active duty population and began implementing MHP concepts as early as May 2009.

Our results for NHC Charleston are presented for the overall enrolled population in Table 25 and for chronic and non-chronic populations in Table 26. We do not include a separate analysis of pediatric patients for NHC Charleston. With the exception of pharmacy costs, there are decreases in all reported measures at NH Charleston.



Table 25. Use and cost impact of NHC Charleston Medical Home—all enrollees

Measure <sup>d</sup>	IP adms	IP days	ER/UCC visits	Spec. care enc. <sup>f</sup>	Prim. care enc. <sup>f</sup>	Pharm. costs	Anc. costs	PMPM costs
Estimated prob. of use	0.0061	0.0061	0.0123			0.3333	0.1225	0.4757
Marginal post-impl. effect	-0.0011 <sup>b</sup>	-0.0011 <sup>b</sup>	-0.0016 <sup>a</sup>			-0.0069 <sup>a</sup>	-0.0053 <sup>a</sup>	-.0032
Change	-15.3%	-15.3%	-11.3%			-2.1%	-4.3%	
Estimated use for users	1.0264	4.8508	8.1013			\$163	\$265	\$905
Marginal post-impl. effect	0.0066	-1.0281 <sup>b</sup>	-1.0849 <sup>a</sup>			\$13 <sup>a</sup>	-\$39 <sup>a</sup>	-\$154 <sup>a</sup>
Change		-21.2%	-13.4%			8.1%	-14.9%	-17.1%
Estimated average use <sup>e</sup>	0.0074	0.0348	0.1120			\$54	\$33	\$430
Marginal post-impl. effect	-0.0011	-0.0116	-0.0260			\$3	-\$6	-\$73
Change	-15.3%	-33.2%	-23.2%			5.8%	-18.5%	-17.1%

a. Denotes p<0.001.

b. Denotes p<0.01.

c. Denotes p<0.05.

d. All figures represent monthly utilization or cost rates.

e. Estimated average use equals the product of the estimated probability of use and the estimated use for users.

f. Missing data in the M2 prevent us from being able to distinguish between primary and specialty care encounters. Results for these measures are not reported at this time.

During our site visit to NHC Charleston, staff indicated that the facility has always had a robust wellness program with a wellness clinic running programs for tobacco cessation, weight management, heart disease, and diabetes. In the summer of 2010, the nearby 628<sup>th</sup> Medical Group-Charleston Air Force Base deployed their IM provider and NHC Charleston enrolled an additional 250-400 unmanaged diabetic patients that were previously enrolled to Charleston AFB. The results for chronic and non-chronic enrollees in Table 26 show an 18 percent decrease in predicted PMPM costs for both chronic and non-chronic patients, which equals \$116 for chronic patients and \$38 for non-chronic patients after MHP implementation.

Table 26. Use and cost impact of NHC Charleston Medical Home by chronic status

Measure	IP adms	IP days	ER/ UCC Visits	Spec. care enc. <sup>b</sup>	Prim. care enc. <sup>b</sup>	Pharm. costs	Anc. costs	PMPM costs
With chronic condition: avg. use	0.0074	0.0402	0.1169			\$90	\$53	\$655
Marginal post-impl. effect <sup>a</sup>	-0.0011	-0.0122	-0.0298			\$8	-\$10	-\$116
Change <sup>a</sup>	-14.3%	-30.3%	-25.5%			8.9%	-19.1%	-17.8%
Without chronic condition: avg. use	0.0072	.0253	.1077			\$21	\$14	\$219
Marginal post-impl. effect <sup>a</sup>	-0.0009	-.0092	-0.0226			-\$1	-\$2	-\$38
Change <sup>a</sup>	-12.7%	-36.5%	-21.0%			-6.3%	-16.1%	-17.5%

a. Marginal effect and percent change are shown only when either the probability of use or the amount of use is statistically significant.

b. Missing data in the M2 prevent us from being able to distinguish between primary and specialty care encounters. Results for these measures are not reported at this time.

## Summary

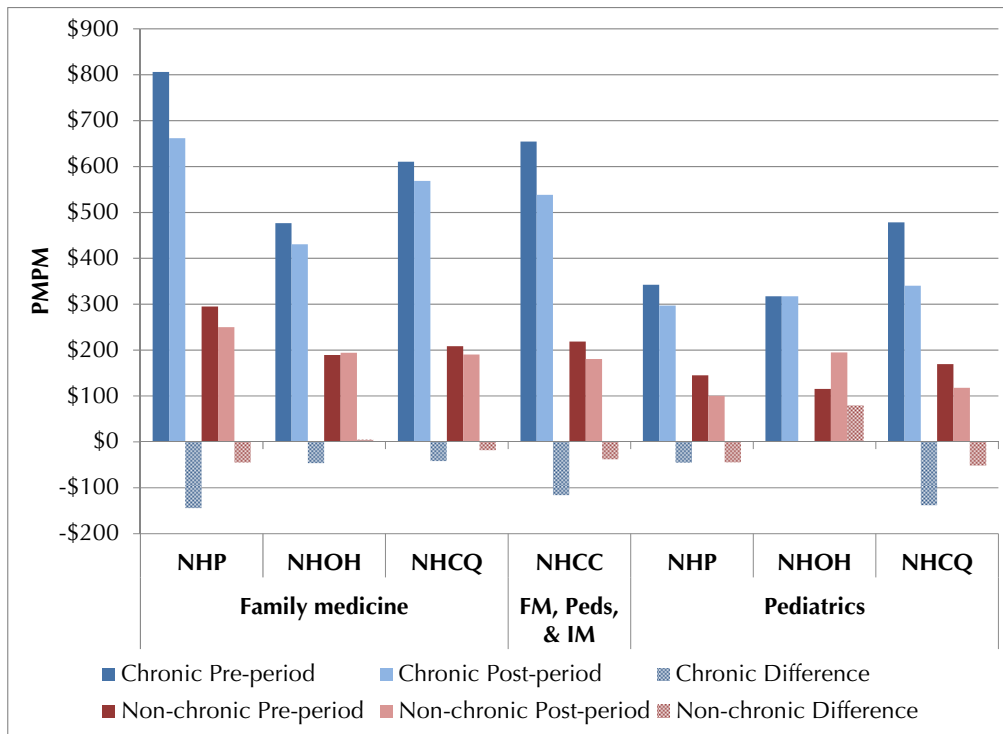
When we look for commonalities across the sites, the results show the following general cost and utilization patterns between the pre- and post-implementation periods across the four sites:

- Utilization of inpatient services as well as ER or urgent care services were generally less in the post-implementation period.
- Specialty care utilization had minimal changes between the pre- and post-implementation periods at most sites, with the exception of the pediatric MHP at NH Oak Harbor and the MHPs at NHC Quantico.
- Primary care utilization was little changed across all sites for both family medicine and pediatric MHPs.
- Pharmacy costs were typically higher in the post-implementation period. This trend appears to be due to an increase in the cost-per-prescription rather than an increase in the number of prescriptions per enrollee.
- Changes in ancillary costs were mixed across the four sites.
- The results show that all sites, with the exception of non-chronic patients at NH Oak Harbor, had decreases in PMPM for family medicine and pediatric clinics.

### Chronic compared to non-chronic

In addition to an overall decrease in PMPM for these MHPs, we found obvious PMPM decreases for patients both with and without chronic conditions as Figure 2 shows. In percentage terms, PMPM changes were very similar for chronic and non-chronic enrollees. However, because patients with chronic conditions have two to three times as much utilization of healthcare services, the dollar changes in PMPM for chronic patients are also two to three times greater than for chronic patients. In other words, these MHPs seem to be effective at controlling near-term costs for patients with and without chronic conditions but substantially greater cost reductions are associated with chronic patients. These results are consistent with our results from our 2011 evaluation of the WRNMMC Medical Home.

Figure 2. MHP impact on PMPM by chronic compared to non-chronic conditions



Note that the largest PMPM reductions occurred at NH Pensacola and NHC Charleston while the smallest PMPM reductions were at NH Oak Harbor. But, also notice that NH Oak Harbor had the lowest PMPM to begin with and still does in the post-implementation period. We want to acknowledge in making this comparison that the step down costs associated with the various healthcare services can vary

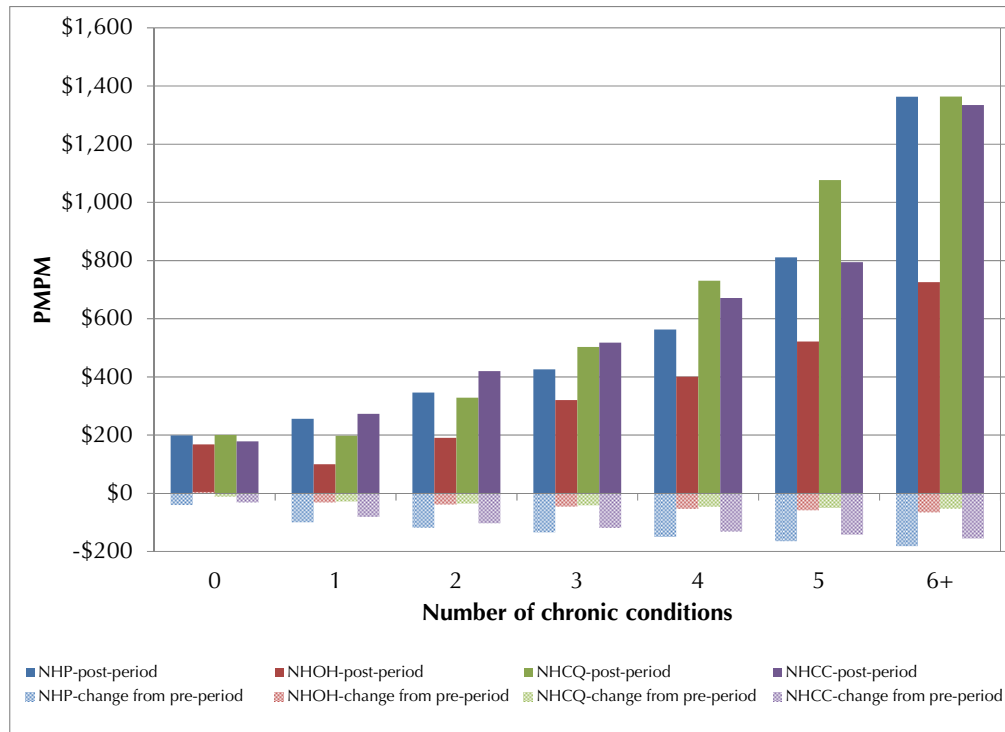
substantially across sites depending on overhead costs in the allocation process. NH Pensacola, for example, has additional costs that stem from the family practice residency program that none of the other three sites have. From this perspective, we want to add some caution and context in interpreting cross-site PMPM comparisons.

Exploring the PMPM comparison further, we estimated post-implementation PMPM costs based on the number of chronic conditions the enrollee had as Figure 3 shows. The figure shows the estimated post-implementation PMPM by site and the dollar reduction from pre-implementation levels. The estimates are for a 50-year-old male retiree.<sup>4</sup> For those without a chronic condition, estimated PMPM costs are less than \$200. This figure rises substantially for those with multiple chronic conditions (to between \$700 and \$1,400, depending on the site, for those with six or more chronic conditions). This trend of increasing PMPM follows patterns one would observe in the general population [15]. The figure illustrates a couple of points: first, higher cost sites show the largest decreases in PMPM, and second, PMPM reductions increase with the number of chronic conditions an enrollee has.

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<sup>4</sup> These demographics are just for illustration to have a normalized comparison across the sites. We can generate similar figures for other demographic combinations, but the patterns shown in Figure 3 would be the same, though of a different magnitude.

Figure 3. PMPM and MHP impact by number of chronic conditions



Note: these figures are estimates for a 50-year-old male retiree who is continuously enrolled to the site.

Using the same predictions for a 50-year old, continuously enrolled male with different numbers of chronic conditions used in Figure 3, we computed the standard deviation in pre- and post-implementation PMPM among the four sites as shown in Table 27. We note that variation across the four sites decreases in the post-implementation period, suggesting that implementing MHP principles has standardized the treatment of both chronic and non-chronic patients across sites.

Table 27. Standard deviation in PMPM costs by number of chronic conditions

Number of chronic conditions	0	1	2	3	4	5	6+
Pre-implementation period	\$32	\$109	\$129	\$114	\$160	\$231	\$350
Post-implementation period	\$16	\$78	\$96	\$90	\$145	\$226	\$314
Difference	-\$16	-\$31	-\$33	-\$24	-\$15	-\$5	-\$36
% difference	-49%	-28%	-26%	-21%	-9%	-2%	-10%

Although the reduction in the standard deviation in PMPM costs varies non-monotonically by the number of chronic conditions, the percentage change in the standard deviation generally is greater for patients with fewer chronic conditions. This is logical because a MHP should help to standardize care and for less complex patients. This

standardization should be more straightforward for patients without chronic conditions compared to those with multiple chronic conditions. Nonetheless, the point is that variation in PMPM across these sites is less in the post-implementation period.

### **Results for specific chronic conditions**

Up to this point, we have shown results for those with compared to those without chronic conditions and also by the number of chronic conditions. We now turn to looking at the PMPM results for specific conditions as Table 28 shows. Note that the results for a particularly chronic condition are not mutually exclusive because many enrollees have multiple chronic conditions. Hence the figures for hyperlipidemia, for example, include any enrollee with this condition regardless of what other conditions he or she may have.

In looking at the PMPM results by chronic condition, we observe that for only hypertension and diabetes does each site show a PMPM reduction in the post-implementation period. For hyperlipidemia, asthma, and COPD, we observe either a reduction or no change in PMPM across the four sites. The results for chronic pain are also worth pointing out because it is the most common chronic condition among the active duty population. Two of the four sites showed a PMPM reduction for this condition, and one site showed no change. The exception was NH Oak Harbor, but as noted previously, it was the lowest cost site to begin with, so PMPM reductions would be more difficult to achieve.

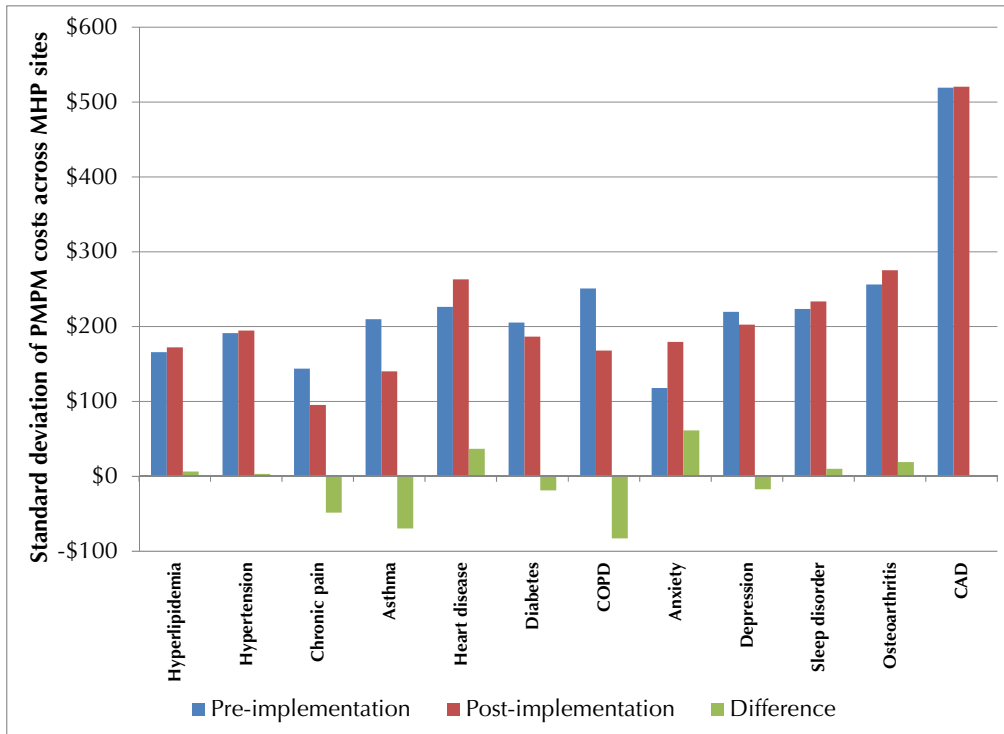
Table 28. PMPM by chronic condition

	NHP	NHOH	NHCC	NHCQ		NHP	NHOH	NHCC	NHCQ
<b>Hyperlipidemia</b>					<b>COPD</b>				
Pre-period	\$839	\$489	\$822	\$638	Pre-period	\$1,024	\$494	\$897	\$627
Post-period	\$839	\$436	\$738	\$638	Post-period	\$1,003	\$494	\$627	\$617
Difference	\$0	-\$53	-\$84	\$0	Difference	-\$22	\$0	-\$270	-\$10
% Change	0.0	-10.9	-10.2	0.0	% Change	-2.1	0.0	-30.1	-1.6
<b>Hypertension</b>					<b>Anxiety</b>				
Pre-period	\$1,026	\$566	\$862	\$782	Pre-period	\$1,004	\$746	\$859	\$976
Post-period	\$897	\$439	\$781	\$687	Post-period	\$1,004	\$666	\$709	\$990
Difference	-\$129	-\$127	-\$81	-\$95	Difference	\$0	-\$80	-\$150	\$14
% Change	-12.6	-22.4	-9.4	-12.1	% Change	0.0	-10.7	-17.5	1.4
<b>Chronic pain</b>					<b>Depression</b>				
Pre-period	\$903	\$566	\$784	\$681	Pre-period	\$1,145	\$619	\$899	\$978
Post-period	\$778	\$584	\$784	\$674	Post-period	\$967	\$619	\$923	\$1,097
Difference	-\$124	\$18	\$0	-\$7	Difference	-\$178	\$0	\$24	\$119
% Change	-13.8	3.2	0.0	-1.0	% Change	-15.6	0.0	2.7	12.2
<b>Asthma</b>					<b>Sleep disorder</b>				
Pre-period	\$1,083	\$584	\$729	\$788	Pre-period	\$1,100	\$628	\$897	\$1,099
Post-period	\$872	\$584	\$568	\$700	Post-period	\$1,130	\$659	\$839	\$1,136
Difference	-\$211	\$0	-\$160	-\$87	Difference	\$30	\$31	-\$58	\$37
% Change	-19.5	0.0	-22.0	-11.1	% Change	2.7	4.9	-6.5	3.3
<b>Heart disease</b>					<b>Osteoarthritis</b>				
Pre-period	\$1,194	\$642	\$927	\$877	Pre-period	\$1,169	\$577	\$1,054	\$946
Post-period	\$1,207	\$574	\$807	\$799	Post-period	\$1,169	\$614	\$1,157	\$790
Difference	\$13	-\$68	-\$120	-\$77	Difference	\$0	\$37	\$103	-\$156
% Change	1.1	-10.6	-13.0	-8.8	% Change	0.0	6.5	9.7	-16.4
<b>Diabetes</b>					<b>CAD</b>				
Pre-period	\$1,097	\$628	\$1,018	\$936	Pre-period	\$2,021	\$926	\$1,900	\$1,271
Post-period	\$931	\$529	\$810	\$917	Post-period	\$2,021	\$926	\$909	\$1,330
Difference	-\$166	-\$99	-\$208	-\$19	Difference	\$0	\$0	-\$991	\$60
% Change	-15.1	-15.7	-20.4	-2.0	% Change	0.0	0.0	-52.2	4.7

Taking the data from Table 28, we computed the standard deviation in pre- and post-implementation PMPM among the four sites as Figure 4 shows. In doing this we observe that the variance in PMPM costs among the sites is less in the post-implementation period for chronic pain, asthma, diabetes, COPD, and depression and minimal to no change in the variance in PMPM costs for hyperlipidemia, hypertension, and CAD. One interpretation of this result is that the MHP model is providing more standardized care across sites, essentially reducing high-level geographic variation in care. While this result is

suggestive, it is only based on four sites. It will be much more convincing if it holds across many sites.

Figure 4. Standard deviation in PMPM costs across MHP sites by chronic condition





## HEDIS, continuity, and access

As discussed in the introduction of this report, the objective is for MHP to improve access, quality, and cost, but the primary focus of this report is on cost and utilization, which drives cost. We note, however, that TRICARE Management Activity (TMA) is continuously assessing patient satisfaction and has periodically assessed staff satisfaction system-wide [4]. For this reason, we are not addressing these aspects of access and quality in this report. However, we do address HEDIS and continuity measures and discuss the concept of access. Specifically, this chapter shows trends in HEDIS data for these sites, as well as provider continuity as measures of quality. As for access, a common metric is third-next available. Although we do not estimate the metric for this report, we provide a discussion of the appropriateness of third-next available as a measure of access, particularly as it relates to PCMHs.

### HEDIS

Table 29 shows the HEDIS metrics by site. These metrics are based on data from Population Health Portal rather than constructed from our patient-level utilization database. The reason for this is that we cannot use the utilization database to create the HEDIS metrics, which require knowing a lab value such as the HbA1c value. So to avoid any confusion, we report the values based on Population Health Portal data.

For the most part, each site was at or above the 50<sup>th</sup> HEDIS percentile in both the pre- and post-period and for asthma, mammograms, and colorectal cancer screening, most sites were above the 90<sup>th</sup> percentile in both periods. In most cases the pre- and post-period values are similar with some higher in the post-period and some lower. Note that because of the system-wide focus on these metrics through pay for performance, we do not explicitly link these gains to MHP. However, we can reasonably conclude that MHP has been able to show cost reductions while at least maintaining quality relative to HEDIS benchmarks.

Table 29. HEDIS metrics by MHP site

	Diabetes LDL screens	Diabetes HbA1c screens	Diabetes A1c < 9.0	Asthma controlled with meds	Mammo- grams	Cervical cancer screens	Colorectal cancer screens
<b>NHP</b>							
Transition	89.7%	90.3%	81.5%	97.2%	81.8%	81.5%	72.9%
Post-period	85.9%	87.0%	78.4%	95.5%	81.7%	80.5%	74.8%
Difference	87.9%	89.6%	79.3%	96.3%	83.5%	81.9%	76.3%
<b>NHOH</b>							
Transition	80.0%	85.6%	70.3%	98.1%	77.7%	80.0%	58.2%
Post-period	78.7%	85.9%	71.5%	98.9%	79.5%	80.5%	63.4%
Difference	84.3%	89.0%	77.7%	98.2%	80.2%	83.4%	69.9%
<b>NHCC</b>							
Transition	91.0%	94.9%	80.0%	96.7%	87.3%	71.8%	77.9%
Post-period	92.0%	94.5%	81.2%	92.6%	82.0%	84.4%	75.3%
Difference	87.5%	92.5%	77.9%	95.8%	81.1%	87.3%	76.4%
<b>NHCQ</b>							
Transition	86.3%	90.0%	79.6%	97.0%	67.1%	83.2%	61.0%
Post-period	81.7%	87.5%	76.6%	98.5%	71.7%	86.9%	59.3%
Difference	84.3%	90.0%	78.3%	97.7%	65.3%	85.3%	58.3%
<b>HEDIS benchmark (percentile)</b>							
50th	85.1%	89.0%	72.2%	92.6%	70.0%	81.4%	59.4%
90th	89.8%	93.7%	81.3%	95.1%	78.7%	86.7%	69.6%

## Continuity

Each site indicated that improving PCM continuity was an important focus of its MHP implementation strategy. From the patient perspective, there are three types of continuity we can consider: (1) Did I have an encounter with my PCM?, (2) If my encounter was not with my PCM, was it with someone within the same team?, and (3) Is my PCM the same for the duration of time that I am enrolled to the clinic? Here we focus our discussion of continuity on the first type of continuity, “Did I have an encounter with my PCM?” Using M2 data, we are able to compare the PCM of record for a patient to each family medicine encounter provider ID to see whether they match. If they match, the first type of PCM continuity is met, the patient had an encounter with his or her PCM. Table 30 shows a comparison of pre- and post-implementation PCM continuity. Each site shows some improvement in PCM continuity after MHP implementation. We note here that continuity is more of a challenge at some

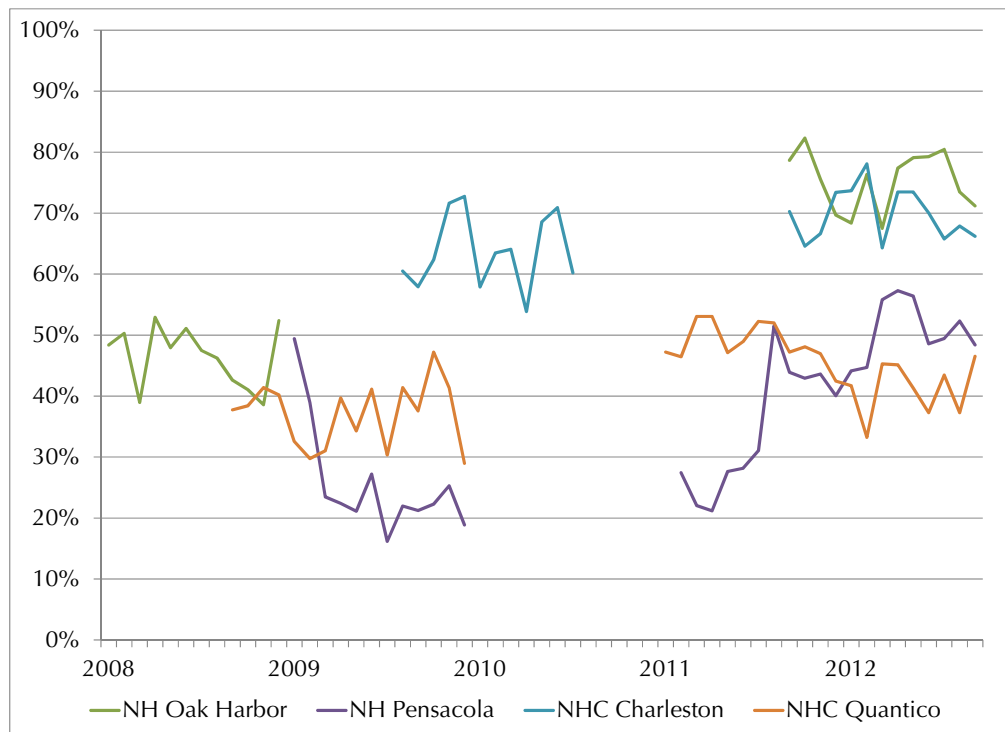
sites than at others. For instance, at NH Pensacola, first year residents are required to enroll patients, but their clinic hours are limited to one-half day a week. It would be difficult for those patients to see their PCM for anything other than a scheduled well-visit. As such, we would not expect PCM continuity to be as high at NH Pensacola as in the other clinics.

Table 30. PCM Continuity by MHP site

	NH Oak Harbor	NH Pensacola	NHC Charleston	NHC Quantico
Pre-implementation	46.5%	25.7%	63.7%	37.1%
Post-implementation	75.7%	41.5%	70.1%	45.5%
Difference	29.2%	15.8%	6.5%	8.4%

Figure 5 shows monthly PCM continuity in both the pre-implementation and post-implementation period at all four sites. This view allows us to see trends over time. While average PCM continuity at NH Pensacola is lower than at the other sites for the post-implementation period, a month-by-month comparison shows marked improvement after mid FY 2011 with PCM continuity around 50 percent.

Figure 5. Family medicine PCM continuity by MHP site



The second and third types of provider continuity are more difficult to access. Team continuity is difficult to determine because patients are enrolled to providers and not to teams. While we do not assess team continuity here, we note that in the absence of provider continuity, team continuity can provide similar benefits to a patient's perceptions of quality. Within the confines of the MHS, maintaining long-term provider continuity is a challenge for active duty providers and service members who frequently change stations or are on deployments. In addition, sites with training programs, such as NHC Charleston turn over a third of their enrollment every 18 months. Long-term provider continuity is also a challenge at NH Pensacola, where in each year of residency, the residents' empanelment grows to accommodate increased training requirements. As the residents progress through the residency and then graduate, enrollees may be shifted from PCM to PCM on a yearly basis.

## Access

We have made no estimates of access in this report. In our view, the best way to measure access is to assess perceptions of access through a patient survey. Such a survey was not in our tasking. CNA fielded such a survey in 2011 for the WRNMMC Medical Home and found that its enrollees perceived higher access than enrollees at a comparison clinic [3].

There are other measures of access. The one commonly used in the MHS is third-next available. We see this metric as inherently flawed and in many ways at odds with PCMH principles. It is flawed as a comparison metric across sites because it is very sensitive to the number of providers in the denominator. If one provider is added or dropped, the value changes dramatically. This regularly occurs in clinics due to events such as personnel rotations, deployments, and medical leave (such as maternity leave). The third-next available metric has an inverse relationship with the number of providers it covers—it is very small if a lot of providers are included and vice versa. If the number of providers in the metric is not the same across sites, it is a very poor comparison.

Third-next available is at odds with PCMH principles because it is implicitly provider and not patient focused. What do we mean by this? In the provider-centric model, everything focuses on the in-

office visit. Third-next available is similarly solely focused on the in-office visit. However, access in a patient-centered model is much broader. Its dimensions also include after-hours nurse lines, telephone consultations, and secure messaging such as RelayHealth. If a clinic, hospital, or health system is solely focused on one aspect of access such as third-next available, it may lead to unintended consequences. For example, clinics could improve third-next available by reducing provider and staff time devoted to telephone consultations or secure messaging and in so doing, actually decrease access even though the measure of access—third-next available—improved. There is a tradeoff and a balance that need to be struck between the various access dimensions.

This is not to say that third-next available does not have its usefulness. It appears to have value from a business manager's perspective of planning, building, and adjusting provider templates. Third-next available can, in this context, help business managers adjust the mix of appointment types to more effectively meet demand.

For these reasons, we recommend that Navy Medicine and the MHS discontinue the use of third-next available as a comparison metric, but use it simply as a tool for the business/template manager. At the same time, we recommend that Navy Medicine and the MHS include in its patient satisfaction survey questions to assess patient perceptions of access as CNA did in its patient satisfaction survey of WRNMMC Medical Home enrollees.<sup>5</sup>

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<sup>5</sup> See Appendix A of [3] for the survey instrument used by CNA, which is based on questions from the Consumer Assessment of Healthcare Plans and Services (CAHPS) survey to assess patient perceptions of access.

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# WRNMMC Medical Home follow-on analysis

This report covers the third year of CNA's analysis of PCMH implementation in Navy Medicine. The first two years focused exclusively on the WRNMMC Medical Home. The third year (this report) focused principally on MHP implementation at NH Pensacola, NH Oak Harbor, NHC Charleston, and NH Quantico. While these four sites are the primary focus in this report, we also conducted some follow-on analysis to our previous study of the WRNMMC Medical Home.

Specifically, we focused on two issues. First, while the results showed that the WRNMMC Medical Home affected utilization and cost [6] as well as patient satisfaction [3], it did not provide information about whether it was increasing adherence to clinical practice guidelines (CPGs), which we presume is positively correlated with outcomes.

Second, the year 2 cost and utilization results showed that the WRNMMC Medical Home was associated with 12.9 and 15.9 percent reductions in pharmacy and ancillary services, respectively [6]. While we noted these changes, we were not able at that time to provide more granular information on them. In the sections that follow, we provide additional information on our exploration of these issues.

## Adherence to CPGs for diabetics

Why should we look at adherence to CPGs? A review of the literature found the following:

“Evidence indicates that improved adherence to medication and lifestyle as part of self-management improves metabolic control. It therefore reduces complications, increases life expectancy and reduces morbidity in people living with diabetes. In turn, these will all reduce costs to the health-care service and hence to national economies. Therefore, any interventions which can improve adherence are highly desirable both for reducing morbidity, reducing costs and improving quality of life” [16].

To ask whether the WRNMMC Medical Home improved adherence to CPGs is overly simplistic. There are many CPGs for various diseases

and conditions, and the CPGs for a specific disease are extremely detailed. For example, the VA/DoD CPG for the *Management of Diabetes Mellitus (DM)* is 147 pages long and the summary of this guideline is 44 pages long. To presume that we could determine from the claims data whether the WRNMMC Medical Home improved adherence to this detailed guideline is not realistic. In addition, the CPG for diabetes is one of many, so we needed to simplify the issue to make it more tractable.

To do this, we limited our analysis to diabetes and on HEDIS metrics. Components of the CPG for diabetes are captured in various HEDIS metrics. The basic HEDIS metrics for diabetes generally fall into one of two groups—first, whether a test occurred, and second, if the test did occur, whether the value was in an acceptable range. Specifically, these metrics include the following:

- Metric for measurement
  - HbA1c testing
  - LDL screening
  - Nephropathy
  - Eye exam
- Metric for value
  - HbA1c < 9.0
  - LDL value
  - Blood pressure value

One can assess the metrics for whether the screening or test occurred through the M2 data, but not whether the test result was in an acceptable range. To do that, we gathered data from the Clinical Data Market (CDM). Unfortunately the completeness of the CDM data was problematic as only about four-fifths of patients in the M2 with labs had lab values in the CDM. This fraction fell to two-thirds when we limited the sample to diabetic patients. Given these data limitations, we limited our review of CPG adherence to the HEDIS metrics for whether the screen, test, or exam occurred because we could assess these using M2.



Table 31 shows the HEDIS scores for the measurement metrics for the WRNMMC Medical Home relative to the non-medical home clinic at WRNMMC and to other comparison sites. At first look, the values for HbA1c testing show substantial gains for post-implementation compared to pre-implementation (FY10 compared to FY07). However, these gains largely reflect changes in coding over the period so they are not reflective of changes in adherence due to PCMH implementation.

Table 31. Diabetes-related HEDIS metrics for the WRNMMC Medical Home

	WRNMMC Medical Home	WRNMMC non-Medical Home	Comparison sites	Medicare benchmark
HbA1c testing				
FY07	18.2%	19.9%	6.6%	76%
FY10	79.2%	76.4%	7.0%	76%
Percentage-point change	60.9%	56.5%	0.4%	NA
LDL screening				
FY07	80.1%	77.4%	13.7%	73%
FY10	81.3%	77.6%	15.1%	73%
Percentage-point change	1.2%	0.2%	1.4%	NA
Nephropathy				
FY07	84.8%	84.7%	18.1%	47%
FY10	88.3%	85.6%	20.2%	47%
Percentage-point change	3.5%	0.9%	2.1%	NA

We also observe improvements over the implementation period for LDL screening and nephropathy. These differences are statistically significant with PCMH patients being more likely to have yearly LDL screening and nephropathy than patients at control sites. Specifically, the odds ratios for LDL screening and nephropathy are 1.20 and 1.26, respectively, when we control for demographic differences and other chronic conditions. As for the eye exam metric, we have not evaluated it here because the standard for the eye exam is every 2 years, which doesn't fit well with one year of pre- and post-implementation data. Overall, the results suggest that the WRNMMC Medical Home is associated with an increase in CPG adherence for diabetic patients.

## Changes in pharmacy costs

Given the results that showed that the WRNMMC Medical Home was associated with a 12.9 percent decrease in pharmacy costs per enrol-

lee, we explored what is behind this decrease to better understand the underlying changes. Possible changes could include patients getting fewer prescriptions, getting less costly prescriptions, and using a less costly source for filling prescriptions. Accordingly, we explored changes in the average number of prescriptions per patient and changes in the use of TRICARE Mail Order Pharmacy (TMOP).

As Table 32 shows, the average number of prescriptions per enrollee decreased by 8.6 percent for WRNMMC Medical Home enrollees relevant to comparison sites when controlling for patient demographics, number of chronic conditions, and seasonality. We don't want to overemphasize this finding as it is positive from a near-term cost perspective, but these findings don't necessary inform us as to whether these changes are driven by good medical practices. One can presume that the more whole-person, patient-centered approach of the PCMH may drive a more coordinated approach to prescriptions that could result in fewer prescriptions per user, but that is just a presumption. For this reason, we provide these results as a reference only.

Table 32. Change in scripts per user per quarter for the WRNMMC Medical Home

	Statistical change <sup>a</sup>	Pre-period average	Change
All enrollees	-0.63	7.32	-8.6%
Non-Chronic	-0.33	3.93	-8.4%
Chronic	-0.74	8.70	-8.5%
Diabetics	-1.11	9.59	-11.6%

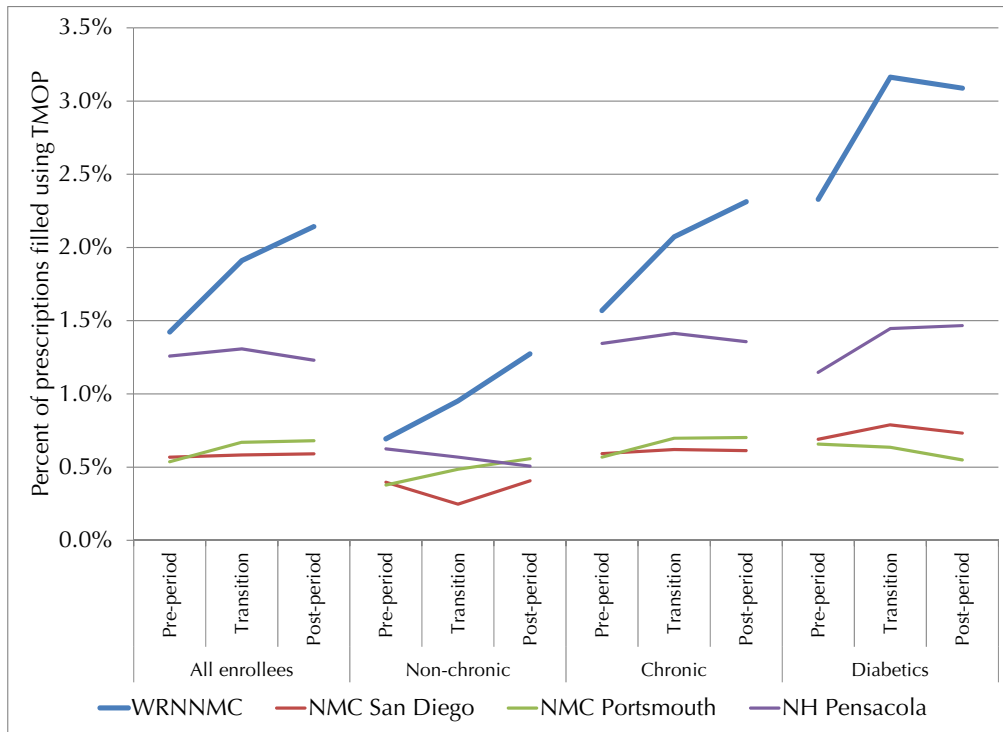
a. Statistically significant at the 0.1-percent level.

It is widely accepted that mail order pharmacies are a more cost-effective means of filling prescriptions than retail pharmacies. Hence, from a cost standpoint, filling a larger proportion of prescriptions through mail order is good as there is no difference in the medication because it is just filled in a different manner. Given this, we explored the rate of TMOP use for WRNMMC Medical Home enrollees controlling for patient demographics, number of chronic conditions, and seasonality.

When doing so, we found that WRNMMC Medical Home patients filled a higher percent of prescriptions using TMOP compared to control sites and pre-implementation levels, as Figure 6 shows. This increase occurred for enrollees both with and without chronic conditions, although the impact is more pronounced with chronic pa-

tients. We note, however, that the fraction of users using TMOP and the percentage of prescriptions filled by TMOP is still quite small; nevertheless, TMOP appears to have an increased share associated with the WRNMMC Medical Home.

Figure 6. Percent of prescriptions filled using TMOP



While there is no difference in the medication between mail order and retail pharmacies (just a difference in the filling source), there is growing evidence that mail order pharmacies have a beneficial impact on patient outcomes and quality. For example, a 2010 study found that patients with diabetes, hypertension, and hyperlipidemia were more likely to adhere to their medications than those getting medications from a local pharmacy [17]. Similarly, a 2011 study found that “[m]ail order pharmacy use was positively associated with LDL-C control in new statin users” [18]. Additionally, research shows that in highly automated pharmacies such as mail order pharmacies, the dispensing error rate is substantially lower than the rates reported by retail pharmacies [19].

## Changes in ancillary costs

As with pharmacy, we wanted to better understand the underlying changes behind the result that the WRNMMC Medical Home is associated with a 15.9 percent decrease in ancillary costs per enrollee. Accordingly, we conducted a statistical analysis, controlling for patient demographics, number of chronic conditions, and seasonality to determine whether enrollees were using more or fewer laboratory and radiology services.

We found that across all enrollees, the WRNMMC Medical Home was associated with a reduction in the amount of laboratory and radiology services used as Table 33 shows. These results, however, differ among those with and without chronic conditions. For laboratory services, the results show that medical home enrollees without chronic conditions used more of these services in contrast to the reduction for those with chronic conditions. While it is difficult to say whether these results are good from a clinical perspective, it may be that the preventative focus associated with medical homes drives more screening among healthier patients than would occur outside medical homes. If this interpretation is correct, the results are indicative of large changes in laboratory use and this use differs significantly for patients with and without chronic conditions.

Table 33. Change in the quarterly number of laboratory and radiology services for the WRNMMC Medical Home

	Laboratory coefficient <sup>a</sup>	Radiology coefficient <sup>a</sup>
All enrollees	-0.88**	-0.51**
Non-Chronic	0.60*	-0.38**
Chronic	-0.70*	-0.56**
Diabetics	NS	-0.41*

a. \* and \*\* imply statistical significance at the 5- and 0.1-percent level, respectively.

## Discussion and recommendations

In theory PCMHs should impact access, quality, and cost as we observed at the WRNMMC Medical Home. The current evaluation, however, focuses principally on cost. The reason for this is that access and quality are best measured by patient surveys (as we did with WRNMMC) in addition to various outcome measures of quality. Conducting such a survey is outside of our tasking. Further, the MHS is continuously surveying patients so we did not want to duplicate those efforts. Also, the MHS assesses outcomes based on HEDIS metrics through Population Health Portal. Given these existing metrics and our tasking, we principally focused on evaluating MHP's impact on cost.

Our approach to evaluating the impact of MHP at these sites predominately involves statistically estimating the change in utilization and cost metrics from before MHP implementation to after. These metrics include inpatient admissions, inpatient days, non-emergent ER visits or urgent care visits, specialty care encounters, primary care encounters, pharmacy costs, ancillary costs, and PMPM costs. The analysis statistically controls for demographic differences between patients to estimate expected use and costs. We supplemented this statistical analysis with site visits to each of the four sites. We interviewed the MTF leadership, MHP clinic leadership, providers, nurses, corpsmen, admin, and business managers. These interviews provided context for our statistical analysis as well as providing lessons learned and common themes about MHP implementation that may be useful to other commands.

## Findings

### Common themes/lessons learned

All sites transitioned to MHP teams, with varying approaches to clinic hours and office/team “pod” configurations, as well as expanded access through secure messaging and after-hours nurse lines. Note that from a qualitative perspective we cannot judge which of these varying

approaches is best. However, our discussions with MHP staff left us with several common themes.

First, from our perspective, the biggest change associated with MHP implementation from prior practice patterns was a focus on provider continuity. This focus was universal across sites. To facilitate provider continuity, the sites took different approaches to patient appointment scheduling practices from a central booking model with process controls to limit booking patients with providers other than their primary care manager to in-clinic or team-specific admin staff taking control of the booking of patients. While we note these different approaches, the singular focus was on facilitating provider continuity.

Second, at the time of our site visits, the MHPs were generally at the beginning stages of identifying three conditions or diseases as a focus. This identification is consistent with current NCQA standards. Further, a few MHPs had initiated proactive identification of patients requiring preventive screenings at the time the appointment was made or during the physician encounter. Any potential for MHP to impact disease prevention (early identification or avoidance) will rely on a systematic approach to ensure that the clinic identifies each panel member for testing/screening as efficiently and timely as possible. Disease registries hold much promise in this area, but acquisition of the necessary IT tools for proactive health screenings is an MHS-wide issue rather than a clinic issue.

Third, reporting all tests results—whether normal or abnormal—is consistent with NCQA standards. We observed that most MHP clinics continued the policy of contacting only patients with abnormal results as had been a common practice before MHP implementation. While notification of all results is the ideal, we do not want to understate the extra effort required of the staff to follow up on each test result. However, the advantages of patient notification for all results are equally important. Secure messaging through the vendor RelayHealth is currently available to all clinics. With the development of an automated interface between secure messaging and the electronic medical record, the staff level of effort for notification of all test results could be decreased.

Fourth, the approach to team composition varied across the MHPs from separate MHPs for family medicine, pediatrics, and internal

medicine, to combining family medicine and internal medicine when there were only one or two internal medicine providers, to integrating all three specialties into a single MHP team. There was not agreement as to which of these approaches is best; however, it appears that the close team relationship facilitated informal consultations across specialties, but that the benefits of multi-specialty teams appear to be unidirectional with the benefits flowing mainly to family medicine providers and staff.

Fifth, it was clear from our discussions with MHP staff, that a big challenge in managing patients was often a complete lack of visibility of the care enrollees receive outside of the direct care system. This was particularly a challenge for small sites that lacked capability for inpatient and specialty care. This problem was mitigated some at sites that had providers with privileges in civilian facilities thus allowing them access to those systems records. The benefits of this relationship should be explored more broadly at other MTFs.

## **Cost and utilization**

The results show that the MHP has significantly impacted the various cost and utilization metrics examined. For example, utilization of inpatient services as well as emergency room or urgent care services is significantly less after MHP implementation for nearly all clinics. Generally the change in utilization of these services was greater for chronic patients than non-chronic patients. Pharmacy costs were typically higher in the post-implementation period. This trend appears to be due to an increase in the cost per prescription rather than an increase in the number of prescriptions per enrollee.

Turning to PMPM costs, the results show that all sites had decreases in PMPM costs for both family medicine and pediatric clinics. When we looked separately at enrollees with or without chronic conditions, the results show PMPM decreases for all sites with the exception of a small increase for non-chronic enrollees at NH Oak Harbor. Further, the PMPM reductions in percentage terms are approximately the same for chronic and non-chronic enrollees. The immediate conclusion from these results is that MHP is effective at reducing costs for patients with and without chronic conditions.

However, because patients with chronic conditions have two to three times as much cost or utilization of healthcare services, the dollar re-

ductions in PMPM for chronic patients are also two to three times greater than for non-chronic patients. In other words, the four MHPs have improved control of near-term costs for patients with and without chronic conditions but substantially greater cost reductions are associated with chronic patients. These results are consistent with the results from our 2011 evaluation of the WRNMMC Medical Home.

Looking further at costs by chronic condition status, the results show that PMPM without a chronic condition is less than \$200 (using an average 50-year-old male retiree as a comparison). This figure rises substantially for patients with multiple chronic conditions (to between \$700 and \$1,400, depending on the site) for those with six or more chronic conditions. In addition, the magnitude of the dollar reductions in PMPM associated with MHP increase with the number of chronic conditions the patient has.

When we looked at specific chronic conditions rather than any chronic condition, we also observed some cost reductions, but these results vary by the specific condition and by site. Additional data would improve the power of these estimates because we are dealing with much smaller numbers when looking at particular conditions.

Further, when looking at PMPM for specific chronic conditions, we observe that PMPM variance among the sites is generally less after MHP implementation. One interpretation of this result is that the MHP model is providing more standardized care across sites, essentially reducing high-level geographic variation in care. Although this result is based on only four sites, it is nonetheless suggestive of a positive change.

## **Access and quality**

As previously noted, the primary focus of this report is on cost and utilization which drives costs. However, we have some things to report on access and quality. From a qualitative perspective, it appears that access has increased at these four sites. All now have secure messaging and provide access through after-hours nurse lines. The common access metric used across the system for access is third-next available. From our discussions with MHP staff, it appears that third-next available is a useful metric for managing and adjusting provider templates.



As we have studied third-next available, it has become apparent that as a comparison metric, third-next available is inherently flawed in that it is extremely sensitive to the number of providers it represents and it is provider-centric not patient-centric. It is focused on measuring access to an in-office visit only—which is inconsistent with MHP principles. A patient-centric metric would account for access to the MHP team through in-office visits, secure messaging, nurse lines, and telephone consultations.

As for quality, the HEDIS measures indicate high values in these metrics before and after MHP implementation. Additionally, under the assumption that quality is positively correlated with provider continuity, it appears that quality has increased by this metric as well. Hence, we conclude that MHP at these sites has increased access and quality while reducing costs.

## Recommendations

Given the results of the study, we have the following recommendations. First, as the near-term benefits for MHP are greatest for patients with chronic conditions, we recommend that BUMED make an explicit enrollment policy to target patients with chronic conditions for enrollment. Note that we are not recommending that clinics not enroll active duty or their family members. Rather, we recommend that BUMED make an explicit enrollment policy about targeted enrollment for open panel space. Each of the four sites we evaluated had room in their panels for additional patients. If the enrollment policy for new or additional patients can target those with chronic conditions, it will have a greater near-term cost impact for the enterprise than targeting patients without these conditions. Navy Medicine goals for recapture of purchased care or complexity required for graduate medical education may benefit from targeting chronic patients for enrollment.

It is not a matter of MHP not being effective for patients without chronic conditions; rather it is a matter of priorities and resources. MHP could focus on (1) those currently with chronic conditions, (2) those without chronic conditions but whose behaviors are trending them towards chronic issues, or (3) those who are otherwise healthy patients to prevent progression to chronic conditions. Our analysis focused on the near-term impacts of MHP, so the relative long-term

benefits of these approaches are not known. But given the differing near-term benefits, we recommend that BUMED make an explicit enrollment policy to drive behavior consistent with its priorities.

Second, we recommend that all MHPs increase their focus on three conditions and diseases of the clinic's choice, not just to be more in line with NCQA standards, but to focus on improving the quality of care and reducing variation in care patterns across MTFs. Appropriate IT tools, such as disease registries have the potential to provide great benefit to patients in this regard.

Third, we recommend that Navy Medicine work to develop a link between secure messaging (through RelayHealth) and the electronic medical record so that clinic staff can use secure messaging to automatically report normal test results to patients.

Fourth, we recommend that Navy Medicine work to gain greater visibility into the care provided to enrollees in the purchased care sector. Some sites have accomplished this by having MTF providers practice at least part time in civilian facilities.

Finally, while this report is primarily about utilization and cost, the impact of MHP on access is of interest. Given that access to care is broader than the provider-patient visit, we recommend that Navy Medicine discontinue use of third-next available as an access metric, because it is a poor metric for comparing across sites and it is a flawed metric relative to patient-centered principles for access. Navy Medicine should replace this metric with a composite metric that assesses patients' perceptions of all forms of access—in-office visits, telephone consultations, nurse lines, and secure messaging—through patient satisfaction surveys.

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