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MICHAEL E. PORTER
ROBERT S. KAPLAN
ALEE HERNANDEZ
MARY L. WITKOWSKI

Navy Medicine: Moving to Value-Based Care

"The nation expects us to be ready for conflict and to protect our seas in time of peace. At any given time, over 10% of our Sailors and Marines are not ready to deploy due to illness or injury. We need to provide the right care to our service members that is patient-centered and enables them to quickly return to duty and their families."

— Navy Surgeon General (SG)

The U.S. Navy, with over 700,000 naval and marine personnel and an annual budget in 2016 of $169 billion, was responsible for war readiness across the globe, ensuring the safety and security of American shipping lanes[1], and providing emergency humanitarian relief and medical aid across the world. At any one time, 40% of naval and marine personnel were at sea or forward deployed.

To support its mission, the Navy operated an in-house health care system as well as purchased care from civilian health care organizations. In 2016, there were 128 naval health care facilities at home and overseas, including 2 tertiary-care medical centers, 9 other hospitals, 7 health clinics, and over 100 branch medical/dental clinics that collectively employed over 63,000 medical personnel with an annual budget of $9.5 billion [See **Exhibit 1**]. Facing similar challenges to civilian health care organizations, Navy Medicine was experiencing rising costs, uneven quality, and long wait times.

In 2016, the Navy Surgeon General (SG), had launched a pilot program to restructure care delivery for four major medical conditions at Naval Hospital Jacksonville (NHJ). The pilot projects culminated in October 2017 and submitted their results to SG. As he reviewed the findings, SG considered what his next steps should be.

Navy Medicine

In 2016, the naval health care system, Navy Medicine, served 2.8 million individuals including active duty navy and marine corps personnel, their families, and retirees[2]. Active duty personnel included both commissioned officers and enlisted servicemembers, who together accounted for 25% of beneficiaries. Among the active duty population, 72% of enlisted sailors and 85% of enlisted marines

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were 30 years old or younger[3]. Common medical conditions in the active duty population included chronic back pain, pregnancy, mental health illnesses, and joint disorders. In times of combat, medical and trauma care was a high priority. Medical issues, such as low back pain, had a direct impact on force readiness.

The remaining 75% of naval health care beneficiaries were reserves, retirees with 20 years of naval service, and dependents. Dependents of active duty personnel were primarily located near U.S. naval bases, while the reserve and retiree populations and their dependents were spread across all 50 states and overseas. The most common conditions amongst the non-active duty were pregnancy, osteoarthritis, diabetes, hypertension and mental illness.

Historically each military service managed the delivery of health care separately from the other branches. The Navy's Bureau of Medicine and Surgery (BUMED) oversaw naval health care and was divided into three regional commands: Navy Medicine East, Navy Medicine West, and Navy Medicine Education, Training and Logistics Command. The Defense Health Agency (DHA) was established in 2013 to address rising costs, centralizing outside contracting of care, integrating IT systems and realizing efficiencies across the Navy, Army, and Air Force systems. The DHA also oversaw TRICARE, the arm of the Military Health System (MHS) responsible for the delivery of health plans for all active duty and reserve service members, retirees and dependents. TRICARE managed contracts with large health insurers such as Humana and Health Net.

Military health spending had been increasing for decades, growing on average by over 5.4% annually since 2000[4,5]. In 2015, the aggregate military health care spending had reached $52B per year, representing 11% of the total Department of Defense (DoD) budget and representing over 1% of U.S. health care spending. Military medicine delivered approximately one-third of care via in-house provider systems with the remaining two-thirds of the care purchased from civilian systems. SG observed, "An average aircraft carrier costs $17 billion; DoD spends the equivalent of three aircraft carriers a year on health care for its personnel, dependents and retirees."

Beyond rising costs, military leaders and Congress had concerns about the accessibility, transparency, and variability in the quality of care because of its high impact on recruiting, retaining, and readiness for deployment of military personnel. SG stated:

> Variability in care leads to variability in outcomes, which leads to variability in sailors being able to do their job.The DoD spends much more per covered life annually than virtually any other health plan in the U.S. Despite this, at any given time we have 10,000 people who are injured or otherwise not available for duty.

In 2014, the Secretary of Defense had ordered a detailed review of the timeliness, quality and cost effectiveness of its health care systems. Average performance of the MHS was on par with civilian health care, but with high variability across facilities. In 2016, as part of the annual review and appropriation process required by the National Defense Authorization Act, Congress mandated a sweeping reorganization of the Navy, Army, and Air Force health services under the command of the Director of the Defense Health Agency. The act directed military medicine to control costs, enhance care, and improve health outcomes, and mandated health care improvement pilots to be initiated with progress reported to Congress no later than March 15, 2019.

A Pilot Takes Shape

Surgeon General (SG), a pediatrician, was former commander of Navy Medicine West and the Naval Medical Center San Diego. Newly appointed as the Navy Surgeon General in December 2015, SG attended the 3-day Health Care Strategy Course at Harvard Business School in January 2016, where he learned that new Value-Based Health Care (VBHC) concepts were being implemented in a growing number of health care organizations.[6] SG decided to test whether VBHC principles could be implemented in the Navy system

After considering several sites for the pilot, SG selected Naval Hospital Jacksonville (NHJ) in Jacksonville, Florida. With 256 beds, NHJ was the Navy's third largest hospital serving over 300,000 active duty, reserve and retired Navy servicemembers and dependents. It was located near civilian hospitals including Mayo Clinic Jacksonville, Nemours Children's Hospital, Saint Vincent's HealthCare, and University of Florida Health Jacksonville, all of which provided contracted care to the Navy for particular service lines. NHJ had a special focus on education and research given these nearby institutions, and had been the site of multiple previous successful innovation pilots that were later were implemented throughout the Navy system.

NHJ was going through a change in command. Its current commanding officer would soon step down after a standard two-year tenure, to be replaced in May 2016 by a new commander . CO, the newly-designated commanding offier, had been the executive officer of Naval Hospital Bremerton (in Bremerton, Washington) where he had led its reorganization. SG met with CO at the Defense Health Headquarters in Washington to describe his vision for the pilot. "We need to test new ways to provide better care for our sailors and their families, to measure the health outcomes we produce, and to know how much it costs us." Before taking formal command, CO began planning the efforts in February 2016.

CO enlisted two full-time project managers in March 2016: a senior health systems engineer and government project manager in the Performance Improvement Office of the BUMED headquarters; and a senior health systems engineer and project manager at the Applied Physics Laboratory at Johns Hopkins University (APL)[a]. CO and the two senior project managers reviewed the literature on value-based health care, especially on Integrated Practice Units (IPUs). They conducted site visits and interviews with health care organizations implementing IPUs, including the Cleveland Clinic and MD Anderson Cancer Center. The team also spent time learning about other value initiatives that had been established in Navy Medicine, such as the Spine Integrated Practice Unit Program at Naval Medical Center in San Diego, California that was modeled after Virginia Mason's integrated multidisciplinary care model for back pain. CO began to meet directly with clinical teams at Naval Hospital Jacksonville to observe current practices.

SG established a Central Working Group (CWG) to support the work of CO and the two senior project managers. The CWG was led by the BUMED deputy chief of Readiness & Health and the BUMED deputy chief of business operations [see **Exhibit 2**]. Its members included the BUMED chief innovation and integration officer, subject matter experts from BUMED functional departments, including facilities, health care operations, manpower and personnel, information management, financial management, and data analytics, and representatives from Navy Medicine East and Navy

[a] Johns Hopkins Applied Physics Laboratory (APL) was a university affiliated research center (UARC) with health systems engineering and project management expertise, experience in the implementation of government pilots, and resources for analytical support.

Medicine West and Navy-wide clinical experts from ten different medical specialties. The CWG met weekly to prepare for the upcoming pilot.

The Central Working Group first selected the medical conditions that would be the focus for the pilots. They studied condition volume data (ICD 10) to identify highly prevalent conditions in Jacksonville [see **Exhibit 3**]. The group calculated how much was spent, both in-house and in contracted care, on each condition and its impact on the readiness of active duty personnel, including days lost for deployment.

Initially intending to pursue two conditions, the CWG eventually selected four conditions for the pilot: low back pain, hip and knee pain, diabetes, and high-risk pregnancy. In 2016, the NHJ: $11.7 million on osteoarthritis, $6.4 million on low back pain, $5.1 million on diabetes and $3.3 million on pregnancy[b]. SG commented:

> "Low back pain is one of the main medical reasons why our sailors are unable to deploy, so low back pain was a no brainer. Our active sailors are young adults and so we take care of a lot of babies; two to three percent of those babies will require neonatal intensive care. When your baby is in the ICU on the other side of the world, it's hard to concentrate on your job, so we are focused on improving the care in this condition. Diabetes and osteoarthritis are targets of opportunity in Jacksonville – we have a large population of folks with these conditions there."

The CWG also sought to address illness related to mental health, such as anxiety and depression. These were among the top ten most prevalent medical conditions in the young active duty population who spent significant time working in stressful training and combat environments. The group discovered that the diagnosis codes for many of these conditions were unreliable. For example, the code for "non-dependent use of drugs" captured patients with severe substance use disorders as well as patients who failed a screening test after an isolated night of drinking. The Navy aleady had a well-established substance abuse program, the Navy Alcohol Drug Abuse and Prevention Program (NADAP), whose only focus was to support fleet readiness by fighting substance use disorders. Given the impact of mental health on physical health conditions, the CWG decided to incorporate mental health care treatment within each of the four selected IPUs. SG hoped that embedding mental health care in the IPUs would combat the current stigma around seeing mental health providers and increase utilization.

Developing the Integrated Practice Units

Upon taking command of Naval Hospital Jacksonville in May 2016, CO established IPU working groups for each of the four conditions. Each group was led by two providers, typically a physician and a nurse, referred to as clinical champions. Other members of the working groups included specialists from disciplines related to the conditions such as nutritionists and clinical pharmacists for diabetes, and neurologists and pain management physicians for low back pain [See **Exhibit 4**]. The physician leader for the diabetes IPU, commented, "The first thing we realized when we started this was to pick good people. As we were permitted leeway to select our teams, we picked people who were energetic, engaged and believed in the vision." A full-time health systems engineer was assigned to each IPU working group to develop meeting agendas, manage scheduling, lead research tasks, prepare summaries, follow up on outstanding issues, and coordinate the flow of information among working group members.

[b] Data reflects in-house care.

The diabetes physician leader stated, "As we began to look at our care pathways, we wondered what a patient would think? And one of our nurses questioned, 'Why don't we ask them?' We asked a patient who was very enthusiastic about her diabetic care to join, and she became one of the founding members of the group and participated in every meeting."

The four IPU working groups began by holding meetings to share ideas about value-based care and integrated practice units. An early decision was to more precisely define the specific condition the IPU would focus on, and establish patient selection criteria. Working groups met weekly over the course of the project to establish a care pathway for the IPU, select process, clinical and validated patient reported outcome measures (PROMs), and create an execution plan including the location of the IPU, the personnel required and the IPU clinical schedule. Working group members shared literature reviews on clinical questions prior to each meeting. The IPU physician and nurse clinical champions gathered input from colleagues within the hospital while the project managers consulted with Navy-wide specialty leaders, DoD staff, and evidence-based recommendations from civilian specialty organizations such as the American College of Surgeons. The working groups held multiple meetings to build consensus. One group, the pregnancy IPU, chose to vote on decisions.

The IPU clinical champions met weekly with CO and the CWG. Clinical champions presented directly to SG and other Navy executive members on the progress of the pilot and the need for additional resource requirements. Monthly updates were also provided to the executive leadership within Naval Hospital Jacksonville. In July 2016, an outside consultant taught a 1.5-day seminar on the key concepts on value-based health care for all members of the NHJ hospital leadership who were not part of the working groups.

CO sought broad input from clinicians ranging from clinical department heads to Navy corpsmen[c], about the pilot. He had frequent informal conversations with IPU leads about the pilots in hallways and cafeteria. SG visited Jacksonville twice to meet personally with the members of the IPU working groups. Several primary care physicians (PCP) expressed concerns that the IPUs would disrupt existing clinical processes and redirect resources and care away from their practices. CO reassured them that IPUs would be used only for certain complex patient issues, and that patients would be referred back to their PCP for routine care. Some clinicians worried about meeting personal workload goals while managing the pilots. CO eliminated those goals for providers in each IPU, and eliminated the reporting within NHJ of relative value unit (RVU) productivity as a key performance metric.

Process Mapping

Diabetes The diabetes IPU decided to focus on patients with uncontrolled diabetes, targeting patients with an HbA1c greater than 9%. The diabetes clinical IPU team included a PCP, pharmacist, behavioral health specialist, nutritionist, and patient representative [see **Exhibit 4**]. A care navigator was responsible for enrolling new patients in the IPU, scheduling appointments, greeting and assisting patients during visits, and collecting patient reported outcomes. CO worked with the facilities department to secure shared space for the diabetes IPU within the family medicine clinic at the hospital, including a check-in desk, two provider offices, and four exam rooms. The IPU would hold four half-day appointment sessions per week.

Existing care pathways were mapped out for diabetic patients, and the team discovered that there were 45 variations such as differential approaches of pharmacy, nutrition, testing procedures and

[c] A Navy corpsman is an enlisted medical specialist of the U.S. Navy, trained to provide medical care in varying sites, from hospital bases to the frontline of war.

patient education. Using evidence-based guidelines, the group reached a consensus on a single care pathway. CO reflected on the process to achieve consensus:

> "Getting 28 different physicians to agree on a single care pathway can be challenging. It was important to repeatedly emphasize the data on the benefits of integrated care and the evidence supporting standardization. This was a clear priority coming from the top of the organization."

The new pathway began with an initial two-hour new patient visit, involving a series of 20-minute individual appointments with each member of the core clinical team. Provider schedules were aligned so that patients could meet with any needed members of the care team during a single visit. Each patient received a progress report at the initial visit that included clinical metrics and the follow up instructions received from each provider. At the end of the initial visit, the patient met with the diabetes IPU care navigator to review the progress report and schedule next steps.

The IPU held a bi-weekly clinical and administrative meeting to discuss new patients as well as existing patients who were non-adherent to their care plan, who were not progressing clinically based on HbA1c and quality of life score, or who any IPU team member had concerns about. Finally, the working group defined a success criterion, HbA1c level < 7% in two consecutive readings, for patients to graduate from the IPU and resume with their PCP for ongoing care.

Low Back Pain Low back pain focused on active duty service members presenting to their PCP or the emergency department with new-onset low back pain of less than 28 days. The IPU introduced a patient reported screening tool (the STarT Back Survey) to evaluate the patients' risk of developing chronic pain, which would put them at risk for readiness for duty. Patients with comorbidities such as bladder dysfunction, trauma, and IV drug use, were excluded. Reflecting on the selection of the condition, the low back pain physician champion commented:

> "If you look at our patient population, they are generally young, healthy people with physically demanding jobs. The number one reason people come to military treatment facilities is because of musculoskeletal care. In our current model, the volume is overwhelming. We'd like patients to be seen in under a week, but it is challenging to do this. We wanted to use this value-based care pilot to get people seen more quickly, since we know that earlier initial visits reduce the number of physical therapy appointments, the cost of care, imaging and referral to surgery."

A physical therapist and a nurse led the care team, which also included a family medicine physician and a behavioral medicine specialist. The low back pain IPU was located within the Family Medicine Health Clinic, about a mile from the main NHJ facility, and included an exam room and a provider's office. The team held four half-day clinic sessions per week.

Patients met for an initial visit with a physical therapist within 48 hours of referral to the IPU, and had a second follow up appointment within a week. At each visit, patients were evaluated using the Oswestry Disability Index (ODI), a PROM which measured pain and performance of activities of daily living. This was used to determine how soon the patient should be seen again, and whether there might be benefit from sessions with behavioral medicine. During patient visits, physical therapists who had questions for the patient's primary care provider were able to walk next door to the Family Medicine clinic. The core care team met with specialty services, such as orthopedics and pain management in monthly treatment board meetings, to discuss additional treatment options in complex cases, and for patients who were not progressing.

The working group determined early on the need for additional physical therapy staff, including five physical therapists and five physical therapy assistants. CO was able to modify the hospital budget to hire two new physical therapists and three physical therapy assistants. Graduation from the IPU was tied to improvement in the Oswestry Disability Index together with physician judgement.

Osteoarthritis The osteoarthritis IPU focused on medically complex patients with hip and knee pain who had osteoarthritis confirmed with x-ray and were not currently candidates for joint replacement surgery. To identify patients, the osteoarthritis IPU physician leader reviewed existing sports medicine and orthopedic patients to determine which patients might benefit the most by addressing their pain and/or preparing them for potential surgery. The majority of the patients were retirees. The team worried that some active duty patients might be hesitant to enroll in the IPU since osteoarthritis was a life-long diagnosis with potential limitations on future deployment.

The IPU was located on the Mayport Branch Health Clinic campus, 35 miles from the main hospital. Facilities included five exam rooms and one larger room set up specifically for physical therapy instruction containing dedicated equipment sourced from another NHJ facility. IPU appointments were scheduled during two half-day clinic sessions per month.

The care cycle began with a 1½ hour visit consisting of a series of 20-minute appointments covering physical therapy, pain management, nutrition, wellness, and behavioral health. The osteoarthritis IPU champion noted, "We had a patient who didn't really see the need for a psychologist. Over the course of time, we were able to discuss with him that living with chronic pain can affect your mental health significantly. He ended up going to see the psychologist over multiple sessions and found it very beneficial."

After each half-day clinic session, the IPU clinical team met to discuss new patients and those not progressing. For those not progressing, the osteoarthritis working group could consult with other experts in the condition that were connected to the IPU, including a pain management physician who could provide injections and other pain procedures, and an orthopedic surgeon regarding the need for surgery. Graduation criteria was based on the patients' and the IPU team's assessment about whether patients had met the activity-level goals they had set for themselves.

Pregnancy The pregnancy IPU decided to focus on medically complicated obstetric patients, who were at higher risk of needing sub-specialty obstetric care from costly nearby civilian tertiary care facilities. Patients were selected to participate in the IPU if they had a qualifying pregnancy risk factor: pre-eclampsia, gestational diabetes, obesity (BMI ≥ 40) and a history of pre-term delivery. The IPU goal was to have all patient care, including delivery, at NHJ or at least to delay the need to transfer to tertiary care later in pregnancy.

The Department of Obstetrics and Gynecology at NHJ had recently established a care pathway for low-risk pregnancies, which was well-accepted by providers. While the department was hesitant to create another pathway, the working group selected an approach similar to the diabetes IPU. The patient had an initial two-hour visit composed of a series of individual appointments with an obstetrician, nurse-midwife, behavioral health specialist, wellness nurse, nutritionist and two corpsmen. The corpsmen checked patients in, guided patients throughout their appointment to different providers and arranged appropriate follow up appointments.

Located within the general obstetrics clinic, the high-risk pregnancy IPU saw patients during two biweekly half-day clinics per month. Following each IPU clinic, the IPU clinical team met to discuss all patients seen that week. Patient follow up appointments varied in frequency based on the patient and diagnosis. The management of pre-eclampsia required periodic monitoring of vitals and symptoms, whereas gestational diabetes required lifestyle modification with a focus on nutrition and exercise and

drug therapy. Patients graduated from the IPU upon delivery of the baby or if their obstetrics care was transferred out of the military health system to a civilian hospital for tertiary care.

Measuring Outcomes

Each IPU agreed on a set of patient-reported outcome measures (PROMs), clinical outcomes, and selected process metrics [see **Exhibit 5**] in consultation with the International Consortium for Health Outcomes Measurement (ICHOM), the Bree Collaborative, and medical specialty societies. PROMs included both condition-specific and general health-validated questionnaires. In the low back pain and osteoarthritis IPUs, clinical teams had previously used PROMs. However, family medicine practitioners in the diabetes IPU raised questions about whether individual clinicians would use the measures in real time to inform the care they were delivering, or if the data would be used primarily for research and performance review. Some clinicians asked to include additional patient outcome measures to gain feedback in additional areas. Traditional quality metrics, such as Healthcare Effectiveness Data and Information Set (HEDIS) measures, continued to be collected and were integrated into the IPU measure sets.

Because the Navy's legacy electronic health record platform did not have the capability to record outcome metrics, PROMs were collected on paper forms. The pilot teams decided not to invest in an interim PROM application, since the military health IT system was about to start a multi-year transition to MHS Genesis, a new Cerner-based EHR system. IPU care navigators administered, collected and manually entered results from the paper surveys into a newly created outcomes database, which was accessible at each IPU site. To utilize the patient's survey results to inform patient care during the actual appointment, clinicians had to manually calculate and interpret the patient's PROMs during the visit. Working groups had selected PROM measures for the IPU in part based on the ease of scoring manually.

Costing

A dedicated costing team was established to implement Time-Driven Activity-Based Costing (TDABC) for all four IPUs[7]. An APL subcontractor with previous TDABC experience led the costing team, which included members from each IPU working group.

After providing an overview of the methodology to the IPU clinical champions, detailed process maps were constructed based on the care pathways developed by each IPU team. [See **Exhibit 6**]. Time estimates were derived primarily from interviews with clinicians, though in some cases paper forms that traveled with the patients were used to record time stamps. The Naval Hospital Jacksonville Data Quality Group provided employee work hours. The TDABC team also created high-level activity maps for work done in the radiology, laboratory and pharmacy departments for the four clinical conditions to make costing more complete.

The costing team leader worked with the accounting, budgeting, payroll, and quality departments at both the hospital and Navy region level to obtain the information needed to calculate the capacity cost rates for all the personnel, space, and equipment used in the IPUs. Compensation differed for military, civilian and contracted personnel, and data was extracted from different data systems[8]. The costing team also accessed pre-existing cost data from the existing accounting system for medications, labs and imaging tests involved in care.

To determine equipment cost, the costing team took pictures of the relevant spaces, catalogued the equipment used at each step, and collected financial data for each equipment type. Working with the facilities and maintenance departments, the costing team also sought to estimate the cost per square

foot for each type of space in the hospital (e.g., clinic space versus operating room space). Due to data limitations, the team ultimately decided to use average cost per square foot for the building as a whole. Overall, the TDABC analysis for all four IPUs took about eight months to complete.

Launching the IPUs

After seven months of planning, the IPU pilots went live in Fall 2016. All hospital staff participated in a half-day training session on value-based care. Though clinicians generally agreed with the concept and goals of VBC, many providers raised concerns about the impact of IPUs on their practice, such as how the IPU would impact the volume and breadth of conditions of patients seen in their practices and how the IPUs would be evaluated.

Each IPU team sought to build patient enrollment quickly [see **Exhibit 7**]. Providers in the low back pain IPU worked closely with the primary care physicians located in neighboring clinic space to appropriately identify patients with low back pain and quickly enroll them in the IPU. The diabetes IPU used patient health information from the Military Health System platform, CarePoint, to identify potential enrollees. The care navigator called patients to educate them about the diabetes IPU and recruit them into the program. Diabetes IPU providers also spoke directly to family medicine practitioners to seek patient referrals. The IPU physician champion discussed the diabetes IPU during Family Medicine department meetings to encourage the clinicians to enroll their patients. A few weeks into the rollout, the diabetes IPU team noted initial slow enrollment numbers and relaxed the HbA1c criterion to allow more patients to join.

For the first six months of the pilot, the Central Working Group and the IPU working groups (including the project managers) met weekly to address issues and share lessons learned. Clinical champions met to discuss adjustments to care pathways and other clinical innovations across the different medical conditions. A newsletter, called the "Value Based Care Clinical Champion Sync," was created to share ideas among the four IPU teams [see **Exhibit 8**]. IPU champions published their results in peer-reviewed journals and presented findings at academic conferences.

Several IPUs changed care pathways based on experience. The osteoarthritis team changed the structure of the initial IPU visit. Rather than seeing each provider sequentially for 20 minutes each, the patient would meet with providers together. During the unified visit, patients introduced themselves to the full team, then the sports medicine physician and the physical therapist performed the physical exam, followed by specific clinical questions from each care provider. Initially concerned that the patients would feel overwhelmed, the team found that patients appreciated the integrated visit and the providers found it valuable to hear the questions raised by other clinicians.

The osteoarthritis IPU also changed the format of the subsequent visits. Initially patients saw all providers on subsequent visits, but this was changed to scheduling follow up appointments only with certain providers based on the patient feedback and the major concerns identified in the PROMs. IPU team members were able to spend more time talking with their patients about their lives and were better able to assess their nutrition education needs. The working group was able to change the care pathway so that patients met either by a dietician or a wellness specialist in subsequent visits instead of always seeing both.

The diabetes IPU partnered with ophthalmology to offer annual eye exams. Itsphysician leader explained:

> "Our beneficiary population is largely not eligible for care in some of our specialty clinics, and care is usually deferred because the civilian networks requires patient co-pays. I walked over to ophthalmology and asked, would you mind helping out with this specific group? They were happy to help so we now have nearly 100% on our eye screenings for our patients."

Recognizing that some diabetic patients could benefit from bariatric surgery, the diabetes IPU worked with the weight loss clinic and bariatric surgery team to identify appropriate patients. These patients were able to be evaluated and treated much more quickly than a typical bariatric surgery candidate, as much of the patients' preoperative work such as the nutritional counseling and lifestyle modifications were already happening within the diabetes IPU.

Patients in the pregnancy IPU, often had young children and no access to childcare. The extended duration of the IPU appointments made visits difficult. The working group looked into partnering with a childcare center across the street or having a staff member oversee the children, but the volume of patients in the pilot meant that there wasn't enough demand. The pregnancy IPU changed the timing of the initial visit from the first to second trimester but otherwise did not modify the care pathway of the IPU. The pregnancy IPU nurse champion stated:

> "We didn't have meetings where the providers all came together to discuss what was and was not working in the IPU, or what we wanted to tweak. We thought, "We are going to hold our course and see if this is working or not. And we will be able to see the pros and cons when we get to the end."

Some of the IPUs modified performance metrics. The low back pain IPU started to track imaging rates and opioid use for all their patients. The diabetes IPU team stopped measuring inpatient admissions because the incidence was so low that a single admission would dramatically change the metric. Many of the pregnancy outcome measures were determined only at the time of the delivery of the newborn, leading to limited availability of data and feedback early in the pilot.

Staffing constraints had been a key concern because providers within the IPU had to maintain their previous clinical appointments during the pilot. The diabetes IPU working group members often met during lunch breaks. The pregnancy IPU working group struggled to find time to meet, citing scheduling conflicts. Staffing was also affected as hiring had been slow for some key clinical resources, such as nurse care navigators and physical therapists. Additionally, many IPU clinical team members were service members on active or reserve duty, and routinely had to attend military training outside of the hospital. In the midst of the pilot, the physician clinical champion of the pregnancy IPU was assigned to a different hospital as part of the Navy's standard rotation policy. A hospital corpsman was added in this case to help with coordination and communication.

IT infrastructure had also been a challenge. The Navy had a homegrown electronic medical record that did not communicate with other systems. Many of the patients were millennials, who communicated via modern technology. SG commented,

> "The millennial generation is fundamentally changing healthcare delivery. They want convenience, experience and technology. The vast majority own a smartphone, and their smartphone is their desired source of information. And we are interested in helping fulfill that interest, with virtual visits and communications. Our goal is a partnership of using virtual technologies to not intrude on people's lives but integrate care for chronic disease into their lives and design care plans around what the patient wants."

The lack of internet service on the base meant that PROMs had to be collected by paper. The diabetes IPU's attempt to implement virtual visits was not feasible.

Results and Future Plans

Results from the IPU became available in September 2017. Patient feedback was overwhelmingly positive, with satisfaction scores exceeding 90%. IPU clinical champions and team members were receiving emails from patients expressing appreciation for the time care navigators and the multidisciplinary team members spent with them. One patient wrote "I like that I get to talk about diet, exercises, and my knee pain with all my doctors at a single meeting. I never leave wondering how I am supposed to put it all together." Unenrolled patients were making inquiries about how to access the IPUs, as news spread within the NHJ community. The diabetes IPU, which had initially relaxed HbA1c criteria to increase its patient population, had to reinstate the 9% eligibility restrictions to limit backlog of follow-up appointments.

The clinical results and patient reported outcomes for the pilots are shown in **Exhibit 9**. Of 201 patients enrolled in low back pain, 68 graduated from the program and felt their symptoms had been resolved. Prior to the study two percent of low back pain patients were taking opioid medications and since the implementation of the IPU the opioid use was reduced to zero. Similarly, time in physical therapy for osteoarthritis patients was cut in half from an average of 90 days and 10 appointments to 42 days and 2.3 appointments with improvement in patient outcomes and a reduction in the time away from work. The osteoarthritis IPU physician champion noted:

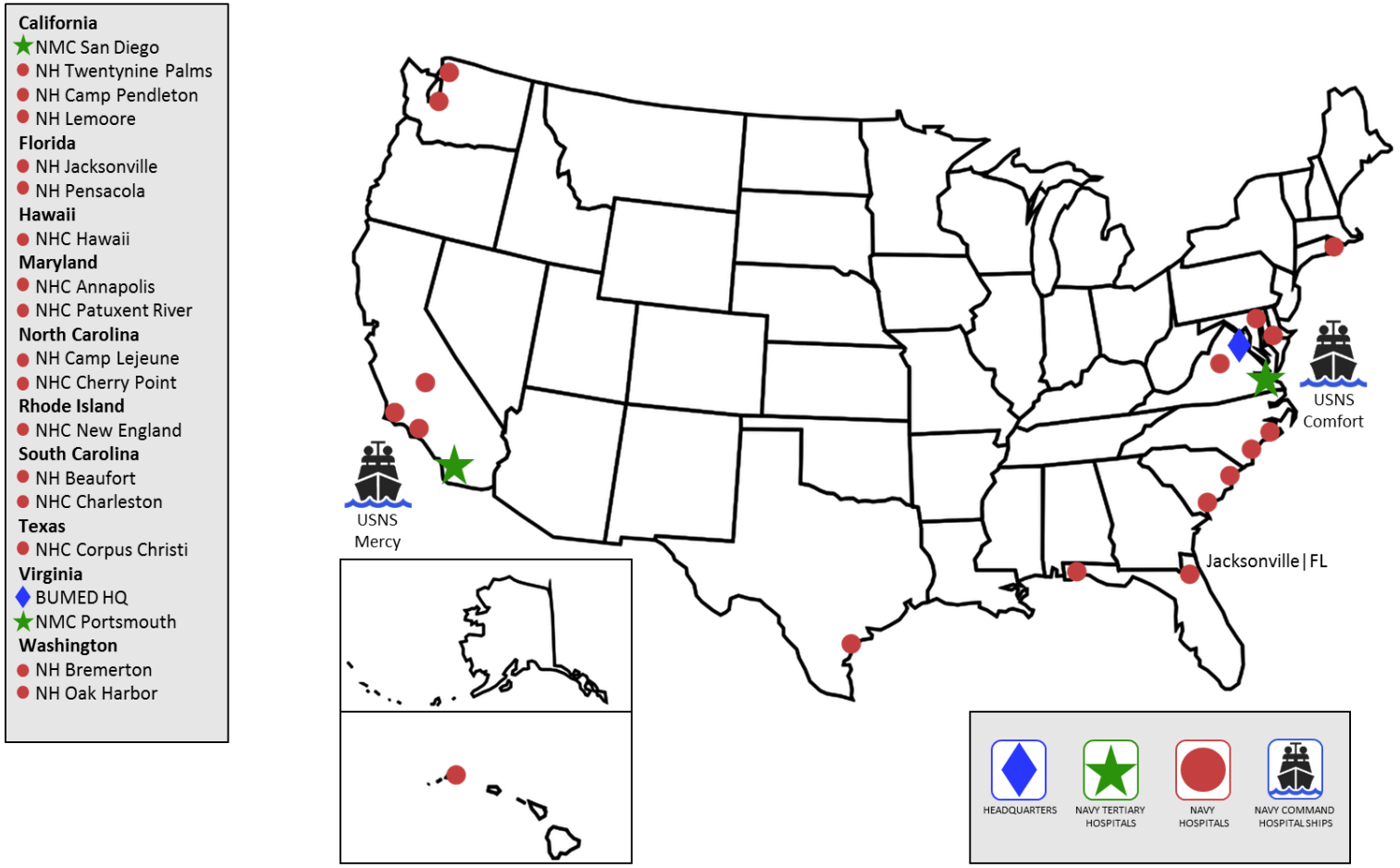
> "Collecting outcomes really helped. We had patients fill out the PROM at every visit. I sat down with them and showed their scores on a graph. It was great for me to see patients getting better and better or if one was suddenly falling back, I could ask what's going on? Why have we gone down here? The outcomes helped us have that conversation quickly."

Cost analysis comparing the average cost of the existing care model to the TDABC costs of the IPU care model for each condition is shown in **Exhibit 10**. The diabetes IPU physician leader commented on the costing analysis, "We had diabetic patients that improved remarkably with impressive reductions in HbA1c. You just have to know in the long run, that's going to save you money because those diabetics are not going to have foot amputations, and they're not going to go blind, and they're not going to have all of the other complications from diabetes since you improved their diabetes at age 35 years instead of 55. Unfortunately, we didn't have the volume of patients or the longer-term cost data to show that." The diabetes working group concluded that the dedicated staffing for the IPU delivered truly valuable care but the short-term economics requried twice as many patients in the program.

The pregnancy IPU nurse champion said, "In retrospect, we took on too many diagnoses: diabetes, pre-term birth, history of hypertension in pregnancy, and obesity. Honestly, I would have picked just one, like diabetes or pre-term birth. We tried to cover too broad an area ." The decision was made to not continue the pregnancy IPU in its current form.

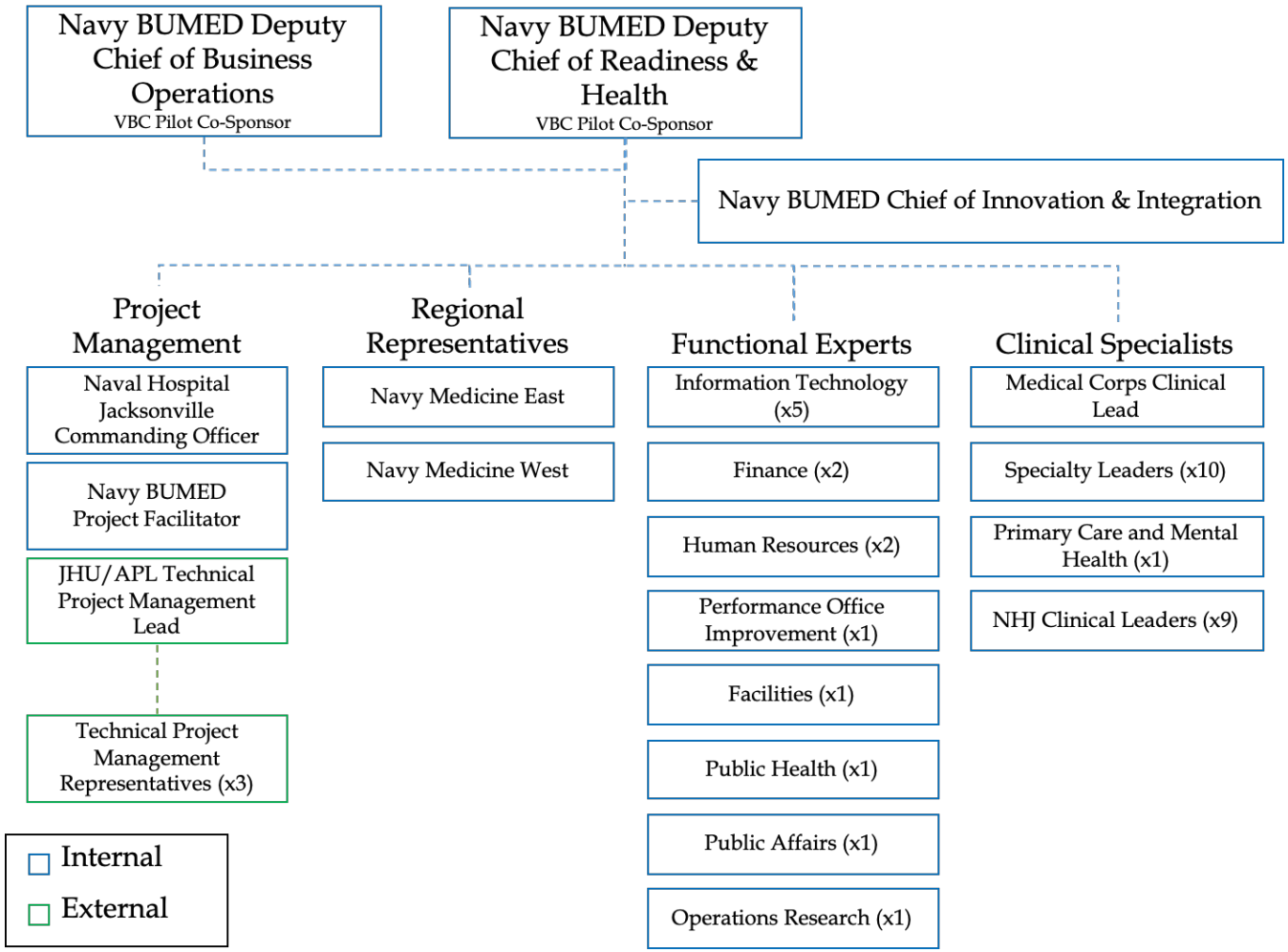
SG reflected on the experiences of IPU pilots, "This has been a great benefit to our patients. We now need to figure out how to export this to other facilities, at home and overseas, to make value-based care more sustainable. We should be ambitious and not just help people who happen to be wearing a uniform; like our Wounded Warriors program, what we learn within the military should inform civilian care as well."

Exhibit 1 Map of Naval Medical Facilities in the U.S. in 2016



Source: Casewriter based on company documents.

Exhibit 2 Value-Based Care Pilot Team Structure – Central Working Group



Source: Casewriter based on company documents.

Exhibit 3 Top Medical Conditions at Naval Hospital Jacksonville by DRG from January 2015 to April 2016

	Active Duty	
	Condition (DRG)	**Number of Patients**
1	Chronic Back Pain	4,152
2	Nondependent abuse of drugs	2,268
3	Hyperlipidemia	1,889
4	Cold/Cough/URI/UTI	1,716
5	Adjustment reaction	1,493
6	Hypertension	1,435
7	Anxiety	929
8	Episodic mood disorders	759
9	Pregnancy	614
10	Depressive disorder, not elsewhere clasified	473
11	Anemia	417
12	Substance Abuse	414
13	Sexual deviations and disorders	289
14	Chronic Obstructive Pulmonary Disease (COPD)	239
15	Neurotic disorders	239
16	Kidney Disease	228
17	Hypothyroid	216
18	Diabetes	196
19	Osteoarthritis	187
20	Sleep Disorder	173

	Non Active Duty	
	Condition (DRG)	**Number of Patients**
1	Hypertension	11,551
2	Cold/Cough/URI/UTI	10,384
3	Hyperlipidemia	9,301
4	Chronic Back Pain	8,524
5	Diabetes	4,755
6	Anxiety	3,305
7	Nondependent abuse of drugs	3,221
8	Pregnancy	2,303
9	Osteoarthritis	2,146
10	Hypothyroid	2,725
11	Anemia	2,489
12	Adjustment reaction	2,160
13	Depressive disorder, not elsewhere clasified	1,773
14	Episodic mood disorders	1,725
15	Chronic Obstructive Pulmonary Disease (COPD)	1,624
16	Kidney Disease	1,485
17	Attention Deficit Hyperactivity Disorder (ADHD)	1,466
18	Asthma	1,271
19	Hyperkinetic syndrome of childhood	1,219

Source: Casewriter based on company documents.

Exhibit 4 Value-Based Health Care Pilot Team Structure – IPU Working Group and Clinical Team

IPU Working Groups

Diabetes	Low Back Pain	Osteoarthritis	Pregnancy
IPU Clinical Champions • Primary care physician (MD) • Nurse (RN) **IPU Working Group** • Behavioral health specialist • Care navigator • Nutritionist • Laboratory specialist • Wellness nurse (RN) • Clinical pharmacist • Diabetes educator (RN) • HEDIS champion • Patient	**IPU Clinical Champions** • Doctor of physical therapy (DPT) • Nurse (RN) **IPU Working Group** • Behavioral health specialist • Care navigator • Laboratory specialist • Wellness nurse (RN) • Clinical pharmacist • Pain management physician (MD) • Orthopedic surgeon (MD) • Radiologist (MD) • Neurologist (MD)	**IPU Clinical Champions** • Sports medicine physician (MD) • Nurse (RN) **IPU Working Group** • Behavioral health specialist • Care navigator • Physical therapist • Nutritionist • Wellness nurse (RN) • Clinical pharmacist • Pain management physician (MD) • Orthopedic surgeon (MD) • Radiologist (MD)	**IPU Clinical Champions** • Obstetrician (MD) • Midwife (RN) **IPU Working Group** • Wellness nurse (RN) • Behavioral health specialist • Care navigator • Nutritionist

IPU Clinical Teams

Diabetes	Low Back Pain	Osteoarthritis	Pregnancy
Core Team • Primary care (MD) • Nurse (RN) • Behavioral health specialist • Care navigator • Corpsman **Ancillary Team** • Nutritionist • Laboratory specialist • Wellness nurse (RN) • Clinical pharmacist • Diabetes educator (RN) • Psychiatrist (MD) • Optometrist/ Ophthalmologist (DO/MD)	**Core Team** • Doctor of physical therapy (DPT) • Nurse (RN) • Behavioral health specialist • Care navigator • Physical therapist • Corpsman **Ancillary Team** • Wellness nurse (RN) • Psychiatrist (MD) • Nutritionist • Clinical pharmacist • Pain management physician (MD) • Orthopedic surgeon (MD) • Radiologist (MD) • Neurologist (MD) • Neurosurgery (MD)	**Core Team** • Sports medicine physician (MD) • Nurse (RN) • Behavioral health specialist • Care navigator • Physical therapist • Corpsman **Ancillary Team** • Wellness nurse (RN) • Nutritionist • Psychiatrist • Clinical pharmacist • Pain management physician (MD) • Orthopedic surgeon (MD) • Radiologist (MD) • Psychiatrist (MD)	**Core Team** • Obstetrician (MD) • Midwife (RN) • Wellness nurse (RN) • Behavioral health specialist • Care navigator • Corpsman **Ancillary Team** • Nutritionist • Psychiatrist (MD)

Source: Casewriter based on company documents.

Exhibit 5 IPU Performance Measures

Overall Quality of Life Patient Reported Outcome Metrics
- SF-36 (every visit)
- CollaboRATE (every visit)

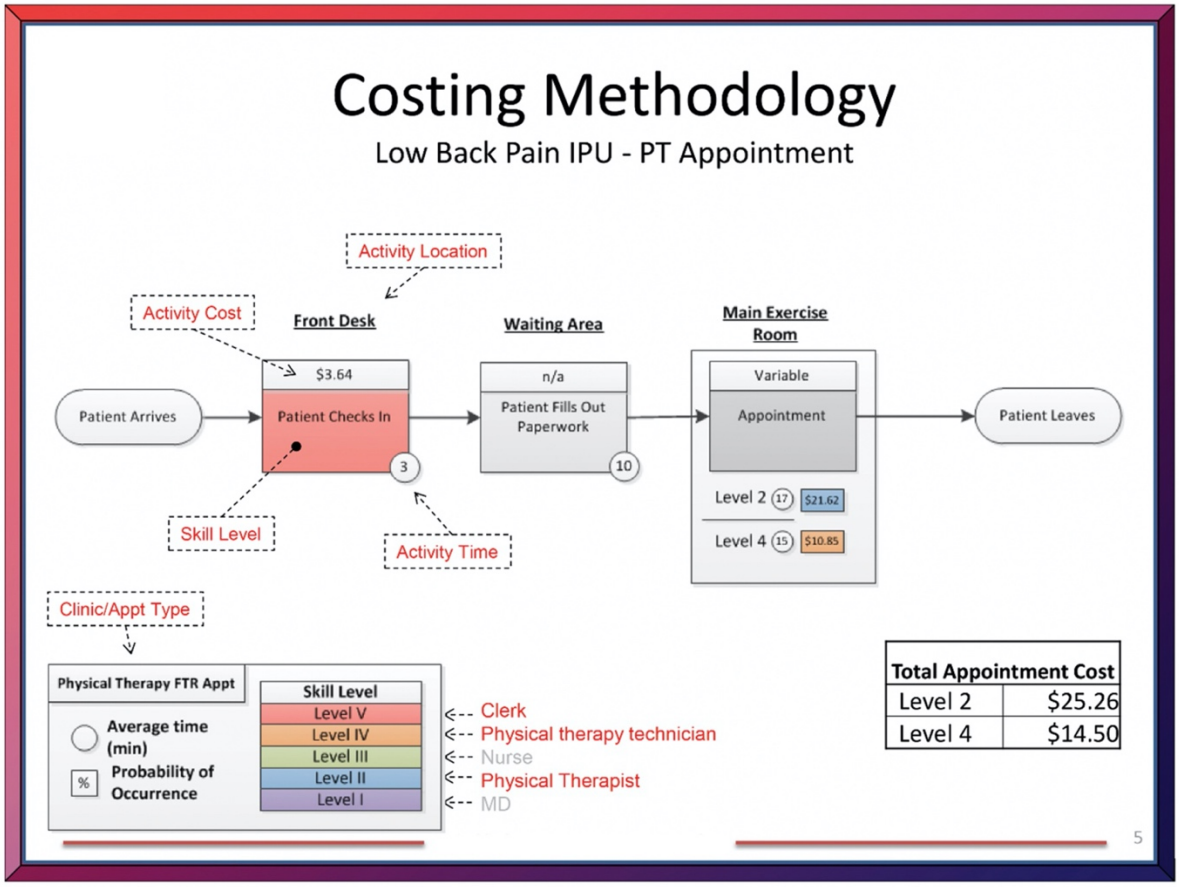
	Diabetes	Low Back Pain	Osteoarthritis	Pregnancy
Clinical Metrics	- HbA1c scores at 3, 6 and 9 months - # of inpatient admissions/100 diabetic patients	- Morphine equivalent daily dose - Return to work	- Percent BMI reduction	- Pre-term labor rate (section v. delivery) - Elective induction rate (<39 weeks) - Induction rate (39-41 weeks)
Process Metrics	- Length of time enrolled in IPU - # & cost of referrals to endocrinology in purchased care	- Time from diagnosis to PT - Length of time in PT program - Appropriate imaging rate	- 30-day readmission rate - Surgical rate - Referral to IPU with proper imaging	- Term-transfer rate
Condition Specific PROM	- PROQOL (every visit)	- Oswestry Disability Index (every visit)	- HOOS, Jr. (every visit) - KOOS, Jr. (every visit)	- MAMA Score (24 wks, 6 wks PP) - EPDS (24 wks, 6 wks PP) - BSS-R (PP, 6 wks PP)

SF-36	Evaluates quality of life survey
PROQOL	Surveys quality of life, including emotional, and physical health
HOOS, Jr.	Addresses impact of hip osteoarthritis on daily functioning
EPDS	Identifies potential depression issues

CollaboRATE	Measures shared decision-making
Oswestry	Assesses management of everyday life, including pain, personal care, and social life
KOOS, Jr.	Addresses impact of knee osteoarthritis on daily functioning
BSS-R	Measures birth satisfaction
MAMA	Measures peripartum maternal adjustment and attitudes

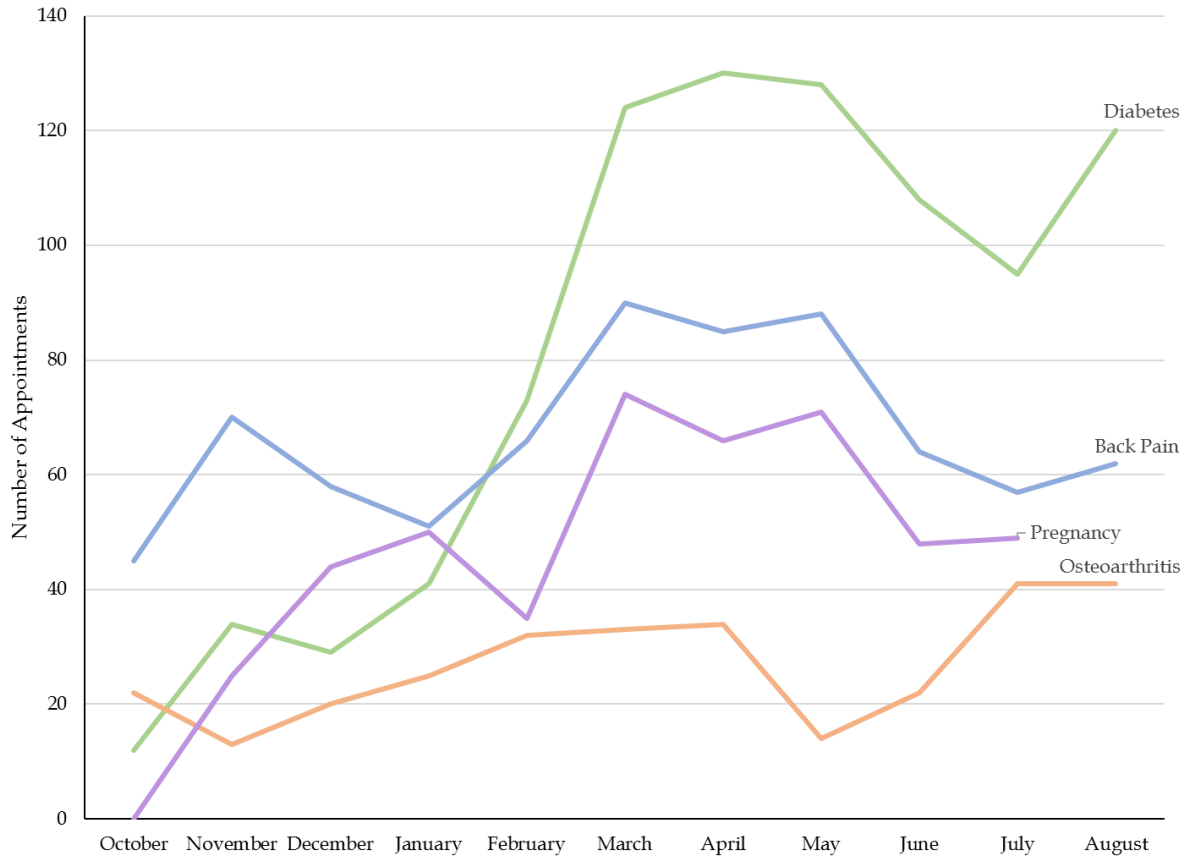
Source: Casewriter based on company documents.

Exhibit 6 Naval Hospital Jacksonville – Example Process Map



Source: Internal Navy educational materials on TDABC for pilot teams.

Exhibit 7 IPU Total Appointments



Source: Casewriter based on company documents.

Exhibit 8 NHJ VBC Pilot Newsletter

VBC Clinical Champion Sync

Sharing thoughts and ideas between IPUs for Value-Based Care Pilot at NH Jacksonville

December 2016

Hot Topics

Appointment/Hour Tracking--

- After clinic profiles are set up, use MEPRS sub-codes; training sheets coming soon.
- If your team utilizes CarePoint, remember to tag IPULBP, IPUOB, IPUDM, IPUOA

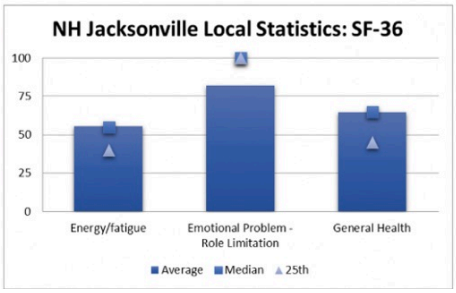
IPU Patient Trackers-

- Ensure that the patient tracking document has information that is useful for YOU! At a minimum, dates and providers seen.
- Monthly Health Goal Report to SG includes:
  - # of total patients
  - # total appointments
- Set a recurring time to update the tracker, establish roles on who is updating.

FORM TO HANDOUT	WHICH PATIENTS
SF-36	All Patients
CollaboRATE	All Patients
PROQOL	Chief Complaint - Diabetes Well Visit
OSWESTRY	Chief Complaint - Back Pain
HOOS	Chief Complaint - Hip Pain + Over 40yo
KOOS	Chief Complaint - Knee Pain + Over 40yo
MAMA	Chief Complaint - 24 week visit & 6 week postpartum visit
EPDS	Chief Complaint - 24 week visit & 6 week postpartum visit

Patient-Reported Outcomes

- Spread PRO word– we need more data!
- SF-36: 886 collected. Stats snapshot below—lowest, highest, and overall scores:



Subgroup Updates

IT/Technology---

- iPads for Virtual Visits and tablets for surveys currently being tested
- Waiting for NICOE WIIR Community to be set up in the production environment
- Distributed Antenna System (DAS) to begin installation in January 2016, with VV slated to begin by April.
- BUMED and local policies in progress

Data/Analytics---

- Microsoft Access database for IPU patient tracking in progress. Will be available for use on local Shared Drive in January.

Communications---

- "Like" the Jacksonville Facebook page and the VBC posts

Feedback Check-in: will be meeting one-on-one with IPU team members for feedback

Hints / Reminders:

- Think about other IPUs when implementing a change; tell your APL team leads!
- Ensure that care navigators are getting time they need for care– if not, tell someone.
- Please reach out if you have any questions!

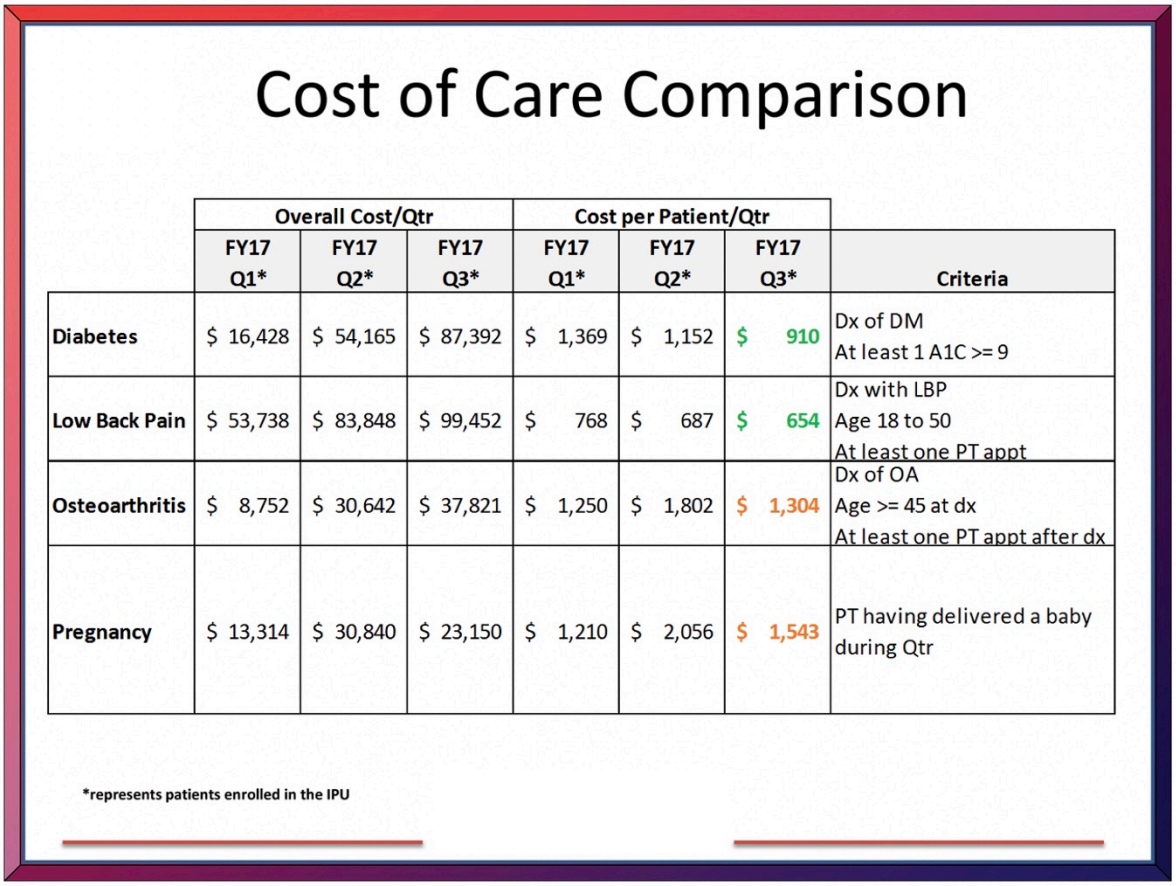
Source: Company documents.

Exhibit 9 NHJ VBC Pilot Results

	Diabetes	Low Back Pain	Osteoarthritis	Pregnancy
Enrollment	112	201	33	44
Avg. # Appt. per Participant	7.23	2.96	10	10.5
Clinical Metrics	HbA1c (*Case mix adjusted*): Baseline 10.6, IPU 8.11	Morphine Equivalent Daily Dose: Baseline 2.7, IPU 0.2	BMI Change: Baseline n/a, IPUΔ 1.4↓	Term Deliveries at NHJ: Baseline n/a, IPU 12/15 Elective Induction Rate: Baseline 4.5%, IPU 6.7% (1 patient)
Process Metrics	# Inpatient Admissions: Baseline 0.8, IPU 1.8*	Diagnosis to PT (days): Baseline 13.1, IPU 4.6 Time in PT (days): Baseline 90, IPU 54 Appropriate Imaging Rate: Baseline 81%, IPU 87%	Referrals to IPU with Proper Imaging: Baseline 62%, IPU 76%	Patients Utilizing Behavioral Health: Baseline n/a, IPU 87% Patients Utilizing Nutrition: Baseline n/a, IPU 76%
Patient Reported Outcome Measures	PROQOL: Overall Quality of Life: Baseline 8.0, IPU 8.2 PROQOL: Diabetes Management: Baseline 2.5, IPU 2.6	OSWESTRY (*Decrease in score reflects improvement in condition*): Baseline 35, IPU 22	HOOS/KOOS Jr.: Baseline 46, IPU 59	MAMA: Baseline n/a, IPU 68

Source: Casewriter analysis based on company documents.

Exhibit 10 NHJ VBC Cost of Care Comparison



Cost of Care Comparison

	Overall Cost/Qtr			Cost per Patient/Qtr			
	FY17 Q1*	FY17 Q2*	FY17 Q3*	FY17 Q1*	FY17 Q2*	FY17 Q3*	Criteria
Diabetes	$ 16,428	$ 54,165	$ 87,392	$ 1,369	$ 1,152	$ 910	Dx of DM At least 1 A1C >= 9
Low Back Pain	$ 53,738	$ 83,848	$ 99,452	$ 768	$ 687	$ 654	Dx with LBP Age 18 to 50 At least one PT appt
Osteoarthritis	$ 8,752	$ 30,642	$ 37,821	$ 1,250	$ 1,802	$ 1,304	Dx of OA Age >= 45 at dx At least one PT appt after dx
Pregnancy	$ 13,314	$ 30,840	$ 23,150	$ 1,210	$ 2,056	$ 1,543	PT having delivered a baby during Qtr

*represents patients enrolled in the IPU

Source: Company documents.

Note: Cost per patient analysis is a comparison of historical care model and costing approach (2016) to IPU care model and costing approach (2017).

Endnotes

[1] FY 017 Department of the Navy Budget. Accessed July 29, 2018. http://www.secnav.navy.mil/fmc/fmb/Documents/17pres/Highlights_book.pdf.

[2] Prine, Carl. "Navy's Top Doc Revamping Military Medicine." Sandiegouniontribune.com. December 13, 2016. Accessed July 30, 2018. http://www.sandiegouniontribune.com/military/sd-me-navy-medicine-20161128-story.html.

[3] *Statement before the Subcommittee on Defense of the House Committee on Appropriations*, 2016th Cong., 27. Subject: Defense Health Program, https://docs.house.gov/meetings/AP/AP02/20160322/104688/HHRG-114-AP02-Wstate-FaisonV-20160322.pdf

[4] "Evaluation of the TRICARE Program: FY 2004 Report to Congress". https://www.health.mil/Military-Health-Topics/Access-Cost-Quality-and-Safety/Health-Care-Program-Evaluation/Annual-Evaluation-of-the-TRICARE-Program?type=Reports#RefFeed. Accessed December 11, 2018. (Note: Casewriter analysis, adjusted for inflation.)

[5] Evaluation of the TRICARE Program: FY 2018 Report to Congress, Access, Cost, and Quality Data through Fiscal Year 2017". https://www.health.mil/Military-Health-Topics/Access-Cost-Quality-and-Safety/Health-Care-Program-Evaluation/Annual-Evaluation-of-the-TRICARE-Program?type=Reports#RefFeed. Accessed December 11, 2018. (Note: Casewriter analysis, adjusted for inflation.)

[6] Porter, Michael E., and Elizabeth O. Teisburg. *Redefining Healthcare*. Boston, MA: Harvard Business School, 2005; Porter, Michael E., and Thomas H. Lee. "The Strategy That Will Fix Health Care." *Harvard Business Review*, October 2013.

[7] Kaplan, Robert S., and Michael E. Porter. "How to Solve the Cost Crisis in Health Care." *Harvard Business Review*, September 2011.

[8] "Federal Pay and the General Schedule (GS)." Go Government. Accessed July 30, 2018. http://gogovernment.org/government_101/pay_and_the_general_schedule.php.