

Partnered Research in Healthcare Delivery Redesign for High-Need, High-Cost Patients: Development and Feasibility of an Intensive Management Patient-Aligned Care Team (ImPACT)

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OBJECTIVES: We employed a partnered research healthcare delivery redesign process to improve care for high-need, high-cost (HNHC) patients within the Veterans Affairs (VA) healthcare system.

METHODS: Health services researchers partnered with VA national and Palo Alto facility leadership and clinicians to: 1) analyze characteristics and utilization patterns of HNHC patients, 2) synthesize evidence about intensive management programs for HNHC patients, 3) conduct needs-assessment interviews with HNHC patients ($n=17$) across medical, access, social, and mental health domains, 4) survey providers ($n=8$) about care challenges for HNHC patients, and 5) design, implement, and evaluate a pilot Intensive Management Patient-Aligned Care Team (ImPACT) for a random sample of 150 patients.

RESULTS: HNHC patients accounted for over half (52 %) of VA facility patient costs. Most (94 %) had three or more chronic conditions, and 60 % had a mental health diagnosis. Formative data analyses and qualitative assessments revealed a need for intensive case management, care coordination, transitions navigation, and social support and services. The ImPACT multidisciplinary team developed care processes to meet these needs, including direct access to team members (including after-hours), chronic disease management protocols, case management, and rapid interventions in response to health changes or acute service use. Two-thirds of invited patients ($n=101$) enrolled in ImPACT, 87 % of whom remained actively engaged at 9 months. ImPACT is now serving as a model for a national VA intensive management demonstration project.

CONCLUSIONS: Partnered research that incorporated population data analysis, evidence synthesis, and stakeholder needs assessments led to the successful redesign and implementation of services for HNHC patients. The

rigorous design process and evaluation facilitated dissemination of the intervention within the VA healthcare system.

IMPACT STATEMENT: Employing partnered research to redesign care for high-need, high-cost patients may expedite development and dissemination of high-value, cost-saving interventions.

KEY WORDS: primary care redesign; Veterans; quality improvement.

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INTRODUCTION

Within the U.S. population, Medicaid-covered and Medicare-covered populations, and large integrated healthcare organizations such as the Veterans Affairs (VA) healthcare system, 5–10 % of patients account for approximately half of total healthcare spending.^{1–7} Interest in these high-need, high-cost (HNHC) patients has intensified in recent years, as healthcare systems and Accountable Care Organizations increasingly focus limited resources on high-risk patients to prevent the unnecessary use of costly services.^{8,9}

To meet the needs of HNHC patients, many organizations are developing specialized intensive management programs, offering enhanced clinical access, care coordination, medication reconciliation, support during transitions from hospital to home, and referrals to social and community services.^{10–12} The evidence on these programs is mixed. Although some early innovative programs reported reductions in emergency department visits, hospitalizations, and costs,^{13–15} many of these were for-profit or employer-based programs. Studies of intensive management in urban and safety-net patient populations generally report more modest or neutral findings,^{16–18} although

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there are exceptions, such as uncontrolled observational studies of the Camden Coalition in Camden, New Jersey.^{19–21}

One reason for the evidence shortage around intensive management programs is the difficulty of integrating complex organizational interventions and rigorous program evaluations. Robust evaluations may require staged interventions or randomization, long follow-up duration, and patient and staff surveys to determine effects, adding cost and time beyond the already expensive clinical efforts.^{21–23}

Partnered research—collaboration between researchers, operational leaders, and clinicians—is a unique approach to program development that may facilitate rapid healthcare redesign and implementation, while allowing for rigorous evaluation and testing. The VA has a rich tradition of sponsoring intramural partnered research, dating back to the development of the Quality Enhancement Research Initiative in the 1990s,²⁴ and these partnerships have been associated with substantial quality improvement achievements.²⁵ This paper describes a partnership between health services researchers, operational leadership, and clinicians in the VA healthcare system that led to the successful design, implementation, and evaluation of a novel intensive management program for HNHC patients in the VA Palo Alto Health Care System

METHODS

Table 1 describes the partnered research approach that we used to redesign care for HNHC patients. The collaboration emerged from shared interest in intensive management programs among national VA leadership (SK), and VA Palo Alto clinical leaders and health services researchers. The VA Palo Alto project core team included researchers (DZ, SA, JB) and facility leadership (SEO, Deputy Chief of Staff; JK, Chief of Medicine; and JC, Associate Chief of Staff for Ambulatory Care), and later expanded to include the ImPACT clinical team

(JS, DH, KH, SS) and advisors from an established intensive management clinic at Stanford University. Our partnership incorporated many of the elements of a collaborative evaluation,²⁶ including iterative dialogue among all partners. Partners maintained clearly delineated clinical and evaluation roles. Decisions were made by consensus when possible, with deferral of final decisions to facility leadership (for program decisions) and research leadership (for evaluation decisions). The core team met weekly during the first year of program development and implementation, and bi-weekly throughout the duration of the intervention pilot and evaluation.

Characterization of Target Patient Population. In response to facility leadership's query, researchers identified high-cost patients using administrative records. For all patients who received care in fiscal year (FY) 2010, researchers identified the 5 % most costly patients ($N=3,135$), excluding individuals who had a total length of stay > 182 days in order to focus on appropriate candidates for an outpatient intervention. For the remaining patients ($n=2,730$), they assessed average FY2010 costs for inpatient, outpatient, pharmacy, and VA-sponsored contract care, frequency of costly acute care (emergency room visits and hospitalizations), and sociodemographic characteristics (e.g., age, sex). Chronic conditions that are the focus of quality improvement efforts and research within the VA^{24,27–29} were identified using ICD-9 codes that were documented at least once in an inpatient or outpatient encounter. Researchers presented descriptive statistics to the facility's clinical leadership committee to inform program adoption and design.

Evidence Synthesis. To guide program development, researchers reviewed common elements of existing intensive management outpatient care programs. The review built on an existing evidence synthesis, prepared by the VA's Evidence-Based Synthesis Program Coordinating Center.¹¹ Researchers

Table 1. Partnered Research Approach, and Research and Operational Roles, in the Development, Implementation, and Evaluation of the ImPACT Program

	Research Partners (Health Services Researchers)	Operational Partners (Leadership and Clinicians)
Characterization of target patient population	Analyze data and present to clinical/operational partners	Facilitate access to data
Evidence synthesis to inform intervention design	Conduct literature review and present evidence synthesis to clinical/operational partners	Assist researchers in understanding local organization and culture that may influence feasibility of intervention
Needs assessment of target patient population	Support the development of interview guides/surveys; analyze quantitative/qualitative data; share findings with clinical/operational partners	Facilitate access to patients; interview patients to inform clinical program development; assist in interpretation of findings
Engagement of clinical partners	Present data about target patient population; develop interview guides/surveys to assess healthcare providers' needs	Facilitate interviews/surveys of healthcare providers and other key stakeholders; assist in interpretation of findings
Resources/Funding	Secure funding (i.e., grants) for program evaluation	Secure funding and resources for program design and implementation
Intervention design	Synthesize findings from data analysis, literature review, and needs assessments of patients, providers, and facility leadership to inform intervention structure and services	Design intervention that is acceptable to clinical staff, addresses needs of local patient population, and builds on existing facility resources and structure
Program implementation	Analyze process outcomes, conduct implementation evaluation, share findings with clinical/operational partners to facilitate quality improvement	Facilitate implementation design that supports a rigorous evaluation (e.g., enroll random sample of patients or identify appropriate control group; minimize cross-over and contamination; provide access to follow-up data)
Evaluation	Conduct rigorous evaluation of intervention effectiveness	Modify program in response to evaluation

supplemented this with peer-reviewed and gray literature describing early innovations in intensive management,^{14,16,18,21–23,30–33} and with review articles describing healthcare delivery interventions for patients with complex chronic illnesses.^{34–36} The review incorporated key findings, study design, and implementation strategies,³⁷ and was discussed with facility leadership to identify common elements of successful programs that would be viable and effective within the VA environment and at the local facility.

Needs Assessment of Target Patient Population. Facility leadership facilitated contact with HNHC patients who were then interviewed by clinical support staff. To guide interviews, researchers adapted a needs assessment tool for HNHC patients that is widely used by intensive management programs.^{38,39} Interviewers asked about four domains: medical neighborhood (e.g., access, care coordination), medical status (e.g., symptoms, treatment), social support (e.g., relationships, home environment), and self-management/mental health. Findings were synthesized by researchers and clinical partners to identify themes representing the target population's most common needs, challenges, and goals. Themes were discussed at weekly meetings, and interviews were conducted until the team felt thematic saturation was achieved.

Engagement of Clinical Partners. Researchers developed a survey to solicit healthcare providers' input about services that would most benefit their HNHC patients. An ImPACT team member administered the survey to primary care providers of target HNHC patients ($N=8$). Providers were given a list of their HNHC patients who were eligible for the new program, and asked to rate (on a scale of 1 to 10) the value of specific services that were under consideration for the intervention. Researchers presented survey findings to the core team.

Intervention Design. Findings from each of the above steps informed the development of an intervention for HNHC patients: Intensive Management Patient-Aligned Care Team (ImPACT). Facility leadership sought to design a program that would build on existing facility resources, including the VA's primary care medical home structure (Patient-Aligned Care Team, or PACT).⁴⁰ Leadership and researchers collaborated on decisions about patient eligibility criteria, structure of the multidisciplinary clinical team, and program design and services. The intervention was iteratively refined in response to feedback from PACT physicians and nurses.

Program Implementation. Facility leadership decided to offer the ImPACT program to a random sample of 150 HNHC patients to refine procedures prior to dissemination and long-term budgetary commitment. The ImPACT clinical program was designated as a non-research quality improvement initiative by the Stanford University Institutional Review Board (IRB). For the program evaluation, researchers received IRB approval to take advantage of the natural experiment and

evaluate the program's effect on utilization and costs, with estimated 80 % power to detect a 20 % decline in costs among the 150 ImPACT patients compared to HNHC patients receiving only PACT care. In order to facilitate clinical management and evaluation, researchers and the clinical team developed a patient tracking system to monitor key information (i.e., patient goals, emergency department visits, hospitalizations, health status changes, frequency of contact).

Evaluation. Researchers developed an evaluation plan that would answer facility leadership questions about program effectiveness and sustainability, and contribute to the broader scientific literature on intensive management programs. Components included a program feasibility assessment, an implementation evaluation at 9 months (using the Consolidated Framework for Implementation Research),⁴¹ and analyses of changes in cost, healthcare utilization, and patient-centered outcomes (e.g., functional status, symptoms, patient activation, satisfaction with care) at 16 months (ensuring a minimum of 9 months follow-up for all enrollees).

Importantly, while research leadership participated in ImPACT core team meetings, there were research collaborators—a statistician, health economist, and data analyst—who did not interact with the clinical team to promote analytic impartiality.⁴² We report the results of our feasibility evaluation here, including an analysis of enrollment, engagement rates, and frequency of clinic interactions with patients. Analyses of data for the other evaluation components are in progress.

RESULTS

Characterization of Target Patient Population. Initial analyses confirmed that the 5 % highest cost patients accounted for approximately half (52 %) of total patient costs for the facility, slightly more than national VA estimates.⁷ For the population of 2,730 high-cost patients who were outpatients for over half of 2010, 67 % of costs were generated by inpatient care, 19 % by outpatient care, 6 % by pharmacy services, and 8 % by VA-sponsored contract care. Nearly half of inpatient costs (49 %) were for medical/surgical care, 16 % for behavioral/mental health care, and 14 % for long-term care. About half of outpatient costs (56 %) were for medical/surgical care and 19 % were for mental health care.

The mean (SD) age of HNHC patients was 63 (14) years, and 40 % were age 65 or older. Paralleling the VA patient population, 94 % of HNHC patients were male. The vast majority (92 %) had at least three chronic conditions, and 60 % had at least one mental health comorbidity. The most common conditions included hypertension (69 %), diabetes (65 %), lower back pain (30 %), ischemic heart disease (29 %), chronic renal failure (28 %), and cancer (26 %). The most common mental health conditions included depression (54 %),

post-traumatic stress disorder (27 %), alcohol dependence/abuse (21 %), and substance use/abuse (18 %) (Online Appendix 1).

Hospitalization rates were extremely high among HNHC patients, with 90 %, 30 %, and 8 % of patients having at least one, three, or five admissions during the year of investigation, respectively. Similarly, for emergency department utilization, 28 % of patients had two to four visits, and 15 % had five or more visits. These utilization rates and patient characteristics helped guide the facility's decisions about program adoption and design.

Evidence Synthesis. The literature review revealed a number of common services among intensive management programs across diverse settings (Box 1). Facility leadership selected services that would be of greatest additional value in the context of the existing VA patient-centered medical home. These included expanding access through a direct call line to clinic staff and after-hours access to a physician, better coordination of specialty care services, and case management to enhance quality of life and strengthen social support and stability. Other services, such as intensive mental health care, home-based primary care, and palliative care, were already well-established within

Box 1 Common Services/Elements of Intensive Management Programs

	Study Design					Description facilitates replication of services	Implementation process and/or changes are well-described
	Review	RCT	OBS with control	OBS without control	Other		
Frequent in-person and telephone contact with patients; Proactive outreach to patients ^{11,18,21-23,31-35}	11,34,35	18,33	---	21,22,31	23,32	22,31-34	22,23,31,33,34
24-7 access to providers ^{11,31,35}	11,35	---	---	31		31	31
Medication reconciliation; Inclusion of pharmacist ^{11,14,18,21,23,30,31,34-36}	11,34-36	18	30	14,21,31	23	14,31	14,23
Support during transitions after hospital discharge ^{11,22,34,35}	11,34,35	---	---	22	---	---	---
Patient-centered care focused on patients' goals and priorities ^{11,14,18,21,22,30,32,35,36}	11,35,36	18	30	14,21,22	32	14,32	18,22,32
Health coaching; Specific models of behavior change ^{14,18,21-23,30,32,34-36}	34-36	18	30	14,21,22	23,32	14,23,32	14,22,32
Coordination of specialty care; Attendance at specialty visits ^{11,14,16,18,21-23,32-36}	11,34-36	16,18,33	---	14,21,22	23,32	23,32	14,18,22,32,33
Protocols for managing chronic conditions ^{11,14,18,23,30,34,35}	11,34,35	18	30	14	23	---	23
Social services (e.g., assistance with employment, transportation and housing) ^{11,16,18,21-23,30,32,33,35}	11,35	16,18,33	30	21,22	23,32	22,23	16,22,32,33
Health information technology ^{11,14,16,18,21-23,30,35,36}	11,35,36	16,18	30	14,21,22	23	14,21-23,30	14,21,23
Home visits ^{11,21,22,32,35,36}	11,35,36	---	---	21,22	32	32	---
Huddles/Weekly interdisciplinary meetings ^{11,14,21-23,31,32,34-36}	11,34-36	---	---	14,21,22,31	23,32	14,22,31	14,21,22,31,34
Mental health assessment and/or treatment ^{11,14,16,18,21-23,30-32,35,36}	11,35,36	16,18	30	14,21,22,31	23,32	16,22,30	16,23,32
Population stratification; targeting patients with high-risk characteristics ^{11,16,18,21,22,31-36}	11,34-36	16,18,33	---	21,22,31	32	16,21,22,31,33,34	21,31,33,34
Limited case load ^{14,16,21,32}	---	16	---	14,21	32	14,16,21,32	14,32

RCT Randomized Controlled Trial; OBS Observational Study. Methods and additional information about the study review process are described in Online Appendix 2. Dorr and colleagues²³ provide additional information on Intermountain Healthcare.³⁰ Lessler and colleagues³² provide additional information on King County Care Partners.¹⁸ Okin and colleagues³³ provide additional information on the program described by Shumway and colleagues¹⁶

the facility, and were made available to ImPACT patients via referral.

Needs Assessment of Target Patient Population. Interviews with HNHC patients ($n=17$) revealed common needs that would be amenable to an intensive management intervention focusing on access, care coordination, and social support and services (Table 2).

Engagement of Clinical Partners. Primary care providers rated all of the proposed services for the new intensive management program highly (all had a mean rating ≥ 8 out of 10): improve chronic disease management, decrease utilization of avoidable/unnecessary care, improve patient quality of life, reconcile medications, provide social support, facilitate transitions from hospital to home, improve pain control and manage pain medications, enhance patient engagement and adherence, provide after-hours telephone consultations with a familiar care team member, offer recreational activities, facilitate access to care, evaluate a patient's home environment, and coordinate specialty care. All of these elements were integrated into the design of ImPACT.

ImPACT Implementation. The ImPACT program is described in Box 2; program materials and procedures are available in the ImPACT Toolkit (Online Appendix 3). Patients were eligible for the program if their total VA healthcare costs were in the top 5 % between 1 October 2011 and 30 June 2012, or if their risk for one-year hospitalization was in the top 5 % (using a VA risk-prediction algorithm).⁴³ Patients were excluded if they were already enrolled in another intensive management program (e.g., mental health intensive case management, home-based primary care, palliative care) or if they

were hospitalized or in long-term care for over half of the baseline period. Selected patients were approached during hospitalizations, emergency department visits, before or after clinical appointments, and by letter and telephone. If patients were interested in receiving ImPACT care, the team completed a comprehensive intake. The intake included a medical chart review and an in-person interview using both structured tools and open-ended questions to assess patients' medical and psychosocial challenges, and to elicit health-related goals and priorities. The initial visit(s) also included assessments of function, frailty, cognitive impairment, social support, advance directives, medication adherence, and patient activation.

The ImPACT team then developed a patient-centered, goal-based care plan, including referrals to appropriate clinical, social, and community-based services. The team used the researcher-developed patient tracker to monitor key events (e.g., recent emergency department visits and hospitalizations, upcoming appointments), document case management goals and progress, and identify individuals with unstable health status or social circumstances. High acuity patients were discussed in a weekly huddle, and contacted as frequently as necessary (e.g., daily, weekly) to facilitate stabilization. When patients were hospitalized, ImPACT team members interacted with inpatient providers to identify necessary services and followed up within one to two days of discharge. Lower acuity patients were also followed up at regular, but longer intervals (e.g., monthly), with outreach to patients who were not actively engaged with services.

Feasibility Evaluation. Two-thirds of invited patients ($n=101$) enrolled in ImPACT within the first 7 months of the program (1 February 2013 to 31 August 2013) and 87 % of participants remained actively engaged in the program at 9 months. Engaged and non-engaged patients did not vary

Table 2. Findings from Formative Interviews with High-Need, High-Cost Patients ($n=17$)

Desirable Services	Needs, Challenges, and Goals of HNHC Patients (<i>with representative quotes</i>)
• Direct and extended hour access	<ul style="list-style-type: none"> • Many patients have tenuous medical conditions that can require guidance/attention at any time: <i>"I never know when I am going to have to go to the ER."</i> • Many patients have a history of mental health symptoms (e.g., anxiety, suicidal ideation) and social circumstances (e.g., isolation) for which they need and/or desire after-hours access
• Care coordination	<ul style="list-style-type: none"> • Patients have difficulty when their provider changes or when they see a substitute (or new resident) provider: <i>"I want to see the same MD."</i> • Patients feel that their specialists often focus on a single condition and do not communicate or coordinate with one another
• Intensive management	<ul style="list-style-type: none"> • Patients have a lot of clinical visits that are difficult to consolidate • Some patients feel that they need constant care: <i>"For someone who has many conditions, and a condition that could kill me at any time, I should be monitored all the time."</i> • Patients are interested in medication reminders and assistance with appointment scheduling and transportation
• Social work services	<ul style="list-style-type: none"> • Some patients have mobility challenges and desire home visits • Some patients with experience in residential or other intensive management programs need support when trying to complete programs, and need housing/support once programs end • Patients desire support when trying to return to school, find employment, or find housing: <i>"I wish someone would help me navigate the system. I don't know what resources or programs are available to me."</i>
• Recreational services	<ul style="list-style-type: none"> • Patients have a range of hobbies and activities that they enjoy, including music, swimming, walking, table tennis, museums, sporting events, reading, painting and crafts, cooking, gardening, movies, and biking

Box 2 Description of ImPACT program

ImPACT is a multidisciplinary team that provides intensive case management for high-need, high-cost patients. Through a “high-touch” model—combining telephone, in-person, and community-based activities—the ImPACT team works to (1) elicit and meet patients’ personal health goals; (2) reduce inappropriate or uncoordinated patterns of care utilization; and (3) prevent exacerbations in illness through early detection and intervention.

Enrollment Criteria:

- Total healthcare costs in the top 5% or Care Assessment Need (CAN) score (risk of one-year hospitalization) in the top 5% for the facility in fiscal year 2012
- Enrolled in VA primary care (PACT) at evaluation site
- Not enrolled in an extended care or comprehensive care program (e.g., mental health intensive case management, home-based primary care)

Team Structure:

- **Nurse Practitioner** – acts as the front line for evaluation of patient’s medical status, facilitating appropriate follow-up, medication management, and connection to other medical services
- **Social Worker** – addresses the psychosocial needs of patients and family/caregivers that arise in the context of their medical and mental health conditions
- **Recreation Therapist** – assesses and places patients in rehabilitative activities outside the traditional healthcare setting
- **Supervising Physician** - provides medical supervision to the Nurse Practitioner, and general oversight regarding care plan
- **Administrative Coordinator** - assists with patient follow-up and data tracking

Key Features:

1. **Adjunct to Primary Care:** ImPACT works in concert with the patient’s primary care team and aims to off-load the time-intensive case management of high need, high cost patients. ImPACT is the first point of contact for patients, and continuously updates the primary care provider; the team refers patients to specialists, including mental health and substance use treatment, as needed.
2. **Co-location/Patient-Aligned Encounters:** Co-located beside the outpatient clinics, team-members regularly arrange brief encounters to coincide with patients’ existing appointments.
3. **Communication Hub for Care Coordination:** ImPACT facilitates multi-directional communication among patients and their providers to align care; providers co-attend specialist visits as needed and coordinate care with community services such as home health agencies, home hospice, and conservators.
4. **Intensive Intake Process:** A combination of structured tools and open-ended questions are used to understand patients’ needs, values, and goals. The multidisciplinary team develops a patient-centered, goal-based care plan.
5. **Interdisciplinary Team Review:** After intake, contact frequency is titrated depending on patient status and the complexity and stability of medical issues, functional or cognitive impairment, and psychosocial issues. Weekly team rounds are conducted to revise care plans based on evolving needs and communications with other providers, and to determine if interventions are meeting the needs of the patient.
6. **Motivation and Education of Patients:** All team members play a role in care-coordination, are trained in motivational interviewing, and work with patients to track progress towards health-goals. Recreation therapy directly engages patients in healthy activities, provides validated education about disease self-management and lifestyle modifications, and leverages existing self-management groups and resources.
7. **On-Demand Availability:** The team provides on-demand access by phone, responding to patient care coordination needs immediately or within hours. The nurse practitioner acts as a medical advice line, providing phone triage, and arranging for in-person evaluation or prompt PCP or specialist follow-up as indicated. After-hour/weekend rotating physician coverage of the phone-line is available to address urgent medical questions.
8. **ER and Hospitalization Tracking:** When patients are hospitalized, ImPACT team members develop a comprehensive transition plan *before* discharge, communicating with outpatient and inpatient providers.
9. **Navigation of Social Services:** Social work assists patients with long term care planning, advance directives, state and federal disability applications, and VA benefits. Social work helps patients access housing resources, community services (e.g., Medicaid, in-home support services, Meals on Wheels), transportation, and respite services. The team also supports patients and their families at end-of-life and assists in completion of POLST.

significantly on key sociodemographic and clinical characteristics, with the exception that non-engaged patients were

more likely to reside in a rural area (15 % vs. 4 %, $p < 0.05$) and had higher rates of schizophrenia (13 % vs. 2 %, $p < 0.05$).

$p < 0.01$). During months 9 to 12 of the program, patients had an average of five ImPACT encounters (documented in-person or telephone care visits), and the ten highest-utilizers had ten to 21 encounters (mean (SD)=14 (3)). A full evaluation of ImPACT's implementation and its effect on healthcare utilization, cost, and patient-centered outcomes is in progress; however, early observations about the program's feasibility, implementation, and reception helped inform the development of a national VA intensive management demonstration project, Patient-Aligned Care Team-Intensive Management (PACT-IM). The VA Office of Primary Care funded PACT-IM programs at five VA facilities, and is supporting a National Evaluation Center to rigorously study the programs' impact on healthcare utilization and costs for HNHC patients.

DISCUSSION

This paper describes a successful approach to partnered research in the design, implementation, and evaluation of an intensive management intervention for HNHC patients. The program's services were informed by patients' characteristics, utilization patterns, needs, and perceived challenges. Iterative dialogue among researchers and operational partners strengthened the intervention's design and feasibility. The resulting program was implemented rapidly and successfully with high levels of engagement, and is now serving as a model for a national multi-site VA intensive management demonstration project.

Partnered research facilitated ImPACT's development in several ways. First, in response to leadership's request, researchers characterized the facility's HNHC patients and helped identify individuals who would likely benefit from intensive management. The collaborative literature review, patient needs assessment, and provider survey guided interventional development. All of these steps were conducted systematically and with a level of rigor (e.g., use of structured assessments and validated measures, assessment of evidence quality) that is typical of health services research, but not always feasible within a quality improvement environment. These pre-implementation efforts not only strengthened the intervention, they also illuminated the cultural and organizational context for researchers,⁴⁴ thereby informing the evaluation design. Similarly, weekly communication between the ImPACT clinical team, facility leadership, and researchers facilitated trouble-shooting and rapid modifications to the intervention and evaluation plan as needed.

Collaboration with facility leadership was also critical to the design of a rigorous evaluation. Facility leadership wanted to ensure that the program's effects would be measurable in order to support decisions about program continuation. They

therefore supported program implementation for a random sample of patients. While piloting on a small subset before dissemination is common, random selection for such initial interventional development is rare in quality improvement.⁴⁵ However, this technique is quite effective for understanding causal inference, and researchers were able to design a robust study of the program's effect on healthcare utilization and costs. Furthermore, the partnered approach permitted rapid design and implementation of the program and its evaluation, so that we were able to enroll a random sample of patients within 12 months of program conception. As a result, the ImPACT program is now informing plans for a multi-site VA intensive management demonstration project, with random enrollment of high-risk patients at five facilities.

Partnered research also presented unique challenges. For researchers, the priorities of facility leadership and clinicians did not always align with the optimal research design, resulting in a need for real world evaluation techniques.⁴⁶ For example, facility leadership chose not to survey comparison group patients in order to minimize burden to individuals who were not receiving intensive management. Researchers therefore had to limit the controlled evaluation to electronic health record and administrative data. There were also instances where the objectives for implementation and evaluation differed. For example, early in the intervention, there was tension about whether to focus ImPACT resources on patients whom the clinical team felt would benefit most, versus maintain a focus on all patients assigned to ImPACT under the intent-to-treat design. Weekly meetings between clinicians, facility leadership, and researchers (importantly, guided by a culture of respect for the expertise of all parties), provided an opportunity to discuss the needs of all stakeholders and resolve conflicts.

Additional challenges arose due to tension between the time needed for rigorous research and the time frame in which definitive results were desired for operational purposes. This tension was heightened because ImPACT is a resource-intensive intervention, and the facility will likely require evidence of safety and cost savings to sustain the program as designed. Relatedly, for the clinical team, the research partnership generated pressure to achieve positive results quickly. This was especially challenging in the context of an intervention that aims to improve health behaviors, prevent unnecessary utilization, and bend the cost curve for HNHC patients—all of which take time.

Finally, the VA's history of intramural research likely contributed to the success of this partnered effort. While many of the elements of this effort could be adopted by academic-operational partners, the VA system and culture encourages collaborations between health services researchers and operational partners that produce high-impact research and policy.²⁴

The ImPACT program represents a successful example of how partnered research can facilitate simultaneous care

redesign and robust evaluation. Employing this design for high-risk, high-utilizing patient populations may expedite the development and dissemination of high-value interventions that transform care for complex and costly patients.

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