Enhanced Care Management: Improving Health for High Need, High Risk Patients in Estonia

Evaluation Report of the 2017 Enhanced Care Management Pilot in Estonia

Draft Version

World Bank Group

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Contents

List of Acronyms

ECM	Enhanced Care Management
EHIF	Estonian Health Insurance Fund
FPA	Family Physicians Association
EHR	Electronic Health Record
MOSA	Ministry of Social Affairs
QBS	Quality Bonus Scheme
NCDs	Non-Communicable Diseases
SOPs	Standard Operating Procedures
WBG	World Bank Group

Acknowledgements

1. Introduction

In 2014 the World Bank Group (WBG) partnered with the Estonian Health Insurance Fund (EHIF) to evaluate health system challenges related to the coordination of health care across different care settings. Data related to select tracer conditions was assessed in relation to the prevention and treatment of chronic diseases, with particular attention to the role and functioning of primary health care. Primary care was selected as the focus of the project as the result of significant evidence that countries with strong primary health systems perform better in terms of improved population health and health expenditure growth mitigation (50). The results revealed care coordination gaps and a potential for primary care system strengthening utilizing an "enhanced care management" (ECM) approach. This conclusion formed the basis of a subsequent ECM pilot project, launched in 2015, which is described in this report.

"Care management" aims to improve health access, quality, and value through proactive outreach for target patient populations. The ECM approach relies on the leadership and energy of primary health providers. ECM has the potential to improve integration of care across care settings, enhance individual patient outcomes, and raise the value of health interventions provided at all levels of the health system.

This paper presents the pilot project on ECM in Estonia implemented between 2016 and 2017. Section 2 provides a brief overview of the health care system of Estonia, presents an in-depth analysis of the results of the 2014 precursor study, and makes the case for ECM as a potential solution to Estonian health sector challenges. Section 3 reviews ECM experiences and best practices. Section 4 describes the participatory ECM program design process. Section 5 presents the experience of program implementation. Section 6 enumerates the results of the pilot project based on an analysis of health insurance claims, stakeholder interviews, a pre- and post-pilot provider survey and the monthly pilot monitoring reports prepared by the local coordinator. Section 7 outlines the next steps and planning for scale.

2. Background – Making the Case for ECM in Estonia

Estonian Health System Overview

The Estonian health system has been hailed for its track record of cost efficiency while achieving good outcomes at levels similar to EU averages. Life expectancy at birth is close to the EU average (77.5 versus 80.9 years in 2014) and under-5 child mortality rate is slightly better than the EU average (3.4 versus 4.4 per 1000 live births in 2014) (53). Despite these relative outcome indicators, Estonia spends significantly less than the EU average on health (6.4 percent versus 10.1 percent of GDP in 2014). The principal source of health financing is public, constituting approximately 76 percent of total health expenditures in 2015 and operationalized through EHIF, the single payer entity (54). The second largest remaining source of financing is out-of-pocket expenditures, comprising approximately 23 percent of total health expenditures. These are mostly concentrated on co-payments for medicines and dental services, suggesting that the financing system is effective in protecting households against catastrophic health expenditures.

Estonia has already made great strides to address health care quality and integration such as the introduction of a quality bonus scheme (QBS) for providers, an e-consultation system, and various other quality assurance mechanisms. Nevertheless, the rise in non-communicable diseases (NCDs), care fragmentation, along with the rising cost of medical products and technologies are also currently driving increases in national expenditures, while the shrinking working-age population has resulted in decreasing revenues to finance health care. These threats to the social health insurance system motivated the country's initial engagement with the WBG on this topic in 2014.

World Bank Analysis 2014-2015

The quantitative and qualitative analysis performed by the World Bank in 2014-2015[1] demonstrated that the Estonian health care system faces considerable challenges with respect to healthcare integration, especially with respect to the prevention and treatment of chronic diseases. Specific findings of the study included:

1. A large proportion of acute inpatient care could be avoided by shifting care to more appropriate primary care settings.
2. A large share of specialist visits could be avoided.
3. Low coverage of preventive services for diabetes and hypertension patients was noted.
4. Patients often bypass primary care and directly accessed specialist care even though these specialists added little value in terms of the care of chronic conditions.
5. Coordination challenges across levels of care exist before and after acute inpatient care episodes, as evidenced by the significant share of unnecessary pre-operative tests and inadequate follow up care by primary health providers.
6. Many of these outcomes were also shown to differ significantly across specific patient/population groups (e.g. avoidable hospital admissions were higher among the poor, men, rural residents and patients with depression).

These results revealed an opportunity to improve the management of specific patient sub-groups at the primary care level. Primary care strengthening could reduce avoidable hospital admissions and specialist visits, increase the provision of preventive services, and improve the flow of information between primary care providers and specialists. This care system strengthening approach would require the expansion of the role of family physicians to provide a set of health management interventions to a subset of high-need patients, hereafter referred to as enhanced care management (ECM).

Enhanced Care Management to Strengthen Primary Care

Primary care is defined as "essential health care based on scientifically sound and socially acceptable methods, universally accessible to individuals and families with their full participation at a cost that the community and country can afford in a spirit of self-reliance and self-determination" (55). Primary care

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[1] Described in World Bank, 2015: The State of Health Care Integration in Estonia. Summary Report, World Bank. Please see Annex 3 for an overview of indicators and tracers used in the study.

is usually the first level of care, where patients make their first contact with a health provider, and where the majority of diagnosis and therapy occurs. Primary care was designated as the principal mechanism to achieve "health for all" in the WHO's Alma-Ata declaration in 1978.

The four functional pillars of modern primary care include: 1) first-contact access; 2) longitudinal continuity over time; 3) comprehensiveness, with capacity to provide care for the majority of health problems; and 4) coordination of care with other parts of the health care system (2). All four pillars are difficult to achieve in complex, high-need patients, particularly in sub-populations who face significant social barriers to care. Patients with complex socio-medical conditions typically make up a small percentage of the overall patient population but account for a disproportionate burden of illness, utilization, and cost. These individuals often have multiple chronic conditions, face significant socioeconomic challenges, and/or have co-existing behavioral health comorbidities. Failure to effectively manage the care of these patients can lead to deteriorations in their health, test duplication, medication conflicts, and medical errors (3,49).

Enhanced care management (ECM) is an effective tool to achieve care coordination for high-need, complex patients and address challenges related to all 4 pillars of primary care. ECM involves focused and proactive outreach to a small number of patients (typically 5-10% of a doctor's patient list) who are at high risk of health status deterioration or increased utilization. The express goal of ECM platforms is to target these complex and high-need individuals in order to improve their health and reduce their need for reactive medical services (4,5). ECM may include: follow up during care transitions (e.g. follow up hospital discharges); tracking test results and referrals; ensuring that quality-of-care targets are met (such as the QBS in Estonia); ensuring medication reconciliation and adherence; and patient monitoring between scheduled visits. ECM can improve care coordination and patient outcomes and are increasingly being implemented across healthcare delivery systems worldwide.

Enhanced Care Management (ECM) Defined

Definition: *"A set of activities designed to assist patients and their support systems in managing medical conditions more effectively."*(41)

Objectives:

- ❖ Increase care coordination for high-need, complex patients across different providers and levels of the health system
- ❖ Address patient needs with explicit goals of improved patient health and reduced need for medical services (4,5)
- ❖ Improve patient engagement by eliciting patient health goals, promoting patient self-management, and establishing patient care plans

3. Preparation – Identifying Best Practices in ECM

In late 2015 the World Bank engaged in a consultation process with experts on risk-stratification and enhanced care management from Canada, the United Kingdom and the US in order to identify the potential of carrying out a risk-stratification and care management pilot in Estonia as part of its continued cooperation with the EHIF. Eventually, the World Bank hired a team of experts from Ariadne Labs to help with the implementation of such a pilot.

Four key elements of programs were identified as a framework of analysis:
1. ***Risk-stratification*** to target patients most likely to benefit from care management.
2. ***Care management plans*** to proactively respond to changes in patient's conditions, anticipate specific future problems, and promote better self-management of current conditions.
3. ***Proactive outreach and transitions follow up*** with all professionals involved in patients' care.
4. ***Team approach and resource connections*** with patients and their caregivers to comprehensively assess and address medical and social needs.

In addition to the key elements described above, a set of system characteristics or conditions precedent to a successful care management practice were considered. These included universal health coverage with a payment environment supportive of care management interventions, motivated multidisciplinary teams, and electronic health records (EHR) systems that allow for reporting on quality outcomes (see Figure 1).

Figure 1: Key Elements of Enhanced Care Management
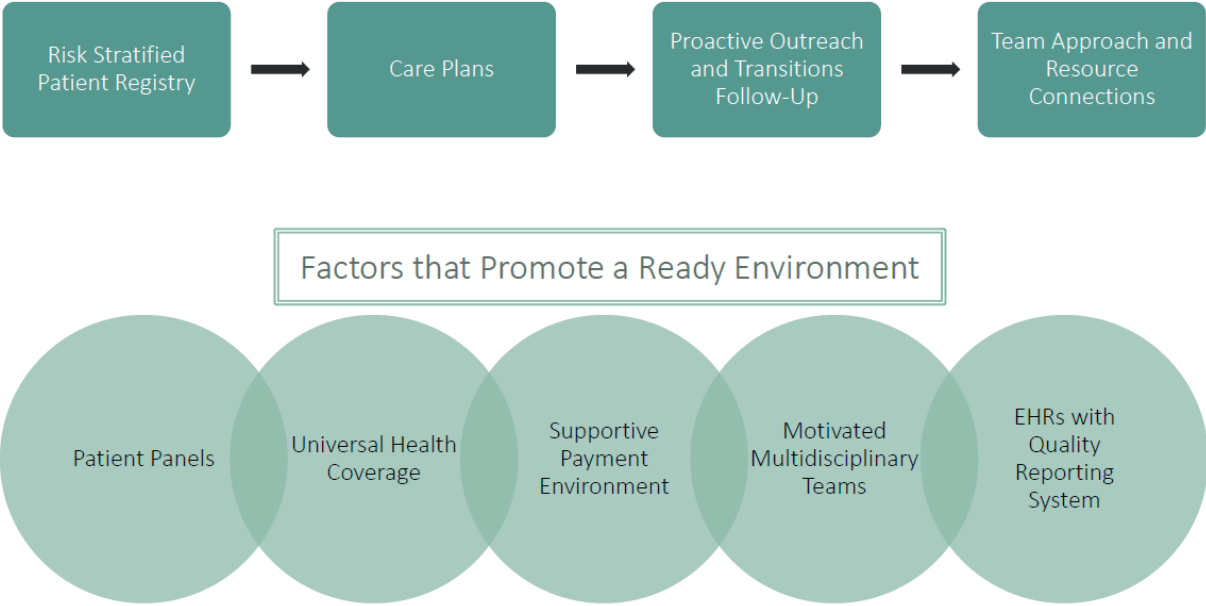
Source: Own Elaboration.

Risk-Stratification - Targeting Patients Amenable to Care Management

The first step to identifying high-risk patients for any given care management program is defining the type of "risk" that the care management program is seeking to mitigate. Risk-stratification is most often conducted to identify those patients at risk of high utilization frequency, high utilization

costs, avoidable hospitalizations, and/or avoidable morbidity or mortality. These different risk types are correlated among each other, but the sub-type of risk that is of highest priority in a program will vary across contexts and is dependent on target population characteristics, health system priorities, and bottle-necks within service delivery pathways. Rising health care costs have been an overarching concern in many health care systems (i.e. in the United States), and the majority of care management programs have been implemented to reduce excess utilization and cost expenditure (6). However, care management efforts are increasingly focussed on promoting patient health and well-being through the facilitation of self-management and engagement with care providers. This shift away from short-term cost-cutting efforts towards health promotion requires a corresponding shift in the risk-stratification approach.

Conventional patient selection tools, when narrowly focussed on high-utilization or high-cost patients, select patients with a wide spectrum of health issues—from high-risk pregnancy to substance abuse to severe heart disease— each of which would require a different care management approach. As an alternative, it is useful to consider building archetypes of patients that the intervention should target. These archetypes are determined by the category of risk that a care management program seeks to mitigate. Patient archetypes, a relatively new concept, involve the incorporation of design thinking[2] to define, group, and solve a problem from the perspective of the user, i.e. the patient (8). By developing common classifications of patient groups that incorporate both medical diagnoses and psychosocial needs, care programs can be oriented toward goals that are achievable and desirable to these patients. From the provider's viewpoint, patient archetypes help simplify the design of care management programs. By creating a patient definition with an associated needs profile (see Figure 2 below), care management programs can be designed with the patient archetype in mind rather than considering the whole universe of potential risk factors and scenarios.

Figure 2: Archetypes of High Users by Pattern and Type of Need
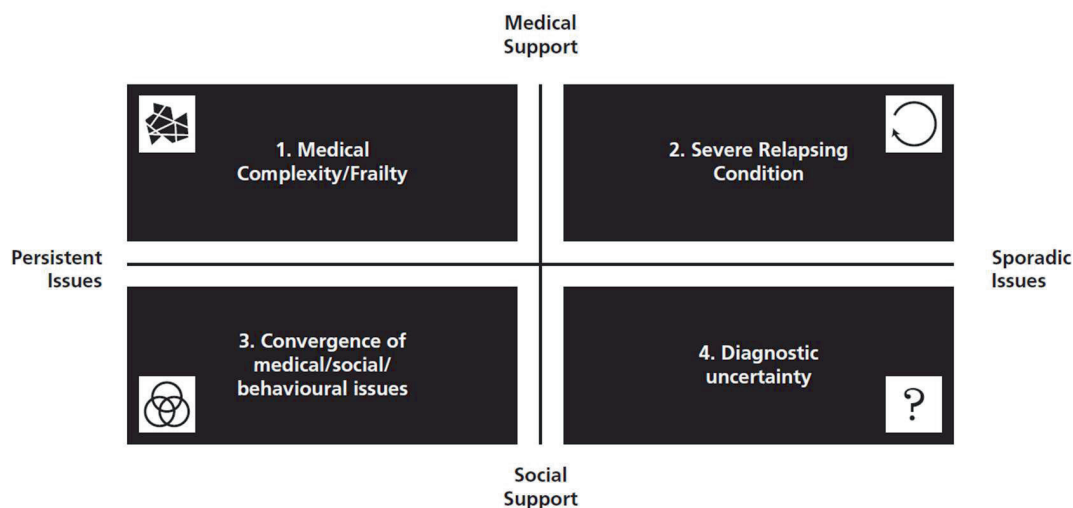
Source: Vaillancourt, S. (2014), Using Archetypes to Design Services for High Users of Healthcare, Healthcarepapers.

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[2] Design thinking is a problem-solving approach used by designers to integrate creativity and social considerations to product and program design.

Once a program has defined the target outcome and identified the patient archetypes to target, a risk-stratification approach is employed to identify a specific cohort of patients to include in the care management program. The three primary approaches for risk-stratification are: 1) algorithm based tools, primarily relying upon health utilization and claims data or clinical data abstracted from the EHR, 2) clinician referral, primarily relying on provider intuition, or 3) a hybrid approach, which utilizes a combination of the quantitative and qualitative approaches described. Emerging evidence suggests that the best method for identifying high-risk populations is a hybrid approach that combines an algorithm-based tool and clinician intuition (3).

Hybrid approaches are sequential, utilizing as their first step an algorithm-based risk prediction tool to analyze available clinical data (claims or EHR) in order to identify a subset of patients at the highest risk for the outcome of interest, or patients who fit the archetype. There are many algorithm-based risk-stratification tools that have been well validated for identifying a subset of patients at high risk for experiencing specific outcomes. However, there are no defined standards for risk-stratification tools and many are proprietary algorithms (e.g., the Johns Hopkins ACG system). Furthermore, no single tool stands out as superior to the others. Algorithm-based models in general do not explain more than half of the observed variability in patient outcomes. In part, this may be due to the fact that algorithm-based methods are limited in their ability to assess important psychosocial considerations that may impact both a patient's need for and ability to benefit from care management (9). Furthermore, patients grouped into highest-risk categories have large variations in care intensity and morbidity year over year, thereby obscuring attempts to cluster individuals into simple categories of high spending or high utilization. Whichever algorithm-based approach is used, there is a need to closely align its parameters with the planned care management interventions, and to consider both the patient's need and their amenability to care management participation (see Figure 3).

Figure 3: Venn Diagram of Relevant Patient Types for Enhanced Care Management
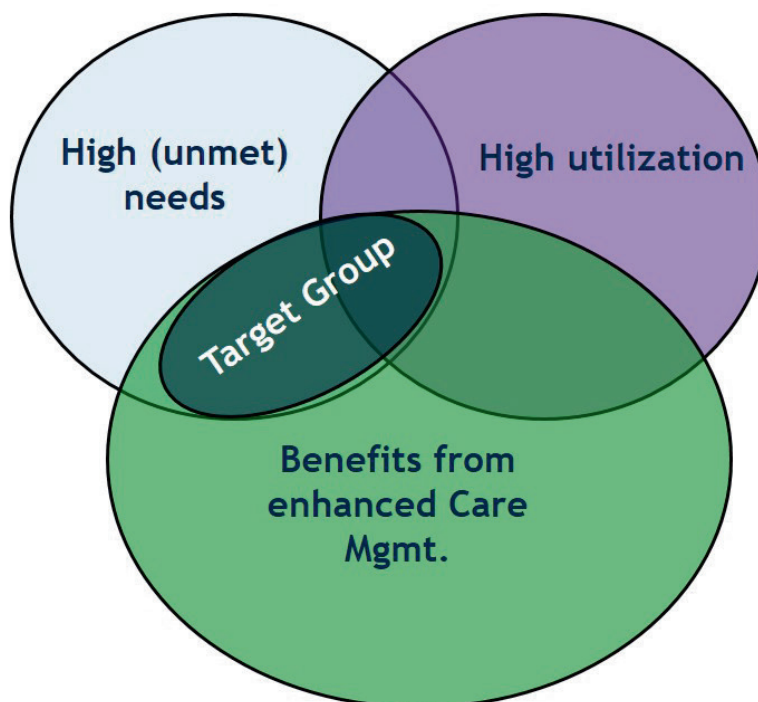
Figure Adapted from: Gerard Anderson & Claudia Salzberg (2016), Identifying High Need High Cost Individuals, Johns Hopkins University.

To improve the predictive value of an algorithm-based method, the hybrid approach includes a subsequent step utilizing clinical intuition and knowledge of patient contextual factors often not found within health record systems or claims data. In this step, the list of patients identified by the algorithm-based tool is reviewed by the responsible primary care provider or the ECM team. Using their clinical judgment and personal knowledge of patients within their community, they can remove patients from the list who—for clinical (i.e. terminal diagnosis), social, or behavioral reasons—are unlikely to benefit from the care management program. Additionally, practitioners can add patients to the list who were not initially captured by the algorithm-based method but who have a strong potential to benefit from involvement in the care management program. The role of clinical intuition in the hybrid approach is powerful, particularly in addressing psychosocial considerations not easily captured in clinical documentation or billing data. Clinicians can leverage their personal relationships with patients to consider –characteristics such as a patient's health literacy, coping skills, physical vulnerabilities, existing linkages to other care providers, and social context or home environment (10).

A patient's social and behavioral characteristics can profoundly affect the relevance and utility of care management programs. For example, an elderly patient who lives alone and is increasingly frail may benefit more from a care management program than an elderly patient with the same disease burden who lives with a family member who is involved in their day-to-day care. Other social factors such as poverty, homelessness, and unemployment may also increase the need that patients have for care management programs (13). Behavioral health issues such as substance abuse, alcoholism, or mental health disorders often increase a patient's care complexity in ways that increase their potential to benefit from care management programs (14). However, in some cases social and behavioral issues can also reduce the likelihood of a patient benefiting from a particular care management program. Severe mental health disorders or severe substance abuse, for example, may require more specialized attention than can be provided through a primary care-based program. Whether social and behavioral issues make it more or less likely for patients to benefit from care management programs depends greatly on the types of resources available to the program. For example, multidisciplinary team-based programs that employ social workers and mental health experts may be able to benefit patients whom single physician-nurse teams do not have the capacity to handle (13,17).

Care Management Plans

Once patients are selected for the ECM, they will each need to undergo a comprehensive evaluation by the care team in order to design an appropriate care management plan and develop a trusting relationship. This comprehensive assessment is needed to determine an individual patient's needs situated within an awareness of their social and contextual environments. This assessment should consider clinical history, gaps in care, barriers they face accessing and receiving care, behavioral and social needs, functional status, and baseline level of patient activation[3] (5,20). Building trusting relationships with high-risk patients is a cornerstone of successful care management programs. The best way care management teams can do this is by understanding a patient's context and addressing their unmet social needs. It has been estimated that up to 70% of the factors that impact a patient's ability to stay healthy are social and environmental, while only 10% are directly related to medical care (31).

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[3] Patient activation refers to the knowledge, skills, and confidence that a patient needs in order to manage their own health and health care.

Care plans should build upon a comprehensive assessment of patient needs, values, and preferences. The design and content of any individual care plan will necessarily depend upon the risks being targeted, the outcomes the program hopes to achieve, the staffing resources available, and the available modalities for care team-patient interactions (5). Successful care management programs typically promote patient and family engagement in self-care (20). One mechanism through which to achieve this outcome is to design "dual-facing care plans," or care plans that are jointly designed by providers and patients or caregivers. To promote use by patients and providers, care plans should be kept simple and organized in a way that maximizes clarity and relevance to patients' daily experience. Care plans should include an "action plan" for patients which outline concrete steps for them to take to make progress towards the care plan goals. They also typically include points of contact for the patient and actions the care team should take in response to critical events (e.g. hospitalizations). Finally, care plans should be designed to meet the technological and literacy levels and capabilities of the intended users.

There is a distinction between a care plan (which is static) and the activity of care planning (which includes a continuous process of reassessment of the plan and realignment of care provided). For care plans to be dynamic, care teams must consider the following, especially for patients not achieving their care plan goals:
- Where does our current care align or not align with our patient's care plan and goals?
- Why is our care plan not working?
- What is the value that we provide to this patient?
- What is the single most important thing that needs to happen to prevent this patient from deteriorating or to align their care to their care plan?
- What specifically is the problem we are trying to solve? Is it medical, social, or both?
- Reflecting on answers to the questions above, how do we plan our daily work?

It is important to note that no "gold standard" exists for either risk-stratification or care management plan construction. Instead, the design of any care management program will necessarily be dependent on the type of risk the program is trying to ameliorate and the target outcomes the program intends to change. It must be built and continually refined based on the experience of both patients and providers to ensure that it meets the goals of improved care, smarter spending, and improved health outcomes.

Proactive Outreach and Transitions Follow Up

A primary goal of a care management program is to coordinate the care and services that patients receive, both inside and outside of the clinical system. Doing so requires that the care team establishes strong working relationships with hospitals, nursing facilities, and other clinical specialties not included in the care team (5). Given this requirement, coordination should factor in to the design of care management program to encourage harmonization across potential stakeholders (37). Coordination with clinical providers enables appropriate follow up during care transitions, tracking lab tests and referrals, ensuring medication reconciliation and adherence, and proactive outreach and monitoring between scheduled visits (38). Establishing regular schedules of contact between care teams and patients also enables proactive outreach and monitoring. These schedules can vary based on patient need and care team capacity, ranging from daily, weekly, or monthly, and incorporating tools such as text messages, phone calls, and health coach visits. Successful care management programs also coordinate with social service providers to connect patients with resources outside of the direct purview

of the health system that may impact a patient's health status, such as housing, food aid, education, elder care, and transportation.

A critical component of coordinating care is monitoring changes in patient health status to ensure safe care transitions across levels of the health system. Doing so requires strong communication and coordination between primary, secondary, and tertiary care services as outlined above. When used appropriately, health information technology can facilitate this coordination. Technology can allow for shared documentation, timely communication between care providers and with patients, real-time alerts, and remote monitoring (5). Technology should be employed to enable timely notification of key events such as hospital admissions, transfers, and discharges. These events are critical moments when care management is particularly important to ensure the timely follow up with the primary care team, to trigger conversations about needed changes to patient care plans, and to assess key safety concerns such as medication fulfilment and reconciliation (5). For example, care management protocols in the US regularly establish information linkages between primary care practices and hospitals. When a patient is seen at the emergency room or admitted to the hospital, care managers are notified and stay in touch with inpatient teams. Once a patient is discharged, an expected interval for follow up is established. For emergency room visits not resulting in admission, care managers are often expected to call the patient within 72 hours of discharge. For patients discharged from an inpatient setting, they call within 24 or 48 hours of discharge to schedule a follow up visit within the following week. At this follow up visit, the provider can perform a medication reconciliation and monitor for signs of clinical deterioration.

Enhanced Care Management Team Approach and Resource Connections

Care management programs can be led by a variety of different organizations including payers, hospitals, or third parties, but the most effective programs are led by primary care teams and located within the walls of their practices (3,22). While multidisciplinary care teams are a vital component of many successful programs (5), there are also examples of small teams of only two providers that can achieve significant impact on patient care (24). At any rate, the composition of care teams varies across programs and should be matched to meet the needs of enrolled patients.

Teams typically include at their core a dedicated care manager, often a nurse, social worker, or community health worker working in partnership with a primary care physician. As care management programs mature, care teams may grow to include other provider types based on the needs of each program's patient population. For example, social workers, community health workers, and behavioral health specialists may be included. The infrastructure and culture of care teams can significantly impact clinical and operational performance. Identifying habits of effective care teams can therefore be instrumental in creating successful care management programs. Co-location, face-to-face meetings, and use of shared IT platforms between all levels of providers can improve efficiency and quality of care, and promote a cohesive team culture (28). Another key practice is the clear assignment of roles and responsibilities across the team, aligned with the overall team mission. Finally, building an environment of support, cohesiveness, and reflection can contribute an effective team atmosphere conducive to achieving the care management program's goals.

4. Engagement – Utilizing a Participatory Process to Design an ECM Program in Estonia

This chapter describes initial steps made to implement an enhanced care management pilot in Estonia and how the main stakeholders were engaged in the process of developing a risk-stratification

model and care management program. Drawing from the international lessons learned and good practices related to risk-stratification and care management described in Section 3 of this report, a World Bank task team - with the support of Ariadne Labs – coordinated with Estonian stakeholders to develop ECM program. The initial phase involved the design of a risk-stratification approach to target patients with the most relevant health risks in Estonia and an associated intervention package feasible for implementation in the context of the Estonian healthcare system.

Initial Consultations with Family Physicians - February 2016

In February 2016, the EHIF hosted an initial consultation with family physicians to initiate a discussion on the development and piloting of a patient at-risk registry. This registry was meant to i) fully harness existing data sources available in the country and ii) serve as a decision-making tool for family physicians in their work related to patients with selected chronic diseases. Following the consultation, it was decided to convene a dedicated working group of family physicians with the mandate to assist in the design and piloting of the methodology for the registry. This working group aimed to i) determine the objectives of the patient at-risk registry and operational parameters of the pilot, ii) provide input on the development of a claims-based risk-stratification methodology and guideline to incorporate family physician knowledge and intuition, iii) participate in the pilot of the patient at-risk registry and share experiences, and iv) participate in a final workshop to assess the findings of the pilot and discuss the registry's broader implementation plan.

1ˢᵗ Family Physician Workshop - March 2016

The first working group workshop took place in March 2016. Their main aim was to agree on the key design features of a primary health care-based care management program in Estonia. WBG and Ariadne Labs representatives presented concepts and models of ECM to a group of fourteen family practitioners from throughout Estonia and staff from the Ministry of Social Affairs (MOSA) and EHIF. The family practitioners participating were selected together with the Family Physicians Association (FPA) and EHIF. This group included previous members of the FPA management board, faculty physicians involved in training Family Physicians in Estonia, and resident physicians in process of training and developing their patient lists. Family physicians were invited by the EHIF to join the working group. The main selection criteria for the participation in the ECM pilot were English language skills and a high intrinsic motivation. At the same time, the EHIF ensured that the working group of family physicians would be representative of Estonian family physician practices as a whole and their different working conditions (e.g. practice locations in both rural and urban areas, group as well as solo practices, etc.). Figure 4 shows the distribution within Estonia of family physician practices (whether solo or multi provider practices) represented in the pilot.

Figure 4: Geographical Distribution of Family Physician Practices Participating in the ECM Pilot
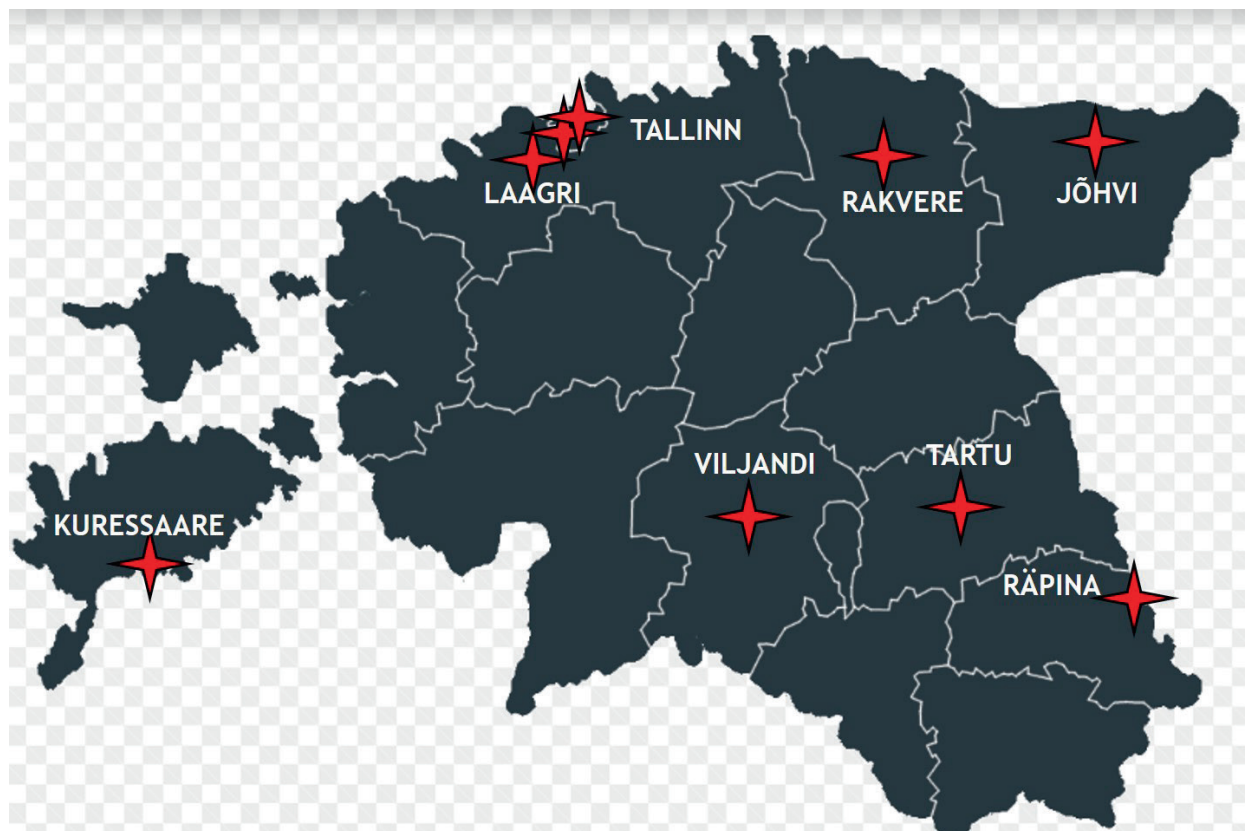
Source: Own Elaboration.

In order to agree on the methodology for the risk-stratification of patients underlying a patient registry, the WBG task team first presented data on the burden of disease in Estonia in order to identify potential target groups for the care management program. To further define criteria for a risk-stratification approach, the workshop participants discussed the following questions:

- Which clinical characteristics are most relevant?

- For each clinical diagnosis category, which adverse events should be avoided?

- Which other co-morbid conditions impair a patient's likelihood to benefit from enhanced care management?

- Which other clinical, behavioral, social/economic factors make patients more or less likely to benefit from enhanced care management?

- Which patient "archetypes" (based on combinations of clinical, behavioral and social characteristics) are most likely to benefit from enhanced care management at the primary care level?

Consensus was reached that the objective of the care management pilot in Estonia should be to improve patient engagement and health outcomes for patients with cardio-vascular, respiratory, and mental conditions.

Enhanced Care Management in Estonia

Improve health outcomes for patients with cardio-vascular, respiratory, and mental disease

Pilot objectives:

- ❖ Assess feasibility of implementing enhanced care management in Estonia
- ❖ Understand impact of pilot on care management processes and selected patient outcomes
- ❖ Learn from experience to inform possible scale-up throughout the country

As a consequence, the question of how to identify the specific group of high-need (and high-utilization) patients that are amenable to ECM was subsequently addressed during the remainder of the workshop. After agreeing on a subset of disease groups that represent a large share of the burden of disease, yet are amenable to care management interventions, the workshop concentrated on developing archetypes of patients most likely to benefit from care management. These archetypes formed the basis of the risk stratification model subsequently developed by the working group. The patient archetype approach allowed participants to focus not only on patients who are the sickest and most at risk of an adverse event, but also a cohort of patients who are slightly healthier and for whom care management could prevent further disease progression.

The metabolic triad (hypertension, diabetes, and hyperlipidaemia) was chosen as the starting point or first filter for the risk-stratification algorithm. The metabolic triad diseases were considered important both in terms of their share of the burden of the disease and also in terms of their contribution to the progression of other chronic diseases (e.g. cardiovascular diseases). In order to be included in the ECM pilot, a patient must have at least one of the metabolic triad conditions (see Figures 5 and 6).

The developed risk-stratification approach groups patients not in terms of their past utilization of health services, but rather in terms of the chronic conditions that they suffer from. At the same time, the selection mechanism does not use a simple count of chronic conditions, but rather considers a chronic condition's type, severity and relationship with other chronic conditions in creating a multilevel or hierarchical risk-stratification model. Non-triad conditions are counted in order to determine the number of total chronic conditions that a patient suffers from. This number, when it exceeds a cut-off level, can be used to exclude patients from the ECM program. These other conditions are not explicitly considered as a criterion for defining the patient archetypes.

Patients that cannot sufficiently benefit from ECM are not included in the patient lists produced by the algorithm. One reason why a patient might not be able to benefit from enhanced care

management is that the severity of one or some of their conditions may be too advanced. Hence, the patient selection algorithm aims to identifying those patients that suffer from a defined range of chronic conditions (i.e. at least two but not more than 7 conditions) and can benefit from the interventions offered by the ECM pilot. These interventions include secondary disease prevention and improved and integrated management of their chronic conditions.

The risk-stratification approach excludes patients with no or limited potential to benefit from care management at the primary health level. Whether a patient can potentially benefit from a care management intervention or not is proxied by four different criteria. First of all, patients that have any diagnosis of acute cancer (cancer in treatment), schizophrenia, dialysis due to renal failure, congenital malformations requiring specialized care, and rare diseases are excluded from the patient list produced as a result of the risk-stratification algorithm. Likewise, patients with more than two of a selection of non-triad chronic conditions are excluded due to the resulting complexity of managing all of their medical conditions. Patients with more than one of a selection of mental conditions considered are also excluded from the patient lists for the care management pilot, given that a family physician is unlikely to be able to take care of the care management needs of a patient with two different mental conditions. Finally, patients who have a total of more than 7 chronic conditions are excluded from the patient lists and the care management pilot as well[4] (see Figure 5).

The patient selection process ensures that patients are selected whose needs are complex but not so severe or complicated as to overwhelm the ECM team resources. Following selection of patients via the algorithm, ECM teams reviewed the list and removed or added names based on their clinical experience and intuition, following the hybrid approach to risk stratification described in section 3 (See Figure 6). One of the key innovations of the agreed upon risk-stratification approach is that it does not only identify patients that have been high users of the health care system in the past, but it also selects and targets patients that have not been regularly in touch with their health care providers. These unknown patients have risk factors (i.e. a condition from the metabolic triad) that if poorly managed can to lead to a worsening health status, disease progression, and future high healthcare utilization. Given the nature of chronic diseases and their way of progressing if not properly treated, patients that do not regularly seek care and help with disease prevention from their family physicians constitute another patient group of interest for the proposed care management intervention. These patients are referred to as unknown patients, because their doctors – while being assigned to them – are not necessarily aware of their needs and current health status, because they tend to have very few or no visits during the year (see group marked "target group II) in Figure 7 below).

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[4] All the 45 chronic conditions that do not warrant an immediate exclusion due to their severity/dominance are considered in the count towards the total number of chronic conditions.

Figure 5: The Patient Selection Algorithm for the Estonia ECM Pilot
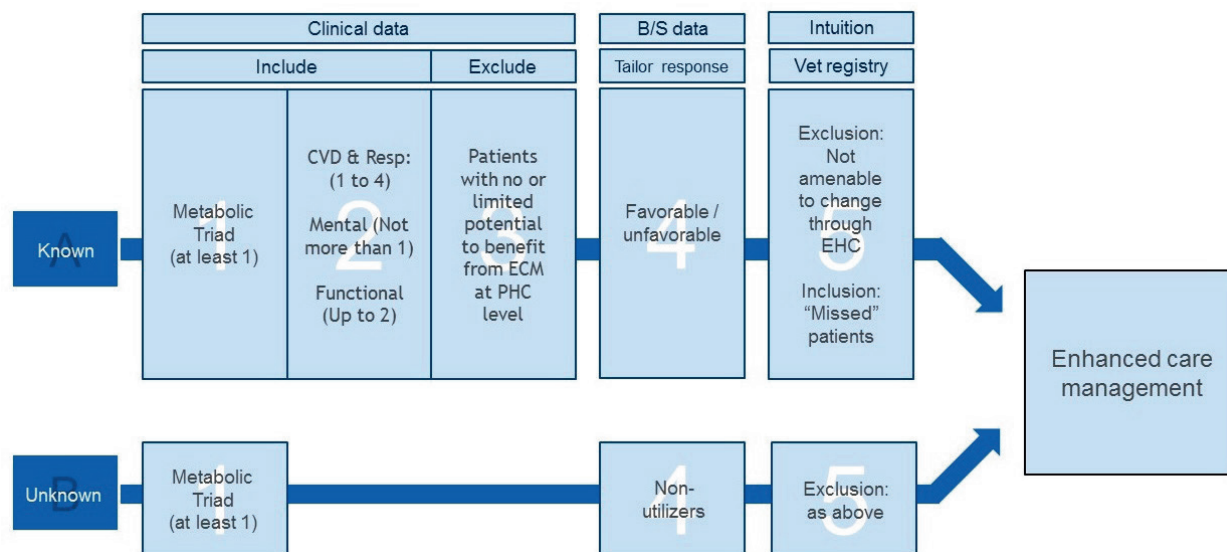
Source: Own Elaboration.

Essential Inclusion Criteria:

- **At least 1 Metabolic triad condition** (hypertension, hyperlipidemia, diabetes mellitus) **and**
- **1 – 4 respiratory and/or cardiovascular disorders,** where 0-2 of Asthma, COPD and 0-2 of ischemic heart disease, stroke, congestive heart failure, atrial fibrillation.

Optional Inclusion Criteria:

- **0-1 mental disorders** (mood disorders, alcohol abuse, substance abuse, dementia) **and**
- **0-2 functional disorders** (vision impairments, hearing impairments, frailty).

Exclusion Criteria:

- **More than 2 cardiovascular disorders/ more than 1 mental disorder**.
- **Any diagnosis of certain disorders**: Acute cancer, schizophrenia, kidney disorders requiring hemodialysis, congenital malformations and rare diseases[5].
- **More than a total of 7 comorbidities:** Diagnoses from the inclusion list, plus list of most common chronic conditions (see Annex 3).

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[5] Though if you wish to include these patients, you may make an exception.

Figure 6: Venn Diagram of Patient Types and Two Potential Target Groups of Patients
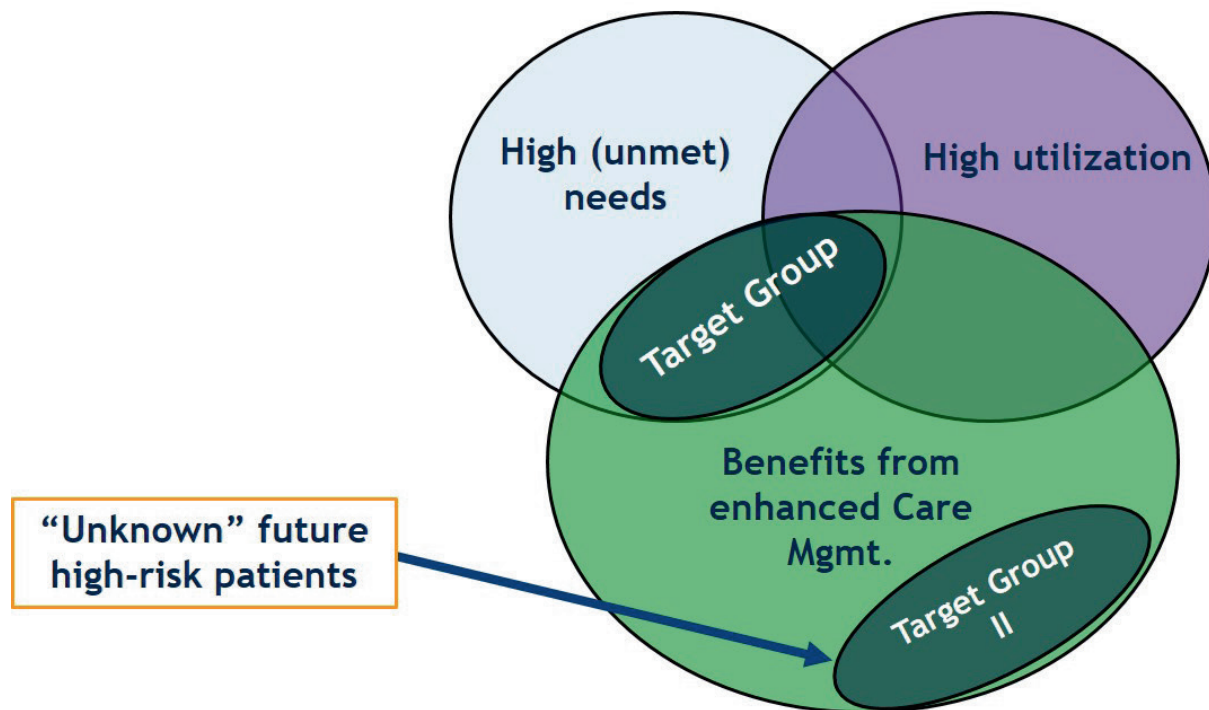
Figure Adapted from: Gerard Anderson & Claudia Salzberg (2016), Identifying High Need High Cost Individuals, Johns Hopkins University.

Following international experiences with care management, the patient selection algorithm for Estonia identifies complex patients with multiple comorbidities and/or social and behavioral health problems as the ideal candidates to be included in a care management program. These patients account for a disproportionate burden of illness, healthcare utilization, and cost. However, care coordination for this segment of the population in the absence of an ECM program can be challenging since they often receive care from many different providers, take multiple prescription medicines, and have high rates of functional limitation. This tailoring of the risk-stratification model to the available care management interventions, and the inclusion of provider intuition to remove patients selected by the algorithm and add new patients, ensures that the patients enrolled in the care management program can potentially benefit from it. The key criteria of inclusion for any given patient is whether they have high unmet potential needs and whether they can benefit from the care management interventions, rather than whether they have had high costs or service use in the past. This approach allows for the inclusion of the "unknown" future high risk patients as described above and focuses on the health maximization for patients included in the care management program.

2nd Family Physician Workshop - November 2016

Following the first workshop, the patient selection algorithm was implemented and tested using EHIF claims data. The 2nd Family Physician Workshop in November 2016 began with a review of the

selection approach. For instance, working group members were familiarized with the distribution of candidate patients for a care management program across the different archetypes (medical archetypes, without considering social and behavioral patient characteristics, see Table 1) considered in the patient selection approach. For this workshop, family nurses joined the working group, attesting to the importance of a team approach for the success of the care management program.

Table 1: Distribution of Estonian Patients Across Archetypes (Medical) in 2015

Archetypes (Medical)	Absolute	Percentage
CVD & Resp. & Mental & Functional	382	0.20
CVD & Resp. & Mental	2,741	1.47
CVD & Resp. & Functional	1,946	1.04
CVD & Mental & Functional	1,541	0.83
Resp. & Mental & Functional	179	0.10
CVD & Resp.	15,491	8.31
CVD & Functional	8,432	4.52
CVD & Mental	13,441	7.21
Resp. & Mental	2,419	1.30
Resp. & Functional	1,072	0.58
CVD	87,637	47.01
Resp.	16,248	8.71
Any of the above	151,529	81.28
Unknown Patients	34,898	18.72

Source: World Bank team calculations.

Mirroring international best practices in care management (see Section 3.), family physicians and nurses attending the workshop were trained in the 4 key components of enhanced care management, namely i) risk-stratification (utilizing the inclusion/exclusion algorithm defined at the 1st workshop), ii) the preparation of care management plans, iii) proactive outreach and transitions follow up, and iv) team building with patients and caregivers. In addition, the group discussed overall pilot logistics, the timetable, and the monitoring & evaluation framework of the ECM pilot.

The patients identified by the algorithm presented a starting point of discussion, but were not required to be included on the participating physician's ECM program lists. Since the process aimed to identify the patients most likely to benefit from care management (without being unmanageably resource-intensive), family physicians were asked to refine the algorithm generated patient lists and

remove patients unlikely to benefit (by providing a reason for their decision to exclude). They were also asked to add patients who they felt were missed by the algorithm. Exclusion and inclusion were directed by the general guidance presented in Table XX below.

Table 2: Guidance for care teams when excluding/including patients for ECM program

Tendencies to exclude certain patients that may have the potential to benefit most	Beware of making assumptions that patients *won't* benefit / want to be involved.
	Beware of biases: try not to exclude patients who elicit negative reactions from providers unless there is a good reason.
	Patients with flagged social risks should be *included* unless there is a very significant exclusion reason.
	Care management programs often benefit patients previously unengaged by traditional primary care models, e.g. poor past adherence to treatment, poor health literacy or lack of engagement.
Practice capacity to deliver benefit from care program	If a patient's disease is severe but likely to benefit from care management, they should be included; if not, do not include.
	Your assessment of whether particular patients will benefit from care management might depend on the composition of your care team, access to particular care providers, capacity, etc.
Current support levels	Existing relationships with other providers such as specialist physicians (e.g. oncologist), private care managers, or institutional care providers (group homes, assisted living) may lessen the additional benefit of care management.
	Isolated patients may particularly benefit from proactive continuous outreach: absence of family support may limit their ability to navigate and negotiate the care system.
Safety considerations	Do not select patients who are likely to be a safety risk to practitioners.

Family physicians in Estonia have, on average, an assigned patient list of around 1,700 people, and many work in solo practices with only one nurse. Considering this context of the Estonian primary health care system and the objective of evaluating the feasibility of a care management program in Estonia, a package of interventions was discussed for inclusion in the care management package. Three steps were agreed upon to guide the implementation of the care management package.

The first step for the enhanced care management on the high-risk patients is needs assessment and care planning. Care plans should be designed first and foremost with patient use in mind and tailored to each patient. The following key principles should be used to achieve this goal:
- **Co-Development:** Care plans should be co-developed with the patient, care provider, and/or patient family members.

- **Keep It Simple:** Care Plans should be organized in a format that maximizes clarity and promotes use by both the patient and provider. It is essential that the patient feel the care plan is accessible.
- **Remember the Overall Goals, and Continually Reassess the Work:** There is a distinction between a care plan (which is static) and the activity of care planning (which includes an evolving assessment based on care provided and aligned with the care plan).

Table 3: Components of the final care plan

Needs assessment	A summary of all active medical problems and key issues the patient wants to address.
Medication	A list of all medications the patient is currently taking including times when they should take them.
Patient goals	2-3 patient goals written in their own words: what does the patient want most in terms of their health? e.g. improved health outcomes, self-care considerations, utilization of certain services, meeting psychosocial challenges, etc.
Action plan	Identify relevant health issues that might occur and articulate contingency plans (if *x* happens, then do *y*).
Care transitions	Articulate what they should do if admitted to hospital (e.g. phone the family practice to alert the care management team)
Contact information	Patient and relative contact details Doctor and nurse contact details Day and evening contact details

The second step for the enhanced care management on the high-risk patients is care coordination and communication with other healthcare and social care providers. The family physicians were asked to keep track of the high-risk patients by ensuring compliance with national guidelines (current quality bonus system), reconcile medication plans and improve adherence, follow up on the high-risk patients during care transitions (e.g. follow up calls, visits after hospital discharges, etc.), track lab tests and referrals, and monitor of patients between scheduled visits.

Prior to the workshop, the WBG team conducted a survey of family physicians to evaluate their familiarity with available social services and benefits at the municipality and state level. The survey also documented their views on whether coordination with these entities was their responsibility and to solicit feedback on their experiences interacting with social services in the past. The survey revealed gaps and misunderstandings regarding the role of family physicians in interacting with social care providers, particularly with respect to identifying which social resources were relevant in particular patient care situations.

The family physicians involved in the ECM pilot were therefore asked to improve information flows between physician care teams and social care (services available, services received). The main aim was to increase coordination with social workers and promote wider implementation of social needs screening by the family physicians. Connecting patients in need with relevant social services can have a significant impact on their quality of life and ability to benefit from care management activities. The physicians were asked to contact municipalities to identify available services and establish relevant contacts per the following protocol:

1. Review their registry lists to identify the municipalities where patients with social care needs reside.

2. Contact the municipalities to create an inventory of services offered by each municipality with relevant contact information and referral instructions.
3. Identify relevant points of contact at the municipality to help coordinate referrals for state-provided services/benefits.

The third step towards enhancing care management involves building an effective team in the practices enrolled in the program. The family physicians were asked to restructure their current work flows in order to optimize outreach to patients enrolled in the ECM pilot. For instance, nurses and family practitioners involved in the care plan pilot could meet weekly for approximately 1 hour devoted to a care management discussion, during which time they could review the registry and discuss updates to individual patient care plans. The family physicians and nurses involved in the pilot would then create an action plan wherein they describe all the pilot related activities and how the tasks are divided across the team.

- Review patients that the team is concerned about for any reason (change in health status, social challenge, inability to contact, etc).
- Discuss patients recently admitted or seen in the emergency department and ensure that they have a follow up plan and follow up visit scheduled.
- Assess which patients need a care plan revised or updated, and outline how that will happen.
- Assess who needs to be connected with social services or referred to specialty physicians, and who will make these referrals.
- Update essential elements of the registry.
- Identify and assign key follow up tasks (with due dates) to team members.
- Ensure follow up actions are performed including scheduling patient outreach or appointments, establishing follow up plans with patients after hospitalization, updating care plans, and interactions with social services, arrangements for QBS-related laboratory tests, or initiation of appropriate medications based on patient conditions.

5. Implementation – Conducting the ECM Pilot in Estonia

The pilot was officially launched in January 2017, designed as a feasibility and acceptability test of the care management program and engaging a limited number of care teams and patients to enable a rapid testing and refinement of the care management process to ensure that the implementation could be appropriately tailored to the local context before being scaled-up. Overall, 10 family physicians and 1 resident working on a total of 9 different patient lists joined the pilot. The main objective of the pilot was to assess the feasibility of implementing enhanced care management in the primary health care setting in Estonia, to understand the impact of the pilot on care management processes and selected patient outcomes and to learn from experiences to inform a possible scale-up throughout Estonia. The care management program itself was designed with the objective of improving the health outcomes of complex patients (and potentially reducing their needs for healthcare utilization). However, given experience from other countries which suggests that fully realizing these outcomes can take several years, this six-month pilot was not expected to result in improved patient outcomes.

Guideline for the Pilot Implementation

Prior to the pilot start, participating family physicians and nurses received a written guideline explaining the rationale of the pilot and describing the different pilot activities in detail. For each of three key pilot activities—applying intuition to patient lists, building care plans, and the process of care coordination and dashboard maintenance—the task team had developed Standard Operating

Procedures (SOPs). These SOPs were drafted based on a review of the global literature on risk-stratification and care management and the experience of the task team members in implementing similar programs in other settings.

The patient dashboard

The patient dashboard is the central management tool related to the care management pilot for care teams. It is a working document that houses key information for all patients potentially entering the care management pilot. The dashboard allows family care teams to review patient lists and make exclusions/inclusions, and – as importantly - the purpose of the dashboard is also to provide care teams with important, standardized, up-to-date information about each of the enrolled patients to simplify the monitoring of their care. There is functionality for patient care plans to be hyperlinked within the dashboard, and in general the dashboard is the main tool for improving patients' care coordination. Maintaining the patient registry is critical to successful care management, since it allows to quickly access patients' care status and current needs and determine who is falling behind in their care plan and/or requires additional care team attention. However, the dashboard developed by the EHIF was set up only by mid-February, delaying the process of reviewing initial patient lists. A lack of user-friendliness prevented the dashboard from becoming the key management tool for family doctors that it potentially could be.

Creation of Patient Lists

In January, the EHIF sent each family practitioner from the working group the list of patients identified by the selection algorithm for a potential inclusion in the care management program. The original plan was for each family practitioner to enrol at least 20 patients per month between February and May. However, all family physician practices encountered some difficulties when enrolling patients during the first months of the pilot. Due to the delayed readiness of the dashboard, the EHIF manually selected patients in each practice who fit the pilot algorithm and sent a list of eligible patients to providers via email. The dashboard was ready by February, but some practices noted discrepancies between their list received from EHIF via email and the one from the dashboard. These technical challenges delayed patient enrolment. The original pilot timeline estimated that each site would have enrolled 50-75 patients by the end of May. In reality, only 40-60 patients from each list were enrolled by the end of May.

Monitoring and Support Functions

▪ A team of local coordinators was hired for the logistical support of the pilot. These coordinators included a local World Bank consultant, a current EHIF staff member, and a physician. Their role was to help family practitioners execute the pilot, troubleshoot problems, and conduct fidelity and outcome monitoring. The local coordinators had an absolutely critical role for implementing and executing the pilot successfully.
▪ The EHIF organized communication and outreach activities to keep stakeholders informed about the work streams and progress made under the care management pilot.

Webinars and Training

Throughout the pilot, family practitioners joined a series of webinars to reinforce and refresh their initial training. The webinars were led by the local pilot coordinator (World Bank consultant).

Table 4: Webinars and Seminars—Topics and Participation Rates

	Videoconferences							Seminar
Date	**20. January**	**3. February**	**15. February**	**28. February**	**17. March**	**5. April**	**28. April**	**21. May**
Topic	Reflections on Building Teams in Primary Care	Coordinating patient care after hospitalization	Review of provider intuition and care plans	Dashboard and finalizing the lists	Eliciting Patient Goals and Promoting Patient Activation	Social Needs Assessment and Resource Connections	Statins and Medication Reconciliation	Seminar on ECM patient stories presented by the nurses and FP-s
Participation Rate	91%	73%	73%	45%	73%	64%	45%	91%

To evaluate fidelity of the pilot implementation, the local coordinators conducted monthly meetings with all family practitioners who were then evaluated qualitatively and quantitatively to measure their progress with respect to different aspects of the care management program. Table 5 states the different evaluation criteria used. Family practitioners were graded on a 1 (poor) to 5 (excellent) (see also Table 5 for more insights on the scale). Together with qualitative data from the monthly meetings, the quantitative score was used to inform pilot implementation in real-time. For example, the local pilot coordinators noticed that many of the family practitioners were having trouble developing patient-friendly care plans and decided to hold a webinar about the topic. During that webinar, each family practitioner had to present an example of a patient-friendly care plan from their own practice and then received feedback from the other participants. As a result of the webinar, the quality and user-friendliness of care plans improved rapidly.

Table 5: Evaluation Criteria for Pilot Implementation and Monthly Report Rubric

Evaluation Criterion	Description	1	3	5
Understanding of Pilot	Familiarity of family practitioners with the pilot goals, tasks, and materials.	Does not understand the aim of the pilot and is not familiar with the tasks or materials.	May understand the aim of the pilot but is familiar with only some of the tasks and materials.	Understands the aim of the pilot and is familiar with all the tasks and materials.
Action Plan	Existence of a formal plan for pilot implementation developed by the family practitioner and their staff.	No action plan.	Action plan is missing components.	Action plan includes all components.

Use of Intuition	Understanding by care teams of how to include or exclude patients in the pilot based on their intuition.	Does not know how to apply intuition and not able to articulate rational for inclusion or exclusion.	Has applied intuition to include and exclude patients, but relies heavily on EHR data and/or inappropriately excludes patients with certain conditions.	Has applied intuition to include and exclude patients, understands the goals of intuition, and may continue to modify list as needed.
Team Work	Clearly defined roles and responsibilities between physicians and nurses and a regular meeting time to discuss the pilot.	Have not defined roles and responsibilities within the team or procedures for managing patients on the list. Have no regular meeting time.	Have established some roles and responsibilities and procedures for managing patients on the list. Have no or very infrequent meetings as a team.	Have agreed on roles and responsibilities within the team and procedures for managing patients on the list. Have established frequent and regular meeting times.
Patient Enrolment	The number of patients enrolled in the pilot each month.	No patients have been invited to participate.	Some patients have been invited to participate.	All patients have been invited to participate.
Care Plans	Quality of created care plans (measurable, time-bound health goals, a plan to achieve those goals, contact information of the patient, their family, and family practitioner).	Have not established patient-friendly care plans, and instead use the dashboard outline. Most patient goals, and action plans, and care transitions are too general and do not follow the rules of good care plans.	Have established patient-friendly care plans which contain most required information. Most patient goals, and action plans, and care transitions are too general and do not follow the rules of good care plans.	Have established patient-friendly care plans which contain all required information. Most patient goals, action plans, and care transitions follow the rules of good care plans.
Established Link with	Family nurses have contacted hospitals	Have not contacted the	Have contacted the hospital, but	Have contacted the hospital and have a

Hospitals	to obtain access to the hospital's electronic medical records or to establish another way to regularly share data.	hospital.	do not have a way to regularly share data.	way to regularly share data.
Regular Communication with Hospitals	Family nurses/care teams know about patient admissions, discharges, ER visits, and ambulance calls.	Do not reach out to the hospital or check the hospital EMR to determine whether patients have been seen recently.	Sometimes reach out to the hospital check the hospital EMR to determine whether patients have been seen recently.	Frequently reach out to the hospital check the hospital EMR to determine whether patients have been seen recently.
Established Link with Social Services	Care team establishes contact with social workers and is aware of available social services, knows the municipalities where a patient lives.	Have not contacted a social worker, do not know where patients live, and are not familiar with what social services are available.	Have contacted a social worker and explained the pilot, are somewhat familiar with the available services, but have not agreed on a contact person.	Have contacted a social worker and explained the pilot, are familiar with the available services, and have agreed on a contact person.
Regular Connection with Social Services	Care team screens for social needs	Do not see a need to screen for social needs. Rarely contact a social worker when a need is discovered.	May know their patients well, but do not regularly screen for social needs. Usually contact a social worker when a need is discovered.	Regularly screen patients for social needs. Always contact a social worker when a need is discovered.
Coordination of Patient Care	Regular reviews of care plans together with patients, arranging of next patient visits in advance, reviewed care plans with patients, proactive tracking of patients'	Rarely schedules next visit or contact time with patients. Rarely reviews care plans on follow up visits. Rarely checks whether the	Usually schedules next visit or contact time with patients. Usually reviews care plans on follow up visits. Usually checks whether the patients have	Always schedules next visit or contact time with patients. Always reviews care plans on follow up visits. Regularly checks whether the patients have bought the medicines

	medication adherence, follow ups with patients recently discharged from the hospital.	patients have bought the medicines prescribed. Rarely contacts patients after learning about specialist visit or hospitalization.	bought the medicines prescribed. Usually contacts patients after learning about specialist visit or hospitalization.	prescribed. Always contacts patients after learning about specialist visit or hospitalization.

6. Results – Evaluating the Estonian ECM Pilot Experience

The following section provides a summary of the results from the ECM pilot evaluation based on an analysis of health insurance claims, stakeholder interviews (key informants and patients), a pre- and post-pilot provider survey and the monthly pilot monitoring reports prepared by the local coordinators. The monitoring & evaluation framework underlying this analysis as well as the frameworks of key informant and patient interviews can be found in Annex 2. The reference for the provider survey is stated under References.

In order to trace an impact of the pilot using claims data, **a difference-in-difference approach** is being employed. As part of the pilot preparations, the entire Estonian population was risk-stratified based on the methodology developed for the ECM pilot in Estonia. As a consequence, the group of patients selected by the risk-stratification algorithm but assigned of non-pilot family physicians constitutes a good comparison group for the group of pilot patients: They had comparable risk-profiles and utilization patterns prior to the pilot, but only the pilot patients were exposed to enhanced care management. The claims data analysis employs data from February – August 2016 and 2017, respectively.

Feasibility

The care management program met each of its implementation target areas and proved to be feasible. A total of 466 patients (197 men and 269 women) were enrolled (and not subsequently excluded) in the care management pilot program between February and August 2017. Despite the short duration of the pilot, the ECM program was quickly adopted by participating practices, as an implementation science summative matrix of performance (see Figure 7) quickly shows. The adherence with key pilot activities consistently improved from the start toward the end of the pilot.

Finally, all the key informants stated that the pilot did meet the objective of proving the feasibility of care management in the current healthcare organizational model. The pilot showed that it is possible to improve the collaboration between social and healthcare providers. Challenges remain in the collaboration with hospitals and social workers as well, but important improvements have been made.

Figure 7: Change in Pilot Adherence (Across all FP Sites)
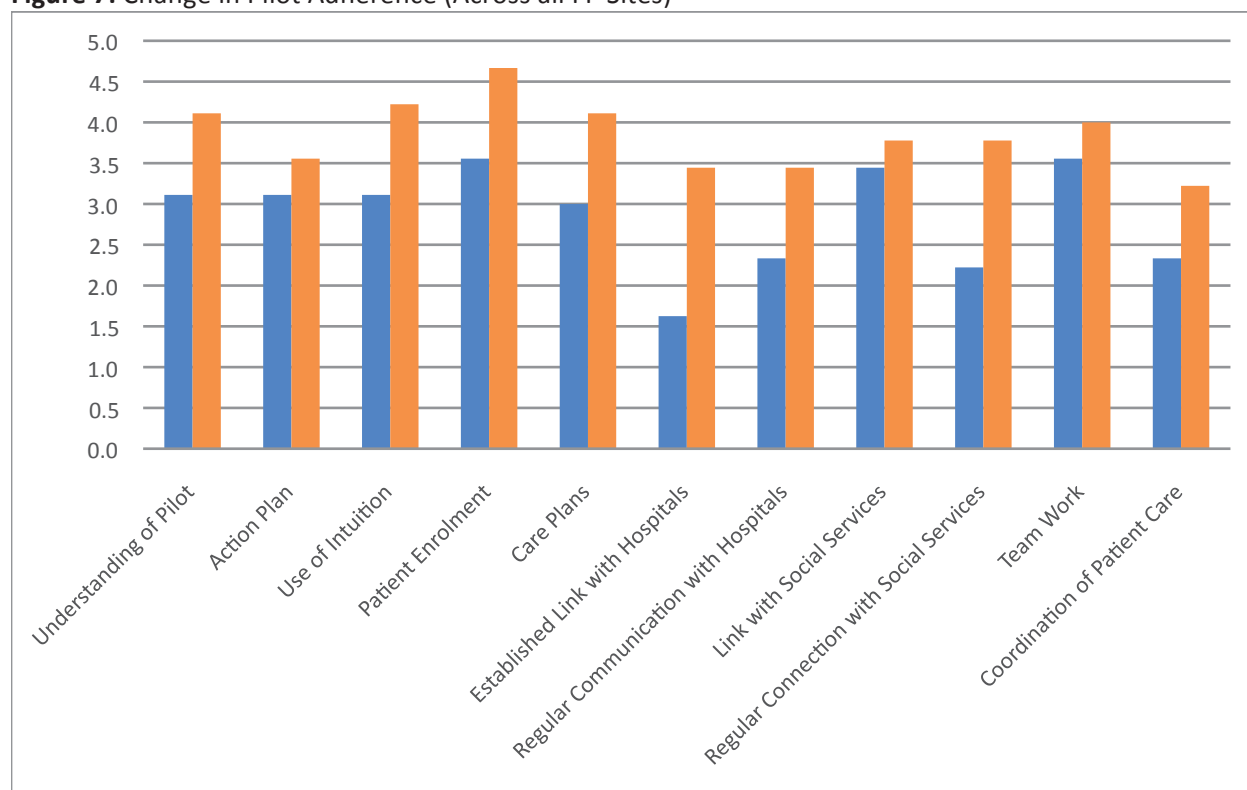
Source: Own Elaboration.

Patient Enrolment

Not all the FPs reached the goal of enrolling more than 50 patients and creating 50 care plans. However, 92% of enrolled patients have a completed care plan. The last FP finalized her list on the dashboard only in mid-March. Initially, most care plans were poorly designed. One problem was that, instead of developing a custom plan with each patient, some family practitioners simply printed off generic templates from the dashboard. These generic care plans were not patient-friendly. For example, they included pharmaceutical codes under the medications list instead of the name of the medications. Another problem was that family practitioners and patients both found it difficult to come up with measurable, time-bound goals. To improve the quality of the care plans, the local coordinators decided to hold a webinar about the topic. During that webinar, each family practitioner presented stories about at least two of their patients and gave an example of the care plans from their own practice. The care teams also received a comprehensive template in Estonian on how to conduct care plans. After this webinar, the local coordinators found that the quality of care plans for many sites improved. Patient interviews showed that about half of the interview patients were aware of the existence of their care

plans. In those cases, patients report that their care plans were also being used to manage their own care needs.

Link with Hospitals

Nearly every pilot site found it difficult to work with their municipal hospital at first. Most sites were not able to arrange for notification whenever a patient was discharged from the hospital. However, by the end of the pilot, 4 of the 9 sites were able to regularly access the hospital's electronic medical records to receive data about their patients.

Acceptability

By patients: At the start of the pilot, there were some concerns among stakeholders that Estonian patients might not be very willing to enrol in a care management program. Also, key informants mentioned that the enhanced care management model make patients even more dependant. However, less than 10% of the patients that were approached with the offer to join the enhanced care management program, actually rejected to be included in the pilot. In some practices, no patients declined to participate. In fact, the patient interviews show that about half of the interviewed patients would recommend the pilot to be extended. These are exactly the patients that also state that they actually know their care plan and were properly introduced to the pilot by their FPs. The remaining patients are indifferent regarding the pilot, given that they did not really notice any change in service delivery.

By family doctors: While family doctors in general embraced the pilot, few among them did not think that their values as practitioners would fit the pilot well. In that regard, the recurrently cited theme was patient responsibility. Several family practitioners expressed that patients should be responsible for notifying their physician after being discharged from the hospital.

Process

The utilization of PHC services increased for pilot patients across the board relative to the comparison group (Table 6). However, the relative increase in the use of physical visits of the family doctors was minimal. In contrast, the increase in telephone consultations (both with nurses and FPs) as well as the increase in the number of pilot patient interactions with nurses in general is notable. The increase in phone consultations of pilot patients is a sign of the better care coordination offered to ECM pilot patients, while at the same time the fact that in-person visits with family doctors did not increase for pilot patients underlines the feasibility of ECM (no major additional resources are needed for the care provision to pilot patients).

Table 6: Changes in Per-Capita Utilization of PHC services

Changes in per-capita utilization	Pilot	Comparison Group	Diff-in-Diff Percentage change

1st-time or follow up visit with GP	(0.762)	(1.042)	10%
Prophylactic visit with GP	0.026	0.011	53%
Home visit by GP	0.004	(0.001)	52%
Phone call with GP	1.617	0.982	118%
Consultation with nurse	0.208	(0.021)	16%
Home visit by nurse	0.026	0.001	296%
Phone call with nurse	1.065	0.088	237%

Source: World Bank team calculations.

At the same time, the provision of laboratory diagnostic tests to pilot patients increased considerably in comparison to comparison group patients. Table 7 states a list of procedures that are part of the guidelines for diabetes/hypertension patients and that are also reflected in the QBS (with the exception of albuminuria testing which is no longer a QBS-relevant procedure as of 2017, see the corresponding immense decline in the use of this diagnostics test).

Table 7: Percentage Changes in Diagnostic Lab Testing for Pilot and Comparison Group Patients

% Change 2017 vs. 2016	Pilot	Comparison Group	Difference
Albuminuria	-77.4%	-88.1%	10.7%
Cholesterol	38.5%	-6.1%	44.7%
Cholesterol fractions	42.9%	-6.0%	48.9%
Creatinine	32.5%	-10.3%	42.9%
EKG	80.4%	-4.5%	84.9%
Glucose	44.4%	-4.3%	48.7%
Glycated Hemoglobin	33.1%	-2.2%	35.3%
Potassium	25.0%	-6.6%	31.6%

Source: World Bank team calculations.

Outcomes

Tables 8 and 9 state major outcomes for pilot patients and attest to the improved quality of care delivered to pilot patients. The number of pilot patients with a prescription of statins increased by almost 12 percentage points or about 30% from 2016 to 2017. At the same time, and reflecting the increased number of phone conversations between pilot patients, the percentage of acute care admissions that had a follow up within 30 days of discharge increased drastically by 20 percentage points to more than 70% of all cases of discharged patients. The average time between a hospital discharge and the follow up visit decreased by about half a day for pilot patients, mirroring the decrease for patients in the comparison group.

Table 8: % of Patients Receiving a Prescription of Statins

% of Patients with Statin Prescriptions	Pilot	Comparison Group	Difference
2016	38.6%	31.5%	-7.1%
2017	50.6%	31.8%	-18.8%
Change	12.0%	0.3%	11.7%

Source: World Bank team calculations.

Table 9: Follow ups within 30 Days after Acute Care Discharge.

% of Patients with Post-Acute Care Follow up Call or Visit	Pilot	Comparison Group	Difference
2016	52.4%	57.7%	5.3%
2017	71.7%	56.4%	-15.3%
Change	19.3%	-1.3%	20.6%
Average Time (in Days) between Discharge and Follow up			
2016	8.77	10.90	2.13
2017	8.32	10.46	2.14

Change	-0.45	-0.44	-0.01

Regarding **medication reconciliation and adherence**, both the provider survey as well as patient interviews suggest that family physicians have obtained better means of communications with specialist in order to carry out medication reconciliation and that patients have actually noticed changes in their medication regime reflected in their care plans. Examples include patients that have received new medications and others that have stopped taking superfluous medicines. While the interviews and surveys show strong anecdotal evidence for a positive impact of the pilot on medication reconciliation, the available claims data does not clearly allow us to confirm that observation. At the same time, improvements in medication adherence cannot be traced down in claims data from the pilot implementation period, given that many prescriptions made in the last months have not expired yet, even though they have not been picked up. Hence, no conclusive statement can be made on the basis of the analysis of claims data.

Facilitators (+) and Barriers (-)

Dashboard Readiness and Technical Difficulties (-): Not all preparation materials were ready on time for the pilot start. To keep the pilot on schedule and not slow down the enrolment process, the EHIF provided lists of potential patients to each family practitioner in the form of MS Excel sheets. By February, the EHIF had successfully developed the dashboard, but some family practitioners found discrepancies between their initial patient lists and the new lists from the dashboard, which created confusion among family practitioners and frustration with the dashboard. Several family practitioners requested guidelines for the dashboard. In addition, the current development of the dashboard is not very user-friendly and requires family physicians to perform a lot of extra and double reporting, effectively decreasing their motivation.

Participatory Pilot Design (+): The pilot initiation did take more time than expected, but the implementation processes had been conceived in cooperation with family physicians. In particular, the algorithm was developed together with the same family physicians and nurses who piloted the care management program. The fact that the intuition of family physicians regarding their patients is applied in the selection of patients increased their motivation and has proved to be a key success factor for the pilot.

Language Barriers (-): One early barrier was language. Since most of the pilot activities are in Estonian and English, there was a language barrier for parts of Estonia with many Russian speakers. The dashboard and example care plans are in Estonian, which made it difficult for Russian-speaking patients to understand the care plans.

Involvement of family nurses and joint learning (+): One success factor expressed by key informants was the involvement of nurses. The pilot initiated changes in how the family physicians and nurses work together and the service delivery model of enhanced care management gave nurses more

responsibilities. This has enforced changes in the way the nurses and doctors work together within their teams and how they coordinate chronic patients care and share tasks within their practice. The pilot design also focused on joint learning, bringing primary healthcare providers together and giving them the possibility to learn from each other's experiences. Key informants highlighted the importance of having the possibility to consult patient cases with peers.

7. Conclusions and Planning for Scale

Conclusions

This pilot study has demonstrated that enhanced care management is both feasible and acceptable in the Estonian health care system. All pilot activities—including the development of an algorithm to identify patients; the applying of provider intuition to finalize patient lists; the formation of teams of family doctors and nurses within primary care practices; the enrolling of patients; the establishment of individual patient care plans; and building connections between primary care and hospitals as well as the social services sector—were completed on or ahead of schedule. Claims data analysis from EHIF shows improved rates of 30 days follow up visits after hospitalization, improved rates of appropriate statin prescriptions, and improved cholesterol testing. There was a non-significant trend toward improved specialist visits and avoidable admissions.

Based on this demonstrated success, the EHIF has committed to scaling up ECM and prepared an action plan detailing next steps and targets. Established targets include expanding the pilot to at least 20 primary care practices in 2018 in order to receive data, analyze the progress and develop a comprehensive monitoring and evaluation framework. The future goal is to roll out a nation-wide enhanced care management program in Estonia. In order to meet this timeframe and successfully scale the program, several action items will be required, as outlined below.

A Strategy for Scale

Scaling the Enhanced Care Management Pilot from nine family lists to all 800+ family lists in the whole country is a laudable but ambitious target. Achieving this goal will require a clear, deliberate strategy for scale that considers perspectives of all stakeholders, including EHIF, family doctors, nurses, patients, hospital representatives, and stakeholders from relevant social services. It will require an ongoing commitment to technical assistance through both direct and web-enabled coaching and coordination services. Most of the key informants actually stated that the scaling of ECM should be incremental. The scaling strategy should address important considerations such as:

- The optimal method and timing of enrolling new practices into the program.
- The payments and incentive scheme provided to these practices for new activities.
- Other stakeholder involvement (i.e. hospitals and social workers).
- Other ongoing or planned changes to primary care design and the health system overall in the Estonian context.

For the next phase of the pilot, a number of resources are necessary to draw upon. The FP participants and EHIF staff who were involved in the first pilot are a critical group that could provide coaching and advice around scaling the model. Focused resources directed toward coaching, educational materials in Estonian, and direct practice support will be required. Over the longer term, educational training within graduate and continuing medical and nursing education regarding the value and practice of enhanced care management will be necessary.

The planned staged expansion of the Enhanced Care Management Pilot affords a valuable opportunity to strategically plan for a building and learning period in 2018 that employs rapid-cycle testing in order to iterate and improve on program materials and procedures in preparation for a nationwide scale-up. At the same time, already participating care teams can further increase the number of patients to be enrolled in the care management pilot. Currently, only around 3% of empanelled patients joined the pilot on average across pilot practices, whereas a typical target percentage of patients for care management programs is around 6-7% of all empanelled patients.

Patient Dashboard Development

A common challenge faced by participants in the pilot was the limited functionality of the dashboard developed to allow providers to track pilot activities, store care plans, and facilitate proactive care management. Before beginning the enrolment of new care teams into the pilot, it will be important that this potential barrier to scale is mitigated. This could be accomplished by conducting an assessment of changes needed to the dashboard and user testing of a revised dashboard to ensure that the design is user-friendly and supportive of the core ECM activities that care teams need to undertake.

Improved Implementation and Update of the Patient Selection Algorithm

Feedback from family doctors and nurses involved in the pilot activity suggests that the algorithm to identify patients for pilot participation – as it has been implemented - may need to be revised and/or updated to ensure that those patients who are most likely to benefit from ECM are being targeted. Using data from the pilot period and in consultation with nurses and family doctors, an important next step will be to revisit the patient archetypes targeted by ECM in order to solicit specific care team concerns and identify areas for improvement. Following refinements of the patient archetype, the algorithm used to generate patient lists will need to be updated. Implementing the random selection mechanism in order to balance the size of patient lists passed on to family physicians for their review (see Figure A1 in Annex 3) would be a straightforward but substantial improvement of the implemented patient selection algorithm. Furthermore, the prioritisation of patients within the registry list based on behavioural data (i.e. whether the patients have filled all their prescriptions during past months) and social patient characteristics (e.g. whether the patient may be socially vulnerable) still needs to be fully developed and then used, as currently this information is not used in the patient selection process.

Scalable Coaching Methodology

The coaching employed during the pilot period was critical to the pilot's success. While it may be feasible to scale the coaching method employed during the pilot to at least 20 family physicians, the

eventual scale-up of ECM across all of Estonia will require a different model for providing coaching support to ensure feasibility and compatibility with available personnel and funding. Therefore, a key to successfully achieving the targets established by EHIF will be developing a sustainable coaching, mentorship, and problem-solving support system to all care teams involved in enhanced care management. The support system should build on the lessons learned about which coaching functions and activities were most helpful to pilot participants. A plan for expanding coaching activities to all members of the care team involved in care management activities, including nurses, should be prepared.

Training Program and Materials

Training on enhanced care management for pilot participants was also essential to the pilot's success. Training activities included two workshops as well as a series of six webinars focused on building the knowledge and capacity of participating family doctors. Similar to coaching, in order to successfully scale enhanced care management to all family doctors in Estonia, it will be necessary to develop a scalable and sustainable training program and supporting materials for care teams. This program should address training for the following groups:

For Pilot Doctors

The topics addressed through training during the pilot primarily involved how to get started with enhanced care management activities. However, as family doctors continue these activities past the six-month pilot period, a new set of skills and capacities will be needed. The training program and materials that will be developed should address the continuing education needs of family doctors and care teams to ensure that the full cycle of ECM activities is covered by available training. New topics that future training may need to address include, among others: supporting complex patient goals, such as weight loss; ensuring a dynamic patient registry over time; and screening for social needs and connecting with social services.

For new Family Doctors

The training strategy should also address how to sustainably provide training—both on foundational pilot activities as well as more advanced topics—at scale to a large number of family doctors. The family doctors participating in the program have highlighted that at the beginning of the pilot, it was essential to have a more thorough training program about ECM. Training activities conducted during the pilot period may provide a starting place for this program. However additional training modalities will also likely need to be explored in order to reach all family physicians in Estonia, both prior to their enrolment in ECM activities and on an ongoing basis as their engagement with ECM progresses.

For nurses

Training activities in the pilot period were largely targeted to family doctors. However, as is clear from the pilot experience and results, nurses are essential contributors to enhanced care management teams and successful scale will require fully capacitating and enabling nurses. Therefore, it will be important for the training strategy to establish a plan for training nurses (continuing and new) alongside or in addition to their physician counterparts.

Link with Social Care

The assessment of social care needs should be further strengthened as part of the care management program, and possibilities of working more directly with the social sector should be explored. As a result of the pilot, participating family physicians became aware of the opportunities to help their patients with their social care needs. While the awareness and acceptability of this activity increased among practitioners, the actual number of patients that receive any kind of social care service still is minimal.

Toward Patient-level, Activity-based Costing of ECM

Today EHIF lacks a mechanism to reimburse family physicians participating in the risk-stratified, enhanced care management program for patients with multiple chronic conditions and social and behavioural risks. As part of the process of scaling up the piloting program, a payment mechanism to reimburse participating family physicians for the costs incurred and to incentivize them to provide enhanced care management should be developed. The international experience suggests different options to pay for enhanced care management and coordination activities6. These payment choices range from a flat rate for each enrolled patient to payments for bundles of or individual services or to performance-based payments.

A first option is to compensate primary care providers in the form of a prospective, add-on payment for all patients enrolled into an enhanced care management program. For Estonia, this seems at least in the beginning the most appropriate choice. With the pilot, the EHIF adopted a risk-stratification approach, which identifies patients most likely to benefit from enhanced care management. Nevertheless, lessons about good performance are still limited, even at the process level. Because of that, it seems premature to tie payments for care management and coordination to performance indicators and targets as part of the current quality bonus system. Yet, close provider monitoring and other quality assurance measures will be required to ensure that patients receive adequate care. The risk-stratification system itself provides sufficient mechanisms to ensure that providers do not 'dump' patients that are difficult and costly to manage. Paying providers per performance may be an option in the future, where the fixed component of the care management and coordination component should be part of the capitation payment to avoid unnecessary complexity of the primary health care payment system. The best first step to start with, would be an add-on payment for all patients enrolled into enhanced care management program.

One of the aims of the pilot was to estimate the resources needed to permanently implement enhanced care management in primary healthcare in Estonia.

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[6] World Bank, 2017: Toward greater integration of care and improved efficiency - A critical review of EHIF's payment system. Summary Report, World Bank.

Currently a mixed payment system including capitation, allowances, fee-for-service payments and quality bonus payments covers the costs of providers to deliver a defined set of services for everyone. This includes chronic care management. Capitation payments cover the costs of labour, medical and non-medical equipment and devices, medicines, as well as office space and administrative activities. A monthly basic allowance covers the cost of premises, IT systems, transportation and training. Since the costs for labour, equipment, premises, lab tests etc. are covered already through the current payments system, estimating the extra time that nurses and family physicians spend on pilot-related tasks is the most relevant question.

All primary healthcare teams that participated in the pilot kept track of the time spent on different pilot-related activities to assess the resources necessary to conduct enhanced care management. The time that nurses spent per patient and on the non-face-to-face activities (i.e. activities related to care coordination, registry and team building) was being kept track of. The nurses were asked to report on the time that was spent by family physicians, nurses alone or in teams on pilot-related activities. The nurses submitted the data every month to the EHIF.

During the monthly monitoring visits, family physicians reported the average time they had spent using the registry or applying intuition to the patient lists as well as the average time spent per patient to create initial care plans and make follow up visits. Family physicians were also asked to report on the regularity of team meetings to discuss the pilot patients. The information provided by the family physicians was compared to the data reported by the nurses.

By the end of the pilot, nine main activities covering all tasks related to enhanced care management had been identified:

1. Inviting of patients, receiving patients' agreement to enrol in the pilot.
2. Preparation of the first patient visit.
3. First visits, creation comprehensive care plans.
4. Phone contacts.
5. Follow up visits, updates of care plans.
6. Reviewing the patient list, decisions to include/exclude patients.
7. Team meetings to discuss patients.
8. Reviewing and updating of the patient registry.
9. Coordination of patient transitions (social or specialist care).

The first five activities are related to one individual patient's care management. Inviting patients to enrol in the program and receiving patients' agreement has usually been a task of nurses in the practices participating in the pilot. The family physicians and nurses are both involved in the preparation of the patient visits. This usually includes the review of patients' medical records, current medications, the generation of a plan for analyses or needed tests etc. The first visit was usually done by the family physicians, because often the patients needed changes in the treatment plan (new medications or a

changing current treatment plan). However, there were also practices, where doing the care plans was the nurses' responsibility (two practices out of nine). The costing proposal should take into account that family physicians were the ones who mostly conducted the first care plans. Most of the follow up activities were supposed to be the nurses' responsibilities, including follow up phone calls and visits. Nevertheless, the claims data from the pilot period show that phone calls were still made by family physicians.

The last four activities are not exactly related to the care management of individual patients. These activities should take place every week or month to help to organizing enhanced care management in the entire practice. Both, the nurse and the family physician should review the patient list and inclusions/exclusions of patients. In bigger group practices, this might also need the inclusion of other staff members who have contact with the high-risk patients. Most of the practices (7 out of 9) did set up a regular meeting time for the nurse and family physician when they can discuss patient cases or care management. Following up on and updating the patient registry has mostly been the nurses' responsibility. This includes following up on the info that was made available through the dashboard about whether patients have bought their medicines and whether they have had a hospital discharge. In addition, nurses needed to keep track of when follow up contacts were made with patients and when the time of follow up visits changed. In most of the practices, both nurses and family physicians were involved in the coordination of patient transitions (social and specialist care). Usually the family doctors were the ones who did get in touch with the social workers if a social need was discovered. The practices who had access to hospital medical records had usually agreed that the nurses would regularly review the information on hospital admissions or emergency room visits. In more complicated cases, sometimes also family physicians checked the electronic medical records.

A draft activity-based costing model for enhanced care management has been developed, taking into account the information provided by primary healthcare providers. The draft proposal will be shared and discussed with the EHIF.

Annex 1: Performance Monitoring Framework

Feasibility

Evaluation Question	Indicators for assessment	Data Sources

1. Was the pilot feasible in the time allowed, with the available staff?	● Completed registry processes
	  ○ % of practices applying intuition to patient lists and providing inclusion/exclusion rationale
	  ○ % of patients, by practice, enrolled in program
	  ○ % of care plans, by practice, completed
		Monthly monitoring of the dashboard
		Monthly reports

	● Quality of care plans	Monthly qualitative review via monitoring visits
	● % of practices that establish link with local hospital to track patient admittances/discharges	Monthly monitoring visits
	● % of practices that establish link with local social services coordinator/provider to facilitate coordination	Monthly monitoring visits

Acceptability

Evaluation Question	Indicators for assessment	Data Sources
2. What was the experience of the providers?	● Changes in provider satisfaction with practicing medicine	Provider survey
	● Changes in perception of quality of care provided	Provider survey
	● Changes in perceived stress of job	Provider survey
3. What was the experience of the patients involved in the pilot?	● Patient acceptance/enrolment rate	Dashboard
	● Patient experience of coordination	Patient Focus Group Discussions
	● Patient concerns with program	Patient Focus Group Discussions
4. What was the experience with the	● Did the pilot meet the goals?	Key Informant Interviews with EHIF staff and other

		stakeholders

Process

Evaluation Question	Indicators for assessment	Data Sources

5. How effective was the pilot at improving process of care delivery?	• Changes to team practice and function
	     o % of teams that institute regular (weekly) meeting to discuss patients in pilot
	     o Self-reported/observed changes to nurses' duties
		Monthly monitoring visits

	• % of patients with post-acute care follow up call or visit with OR average time between acute-care discharge and primary care follow up call or visit	Dashboard/claims data
	• Changes in reported frequency of post-hospital coordination	Provider survey
	• Changes in reported frequency of contacting patients between visits	Provider survey
	• Changes in reported frequency of coordination care with social services or other community providers	Provider survey
	• Changes in reported preparedness of practices to manage patients with multiple chronic conditions	Provider survey
	• Changes in reported preparedness of practices to manage patients with substance-use related issues	Provider survey
	• Changes in reported preparedness of practices to manage patients in need of social services in the community	Provider survey
	• Changes in reported practice use of personnel to coordinate care for patients with chronic conditions	Provider survey
	• Changes in reported frequency of patients with chronic conditions being given written instructions for managing care	Provider survey
	• Changes in reported frequency of patients with chronic conditions having self-management goals recorded	Provider survey
	• Changes in reported frequency of practice receipt of timeline information post-specialist visit	Provider survey
	• Changes in reported frequency of practice receipt of notification patients have been in the emergency	Provider survey

	department	
	● Changes in reported frequency of practice receipt of notification of patient discharge from hospital	Provider survey
	● Changes in reported timeframe for practice receipt of information needed to manage patients post-hospital discharge	Provider survey
	● Changes in reported method of receiving post-hospital discharge information	Provider survey
	● Changes in reported ease of coordination patient care with social services	Provider survey

Outcomes

Evaluation Question	Indicators for assessment	Data Sources
How effective was the pilot at improving outcomes of care delivery?	● Avoidable specialist visit rate	Claims data
	● % of patients in need of statins with prescription	Claims data

Facilitators and Barriers

Evaluation Question	Indicators for assessment	Data Sources
How can Estonia replicate and spread?	● Main facilitators of implementation	Monthly monitoring visits EHIF Key Informant Interviews Patient focus group discussions
	● Main barriers to implementation	Monthly monitoring visits EHIF Key Informant Interviews Patient focus group discussions

Annex 2: Frameworks of Key Informant and Patient Interviews

Key Informant Interviews

In order to assess the results of the care management pilot, 9 key informants from the Estonian health care system were interviewed. Interviews took place before the pilot start and after the pilot officially ended. The objective of the interviews was to i) assess the acceptability of enhanced care management, ii) understand the strengths and weaknesses of the pilot, iii) assess the feasibility and discover biggest concerns and drivers implementing enhanced care management, and iv) identify potential constraints and opportunities for scaling-up.

Key informant interviews included:

(i) Representatives from the Estonian Health Insurance Fund,

(ii) Representatives from the Ministry of Social Affairs,

(iii) Family physicians participating in the pilot,

(iv) Hospital managers, and

(v) Social workers.

Pre-pilot interviews focused on the following questions:

1. What are your goals and expectations for this care pilot?
2. How optimistic are you that these goals will be met?
3. What do you see as the greatest strengths of this pilot?
4. What are you most concerned about and why?
5. What do you think is the most important thing that EHIF can learn from this pilot?
6. What do you think this pilot needs to demonstrate in order to be taken to scale?

Post-pilot interviews focused on the following questions:

1. How, if at all, did your goals and expectations for this pilot shift over time? Why?
2. In what way(s) were your goals and expectations met for this pilot? In what way(s) were they not?
3. What did you see as the greatest strength/most successful component of this pilot?
4. What do you think drove the successes of this pilot and why?
5. What did you see as the biggest challenge of this pilot?
6. What factors do you think limited the success of this pilot and why?
7. What is the most important thing that EHIF learned from this pilot? Why is this important?
8. Based on this pilot experience, would you recommend taking the enhanced care management program to scale in Estonia? Why or why not?

9. If yes, what factor do you think would be most critical for scaling?
10. What, if anything, about the pilot experience do you think would need to change to make scaling effective?

Patient Interviews

A random sample of 18 patients participating in the ECM pilot was selected after the termination of the pilot for interviews to evaluate their experience with the pilot and to identify main obstacles of implementation as well as the potential constraints and opportunities for an extension of the ECM program. The final sample was chosen from an intermediate sample containing 4 patients from each practice. Another telephone survey was conducted among pilot patients from the Järveotsa primary healthcare centre.

List of Questions for the Patient Interviews:

1. Have you been informed about the enhanced care management program (your participation in it)?
2. Do you notice changes in the care that you receive compared to previous years?
3. Do you feel that your chronic care management has improved since February 2017 or that it has remained the same?
4. Do you know whether you have a care plan?
5. Have you visited a hospital, called an ambulance or gone to the emergency room since February 2017? If so, was there any follow up from your family physician and/or nurse, and did the follow up procedure change with respect to previous hospital stays/emergency room visits/uses of an ambulance?
6. Do the family physician or nurse ask you whether you know who to turn to in case you are in need for a social service?
7. Do the family physician or nurse ask you whether you have prescriptions for all the necessary medications and whether you have bought the prescribed medicines?
8. Can you afford all the medicines you need?
9. What do you like most about the enhanced care management program?
10. Would you recommend extending the enhanced care management pilot to other family physician practices?
11. Do you have any recommendations for future improvements related to chronic care management provided by family doctors and nurses?

Annex 3: Additional Tables and Figures

Table A1: List of 50 Chronic Conditions Considered in the Risk-Stratification Algorithm

No	Chronic condition	ICD Codes
Metabolic Triad		
1	Hypertension	I10-I15
2	Lipid metabolism disorders	E78
3	Diabetes mellitus	E10-E14
Target Conditions		
4	COPD	J40-J44, J47
5	Asthma	J45, J46
6	Chronic ischemic heart disease	I20, I25, I21
7	Cerebral ischemia/chronic stroke	I60-I64, I69, G45
8	Atrial Fibrillation and Flutter	I48
9	Cardiac insufficiency	I50
10	Mood Disorders	F30-F39
11	Dementia	F00-F03, F05.1, G30, G31, R54
12	Substance Abuse	F11-F19, F55, Z71.5, Z81.3, Z81.4
13	Alcohol Abuse	F10, Z71.4, Z81.1
14	Frailty (falls)	R41.81, R54, W00, W01, W04, W05, W06, W07, W08, W10, W18, W19, Z91.81
15	Severe hearing loss/ Severe vision reduction	H90, H91.0, H91.1, H91.3, H91.8, H91.9,H17-H18, H25-H28, H31, H33, H34.1-H34.2, H34.8-H34.9, H35- H36, H40, H43, H47, H54
Other Chronic Conditions		
16	Anemia	D50-D53, D55-D58, D59.0-D59.2, D59.4-D59.9, D60.0, D60.8, D60.9, D61, D63-D64
17	Anxiety	F40-F41
18	Atherosclerosis/PAOD	I65-I66, I67.2, I70, I73.9
19	Cardiac arrhythmias*	I44-I45, I47, I49
20	Cardiac valve disorders	I34-I37
21	Chronic cholecystitis/Gallstones	K80, K81.1
22	Chronic gastritis/GERD	K21, K25.4-K25.9 K26.4-K26.9 K27.4-K27.9 K28.4-K28.9 K29.2-K29.9
23	Dizziness	H81-H82, R42
24	Eating Disorders	F50, R63.0
25	Epilepsy	G40
26	Hemorrhoids	I84
27	Hypotension	I95
28	Intestinal diverticulosis	K57
29	Joint arthrosis	M15-M19

30	Liver disease	K70, K71.3-K71.5, K71.7, K72.1, K72.7, K72.9, K73-K74, K76
31	Lower limb varicosis	I83, I87.2
32	Migraine/chronic headache	G43, G44
33	Neuropathies	G50-G64
34	Obesity	E66
35	Osteoporosis	M80-M82
36	Parkinson's disease	G20-G22
37	Prostatic hyperplasia	N40
38	Psoriasis	L40
39	Psychological Disorders	F8
40	Purine/pyrimidine metabolism disorders/gout	E79, M10
41	Rheumatoid arthritis/Chronic polyarthritis	M05-M06, M79.0
42	Somatoform disorders	F45
43	Thyroid diseases	E01-E05, E06.1-E06.3, E06.5, E06.9, E07
44	Urinary incontinence	N39.3-N39.4, R32
45	Urinary tract calculi	N20
Exclusions due to High Severity		
46	Cancer (if active/acute)	C00-C14, C15-C26, C30-C39, C40-C41, C43-C44, C45-C49, C50, C51-C58, C60-C63, C64-C68, C69-C72, C73-C75, C81-C96, C76-C80, C97, D00-D09, D37-D48
47	Congenital Disorders	Q0-Q8
48	Rare Diseases	F01.1, D21.9, D47.4, D48.9, D56.0, D82.4, E70.3, E75.5, E80.0, E85.0, G47.3, H16.3, H49.8, I78.8, K90.8, M60.9, N04.1, R23.8
49	Renal Failure (Advanced)	N18-N19, Z49
50	Schizophrenia	F20

* Without Atrial Fibrillation (see separate condition)

Adapted and Modified from: Van den Bussche et al. - Patterns of ambulatory medical care utilization in elderly patients with special reference to chronic diseases and multimorbidity - Results from a claims data based observational study in Germany (2011).

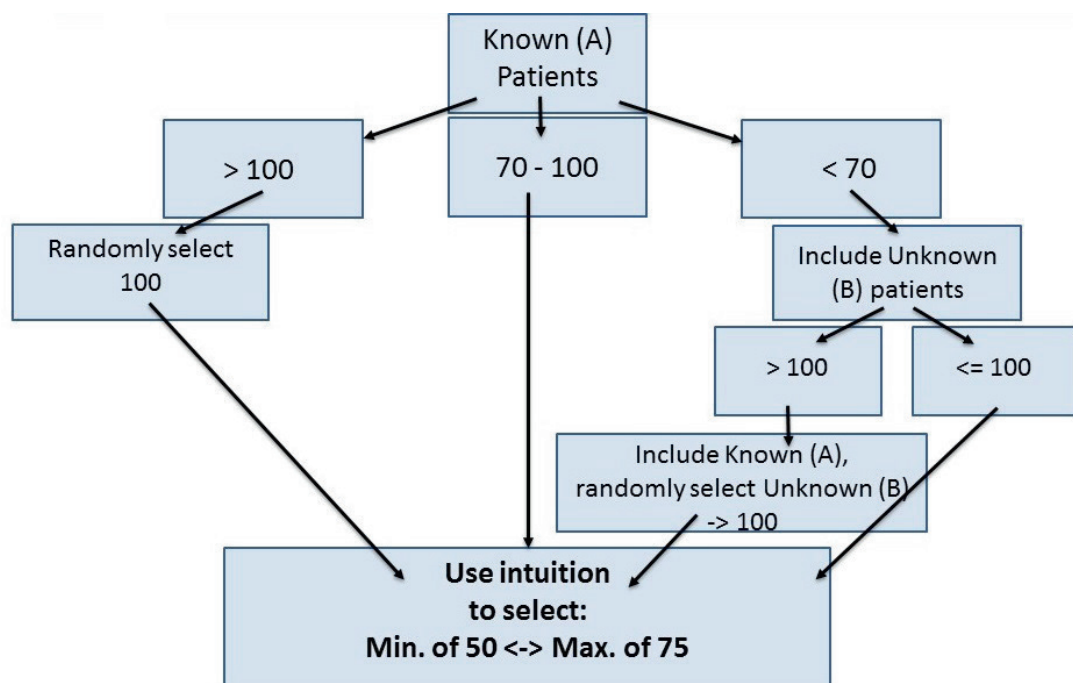## Figure A1: Constructing the Consolidated Patient Lists for Each Practice List

Figure A1: Constructing the Consolidated Patient Lists for Each Practice List

Table A2: Overview of Indicators and Tracers Used in "The State of Health Care Integration in Estonia"

	Provider Type	SES (Income Quintile)	Urban/Rural	Ida Viru/Rest of Estonia	Gender	Self-Management Impairing Comorbidities
Avoidable Hospital Admissions	X	X	X	X	X	X
Extended Hospital stays	X					
Avoidable Specialist Visits	X	X	X	X	X	X
Provider Continuity		X	X	X	X	X
Under-provision of Preventive Services	X	X	X	X	X	X
Incomplete Discharges	X	X	X	X	X	
Inadequate acute inpatient follow-up care	X	X	X	X	X	
Unnecessary pre-operative diagnostic tests	X					

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