Institute for Healthcare Improvement

A Guide to Working with High-risk High-cost Patients

Introduction.
For many years organizations that are responsible for the cost of health care have been interested in doing a better job of managing the high-cost individuals. These individuals are commonly identifies as the 5% of patients who account for 50% of the cost of health care. Actuaries have been thinking about risk and prediction for a long time from an insurance perspective and have been focused on this high-cost population. Health insurers are increasingly using predictive models to identify fraud and abuse[i]. A good reference is *Health Risk Adjustment and Predictive Modeling* by Ian Duncan. Working with high-cost individuals is a seductive idea: just control their cost and you can make a huge impact on overall spending on health care. Yet we know this impact has been elusive for many organizations who have attempted to focus on this population. We need to think about this work carefully and take a very cost-effective approach in the design of our supporting system

Our concern now is that people are too quickly gravitating to a program/solution without understanding the problem well enough. When looking back at last year's claims, you could break the population into three groups: low, medium and high-cost individuals. When looking forward you need to realize that next year's high-cost individuals will come out of all three groups. Future risk is where we need to keep our focus. The core of this work is to know who is at high risk for future high cost and to determine whether interventions can be designed that will impact their care in a cost-effective manner. So there are at least four issues in play: identification, impactibility, potential interventions and cost effectiveness. When it comes to cost effectiveness you need to consider the potential savings along with the cost of the intervention. The approach that we are going to outline is to learn how to manage this population in a cost-effective way.

Moving Forward

Base on work that we have been doing with organization around the world at IHI we are going to discuss a 5 step process for working with a high risk high cost population.

Step One is to decide what the high-risk population is that you want to work with. You are going to use some case finding techniques to identify a population that you want to work with. You can use a predictive modeling algorithm or some screening criteria to find your population (i.e., everyone who spent more than $50,000 or all newly diagnosed cancer patients) or ask clinicians who they think are high-risk. There are strengths and weakness to all methods.

A good review of the literature around predictive modeling was done by the King's Fund, in partnership with Health Dialog and New York University in 2005. They describe the three methods which are expanded in Appendix A as:

1) Threshold approach;
2) Clinical knowledge; and
3) Predictive modeling.

To see their work: http://www.kingsfund.org.uk/projects/predicting-and-reducing-re-admission-hospital. One of their conclusions was that predictive modeling gave you the best chance to risk stratify the population for future costly events.

At the end of Step One you should have a population of individuals who you think will have high risk in the future that you want to consider working with. You should have an idea of the size of the total population of these patients.

Here is an example of selecting a population using the threshold approach:

Table One: From Care Oregon

Population Segment	# Members	% Members	Avg Total Paid Cost per Member/ 12 mos	% Paid Cost of Segment/ 12 mos	# ED visits	# IP Admits
No inpatient visits/ 6+ ED	81	3%	$8,743	5%	786	0
1 Non-OB inpatient and 0-5 ED visits	97	4%	$18,767	14%	147	97
2+ Non-OB inpatient OR 1 Non-OB inpatient AND 6+ ED visits	71	3%	$59,440	32%	383	189

Remember you are trying to select patients who are at future risk for high cost. As we discussed in our earlier paper on high–risk, high-cost patients, many patients who have high cost this year will not be as costly next year. It is the simple idea of regression to the mean. You need to identify the individuals who will be at greatest risk in the next year.

With a predictive modeling tool you can give risk scores to individuals in the population and use those risk scores to stratify your population. In this way you can try to select individuals who are at high-risk. No matter how you select your population you will need

to consider whether you can impact their outcome in a cost-effective manner with whatever interventions you devise.

Table 2: Commercial and non-commercial tools that you can use for predicative modeling

Model	Developer/ Vendor	Data Sources	Risk of	Link
PARR ++, PARR1, PARR2	Health Dialog	• Patient Demographics • Hospital and ED utilization • Diagnostic data (ICD) --DCC-HCC • Community Characteristics	Readmission in the next 12 months	Kings Fund, Nuffield Trust
Combined Predictive Model	Health Dialog; Kings Fund; John Billings, NYU	• Patient Demographics • Inpatient • Outpatient • A&E • GP data • Community Characteristics	Emergency hospitalization in the next 12 months	Kings Fund, Nuffield Trust
Adjusted Clinical Groups (ACG)	Johns Hopkins	• Age • Gender • Diagnostic data (ICD) • Pharmacy data (NDC)	Future hospitalization, high cost, or high pharmacy use	http://www.acg.jhsph.org/

Impact PRO	Optum (formerly Ingenix)	• Medical claims
		• Pharmacy claims
		• Additional modules:
		  • Lab data
		  • Pharm risk groups
		  • Clinical indicators
			Risk of future cost, inpatient stay.	Optum Insight

Model	Developer/ Vendor	Data Sources	Risk of	Link
Risk Navigator Clinical	Elsevier/ MEDai	• Medical claims • Patient demographics • Lab data • HRA data • Episode treatment groups • Pharmacy data (NDC) Insurance type	Future cost, clinical risk (diabetes, comorbid cardiovascular, etc.)	MEDai
Clinical Risk Groups (CRG)	3M	• Age • Gender • Medical claims data (ICD) • Pharmacy data • Functional health status	Future healthcare utilization and cost	3M
Diagnostic Cost Group-Hierarchical Coexisting Conditions (DCG-HCC)	Verisk Healthcare Inc. (formerly DxCG); developed at Boston University	• Age • Gender • Diagnostic data (ICD)	Concurrent 'expected' spending, risk of future expenditures	VeriskHealth
Scottish Patients at Risk of Readmission and Admission (SPARRA)	Information Services Division, NHS National Services Scotland	• Pharmacy data • Hospital, ED, outpatient, and psychiatric utilization	Admission, readmission in the next year	ISD Scotland

In table 3 you will see a list of high-cost individuals from one organization. These are individuals under 65. As you look at the data you will see terrific variation in cost at the individual level from year to year. Some high-cost individuals become low-cost and some low-cost become high-cost.

Table 3 High-Cost Individuals as seen over time (partial table see Appendix B for full table)

Claimant #	Paid Medical 2009	Paid Medical 2010	Paid Medical 2011	Paid Medical 2012 (Through November)
1	$550,502.00	$75,185.00	$282,155.00	$1,529.00
2	$237,266.00	$76,702.00	$0.00	$0.00
3	$234,765.00	$0.00	$0.00	$0.00
4	$186,464.00	$1,938.00	$2,691.00	$0.00
5	$178,360.00	$0.00	$0.00	$0.00
6	$169,233.00	$7,542.00	$1,735.00	$3,575.00
7	$153,968.00	$8,465.00	$6,299.00	$67,725.00
8	$150,041.00	$39,430.00	$100,113.00	$79,604.00
9	$148,572.00	$0.00	$0.00	$0.00
10	$143,280.00	$905.00	$380.00	$1,864.00
11	$135,407.00	$43,328.00	$3,131.00	$0.00
12	$128,299.00	$1,282.00	$1,443.00	$309.00
13	$114,780.00	$14,204.00	$126,622.00	-$121,525.00
14	$104,866.00	$9,717.00	$6,466.00	$4,166.00

Step Two is the logical next step because you want to understand the needs of this population to see if you can develop cost-effective interventions that can make a difference. This goes back to the idea of impactibility. Can we make a difference? There is seldom a case in healthcare where an improved design could not improve the care for the patient. However the issue is can we improve the care and do it in a cost-effective manner. Based on work from our last R and D cycle we know that people with multiple chronic diseases represent a high-cost group. Frail elderly would be another group that overlaps some with the first. Patients with significant disability are another group. Patients with mental health issues and chronic disease are another. There could also be special case groups like patients with chronic kidney disease that are moving to a stage where dialysis is needed[ii].

So in order to produce a better understanding of the high-risk population that you have identified, look to the following to create this deeper view:

1) Using data systems
2) Using clinic personnel
3) Using patient interviews
4) Using third party data to understand personal behavioral and economic issues
5) Consider GIS mapping

A good practical step here would be to take a list of high-risk patients that you identified in step number 1 and interview clinicians to learn what they see as the big cost-driver issues. Secondly, go interview 10 of the patients to learn more from their perspective.

And thirdly, continue to analyze whatever data you have to see if there are particular issues or trends that you see. This should lead to some ideas around the root cause of their problems and possible interventions that you might want to test.

Here is an example from a Triple Aim Community member who is working on high–risk, high-cost individuals

> *"We reviewed charts of patients with at least 4 ER visits and at least 2 hospitalizations and found that in middle age alcohol and substance abuse was a major contributor to health care use. Over 60 years, multiple chronic diseases became the major issue. Depression and other mental health issues are likely common but not well documented or screened for. Substance abuse was often not addressed during hospitalization."*

When interviewing potential high-risk individuals you may want to use a tool like the Harms 8 (More information here) which helps you look at the following dimensions: knowledge, resilience, health beliefs, stability, physical functioning, self confidence, reasoning, and social support. Another tool to consider is the Outcome Star: http://www.outcomesstar.org.uk.

The same Triple Aim organization that did chart review above also did a HARMS 8 survey with patients admitted to the hospital to generate new ideas for transitioning patients after discharge:

1. Refer patients with high risk for medication errors to public health nursing home visit to review meds & med management

2. Identify roles and gaps between different resources:
    - Behavioral health & substance abuse
    - CHR's
    - Medical social work
    - Environmental health & injury prevention
    - Utilization review
    - Counseling services
    - Aging programs
    - Pharmacy
    - PHN

3. Learn more about contract health transportation services
    - Can a patient with children obtain rides to outpatient appointments? What transportation contract allows for this service?
    - Can a patient with behavior and physical limitations get a non-emergent ambulance transport? For what type of appointments?

The ideas listed above are not necessarily the solutions for your problems. They are just to demonstrate what you can learn when you start to understand your population better by using a tool like the HARMS 8 or Outcome Star.

The last comment to be made is that most predictive models use claim data as their main focus. This does not always get at the psycho-social issues and patient activation issues that are important. You can get at the psycho-social issues and patient activation issues by interviewing and potentially build that into a model for patient selection. Or you could purchase third party data on populations that can help you understand more about behavior and economic issues. For instance companies like Acxiom keep enormous data bases on consumer activity. They can segment the market into 70 different consumer segments. By using their data with your population you can learn a lot about their social and economic situation without having to get data from individuals.

By the end of step two you should have some ideas on root cause issues and potential interventions.

Step three is to test out some of your ideas with a few individuals. At IHI we have recommended an approach that we call 5x scale up. The idea is to start small and then scale up in increments of 5. The system issues in the table below are meant for illustration and not as a template to design from. It step 4 we will actually start to fill this type of scale up form out in detail. Right now we want you to focus on working with just 5 individuals. The goal now is to get the work started and begin to learn your way through it. You have limited financial risk with any interventions that you do with 5 people versus huge potential cost when you work on the whole population.

Table 4: 5X Scale Up

Number of people	**System issues to address**
5	1. Form a team of volunteers 2. Find people through referrals
25	1. Full time team 2. Redesign of practice 3. Cooperation of hospitals for data 4. Assess outcomes
125	1. Grant funding for operations 2. Consistent population outcomes
625	1. ?
3125	1. ??

15,625	1. ???

Specifically in this step you should co-create a care plan with 5 people (1 plan per person)

- Start with what matters to the person
- Include an identified family member or friend in planning discussion if preferred
- Identify the person's life and health goals together
- Identify the person's care preferences together
- If the goal is big, start by outlining steps and doing the first step

Here is a case study from Care Oregon to demonstrate this approach. Let's call the patient George (not his real name).

- 62 yr-old Caucasian man admitted to the hospital twice for complications related to CHF (Shortness of breath, tachycardia, and fluid volume overload). Also has diabetes, cognitive challenges, has been intermittently on O2.
- Lives alone in a single-room apartment, has daughters and an ex-wife who live in other states. Doesn't have a lot of social interaction but has two cats that he adores.
- Cardiology Nurse Practitioner (NP) refers him to our outreach worker upon discharge. NP goal: no 30-day readmission.
- Everywhere in his chart it is written that George is usually belligerent, uncooperative, non-compliant, and verbally abusive.

Now let's consider his resources and capabilities:

- Good Medicaid insurance coverage
- Committed care team with timely, reliable access
- Stable living situation
- State-sponsored caregiver who George trusts

And also his Socially Determined Risk Factors:

- Living in poverty
- Low health literacy
- Demonstrates challenging interpersonal behaviors (from care team perspective)
- Demonstrates inability to effectively advocate for himself
- Demonstrates difficulty with basic planning and problem solving (cognitive impairment?)

Now what matters to George?:

- Does not like to be hospitalized or referred to the ED
- Wants to live alone with his cats
- Likes to be able to get out of his apartment and "move around outside"

- Desires privacy and respect from care providers
- Wants to be in touch with daughters more frequently

And the system barriers for George:

- Care providers do not treat him with respect or offer him privacy.
- Has not been able to get an appropriate wheelchair.
- Care providers in different settings (ED, Hospital) don't talk to one another.

Based on all of this, here is the plan that was used with George:

- With permission, go through George's cupboards and refrigerator to assess daily diet habits.
- Go grocery shopping with George and his caregiver; teach about sodium and fluid related to CHF and connect to his desire to stay out of the hospital.
- Role model advocacy with visiting care providers (home health, case worker) by setting up regular visiting times based on George's preferences; also requiring a phone call prior.
- Accompany George to medical appointments to provide care coordination and opportunity to role model "respectful" communication on both sides.
- Work with health plan and DME provider to replace wheelchair so that he can get out of his room.
- Teach George how to use Facebook to connect with daughters.

The goal in working with 5 individuals is to begin to understand opportunities and barriers within the system. At its most elemental level you are learning your way into the larger-scale design issues that you will face as you begin the next step. As you work with 5 you are not concerned with the cost-effective issues .You are just seeing if you can co-develop a plan with these 5 and execute the plan. The key is to learn with these individuals. You are going to attempt to learn at the individual level so that you can act for the system.

Step four is to take the learning from working with 5 individuals and see if you can scale it up to 25.

Let's revisit the concept of 5X scale-up. At each level of scaling up from 5 to 25 to 125, etc you need to think about the specific change ideas that you are working on and how you will modify that change for the size of the population. In addition you will need to consider structural support issues that will impact those changes. The structural issues are: information technology, physical issues (e.g. space, equipment, capacity), human resources (i.e. workforce organization and capabilities), funding and the learning system.

Consider these 4 major change areas for the HRHC at the level of working with 25 individuals:

- Patient Identification/recruitment
- Patient Engagement
- Caring for Patients
- Community Support

For each of these ideas you may want to consider any structural issues that are associated with that change for 25 patients.

Structural Issues for Scale-up

Example at 25	IT	Human Resources	Physical	Funding	Learning system
Patient Identification/ recruitment					
Patient Engagement					
Caring for Patients					
Community Support					

The following tables are from the scale-up work of Care Oregon on high-risk, high-cost Medicaid patients in Oregon.

Structural Scale-Up Issues for Key Change Ideas

Key Change Areas	5 to 25	125	250-625
Patient Identification/ recruitment	· Use claims or admission encounters to ID frequent flyers · Ask providers for complex/ costly patient referrals · Do chart reviews	· Land on a standard set of enrollment criteria (critical for future program eval) · From PDSA testing, determine most feasible and reliable method of identification (might be a combo) · Develop methods to "flag" eligible patients in EMR or registry	· Create formal patient ID process and standardize · Consider centralized "triage" function/role
Patient Engagement	· Focus on remedying each individual patients' barriers and challenges	· Look for most common barriers to engagement and formalize interventions · Develop case closure/ graduation criteria · Carefully look at engagement "failures" and do root cause analysis · Explore patient "typologies" to determine ideal candidates for intervention/program · Use culturally-specific staff or known community members	· Develop standard case review and supervision process · Spend most time on optimal "typologies" · Develop a "decline-reconsider" strategy and look for small engagement windows of opportunity for toughest clients

Structural Scale-Up Issues for Key Change Ideas

Key Change Areas	5-25	125	250-625
Caring for Patients	• Temporarily reallocate a portion of existing staff or use volunteers/ students to help with pilot • Keep a log of workforce development needs and train ad hoc • Recruit for relevant experience • Include primary care in program planning	• Allocate staff from other duties if trends have been promising • Collaborate and share staff resources across organizations • Hire new staff if funding has been secured • Consider non-traditional workforce • Begin to formalize the necessary workforce training • Recruit for commitment and passion • Pay attention to optimal/ average LOS in program	• Develop standard case review and supervision process • Create formal orientation and workforce training plan • Address potential for staff burnout • Formalize primary care participation and look at specialty and home health roles • Develop partnership with acute care system, mental health and addictions providers
Community Support	• Begin building a registry of potential partners by tracking the other organizations/ agencies that are serving each patient • Have new partners serve a few individuals on a trial basis	• Choose one or two community stakeholders and formalize collaboration (including those with valuable data) • Formalize referral processes • Predict and match demand with capacity	• Continue to partner with community resource agencies critical to patient population

These two tables illustrate both how the changes evolve and how the structure to support those changes will evolve. For the moment just focus on the changes that are shown in step 5-25; we will discuss the 125 and beyond in the next section. In the section under 5-25 you see them address workforce issues, "Temporarily reallocate a portion of existing staff or use volunteers/ students to help with pilot" and IT issues, "Use claims or admission encounters to ID frequent flyers"

Your work will not be exactly the same as this example but you need to clearly identify the changes that you are making and what structure you need to support them.A challenge that you will have with this step of the process is to spend too much time planning and not enough time testing your way into your design.

One last thing to think about in this section is: how many people you are ultimately planning to work with. For example, one health system we recently visited cares for 450,000 individuals. Their target high-risk population is 1% of the total or 4500 individuals. In the end they will need a system that can manage 4500 individuals in a

cost-effective manner. So as you build and work with 25 you also need to consider whether this design has the potential to scale to much higher numbers. There is no way when you work with 25 that you can answer that question completely. That is why in the next step we will work with 125. Each step of the way you are building a cost-effective solution for your population.

Step five building to 125 and beyond.

Let's us relook at the same issues as we did in step four

- Patient Identification/recruitment
- Patient Engagement
- Caring for Patients
- Community Support

The question at each step is what needs to be done in these areas as we increase the patient population to 125. Go back and look at key change ideas under 125. From this you get a sense of what Care Oregon did to manage its high-cost, high-risk Medicaid population.

If you look closely you will see that there is no discussion around two structural issues: the learning system and funding. These have been separated out and are illustrated in the table below for 25, 125 and beyond.

Structural Scale-Up Issues

	5 to 25	125	250-625
Complex Patients	Funding · Use existing funding for reallocated positions – shifting resources Learning System · Track progress using sticky notes & visual management system · Create an excel database · Interview providers and patients to learn about impact · Get project staff together once per week to review data and conduct case-based learning conferences · Conduct intentional PDSA cycles – document results	Funding · Apply for small grant to demonstrate ROI · Share early results with whomever has financial risk to get further funding support · Consider multi-payer/multi-organizational funding approaches Learning System · Set up a formal visual management system · Allocate part-time admin/data entry staff · Create run charts with operational measures (# engaged patients, # patients that decline, # visits per day per staff, etc) · Learn from outliers – huge successes and huge failures · Begin to document best practices (or PDSA cycles that go really well) · Formalize a "community of practice" across project team and front line staff	Funding · Work to create efficient processes and take advantage of centralizing infrastructure costs · Work with payers to secure funding by articulating ROI · Design funding models that rely on positive financial performance (ie withholds or P4P) · Look for population-based capitation/global payment opportunities Learning System · Conduct regular learning retreats and cross-organizational learning collaboratives · Continue to use process improvement metrics to refine interventions and program

In summary, we have discussed a 5-step process that will get you to the point of 125. You will need to continue this process with 625, 3125, etc until your target population has been reached.

[i] Medicare and Medicaid: Savings Opportunities from Health Care Modernization. UnitedHealth Center for Health Reform & Modernization. Working Paper 9. January 2013. http://www.unitedhealthgroup.com/hrm/UNH_WorkingPaper9.pdf

[ii] Berger A, Edelsberg J, Inglese GW, Bhattacharyya SK, Oster G.Am Cost comparison of peritoneal dialysis versus hemodialysis in end-stage renal disease. J Manag Care. 2009 Aug;15(8):509-18.