

Initiative Options for Simulation Scenarios

The following options are in version 3s of the ReThink Health Dynamics simulation model.



Enable healthier behaviors

Promote healthy behaviors and help people to stop behaviors that can lead to chronic physical illness—smoking, poor diet, inadequate exercise, alcohol and drug abuse, unprotected sex, etc.

Consequences: Reduces onset of mild and severe chronic physical illness, the likelihood of urgent events (e.g., heart attacks from cigarette smoke), as well as the onset of mental illness associated with drug abuse. Also reduces the need for medications for lifestyle-related disorders including asymptomatic hypertension and high cholesterol.

Time and cost assumptions (modifiable): Risky behavior prevalence declines over time as cessation increases and new onset decreases. Costs \$100 per capita per year for population engaging in risky behavior. One may choose, for budgetary or equity purposes, to focus this intervention only on the disadvantaged, or youth, working age, or seniors.



Reduce environmental hazards

Reduce the fraction of people with significant exposure to environmental hazards and pollutants in their homes, neighborhoods, or workplaces.

Consequences: Reduces onset of mild and severe chronic physical illness (e.g., cardiovascular disease, asthma, cancer, chronic lead poisoning), and the likelihood of injuries (e.g., due to fire, falls, drowning, heat stroke) and other urgent events (e.g., heart or respiratory attacks triggered by air pollution) requiring an ER visit.

Time and cost assumptions (modifiable): Takes an average of 5 years to remediate hazards. Costs \$200 per capita per year for population in hazardous surroundings. One may choose, for budgetary or equity purposes, to focus this intervention only on the disadvantaged.



Reduce crime

Reduce the fraction of people who live and work in high crime areas.

Consequences: Reduces the likelihood of injuries requiring an ER visit, and also helps to discourage unhealthy behaviors (physical inactivity, drug abuse, unprotected sex) and encourage healthy ones.

Time and cost assumptions (modifiable): Takes an average of 5 years to reduce crime prevalence. Costs \$200 per capita per year for population in high-crime areas. One may choose, for budgetary or equity purposes, to focus this intervention only on the disadvantaged.



Create student pathways to advantage

Provide programs for disadvantaged high school and college students to improve graduation and matriculation rates. Greater educational attainment improves one's chances to become advantaged through higher-paying jobs.

Consequences: The advantaged are less likely to engage in unhealthy behavior, or to live in hazardous or high-crime environments, or to develop chronic physical or mental illness, or to be uninsured, or to go to the hospital for non-urgent care; and more likely to engage in self-care and care-seeking activities.

Time and cost assumptions (modifiable): Takes an average of 5 years following completion of a student pathways program to move from disadvantaged to advantaged. Costs an average of \$14,000, over the period of high school and college, per disadvantaged young person.



Create family pathways to advantage

Institute policies and programs (for example, living wage policies, tax credits and subsidies, and housing vouchers) to improve economic prospects so that some disadvantaged families—those earning below twice the federal poverty level—may become advantaged.

Consequences: (see student pathways consequences above.)

Time and cost assumptions (modifiable): Takes an average of 3 years to move families from disadvantaged to advantaged. Costs \$1,000 per capita per year for the disadvantaged population.



Improve routine preventive and chronic care for physical illness

Improve physician compliance with all recommended guidelines for preventive and chronic physical illness care. Preventive care includes screening, immunization, lifestyle counseling, and referral to behavioral and mental health counselors as needed. Implementation may require investment in reminder systems and training.

Consequences: Reduces death rates and the frequency of acute and urgent episodes among patients with chronic physical illness, and rates of onset of mild and severe chronic physical illness; and increases rates of behavioral reform and mental illness control. These benefits are attained at the cost of additional physician visits and increased use of medications.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features, and then average 2 years for improved care to reduce acute and urgent episode rates. Costs \$35,000 per office-based physician per year.



Improve care for chronic mental illness

Help the mentally ill effectively treat their symptoms and live more positively and productively.

Consequences: Reduces urgent psychological visits to the ER, and unhealthy behaviors; and improves routine physical care-seeking and self-care. These benefits are attained at the cost of increased use of medications and additional visits to mental health care professionals.

Time and cost assumptions (modifiable): No delay in implementation. Costs \$800 per capita per year for previously uncontrolled mentally ill population. One may choose, for budgetary or equity purposes, to focus this intervention only on the disadvantaged.



Support self-care

Help people who currently have problems with adherence to get regular preventive and chronic care and to follow physician advice for use of medications and other self-care. This may involve reminder systems as well as transportation and other support services for those who need them.

Consequences: Improves the extent and effectiveness of preventive and chronic physical illness care (with effects as described in the option above), and also reduces the likelihood of hospital readmission.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$100 per capita per year for previously non-adherent advantaged population, and \$200 for disadvantaged. One may choose, for budgetary purposes, to focus this intervention only on the disadvantaged.



Prevent hospital-acquired infections

Implement procedural changes in hospitals to reduce the fraction of inpatients that develop a hospital-acquired infection.

Consequences: A lower HAI rate means fewer deaths and fewer extended lengths of stay for inpatients. Although most insurers today reimburse for the additional costs of an HAI, the trend is toward non-reimbursement. Thus, in the near future, a lower HAI rate will improve a hospital's profit margin.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$1,000,000 per 100 beds as initial investment, then subsequent maintenance investment at rate of 10% per year.



Redesign primary care practices for efficiency

Increase the fraction of primary care providers whose practices or clinics are streamlined to run as efficiently as possible. This is sometimes referred to as idealized design of clinical office practices (IDCOP). The IDCOP approach comprises a number of techniques for appointment scheduling, staff utilization, and use of information technology.

Consequences: Practice redesign helps PCPs better accommodate demand.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$28,000 per PCP per year. One may choose, for budgetary purposes, to focus this intervention only on FQHC PCPs.



Recruit primary care providers for general (non-FQHC) offices and clinics

Recruit more general PCPs serving the non-poor (both insured and self-paying) and/or the insured poor (Medicaid). Some tactics include first-year income guarantees and local PCP residency programs.

Consequences: An expanded supply of general PCPs can better accommodate demand from the non-poor and from the insured poor.

Time and cost assumptions (modifiable): Takes average 2 years for general PCPs to consider options, including recruitment offers and negotiations, and to relocate. Costs \$200,000 per newly arriving PCP including costs of search and subsidy to guarantee minimum PCP income for some time after arrival.



Recruit primary care providers for FQHC clinics

Recruit more PCPs serving the poor (both insured and uninsured) in Federally Qualified Health Center clinics.

Consequences: An expanded supply of FQHC providers can better accommodate demand from the insured poor and from the uninsured poor.

Time and cost assumptions (modifiable): Takes average 2 years for FQHC PCPs to consider options, including recruitment offers and negotiations, and to relocate. Costs \$200,000 per newly arriving PCP including costs of search and subsidy to guarantee minimum PCP income for some time after arrival.



Improve hospital efficiency

Make process improvements that reduce the average length of stay for inpatients.

Consequences: Allows for a reduction in beds for a given volume of inpatients, and thereby reduces operating costs and improves hospital profit margin.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$1,700,000 per 100 beds as initial investment, then subsequent maintenance investment at rate of 10% per year.



Offer pre-visit consultation for non-urgent episodes

Establish telephone call centers, staffed by trained triage nurses with software support, to advise callers on whether they should seek medical care for their non-urgent episode or instead take care of themselves at home.

Consequences: Can reduce the number of primary visits to physicians and non-urgent visits to ERs, without affecting the quality or intensity of care for conditions that should receive medical care.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$12 per capita per year across entire population.



Create medical homes

Ensure that more patients go to primary care providers (PCPs), rather than specialists or hospitals, for their routine care and as their first stop for non-urgent episodic care. Medical homes need electronic medical records and perhaps decision-support systems for more effective referrals.

Consequences: Has the potential to reduce the cost of routine visits and non-urgent acute care, to improve patient self-care, and to reduce the number of referrals and admissions generated by non-urgent acute care. Also, decision support for PCPs should reduce their susceptibility to the allure of costly new hospital service offerings. However, more patients means more demand on PCPs, creating the possibility (unless averted through other means) of a PCP shortage for some population segments.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$10,000 per PCP per year.



Coordinate health care

Coordinate patient care and provide coaching for patients and physicians to reduce duplicative or unnecessary referrals and admissions and to reduce medication costs. Care coordination requires sophisticated integrated information systems as well as coaching arrangements and protocols for shared decision making and use of generic drugs whenever appropriate. You may also choose, for additional program cost, to include a regular process by which new, higher-priced medical technologies are assessed as they start to become popular and rejected if they do not meet cost-effectiveness criteria.

Consequences: Reduces follow-up actions from an initial physician visit that might result in duplicative or unnecessary services—referrals to specialists, ambulatory tests and procedures, hospital admissions—without adversely affecting health outcomes. Also reduces ongoing medication costs by rationalizing use of prescription drugs.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$15,000 per office-based physician per year. The regular assessment of new technologies raises the maintenance cost by 25%.



Reform medical malpractice

Institute effective tort limits or a fairer adjudication process so that fewer lawsuits go forward and, as a result, doctors see less need to engage in purely defensive practices that do not benefit patients.

Consequences: Reduces referrals to specialists, ambulatory tests and procedures, hospital admissions, and use of high-priced medications—without adversely affecting health outcomes.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$1,500 per office-based physician for every year the initiative is in effect.



Improve post-discharge care to reduce hospital readmissions

Reduce the risk of hospital readmissions through improved discharge practices, including medication reconciliation and more referral to home health care and skilled nursing facilities for rehabilitation.

Consequences: Reduces hospital utilization and costs, but increases utilization and costs of home health care and nursing facilities.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$1,000,000 per 100 beds as initial investment, then subsequent maintenance investment at rate of 10% per year.



Expand the use of less invasive end-of-life care

Increase the fraction of end-of-life patients using hospice services and thereby choosing not to receive other services (e.g., physician, hospital, nursing home) when acute episodes occur. Simultaneously increase the fraction of end-of-life patients using palliative care team services during inpatient stays, thereby also reducing costs.

Consequences: Reduces health care costs.

Time and cost assumptions (modifiable): Takes average 1 year to implement initiative features. Costs \$1.25 per capita per year across entire population.



Gather Innovation Funding

All of the initiatives on the preceding pages require funding and can only be implemented if funding is available. Such funds may include grants, taxes (four possible types), and loans. One specifies these funds for each year from 2015 to 2040 as given dollar amounts of inflows and loan repayments. If some of the accumulated funds are unused in one year, the remainder rolls over to the next year, and may be used even after no new funds are flowing in. For each type of funding, one also specifies whether some fraction is restricted for use with upstream (public health) initiatives, or downstream (medical care) initiatives, with the remainder being unrestricted and available as needed for both types of initiatives.



Pay for health care based on value

A value-based payment (VBP) plan is one in which physicians and hospitals are rewarded with higher payments for making greater efforts to improve quality and reduce costs in certain specified ways. As a result, value-based payment has the effect of partially incentivizing these activities, although perhaps modestly if the providers have to pay a significant amount out of their bottom line to implement the activity.

You may specify, with a time series input (for every 5 years), the fraction of the insured population covered by value-based payment plans. Based on available data, our baseline setting for the national Anytown model is 0% VBP through 2010, ramping up to 25% by 2015 and 50% by 2020, and then remaining at 50%.

Consequences: When a sizable fraction of the population is covered by a value-based payment plan rather than conventional fee-for-service, providers will adjust their practices accordingly. In particular, they will be incentivized to support, at least in part, the following activities: Preventive and chronic care quality improvement, Care coordination, Medical home, Self-care support, PCP practice redesign, and Post-discharge care improvement.

If a community-level initiative is NOT implemented for a given activity, then full value-based payment (i.e. a large enough fraction to influence all providers) will incentivize 10% of the maximum effort. That is, providers will choose to respond modestly to the reward (for the sake of reputation or from conscience or the like), recognizing that they will have to pay for the effort out of their own bottom line; the community is not helping to defray the cost.

If a community-level initiative DOES exist for that activity, but the value-based payment fraction is at zero, then the activity will be done at 80% of the maximum (not 100%), even though the community is in theory paying the full cost, because of concerns by providers (absent the incentive of VBP) that the behavior will cause headaches and time sinks.

If a community-level initiative exists for the activity, and value-based payment is full, then the behavior will be done at 100% of the maximum.



Offer global payments to providers

A provider operating under strict global payment receives an annual capitated (per-patient) amount, with no fee-for-service extras or bonuses. Global payments to physicians typically correspond to salaries they receive from hospital systems (for whom they work as employees), whereas global payments to hospitals come directly from insurers. As of 2014, about 60% of primary care physicians nationwide were salaried, 50% of surgeons, and 25% of other specialists; but quite a few of the hospitals still offered bonuses to doctors (especially specialists) based on billing volume, which suggests that many employed doctors were not on strict global payment and were actually being paid on a modified fee-for-service basis.

You may specify three different time series (with inputs every 5 years): (1) fraction of PCPs under global payment; (2) fraction of specialists under global payment; and (3) global payment fraction of hospital revenues. Based on available data, our baseline settings for the national Anytown model are set at 0% through 2010 for all three time series, ramping up to a higher value in 2015 and remaining there: 60% for PCPs, 15% for specialists, and 2% for hospitals.

Consequences: Global payment can affect provider income for all three provider types. Per-capita global payment rates are set as delayed versions of the per-capita fee-for-service cost. An adjustment of 5 years is assumed, which under global payment gives providers greater income stability for several years during a time of utilization decline (say, as a result of care coordination), but does not prevent income decline in the longer term as the capitated rate converges to the new lower level.

The one direct behavioral impact of global payment in the model is that it reduces the “supply-push” ordering of additional visits, procedures, or hospital admissions by specialists. In particular, the supply-push response is suppressed in exact proportion to the global payment fraction for specialists.

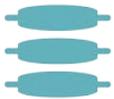


Reinvest Savings

Reinvesting savings involves negotiating with payers an arrangement in which they calculate healthcare cost savings against appropriate benchmarks (benchmarks normally rising over time with national health care inflation, but this change rate may be modified) and then return to the community some fraction of those savings. The fractions returned may vary by payer (commercial, Medicare, Medicaid) and are also assumed, per negotiation, to be reduced if sufficient funds have accumulated in reserve to cover the indicated program spending for several years (default: 15+ years of accumulation reduces the fraction to zero for all payers.)

The reinvested savings may be used to fund the initiatives on the preceding pages, with perhaps some savings shared with providers, hospitals, and individuals/employers. Like the innovation fund, if some savings are unused in one year, the remainder rolls over to the next year. Reinvested savings are not segregated from innovation funds; the two are merged as total funds available to the community.

Some fraction (one fraction for physicians and another fraction for hospitals; default for both = zero) of each year's reinvested savings may be designated for sharing with physicians, hospitals, and individuals/employers as a "cost of doing business" to secure their cooperation with the gain sharing arrangement and the selected initiatives it will fund. Shares to physicians are divided equally among all PCPs and specialists. The sharing with specialists may help offset any supply-push response that would occur as a result of Coordination or other cost-reduction initiatives that may negatively impact their income.



Establish a Backbone Organization

Establish a formal backbone organization to strengthen the collaborative infrastructure for a multi-sector partnership. Backbone resources may support planning, prioritization, communication, measurement, financing, and other tasks. In this model, the backbone option is an accounting tool that lets users track how program funds are used (i.e., for the backbone organization or for selected initiatives). It does not alter the effectiveness of the initiatives themselves.



Trends that may be adjusted for 2015 and beyond



Reduce uninsurance due to federal mandate or expanded eligibility

You may specify reductions in the uninsured fraction for four different groups: advantaged youth and/or working age (who would have to purchase commercial plans or join insurance exchanges), and disadvantaged youth and/or working age (newly covered as a result of Medicaid expansion.)

Consequences: Having insurance makes people more likely to seek preventive and chronic care, which is good from a health standpoint, but has mixed cost effects (more routine visits, more drugs, fewer acute episodes). Increased insurance may put added pressure on general PCP capacity, while it takes pressure off of FQHC PCP capacity, as the newly insured disadvantaged now have the choice of going to a general PCP—and these shifts may affect the volume of non-urgent ER visits. At the same time, more of the advantaged can now afford to see specialists and have elective tests and procedures, thereby increasing various costs.





Underinsured fraction of the Disadvantaged

Many people in the US with health insurance have out-of-pocket costs (co-pays, co-insurance, deductibles, and self-paid premiums) that are so high relative to their income that an impediment is created to getting good quality care—it is as if they had no insurance at all. The Commonwealth Fund has documented growth in underinsurance from 2003 to 2014, 90% of this increase occurring between 2005 and 2010 (with very little occurring after passage of the ACA).

We have done an analysis using national MEPS data (focused on physician office visits and insured working age people with no significant health problems) that confirms a decrease in utilization for the publicly insured disadvantaged. The analysis showed no such decrease for the privately insured. Based on this analysis, we have included in the model an input time series of the underinsured fraction of the disadvantaged.

In line with the Commonwealth Fund data, this time series starts at 25% in 2000 and climbs to 44% by 2014. Our default assumption is that this fraction will remain at 44%. You may specify a change to this assumption (with inputs every 5 years).

Consequences: We assume that increases in underinsurance affect care-seeking behavior in several areas of the model where outright lack of insurance already plays a role. These include the fraction of patients seeking preventive and chronic care, going to specialists, going to hospital outpatient departments and ERs, getting referrals for outpatient tests or procedures or elective inpatient stays, and using hospice. The year 2010 is used as a point of comparison, and to the extent underinsurance exceeds this amount, care-seeking behavior of the disadvantaged insured (both working-age adults and youth) is inhibited. In effect, the *underinsured* disadvantaged are assumed to behave identically to the outright *uninsured* disadvantaged.



Environmental Hazards (baseline before environmental hazards intervention)

Air pollution rates (PM 2.5 and ozone; 26+ days/year exceeding EPA standards) have declined nationally from 1990 to the present, while water systems problems (any EPA health-related violation/year) and households lacking adequate plumbing facilities (American Housing Survey) have remained about the same. We have summed four fractions to estimate separate trends in “fraction of population living in hazardous environment” for the Advantaged and the Disadvantaged. The input time series for the Advantaged starts at 33% in 2000, hits a low of 12% in 2010, and rebounds a bit to 15% in 2015. The input time series for the Disadvantaged starts at 43% in 2000, hits a low of 16% in 2010, and rebounds a bit to 20% in 2015.

Our default assumption is that both of these series are flat after 2015, remaining at their 2015 values. You may specify a change to this assumption (with inputs every 5 years).

Consequences: If environmental hazard rates were assumed to grow or decline after 2015 rather than flattening, this would affect urgent events and ER visits and would also gradually affect the prevalence of chronic physical illness.



Crime (baseline before crime intervention)

Crime rates have declined nationally from 1990 to the present. We have used the National Crime Victimization Survey’s data on “violent victimizations” to estimate separate trends in “fraction of population living in high crime area” (assault-type crime) for the Advantaged and the Disadvantaged. The input time series for the Advantaged starts at 30% in 2000 and declines to 15% in 2015. The input time series for the Disadvantaged starts at 42% in 2000 and declines to 29% in 2015.

Our default assumption is that both of these series are flat after 2015, remaining at their 2015 values. You may specify a change to this assumption (with inputs every 5 years).

Consequences: If assault-type crime were assumed to continue declining after 2015 rather than flattening, this would reduce urgent events and ER visits and would also gradually reduce the prevalence of high-risk behaviors.



Change economic conditions affecting disadvantage

You may specify multipliers reflecting general economic trends that affect the disadvantaged fractions of the population. This is done via three input time series: one series for youth, one for the working age, and one for seniors. A value of “1” indicates no effect of the general economy on disadvantage relative to the year 2000; “1.15” would indicate a 15% relative increase in disadvantage. Note that forces other than the general economy may affect disadvantage in the model, including chronic physical or mental illness (effects of disability), rising health care costs (effects of medical bankruptcy and job layoffs), as well as the Pathways to Advantage interventions.

Consequences: An increase in disadvantage has consequences that are the opposite of those described above for Pathways to Advantage.



Change primary care appointment slots for the Disadvantaged

You may specify the fraction of general (non-FQHC) PCP appointment slots available to the non-senior Medicaid-only population via input time series. A reduction in the fraction over time could reflect increased financial pressure on general PCPs due, for example, to declining Medicaid reimbursements.

Similarly, the fraction of FQHC PCP appointment slots available to uninsured disadvantaged patients is specified as an input time series. As a default, this time series is assumed to remain at its initial value. A reduction in the fraction over time could reflect increased financial pressure on FQHC PCPs due, for example, to declining Medicaid reimbursement rates.

Consequences: A reduction in PCP appointment slots for Medicaid or uninsured patients could create or exacerbate PCP capacity shortages for these populations, leading to less adequate preventive and chronic care and more use of the ER for non-urgent events.



Change the real rate of inflation in healthcare costs

You may specify via input time series changes in the national rate of inflation in healthcare costs expressed relative to general economic inflation. This real rate is measured as annual growth in national personal healthcare expenditures per capita minus growth in the general Consumer Price Index (CPI). It fluctuated generally in the 2-5% range during 2000-2005 and in the 0-3% range during 2005-2010. After 2010, the default rate is 1.5% per year.

Note that this real rate of health care cost inflation allows for growth in costs not only from price changes for specific items, but also from the adoption of new technologies and broadening criteria for the use of technology. In other words, it allows for a changing market basket of services and products applied to a given medical condition, and is thus conceptually different from the Medical Care portion of the CPI, which assumes a fixed market basket.

Consequences: Health care cost inflation is assumed to gradually raise the costs of all categories of healthcare costs in the model. It also gradually raises the cost of implementing “provider-level interventions”, that is, the interventions listed above that require hospital or physician involvement.

Care Coordination can to some extent blunt the effect of healthcare cost inflation, but it must include the option to screen and potentially reject new, higher-priced medical technologies as they become popular.

In the model, increasing healthcare costs faced by employers leads to greater uninsurance for the working age population. Rising healthcare costs also lead to more people being forced into Disadvantage, due to high out-of-pocket costs (in some cases, bankruptcy) and job layoffs. Both of these trends have been evident nationally from the late 1990s to the present.



Change the goal for hospital occupancy

You may specify the hospital occupancy goal via input time series. As a default, this time series is assumed to remain at its initial value (66% for the US overall). An occupancy goal lower than the initial value of occupancy will lead to a decline in occupancy through more rapid growth of staffed beds. If the occupancy goal later increases, that would allow an increase in occupancy toward its new goal through slower growth of staffed beds.

The occupancy goal might differ from the initial occupancy, or might change over time, for two possible reasons. One is “passive”: small hospitals generally have lower occupancy than large (typically urban) ones, so if there is a trend in the size of hospitals (say, due to increased or decreased urbanization), such a trend would naturally affect the occupancy goal as well. The second is “active”: if hospitals start competing for patients on the basis of number and types of beds available, the resulting rapid growth of beds could drive the occupancy goal below its initial value. A decision by hospitals to end such a “beds race” could increase the occupancy goal; for example, allowing it to return to the initial value of occupancy.

Consequences: Lower hospital occupancy translates (other things being equal) to lower hospital profitability. If hospital profits are being threatened by interventions that reduce hospital volume (e.g., care coordination), then restoring profitability may require not only the hospital efficiency intervention to reduce average length of stay (see above) but also a decision by hospitals to raise the occupancy goal.

Intervention Options for Simulation Scenarios

The table below shows where the direct effects of each intervention concentrate.

RISK	 Healthier behaviors	 Violent Crime	 Student pathways
	 Environmental hazards		 Family pathways
CARE	 Preventive/chronic care	 Self care	 Hospital infections
	 Mental illness care		
CAPACITY	 PCP efficiency	 Recruit PCPs (general; FQHC)	 Hospital efficiency
COST	 Pre-visit consult	 Coordinate care	 Post-discharge care
	 Medical home	 Malpractice	 End-of-life care
FUNDING	 Innovation funding	 Value-based payment	 Reinvest savings
		 Global payment	
BACKBONE	 Backbone organization		