Institute for Healthcare Improvement

Age-Friendly Health Systems Inpatient ROI Calculator Instructions

The Business Case for Becoming an Age-Friendly Health System

This content was created especially for:

Age-Friendly Health Systems

An initiative of The John A. Hartford Foundation and the Institute for Healthcare Improvement in partnership with the American Hospital Association and the Catholic Health Association of the United States

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IHI Age-Friendly Health Systems Inpatient ROI Calculator Instructions

For important background information, please see the 2019 report, *The Business Case for Becoming an Age-Friendly Health System,* published by the Institute for Healthcare Improvement. The report and the ROI Calculators for both inpatient and outpatient settings are available on IHI's website (ihi.org/AgeFriendly).

Note: At this stage, the Excel spreadsheet calculator is optimized for PC use. While it will work with the Apple OS, some features work more slowly.

The Inpatient ROI Calculator is designed for hospital clinicians and financial executives to assess the business case for providing an age-friendly approach to care using the "4Ms" Framework of an Age-Friendly Health System (referred to as simply "4Ms" throughout these instructions). The user inserts the values for the 4Ms Framework's inputs and the calculator's algorithm reports the financial results — the outputs. The calculator expresses the financial returns both in terms of net income and in the form of a percentage — the ROI. The source of the ROI for the 4Ms in this setting is the avoidance of medical expenses that the 4Ms have the capacity to avert by reducing iatrogenic events such as delirium, falls, infections, etc.

How to Use the Excel Spreadsheet Calculator

The Excel spreadsheet calculator has two tabs: "Calculator" and "Sensitivity Analysis." Make sure you begin with the first tab, as the second tab requires the completion of the first. The second tab is optional (see an explanation at the end of these instructions).

The user progresses through five discrete steps, entering data inputs in the designated cells, leading to a "Results" section. Click on the numbered buttons sequentially to go to the corresponding section. (If you wish, you can explore the second tab, but only after you complete these five steps.)

How to Enter Inputs

The cells that require user inputs are identified by spinner buttons — up and down arrows. The user selects the appropriate value of the variable by clicking until the best estimate appears in the cell. *Do not type in the numbers directly; use only the arrows to select the desired number.*

"Help" Guidance

If you are uncertain as to what you are supposed to enter or what an output means, simply click on the cell with the caption next to that cell. You will then see a question mark (?) and when you click on it, a "help" note appears that explains its meaning.

Step 1: Specifications

First, decide the service line (e.g., coronary artery bypass surgery, orthopedics, Acute Care for the Elderly [or ACE] unit) for which you are inputting data, if not for the entire hospital. (The Scenario tool enables you to make comparisons of the financial returns across service lines.)

Next, choose whether to include utilization changes resulting from your hospital-based 4Ms effort that occur after discharge in post-acute care (PAC) facilities such as a rehabilitation center or a skilled nursing facility. There is evidence that delirium and pressure sores increase PAC costs. If your organization does not have financial responsibility for post-acute care, it is suggested that you do not check that box since the changes here do not affect the 4Ms business case for the hospital.

Step 2: Population

Insert basic information that establishes the scale of the 4Ms program. First, enter the number of annual admissions. Be sure to insert a total number that corresponds to the chosen service line. Next, decide on the number of years, called the Amortization Period, over which you wish to spread any one-time only or launch costs. If there are no start-up costs, ignore this entry. If there are any launch costs, spread these over the number of years the 4Ms program will be in existence; the cost should not all be borne in the first year. Rather, amortize this cost by apportioning an annual amount to each year of the 4Ms program's life. There is no rule here as to how many years to stipulate. Once you select the number of years, divide the total launch expense by the chosen amortization period and then add the result to other annual fixed expenses.

Step 3: 4Ms Costs

The calculator performs an incremental analysis of what the 4Ms add to cost and what benefits they bring in terms of medical expense avoidance. The next set of entries accordingly allows the calculation of the incremental costs, if any, of incorporating the 4Ms into a usual care delivery system. These entries should reflect only those costs *over and above* usual care. These entries are *not* to reflect the total costs of the service line. The cost entries required are for fixed and variable expenses.

4Ms Program Launch Costs

The launch costs do not recur annually. For example, the initial launch of the 4Ms program may require a retrofitting of the unit (i.e., adding a feature or otherwise modifying an existing space to have it conform to the needs of age-friendly care), a modification of the IT system, or an educational program for staff. You can set this cost to zero for established programs. Based on the amortization period you have already chosen, this expense will be spread evenly across the previously specified number of years.

Fixed Costs

There may be some 4Ms costs that are incurred each year, but do not vary with the number of admissions. For example, there may be a lease expense for additional space to accommodate an exercise program. If it is a true fixed cost, then the expense will not change within a reasonable range of admissions and therefore of patients served. Another fixed cost is any added staff (nurses, medical assistants, etc.) associated with the 4Ms program. While staffing costs would be fixed within a range of admissions, this cost would increase when the staff capacity was reached and other staff need to be added. It is advisable to consider staffing as a fixed cost within that plausible range of scale — that is, reflect on the incremental staffing needs for a 4Ms model of care for a plausible range of admissions centered around your entry above for annual admissions.

Variable Costs

Certain costs may rise continuously as the scale of the 4Ms program grows. These are called variable costs. An obvious example is the cost of age-friendly supplies provided to each patient (e.g., an easy-to-grip water pitcher to promote hydration). In the calculator, enter only the added cost of the age-friendly supplies relative to usual care. The calculator will then show the annual total cost of the 4Ms program.

Step 4: Estimates/Values

You may consider up to three hospital-acquired conditions that may be affected by implementation of the 4Ms. In the calculator, two conditions are named: delirium and hospital-acquired pressure ulcers (HAPUs). You can replace either of these conditions with other iatrogenic events by typing over these labels in the spreadsheet. There is also a third, blank option, where you may insert falls, infections, or any other hospital-acquired condition (HAC).

The instructions for this section use delirium as an example. The instructions apply equally to other conditions.

Incidence

For each HAC, enter the incidence your facility has experienced or might be expected to experience under usual care. Later, you will have the opportunity to estimate the impact of an age-friendly model of care on this incidence figure. For delirium, it is often impossible to distinguish between prevalent (pre-admission) and incident (arising after admission) delirium. Incident delirium is expressed as a percentage of those individuals admitted who will develop the condition or who have a latent condition that becomes fully expressed while in the hospital. That is the percentage to enter here.

4Ms Program Effectiveness

These are crucial entries. The 4Ms are expected to reduce the incidence of HACs. Enter the reduction in incidence that is expected, based on what the evidence has shown the effectiveness to be. Suppose that under usual care, the incidence of delirium amounts to 20 percent of all admissions. Suppose further that, with an age-friendly model of care, incidence drops to 15 percent of all admissions. That would translate to a program effectiveness of 25 percent, and the spinner should be set at 25 percent. (The five-percentage point reduction divided by 20 percentage points equals a 25 percent reduction.)

Type of Stay

The entries here refer to the length of stay (LOS) and the cost per day under two types of stay. “Normal” refers to the LOS and the cost per day in the absence of a given condition. For example, “normal” refers to the LOS for a patient who is negative for delirium. The other type of stay is called “Extended due to condition,” which refers to a hospital-acquired condition. You will then record the consequences: the added number of days and any change in the cost per day when the condition occurs.

It might be reasonably expected that the HAC prolongs the LOS, in which case you will insert the added number of days caused by the acquisition of the condition.

The average cost per day may rise or fall when the stay is longer. Many hospitals believe that delirium's complications raise the average daily cost; others may find that the additional days are less expensive than the days prior to the acquisition of the condition. Thus, you can select a lower or a higher cost averaged over the entire prolonged stay.

If you elected to include the financial consequences of the 4Ms for post-acute care (PAC), then a similar set of entries for PAC needs to be inserted. The entries there refer to the changes that might be expected in a PAC stay in terms of LOS and daily cost when the HAC was present prior to hospital discharge.

Step 5: Cost Offset from Coding and Revenue for HAC

This section considers the possibility that additional payments will be made to the hospital (for example, by CMS) if a case of delirium is detected and coded, and payment is received. Under Medicare fee-for-service, hospitals are entitled to bill for hospital-acquired delirium but not for pressure sores. To the extent that the hospital's cost of addressing delirium is reimbursed, even partially, you need to consider this reimbursement. The reimbursement offsets a portion of the cost burden of delirium to the hospital. Therefore, coding and the revenue affects the ROI from prevention and must be accounted for.

In order to calculate the amount of revenue needed to offset the cost per case of delirium, you will need to provide two pieces of information in the Excel spreadsheet:

1. Revenue per case detected (code modification). CMS allows a code modification for delirium. There are several possible Current Procedural Terminology (CPT) delirium-related codes, each of which offers a different fee that can be billed.

2. Detection and coding effectiveness (percentage of cases detected). While there may be eligibility for a code modification for a case of delirium, often cases go undetected and therefore billing is not done. This entry is designed to reflect the share of all delirium cases that is detected and billed for.

Once this final step has been taken, the calculator has all the information required to provide the financial results from the provision of the 4Ms model of care in the hospital.

Results

This section summarizes the financial results of providing the 4Ms model of care.

- "Net Benefit" means the cost avoidance from reducing the number of all HACs minus the expense of the 4Ms program. There is another way of expressing the financial return: ROI, a percentage, is calculated by dividing the net benefit of the 4Ms program by its cost.
- "Time Reclaimed by the Older Adult" is another result that is reported. While not directly part of the 4Ms business case, this metric is a central and significant one to calculate and report. It's at the heart of an Age-Friendly Health System and pertains specifically to the What Matters element. Time not spent in the hospital and the PAC facility is certainly part of What Matters to the patient.

- Based on your entries, the calculator will have tracked the impact of the 4Ms on rates of HACs and on the prolonged stays associated with them. The Time Reclaimed by the Older Adult figure covers the entire population that benefited from the 4Ms. A number of factors in the model influence the result for Time Reclaimed by the Older Adult: the number of admissions, the incidence of the HACs, the effectiveness of the 4Ms program in preventing HACs, and the number of days the HACs add to inpatient and post-acute stays.

Optional Tools

Below, three optional tools within the Excel spreadsheet calculator are described: Find Levels (Target ROI), Scenarios, and Sensitivity Analysis.

Find Levels (Target ROI)

The calculator computes the ROI based on your inputs. But you can use the Find Levels feature to determine the magnitudes of key variables that will result in a specific Target ROI. For example, if you are aiming to be cost-neutral, then you would insert 0% as the Target ROI and the calculator will inform you of the levels of delirium prevention effectiveness required to achieve that goal. You can also see the maximum 4Ms program cost that can be expended while still achieving the ROI goal. These calculations can assist in setting goals for your 4Ms program.

Note: Make sure that after you insert the Target ROI, you click the button that says "Find Levels" in order to see the result.

Scenarios

You can save one set of entries in order to compare results with a second set of entries based on different assumptions. For example, you may wish to compare a conservative set of assumptions with a more optimistic one, or to compare results for one service line with another. You can do both with the Scenarios tool.

To use this tool, first complete a set of entries. When finished, click on the "Scenarios" button. Select "Save Scenario," and the tool will allow you to recall this scenario later. Be sure to name the scenario saved. Then, when you wish to examine an alternative scenario, enter a different set of numbers corresponding to it; save and name that alternative scenario. When you click on the "Scenarios" button again, you will see the "Compare Scenarios" option which will show you a side-by-side comparison of the results for the selected scenarios.

Sensitivity Analysis

This tool is found on the second tab in the Excel spreadsheet and may be *used only after the first tab ("Calculator") has been completed*. This sensitivity analysis is a Monte Carlo simulation (a technique used to understand the impact of risk and uncertainty in forecasting the ROI). It permits an investigation into the probable range of estimates for the ROI. The tool is useful since there will be uncertainty regarding the exact values of the key inputs. In that context, it is wise to report a reasonable range rather than single estimates.

To run the simulation, follow these steps:

1. Select the independent variables from the menu on the left side that you believe are most subject to uncertainty. Remember that you have already inserted values for all the

independent variables to get to this point. These entries will automatically appear in the middle column labeled “Most Likely” if you click on the button labeled “Use Current Values.”

2. Determine the degree of variability you want the simulation to consider by clicking on either “Make 90%–110% of Most Likely” or “Make 80%–120% of Most Likely.” Choose the broader range if there is greater uncertainty regarding the central values in the middle column.

3. Click on the number of simulations to run. If you selected only a couple of variables to have subject to uncertainty, you might select 200 runs, which can be completed quickly. The more runs you choose, the more accurate the results, although the time required to run the simulation is longer.

4. Now inspect the results appearing in the table on the right side. It will show the parameters of the distribution — minimum, maximum, span, average, and standard deviation — for the key result areas: Net Benefit, ROI, and Time Reclaimed by the Older Adult. A graphical portrayal of the ROI range should also appear along with the range for the extent of Costs Avoided.

5. If you return now to the first Excel tab called “Calculator,” you will see in the right-hand corner the Simulation Results summarized there as well.