

Instructions and Background on Using the Telehealth ROI Estimator

Introduction: Costs and Benefits

How do investments in remote patient monitoring (RPM) devices affect the bottom line?

The telehealth ROI estimator is a simple, practical tool that can help healthcare decision-makers explore answers to that question. Specifically, the estimator is designed to provide an estimate of RPM costs and benefits for situations that meet the following criteria:

- The investing organization is a US hospital system with a home care practice or a stand-alone US home care organization that conducts home visits over a fixed period of time.
- Patients have diabetes, COPD, CHF, or a combination.
- Patients are being monitored following hospitalization for an acute episode.
- The organization is focused on reducing recidivism, either ER visits or hospital readmission for the same condition within 60 days following discharge.

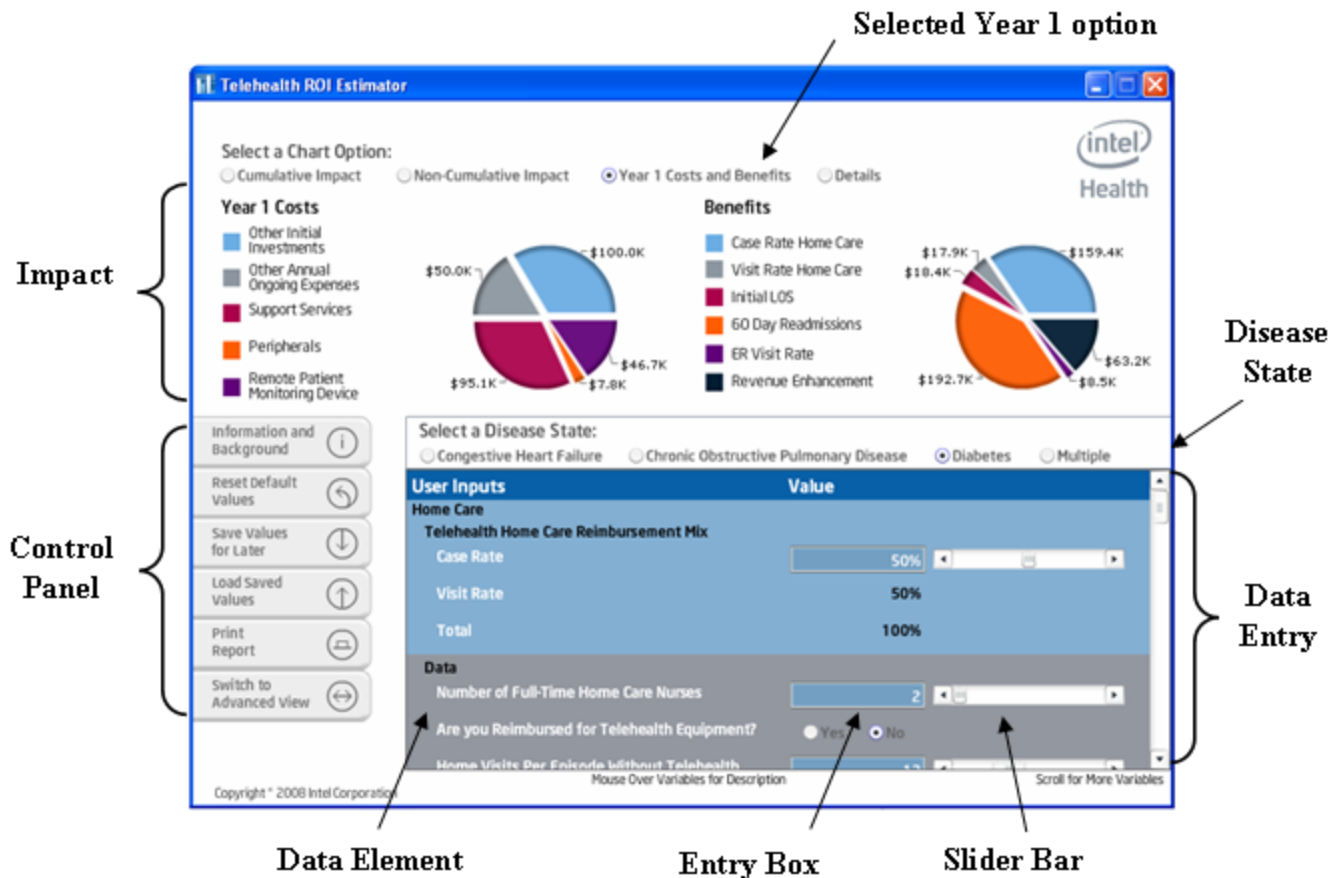
*The assumptions and structure of the telehealth ROI estimator are based on an extensive review of the healthcare literature, as well as interviews with numerous industry experts. These case studies and outcomes reported on the use of existing telehealth technologies; **they are not based on results achieved using the Intel® Health Guide.** See the Background section of this guide for more information about the estimator and the studies that inform our ROI assumptions. Before making any decisions using the estimator, be sure to adjust the data elements to reflect your actual situation.*

Instructions: Getting Started with the Simple Model

As you open the estimator, you'll see buttons to specify the type of organization. The default is for a US hospital with home care, so change that if you're a US independent home care organization.

Choose the simple model, which lets you quickly explore the estimator using a series of default assumptions. Once you're familiar with the estimator, you should use the advanced model and modify the data elements to reflect your actual situation.

Launch the estimator and review the Legal page. If you accept and click "I Agree," you will be on the main page with the simple model. As you look at the illustration below, note the control buttons on the left, the data entry area in the center (including the area for specifying what disease(s) are being monitored), and the impact area at the top. Also note that the impact area shows what you see if you select the Year 1 Costs and Benefits chart option.



Control Panel

The control panel buttons on the left of the screen enable you to:

- Get more background about the estimator
- Save or restore your data
- Print or email a report
- Switch between the simple and advanced models

Exiting the estimator or switching between simple and advanced models resets the tool and deletes the entries you've made. Use the Saved Values for Later and Load Saved Values buttons on the left to save and restore them. You can also use Save Values for Later to model a different situation and retain your work. However, this feature saves a single set of entries. To model multiple scenarios, it is best to print or email a copy of your work.

Data Entry: The Default Scenario

The estimator is pre-loaded with default data elements so you can quickly see the approximate costs and benefits from RPM. Scroll through the data entry area in the center of the screen to see these defaults.

The default scenario models a patient population that has CHF and is 70% case rate. Patients are seen by a total of five full-time home care nurses and are visited 12 times in the follow-up of the post-acute episode. Each nurse has a case load of 20

patients. In the U.S. Independent Home Care, Advanced model, there is an assumption of a \$100 per month RPM reimbursement for your visit-rate patients. This is \$0 in the U.S. Hospital with Home Care model. There are data elements for home care, then for costs (including RPM devices, peripherals, services, and initial and ongoing set-up, training, etc.), and finally for the acute or hospital setting itself.

Changing the Defaults

In the simple model, you can change the disease state, patient mix, number of home care nurses, number of home visits per episode, and current home care nurse case load. These elements are located near the top of the data entry area. To edit them, click the appropriate button (for disease state), type a number into the box, or use your mouse to move the slider bar left or right. (In the advanced model, you can change any data element.) In the advanced model, you can edit all 45 data elements.

Patient mix is linked to the case-rate payment per patient per episode. You can also select whether you will be reimbursed for RPM equipment for your visit-rate patients. The default is "No." If you change it to "Yes," then \$100 is added per month per RPM.

Look at the disease state buttons at the top of the data entry area and note that the default setting is CHF. If you change it to COPD, you can scroll down to the peripherals section of the data entry area and see that the estimator now assumes the use of a blood glucose meter and drops the pulse oximeter. A weight scale and blood pressure monitor are included for both CHF and COPD. Switch to the advanced model to adjust these and the remaining data elements.

ROI Impact

The top of the screen shows output charts documenting the financial summary of the current assumptions, including cumulative costs and benefits over a five-year horizon. Make sure you have selected CHF. With these defaults, the year 1 costs are \$529,000 and benefits for hospital and home care combined are \$676,000. The break-even point occurs late in year 1.

Use the [Select a Chart Option](#) buttons across the top of your screen to see the non-cumulative impact, year 1 costs and benefits, and a detailed table view. For more information about the assumptions and data elements behind the ROI model, see the Assumptions about RPM Value discussion at the end of this guide.

Two factors that influence telehealth ROI are the growth in your RPM patient population, and the portion of the total potential benefits that are actually as you deploy RPM technology. At the bottom of the data entry area, you'll see two data elements to recognize these factors. Note that the annual forecasted growth rate is assumed to be 10%. There's also a success factor of 50% for the first year in the US Hospital with Home Care model, reflecting the assumption that 50% of total benefits are realized due to ramping the use of the technology, modifying workflows, and so forth. This is 75% in the US Independent Home Care model. Again, the advanced model lets you modify these.

Instructions: Fine-Tuning Your Analysis with the Advanced Model

Before making investment decisions based on the estimator, you should use the advanced model to adjust any of 45 data elements to match your business and clinical environment. ROI is recalculated each time you change one, so you can get a real-time idea of the each element's sensitivity in impacting the financials.

To explore the advanced model, let's walk through a hypothetical scenario. Open the ROI estimator, select "U.S. Hospital with Home Care", select "Advanced Model" and then "Launch Estimator":

1. Say your hospital's home care organization manages patients with multiple diseases. At the top of the data entry area, change the disease state to Multiple.
2. Your patient population mix is 50% case rate and 50% visit rate so change Case Rate to 50% (rather than 70%)
3. You have only 3 home care nurses who would use RPM (rather than 5). Change Number of Full-Time Home Care Nurses by typing a 3. Hit Tab to move to the next button.
4. Your compensation rate is \$70,000. Change Home Care Nurse Compensation from \$72,600 to \$70,000.
5. Change Cost of Home Visit to \$100 (rather than \$115).
6. You are reimbursed from the government for telehealth equipment for your Visit Rate patients at a rate of \$50 per month, so change Monthly Telehealth Equipment Reimbursement to \$50.
7. Change Length of Home Visits Including Travel with Telehealth (minutes) to 90 minutes rather than 70, since your patients have more complex conditions.
8. You should see a warning that your nurses are working overtime. To correct that and reflect the added time spent with patients, change Home Care Nurse Patient Case Load without Telehealth to 17 (rather than 20). At this point, you can see the tool calculates a Home Care Nurse Patient Case Load with Telehealth of 26.
9. Move down to the Telehealth Solution Costs section of the data entry area. Since you plan to own the devices, let's say 10% of the units will be inactive or in-transit. Change Utilization Assumption with Telehealth to 90% (instead of 100%).
10. Notice that all peripherals are selected. However, you think only half your patients will need a blood glucose meter, so in the Peripherals section, change Blood Glucose Meter to 50%.
11. Since you have a smaller practice, you believe your start-up investment in workflow changes, training, program management and other one-time costs will be \$90,000 (instead of \$100,000), and ongoing costs will \$45,000 (rather than \$50,000). Move down to Other Solution Costs and make these changes to Other Initial Investments and Other Annual On-Going Expenses.
12. Let's say your existing rate of recidivism is 30% rather than 40%. Move to the Cost Savings Opportunities section and change 60-day Readmission Rate without Telehealth to 30%.
13. The defaults are based on an assumption that recidivism will drop by 40%. You're skeptical, and given a patient population with multiple conditions, you

- believe a 30 percent drop is more realistic. Change 60-day Readmission Rate with Telehealth to -30% (instead of -40%)
14. Your hospital is occasionally at full capacity. Go to Revenue Opportunity and change Ability to Fill Freed Beds with Telehealth to 25% (rather than 50%)
 15. Finally, you believe it may take longer than a year to see the full benefits. Go to Success Factor and Annual Growth and change Year 2 Success Factor to 75% (instead of 100%).

Now, look at Cumulative Impact in the output chart. You see a first-year cost of \$353,500 and a benefit of nearly \$350,000. Note that the break-even period is in Year 2, when the combined benefits for home care and hospital reach \$928,000 – \$288,000 more than cumulative costs by the end of this second year. The following table summarizes the inputs and assumptions you changed for this scenario.

Data Elements Changed in the Above Scenario	New Data
Disease state (button)	Multiple
Case Rate	50%
Number of Full-Time Home Care Nurses	3
Home Care Nurse Compensation	\$70,000
Cost of a Home Visit	\$100
Monthly Telehealth Equipment Reimbursement	\$50
Length of Home Visit Including Travel with Telehealth (minutes)	90
Home Care Nurse Patient Case Load without telehealth	17
Utilization Assumption with Telehealth	90%
Blood Glucose Meter	50%
Other Initial Investments	\$90,000
Other Annual On-Going Expenses	\$45,000
60-day Readmission Rate without Telehealth	30%
60-day Readmission Rate with Telehealth	30%
Ability to fill freed beds	25%
Year 2 Success Factor	75%

About the Estimator

Intel’s Digital Health Group developed the ROI Estimator based on the telehealth value model. The value model methodology started from the approach Intel uses to prioritize its own IT investment decisions. We refined and shared this methodology with IT decision-makers and CFOs in numerous industries, and then DHeG worked with global healthcare leaders to develop the healthcare IT and the mobile point of care value models. The telehealth value model and the estimator build on this foundation.

The telehealth value model and the assumptions and structure of the Telehealth ROI Estimator are based on an extensive review of industry journals such as Diabetes Technology and Therapeutics, Disease Management and Health Outcomes, and Telemedicine Journal and e-Health, as well as interviews with industry experts. The literature review yielded over 100 case studies, editorials, and papers describing the use of RPM technologies, and was narrowed down to over 40 that described robust,

sizable studies of RPM technologies. Note that these case studies and outcomes are based on the use of existing telehealth technologies and **not on results achieved using the Intel® Health Guide**. Cost assumptions are based upon Intel research and reflect market rates.

All these defaults should be changed to reflect your unique situation prior to making any decision using the data from the estimator. Use the advanced model to modify these defaults.

Assumptions about RPM Value

The literature review, along with in-depth interviews with home care experts, indicates that RPM can improve staff productivity and reduce medical cost while providing as good or better clinical outcomes and patient satisfaction. The daily monitoring enabled by technology can allow costly pre-scheduled visits to be replaced by as-needed interactions – sometimes via home visits, but often through telecommunications. Studies showed that when patients could be monitored at home, they were able to be released earlier.¹ Their readmission rate dropped,² and they made fewer visits to the Emergency Department following discharge.³ These changes impact both the home health and acute care sides of the house.

The assumptions in the estimator reflect these findings and are structured around three sources of benefit:

- **Home care productivity.** In the simple model, we assume a 50% reduction in the number of home visits – from 12 over the 60-day monitoring period to 6. This reduction saves travel and visit time, and allows for caseload to increase 40% to 28 patients. Note that cutting the number of visits in half does not double the caseload since new activities such as remote monitoring and more frequent calls to a patient require time. This reduction is reflected in the data entry area.
- **Acute care cost savings.** The estimator includes revenue and costs assumptions. It assumes that initial length of stay of a patient with CHF is 5.5 days, and that when a CHF patient is discharged to RPM, the hospital about length of stay (LOS) drops by about ½ day or 10%. It also assumes that the previous rate of readmission within 60 days was 25%, and that recidivism drops 40% with RPM. These readmissions last 6 days and drop 20%. Finally, the estimator assumes that the normal ER visit rate is 15% and that it drops 40% with RPM. These assumptions change depending on the disease state

¹ For example, see V. Fleishman, Remote Physiological Monitoring: Innovation in the Management of Heart Failure, 2004, New England Healthcare Institute, and R. Clark - Telemonitoring or Structured Telephone Support Programmes for Patients with Chronic Heart Failure: Systematic Review and Meta-Analysis, 2007, British Medical Journal.

² For example, see K. Danksy, Cost Analysis of Telehomecare, Journal of Telemedicine and e-Health, 2001; R. Hoyt, Reducing Readmissions for Congestive Heart Failure 2001, American Family Physician, 2001, and L.Hudson, Remote Physiological Monitoring: Clinical, Financial, and Behavioral Outcomes in a Heart Failure Population, Disease Management, 2005.

³ For example, see J. Vaccaro and J. Cherry, Utilization Reduction, Cost Savings, and Return on Investment for the PacificCare Chronic Heart Failure Program, “Taking Charge of Your Heart Health,” Disease Management, 2001.

selected, and you can modify them further by using the advanced model. To see full details of the hospitalization rates, select the Details chart at the top of the screen and scroll to the very bottom.

- **Revenue opportunities.** The estimator assumes that the hospital is constrained and that the hospital can fill 50% of any beds that are freed by lower LOS and reduced recidivism.

For additional information on Intel Digital Health, contact your Intel representative or visit us on the web at www.intel.com/healthcare.