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# Quality improvement for asthma care: The asthma care return-on-investment calculator

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Tools You Can Use to Make a Difference  
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# Agenda

- What is the Asthma Care Return-on-Investment calculator?
- Background
  - Definitions
  - Key issues
  - How can the calculator help evaluate asthma care programs? What does it provide?
- How does the calculator work?
- Summary of literature review
- Conclusions
- Resources





# What is the Asthma Care ROI Calculator?

## ■ Purpose

- Help state policy makers and health plans estimate financial returns asthma quality improvement programs

## ■ Why developed?

- Most studies don't address financial impact, rather clinical and use impacts only
- Clinical or use impacts need to be translated into costs or savings

## ■ How are estimates generated?

- Combine clinical evidence about impacts on utilization with separate cost data to estimate financial impact





# Background: definitions

- Asthma care programs typically follow NAEPP (National Asthma Education and Prevention Program) guidelines
  - Patient education
  - Provider activities

- Financial metrics

$$\text{Return on Investment (ROI)} = \frac{\text{Savings}}{\text{Program Cost}}$$

= \$1 break-even

$$\text{Net Present Value (NPV)} = \text{Savings} - \text{Program Cost}$$

= \$0 break-even

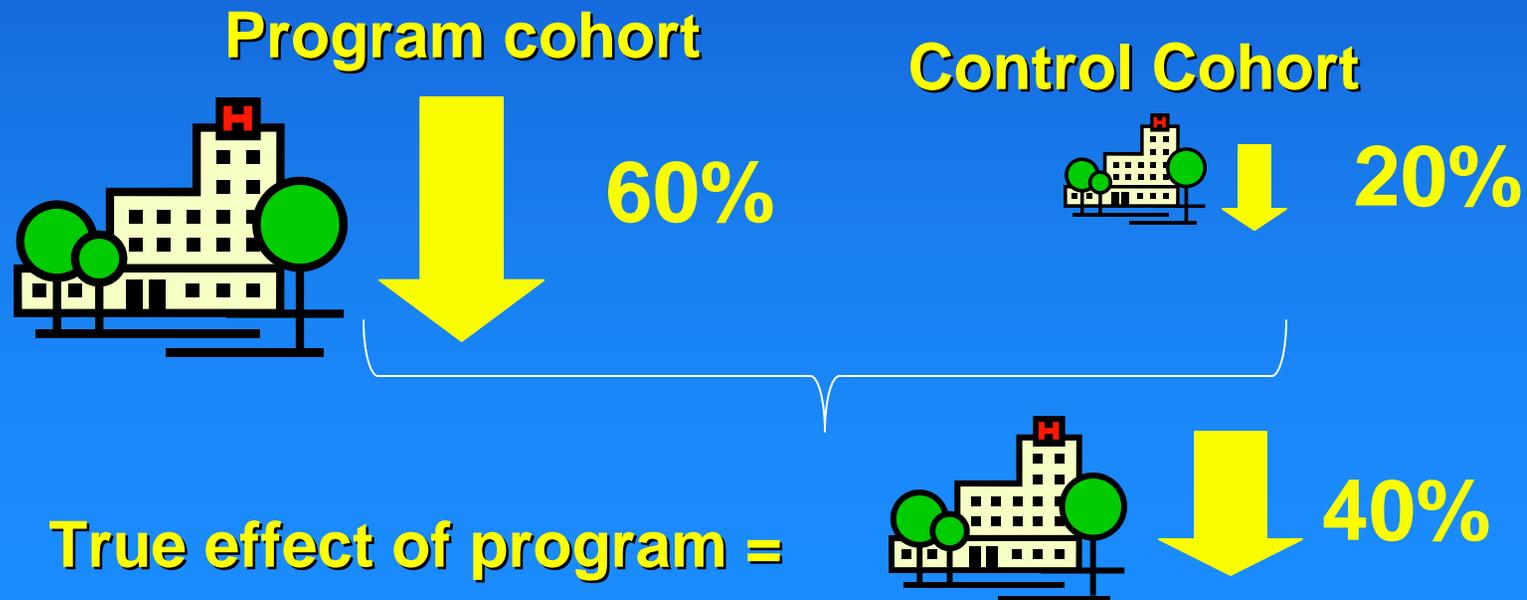
# Background: cost vs. quality

- Programs that improve quality of asthma care may or may not reduce total medical care costs



# Background: program evaluation methods

- **Regression to the mean bias**
  - Sick patients may get better over time, even without the program
  - To be successful, a program must “beat” the regression to the mean bias



# How does the calculator work?

**72,777** participants who  
average

**0.25** ED visits per year



**18,194** annual visits to ER

Asthma  
program



**30%**



**5,458** visits to ER saved

Each visit  
costs **\$88**



**\$480,304** saved

Repeat for each component asthma-related costs

Compare change in medical care expenditures with program cost



# How does the calculator work?

## Cost components

- Asthma-related medical care
  - Emergency department visits
  - Hospital stays
  - Outpatient visits
  - Medications
  - Ancillary testing
  
- Productivity (optional)
  - Missed school or work days



# Data sources

## 1. Population demographics

- Medicaid (CMS 2003)
- Employer sponsored health insurance (CPS 2003-2005)
  - State employees (BLS 2003-2005)

## 2. Large, nationwide, medical claims database (MarketScan™)

- Prevalence rates
- Utilization and costs for asthma patients

## 3. Literature review (52 studies)

- Impact of asthma care programs
- Cost to implement asthma care programs

## 4. You!

- Virtually all data used by the model can be changed by the user

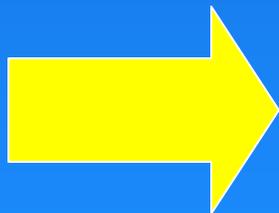


# Calculator features

- **Ability to examine how the following factors may change financial impact of program**
  - Who is included in the program
  - What benefits are counted?
  - Length of the program
  - Cost to implement the program
- **Options to describe benefits and costs from a third-party payer or society perspective.**

# Calculator features

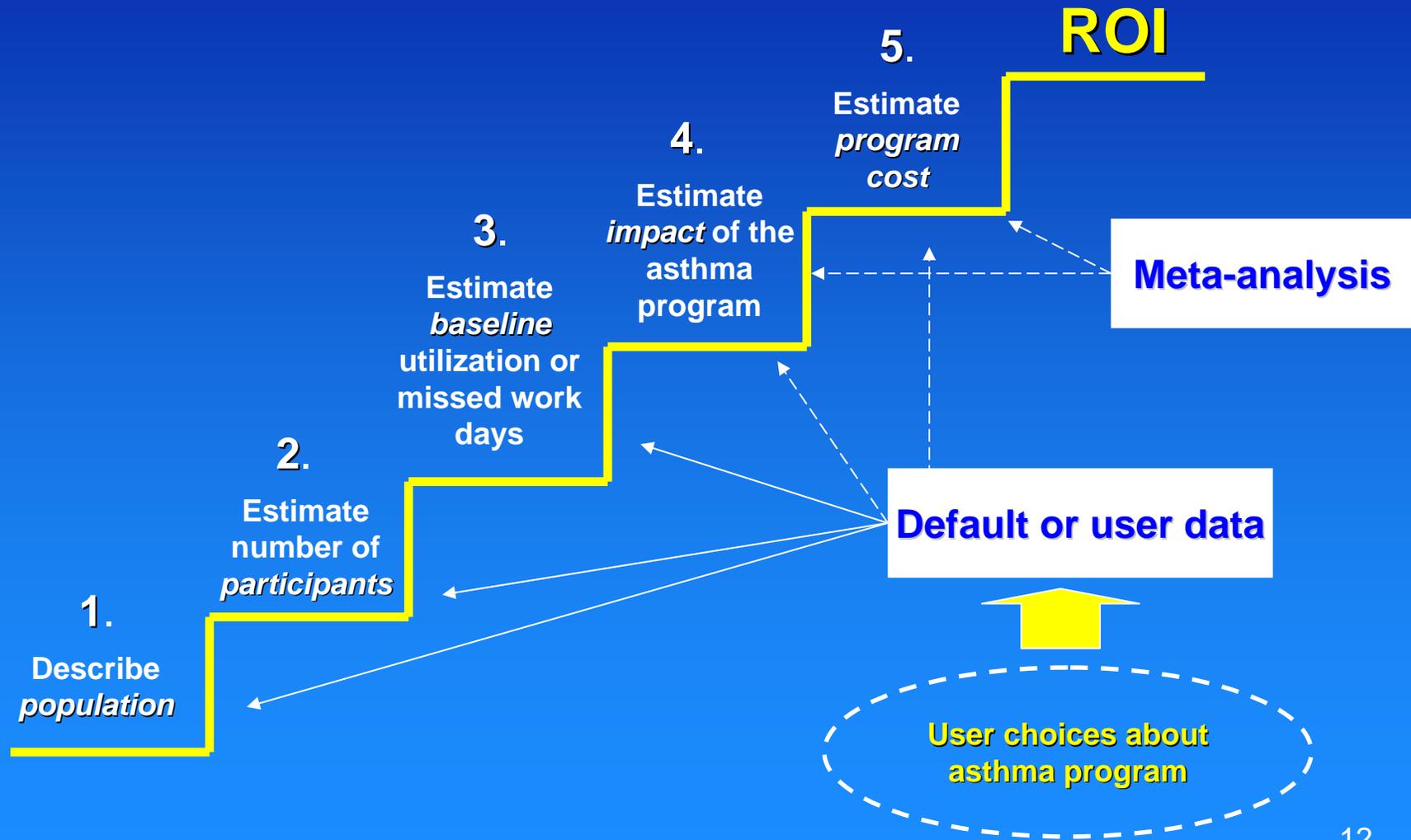
- Ability to choose the research design to use in estimating savings
  - Studies without a control group
    - Use as a benchmark for preliminary results
  - Studies with a control group
    - shows expected **true savings**



**Use calculator in planning an asthma care program**

**Framework of calculator may be useful for evaluating an asthma care program**

# Steps in the ROI calculator





# Population

Select the type and geography of the general population (people with and without asthma) that you are considering for asthma care quality improvement. For a general discussion of this page, click on the black question mark. ? For information on a particular item, select a blue question mark.

Population type ?  Geographic location ?

Size of population ?

### Age & gender of population ?

	Male	Female
1 - 4	6.2%	9.1%
5 - 17	15.0%	21.9%
18 - 34	9.2%	13.7%
35 - 44	4.6%	6.7%
45 - 54	3.7%	5.6%
55 - 64	1.8%	2.5%

Sum = 100.0%

The sum should be 100%.

### Race of population ?

White	43.8%
African American	23.1%
Hispanic	22.1%
Asian or Pacific Islander	3.5%
American Indian / Alaskan Native	1.5%
Other / Unknown	6.0%

Sum = 100.0%

The sum should be 100%

Data sources ?



# Participants

For a general discussion of this page, click on the black question mark. ?

Do the following on this page:

- 1) Select the age group and asthma severity that you want to target for a quality improvement program. (If you want to target people through emergency departments or hospital inpatient settings, select "persistent asthma with an acute visit".)
- 2) Review the number of people eligible for program and the percent expected to participate in the program. Modify if needed.

Age Group: ?

Select children, adults, or both

Child  
 Adult

Asthma Severity/Definition: ?

All asthma (intermittent & persistent asthma)  
 Persistent asthma only  
 Persistent asthma with an acute visit

Number of patients eligible for the program, by age & gender

	Male	Female
1 - 4	135,966	128,581
5 - 17	285,481	300,304
18 - 34	101,469	172,338
35 - 44	81,146	190,717
45 - 54	100,414	270,990
55 - 64	79,246	149,804

? Asthma patients eligible for program: 1,996,456

(Calculated from population, age group, asthma severity/definition, and prevalence rates.)

? Percent of eligibles who will participate: 25.0%

? Expected patients who will participate: 499,114

View asthma prevalence rates\*



# Baseline Data

For a general discussion of this page, click on the black question mark. ?

Make two decisions on this page:

- 1) Select a treatment definition and cost perspective for calculating results.
- 2) Review the baseline utilization and cost estimates. Modify them if you have pre-program estimates for your population

Please select a type of treatment definition: ?

Asthma Treatment

Any Treatment

Please select a cost perspective: ?

Program / plan

Pgm / plan & patient

Annual emergency department visits per patient ?

Cost of an emergency department visit ?

Annual hospital stays per patient ?

Cost of a hospital stay ?

Annual outpatient visits per patient ?

Cost of an outpatient visit ?

Annual cost of asthma medications per patient ?

Annual cost of asthma-related ancillary services per patient ?

Annual missed work days per adult from asthma ?

Cost of a missed work day ?

Annual missed school days per child from asthma ?

Cost of a missed school day ?

Microsoft Excel - Asthma\_ROI\_model\_20070601.xls

Overview Contents Population Participants Baseline Data **Program Impact** Program Cost Results Appendix Save and Exit Exit

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## Program Impact

For a general discussion of this page, click on the black question mark. ?

This page shows the impact estimates from a meta-analysis of the research literature on asthma quality improvement and disease management. You have one decision to make and one option on this page.

- 1) Select the type of study you want to use for results.
- 2) Freeze the impact values if you want to compare different scenarios when the impact stays the same.

Select a study design: Randomized controlled studies      Check to keep impact at current values:  Freeze impact values

<b>Healthcare Measures:</b>	<b>Productivity Measures:</b>
Program impact on emergency department visits?* <span style="float: right; border: 1px solid black; padding: 2px;">-25%</span>	Program impact on missed work days per adult?* <span style="float: right; border: 1px solid black; padding: 2px;">-86%</span>
Program impact on hospital stays?* <span style="float: right; border: 1px solid black; padding: 2px;">-37%</span>	Program impact on missed school days per child?* <span style="float: right; border: 1px solid black; padding: 2px;">-57%</span>
Program impact on outpatient visits?* <span style="float: right; border: 1px solid black; padding: 2px;">-21%</span>	
Program impact on the cost of ancillary services?* <span style="float: right; border: 1px solid black; padding: 2px;">-66%</span>	
Program impact on the cost of asthma medications?* <span style="float: right; border: 1px solid black; padding: 2px;">16%</span>	

\* Negative percents are a decrease and positive percents are an increase in health care use or cost or missed days.

Microsoft Excel - Asthma\_ROI\_model\_20070601.xls

Overview | Contents | Population | Participants | Baseline Data | Program Impact | **Program Cost** | Results | Appendix | Save and Exit | Exit

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A1      Program Cost

 **Program Cost** 

For a general discussion of this page, click on the black question mark. ?

Review four decisions that will affect calculations of the cost of the program to be implemented. Modify if appropriate.

- 1) Length of operation planned for the program.
- 2) Time until the full-impact of program is expected.
- 3) Cost of the program per person per year (consider changing based on costs estimates for specific programs from vendors).
- 4) Discount rate for valuing savings and costs that occur in different years.  
(If immediacy of results is essential in your program, you may want to raise the discount rate.)

How long will the program operate ( 1 to 10 years)?	<input type="text" value="5"/>	What is the annual program cost per participant?	<input type="text" value="\$395"/>
How many years until the program achieves full impact?	<input type="text" value="2"/>	What is the discount rate for ROI calculation?	<input type="text" value="3%"/>



# Results

[Go To Detailed Results](#)

For a general discussion of this page, click on the black question mark. ?

This page shows the impact of the asthma program and summarizes the assumptions you made in the calculator. Make two decisions on this page: 1) Whether to include health care savings, productivity gains, or both. 2) Whether to report results per participant or per program.

Choose whether to display averages or totals:  Show averages per participant  Show totals for all participants

### Current Model Settings

Population type	Medicaid
Geographic location	Nation
Asthma definition	Persistent only
Adults and/or children	Adults and Children
Estimated persons with asthma	1,996,456
Percent who will participate	25%
Estimated program participants	499,114
Annual program cost per participant	\$395
Years the program operates	5
Program phase-in period (years)	2
Discount rate for NPV and ROI	3%

<b>Health Care Savings per Participant</b>	<b>\$257</b>
Emergency department visits	8.2%
Hospital confinements	227.8%
Outpatient visits	14.8%
Asthma-specific ancillary services	36.9%
Asthma medications	-187.6%
	100.0%

<b>Productivity Gain per Participant</b>	<b>\$1,714</b>
Productivity for adults	76.9%
Productivity for children	23.1%
	100.0%

<b>Total Program Cost per Participant over Years the Program Operates</b>	<b>\$1,809</b>
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Choose health care savings, productivity gains, or both:

Include Health Care savings in the NPV and ROI

Include Productivity gain in the NPV and ROI

### Overall Impact of Program

Net Present Value (NPV)	-\$1,552
Return On Investment (ROI)	\$0.14
<a href="#">Update&gt;&gt;</a> Break-Even Program Impact	-13%
<a href="#">Update&gt;&gt;</a> Break-Even Program Cost	\$56.04

Microsoft Excel - Asthma\_ROI\_model\_20071128.xls

Overview Contents Population Participants Baseline Data Program Impact Program Cost Results Appendix Save and Exit Exit

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## Undiscounted Results per Person for the User-Specified Program Tabulated by Outcome Measure and Year

[Return](#)

The earliest year represents the baseline period before the program is implemented. Savings are estimated by comparing the results on this page to a scenario with no program, for which the baseline values hold steady over time.

Annual utilization & cost per patient	2007	2008	2009	2010	2011	2012
Emergency department visits	0.24	0.21	0.18	0.18	0.18	0.18
Hospital confinements	0.06	0.05	0.04	0.04	0.04	0.04
Outpatient visits	1.16	1.04	0.92	0.92	0.92	0.92
Emergency department cost	\$20.64	\$18.06	\$15.48	\$15.48	\$15.48	\$15.48
Hospital confinement cost	\$386	\$314	\$243	\$243	\$243	\$243
Outpatient cost	\$44.08	\$39.45	\$34.82	\$34.82	\$34.82	\$34.82
Asthma-specific ancillary cost	\$35.00	\$23.45	\$11.90	\$11.90	\$11.90	\$11.90
Asthma medication cost	\$735.00	\$793.80	\$852.60	\$852.60	\$852.60	\$852.60
Missed work days for adults	5.82	3.32	0.81	0.81	0.81	0.81
Missed school days for children	4.84	3.46	2.08	2.08	2.08	2.08
Productivity cost for adults	\$374.58	\$213.51	\$52.44	\$52.44	\$52.44	\$52.44
Productivity cost for caregivers	\$169.40	\$121.12	\$72.84	\$72.84	\$72.84	\$72.84



# Results from the literature review

Savings are more likely for some populations than others, depending on the component of care. For example:

- Interventions for people with **persistent asthma** (versus all asthma) had:
  - Higher savings on ED visits and outpatient visits
  - Similar savings on missed work/school days
  - Lower savings on hospitalizations
  - Smaller increases in medication costs (so higher savings)

# Results from the literature review

- Interventions in **Medicaid** populations (versus other coverage) had:
  - Higher savings on hospitalizations, outpatient visits, missed work/school days
  - Lower savings on ED visits
- Interventions for **children** (versus adults) had:
  - Higher savings on outpatient visits and asthma medications
  - Lower savings on ED visits, hospitalizations, and missed work/school days
- **Controlled studies** showed lower savings than non-controlled studies



# Results from literature

- Few studies reported **program cost**; those that did reported a wide range (7 studies)
  - Average of \$395 dollars per patient per year
  - Low of \$81 for automated educational mailing to general populations
  - High of \$989 per year, targeted to highest cost patients



# Results from literature

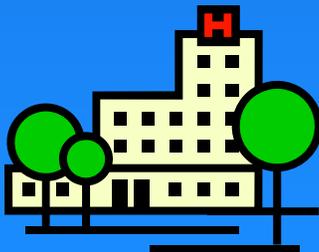
- Few studies reported the impact on **asthma medication** use (10 studies)
  - Studies **without a control group** reported larger increases in medication costs
  - **Baseline** asthma medication costs varied



# Conclusions

## What are the key drivers of ROI?

- Decrease in costs due to hospitalizations
- Increase in medication use
- Cost to implement the program



# Conclusions

## What can the asthma care calculator do?

- Help **forecast** the **financial** impact of asthma care programs
- Summarizes published evidence from **52 studies** on the impact of asthma care programs on use of medical care services and productivity





# Resources

- Breakout sessions
  - Policy implications
  - Hands-on-Training
- Detailed report available on request
  - Documents methods, definitions used for the default baseline data
  - List of studies included in the literature review
- Send questions, suggestions and stories about the use of the calculator to:  
**Ginger Carls (Ginger.Carls@thomson.com) or**  
**Rosanna Coffey (Rosanna.Coffey@thomson.com)**