The Asthma Care Return-on-Investment Calculator: Overview and Demonstration

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*Thomson Reuters (formerly Thomson Medstat)

Outline

- **Overview of calculator**
- **Ways to use the calculator**
- **Information behind the calculator**
- **Caveats**
- **Question and Answer**
- **Demonstration**
  - Calculator steps with default data sources
  - Results with default data
- **Insights from Alabama Medicaid**
- **Question and Answer**

Have you ever used or reviewed the Asthma ROI Calculator?

■ A short poll will appear on your screen. Please take a few seconds to answer the poll and provide valuable feedback!

Why an Asthma ROI Calculator?

- **Purpose**
  - Help State policymakers and health plans estimate potential financial returns from asthma quality improvement programs

- **Why developed?**
  - Most studies don't address financial impact – only clinical and use impacts
  - Clinical or use impacts must be converted to costs or savings

- **How are estimates generated?**
  - Evidence from the literature (meta-analysis) combined with baseline utilization and costs
  - Enter your population and other optional estimates into calculator at AHRQ Web site

How the Calculator Works

Baseline utilization

100,000 participants who average

0.25 ED visits per year

→ **25,000** annual visits to ED

Evidence

Asthma program (could use pilot) ↓ **50%**

→ **12,500** visits to ED saved

Assign costs to utilization changes

At **$300** per ED visit

→ **$3,750,000** saved

Repeat for each service & productivity component

Compare change in medical care expenditures with program cost

Return on Investment (ROI)

Program costs $50 per participant → $ROI^* = \dfrac{\$3,750,000 \text{ saved}}{\$5,000,000 \text{ cost}}$

($50 cost per participant) x (100,000 participants)

ROI = $0.75

Every $1 invested returns only 75 cents, or costs 25 cents

A breakeven ROI = $1.00

*Formula involves discount rate. See Calculator Appendix, "How the Model Works."

Cost Components Included

- **Asthma-related medical care**
  - Emergency room visits
  - Hospital stays
  - Outpatient visits
  - Medications
  - Ancillary testing
- **Productivity (optional)**
  - Missed school or work days (not caregiver time)
- **Costs of implementing a program**

Ways To Use the Calculator

Applications:
Ways To Use Calculator

- **Forecast** financial impact
- **Assess** impact of key **assumptions** about proposed program
  - Examine alternative target populations to assess trade-offs
  - Are assumptions "reasonable" compared to other evidence?
- Estimate "**cost hurdle**" needed to break even
  - Negotiate with vendors
- Observe components of calculator in **planning** an evaluation of an asthma care program

Applications:
How It Helps With Policy

- **Michigan Pediatric Asthma Coalition**: Used to make a funding decision for a county asthma program

- **New York Department of Health**: Used to consider evaluation components for a housing improvement project aimed to reduce asthma symptoms

- **Massachusetts Asthma Prevention and Control Program**: Used to consider ROI for environmental approaches to asthma prevention and control

- **Alabama Medicaid Agency**: Using to plan and justify a pilot asthma care improvement program for Medicaid recipients.

Information Behind Calculator

Methods:
Literature Review Inclusion Criteria

	Includes	Excludes
Population	Children, adults under 65	Adults 65 and over
Setting	United States	Non-U.S. settings
Intervention	Self-management of asthma or physician education	Clinical trials comparing medications, summer camp
Type of study	Individual interventions	Meta-analysis, editorials
Timeframe of outcomes	Studies of long-term effects of intervention ($\geq$ 6 months)	Studies of short-term effects of intervention (< 6 months)
Year published	1995-2007 (March)	Before '95; after March '07
Outcomes	Hospitalization, outpatient visit, ED visit, total costs, cost of medications, cost of ancillary services, or productivity losses (missed work or school days)	Studies with no utilization outcomes (e.g., only changes in quality of life, knowledge of asthma, etc.)

Methods: Evidence Built Into Calculator (52 Unique Studies)

	Age groups included							
	Children only		**Adults Only**		**Both Children and Adults**		**TOTAL**	
	Number of Patients	Number of Studies	Number of Patients	Number of Studies	Number of Patients	Number of Studies	Number of Patients	Number of studies
ED Visits	13,213	21	714	11	8,812	9	22,739	40
Hospitalizations	17,575	19	7,161	9	2,526	7	27,262	33
Outpatient Visits	20,229	18	6,986	4	1,888	5	29,103	25
Missed Work/ School Days	4,172	11	521	5	443	3	5,136	17
Medication Cost	486	2	301	3	13,580	5	14,367	10
Ancillary Service Cost	61	1	148	2	0	0	209	3

Notes: Total studies can be less than sum of row because some studies reported results for both adults and children. Patients include both treatment and control groups.

Methods: Meta-Analysis

- **Observations:** Each study outcome (child/adult, hospital/etc.) = 1
- **Dependent variable:** Percent change in measure
- **Explanatory variables/indicators:**
    - Type of measure (e.g., hospital, ED, productivity)
    - Age group (children, adults, both)
    - Whether most patients in the study were Medicaid/SCHIP
    - Study patients' asthma severity (persistent, intermittent, or all)
    - Study design used (randomized, all controlled, uncontrolled)
    - If intervention primarily focused on physicians (not patients)
    - Whether outcome measured after 2 years
    - Sample size and sample size squared
- **Regressions:** Weighted linear, clustered SE
- **Impact:** Percent change predicted from coefficients

Methods: Meta-Analysis Observations

- **Number of studies**
  - 76 studies met inclusion criteria
  - 52 of them had usable findings
- **Number of findings**
  - 93 findings for emergency department visits
  - 78 findings for hospitalizations
  - 57 findings for outpatient visits
  - 24 findings for productivity
  - 17 findings for medication costs
  - 2 findings for cost of ancillary services
  - 22 findings for total medical cost
  - 2 findings for total indirect costs

Methods: Baseline Costs & Utilization

- Calculator includes baseline estimates for costs and utilization specific to the population selected (national or State):
  - Medicaid
  - Employer-sponsored health insurance (privately insured)
  - State government employees & dependents
- Demonstration lists these and other sources used in calculator

Caveats

Caveats

- **Limited evidence for some components:**
  - Few studies (7) reported program cost – wide range:
    - Average = $395 dollars per patient per year
    - Min. = $81 automated general educational mailing
    - Max. = $989 program for highest cost patients
  - Few studies (10) reported asthma medication costs:
    - Studies without a control group reported larger increases in medication costs
    - Baseline asthma medication costs varied
- **AHRQ does not plan updates at this time**

Caveats & Solutions

Problems:

- Literature continues to grow

- Baseline data become obsolete

- Estimate predates current year

Solutions for users:

- Monitor literature post April 2007 & input results

- Use your own data to populate the calculator

- Inflate estimates using inflation factors described in appendices

Questions?

- **To ask verbal questions:**
Please press *1 on your phone to be placed in the queue for questions

OR

- **To ask electronic questions:**
Type your question into the Q&A box on the right-hand side of your screen

Demonstration

Demonstration Outline

- Calculator steps with default data sources
- Results with default data

Overview of Calculator Steps

Asthma Calculator Home

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Getting Started

2. Define Key Program Features

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3. Review/Edit Program Features & Data (Optional)

Population

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Baseline

Program Impact

Program Cost

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5. Resources

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    How the Model Works

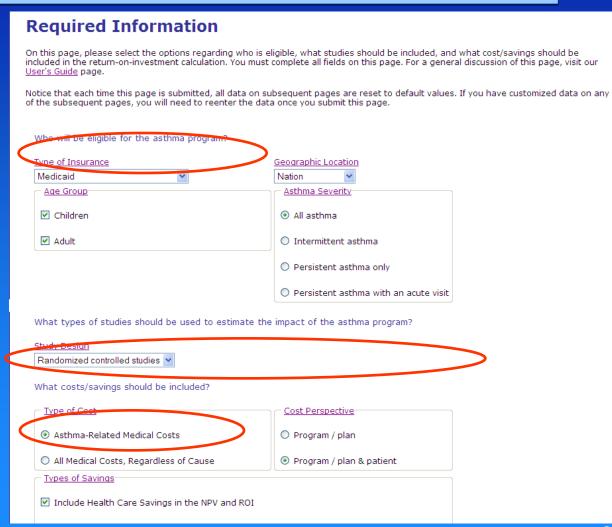   Default Values

Default or user data

Meta-analysis

User choices about asthma program

Review/Edit Program Features/Data: POPULATION

Asthma Return-on-Investment Calculator

Population

This page is populated with estimates of the size of the population and age and gender (race for Medicaid) characteristics of your population. These estimates are combined with prevalence rates to estimate the number of asthma patients in your population. If you know the demographic characteristics of your population, enter them here. You can change the number of eligible asthma patients on the next page (*Participants*) if you know this information. For a general discussion of this page, visit our User's Guide page.

Size of Population: 47,070,208

Age & Gender of Population

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

Sum = 100.0%

The sum should be 100%

Race of Population

White	43.8%
Black	23.1%
Hispanic	22.1%
Asian/Pacific Islander	3.5%
American Indian/Alaska Native	1.5%
Other	6.0%

Sum = 100.0%

The sum should be 100%

Submit and Review Changes

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Submit and Proceed to Participants Page

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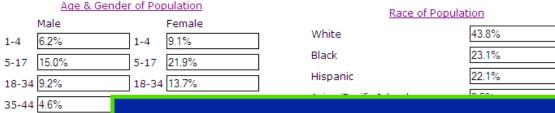- User's Guide
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Population

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Size of Population: 47,070,208

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45-54	3.7%		
55-64	1.8%		

Race of Population

White	43.8%
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Default data sources:

- Center for Medicare & Medicaid Services
- Current Population Survey, Annual Social and Economic Supplement
- Bureau of Labor Statistics Quarterly Census of Employment and Wages

Review/Edit Program Features/Data: PARTICIPANTS

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Asthma Return-on-Investment Calculator

Participants

On this page, you may review your selections about the age and asthma severity of patients eligible for the program as well as the number of patients likely to participate in the program. You may make changes to the number of asthma patients eligible as well as the percentage of eligible patients who are expected to participate. For a general discussion of this page, visit our User's Guide page.

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

	Male	Female
1-4	380,712	394,598
5-17	601,225	686,519
18-34	186,524	366,364
35-44	117,949	299,343
45-54	131,115	368,792
55-64	94,417	189,335

View asthma prevalence rates

Asthma patients eligible for program: 3,816,893

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

Percentage of eligibles who will participate: 25.0%

Expected patients who will participate: 954,223

[Submit and Review Changes]

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Review/Edit Program Features/Data: PARTICIPANTS

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Participants

On this page, you may review your selections about of patients likely to participate in the program. Yo of eligible patients who are expected to participat

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Default data sources:
- MarketScan™ Medicaid or Commercial Claims databases

Calculator operation:
- Applies default prevalence and participation rates to population data

  OR

- Allows user to enter the number of eligible participants and participation rate

Review/Edit Program Features/Data: BASELINE DATA

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Baseline Data

This page displays average annual medical care utilization, productivity, and costs per eligible patient with asthma. If you have your own data, input them here. More information on the default data, which are customized based on your selections of age, type of insurance, and severity of asthma, is provided on the User's Guide page.

Annual emergency department visits per patient:	0.12	Cost of an emergency department visit:	$91
Annual hospital stays per patient:	0.03	Cost of a hospital stay:	$6,683
Annual outpatient visits per patient:	1.06	Cost of an outpatient visit:	$41
Annual cost of asthma medications per patient:	$439	Annual cost of asthma-related ancillary services per patient:	$28
Annual missed workdays per adult from asthma:	5.53	Cost of a missed workday:	$73.36
Annual missed schooldays per child from asthma:	5.0	Cost of a missed schoolday:	$39.89

[Submit and Review Changes]

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Asthma Return-on-Investment Calculator

Baseline Data

Default data sources:

MarketScan Claims Database (2005)

- Medicaid (8 geographically dispersed States)
- Employer-sponsored health insurance (over 100 large self-insured employers, 15 million lives, geographically balanced)

National Health Interview Survey (2003)

- Number of missed work or school days due to asthma

Bureau of Labor Statistics (2006)

- Average wage rate
- Federal poverty line (for value of missed work day for Medicaid recipients)

Other potential data sources:

- State, local, or plan-level claims data
- Special surveys of number of missed school/work days due to asthma

Advice for calculating data fields:

- Decide what use & cost components to include
- It's okay to combine use & cost from different sources
  - Just make sure measures are calculated the same way for the same population

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Program Impact

This page summarizes the evidence from existing studies (through March 2007) of the likely impact of the asthma program on health care and productivity measures. If you have your own evidence, possibly from a pilot study, input it here. More details on this page may be found on the User's Guide page.

Health Care Measures:		**Productivity Measures:**	
Program impact on emergency department visits?*	-14.0%	Program impact on missed workdays per adult?*	-88.0%
Program impact on hospital stays?*	-48.0%	Program impact on missed schooldays per child?*	-58.0%
Program impact on outpatient visits?*	-9.0%		
Program impact on the cost of ancillary services?*	-66.0%		
Program impact on the cost of asthma medications?*	25.0%		

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

[Submit and Review Changes]

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Asthma Return-on-Investment Calculator

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Data source:
- Meta-analysis of literature

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Review/Edit Program Features/Data: PROGRAM COST

Asthma Return-on-Investment Calculator

Program Cost

Here you note assumptions about the features and costs of the asthma program intervention.

For a general discussion of this page, visit our User's Guide page.

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 cost 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)? `5`   What is the annual program cost per participant? `$450`

How many years until the program achieves full impact? `2`   What is the discount rate for ROI calculation? `3%`

Submit and Review Changes

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See User's Guide for:

- What to include in your estimates of annual cost per participant
- How to choose a discount rate

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Demonstration Results

Results

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Results

This page summarizes the forecasted potential savings (or additional costs) for the asthma program. Current selections for the model are shown in the left column, below the navigation menu. You may toggle between presenting costs/savings per participant or for all participants in the program. You may also view detailed results. For a general discussion of results, visit our User's Guide page.

This page shows the impact of the asthma program and summarizes the assumptions you made in the calculator.

Averages or Totals?

◉ Show averages per participant

○ Show totals for all participants

[Submit and Review Changes]

Health Care		**Productivity**	
Health Care Savings per Participant:	$42.60	Productivity Gain per Participant:	$1,813
Emergency Department Visits:	14.7%	Productivity for Adults:	75.5%
Hospital Confinements:	924.9%	Productivity for Children:	24.5%
Outpatient Visits:	37.6%		100.0%
Asthma-Specific Ancillary Services:	177.6%	**Overall Impact of Program**	
Asthma Medications:	-1,054.7%	Net Present Value (NPV):	-$76
	100.0%	Return on Investment (ROI):	$.96
Cost		Break-Even Program Impact:	-13.0%
Total Program Cost per Participant Over Years the Program Operates:	$1,932	Break-Even Program Cost:	$405.23

You can save multiple scenarios to an Excel file. Each scenario you save will be added as a separate worksheet to the file. When you are ready to download the Excel file, select the button labeled Download Saved Scenarios.

[Save This Scenario to an Excel File]

[Download Saved Scenarios]

Input values for Scenario 1

This page displays the inputs used to return the results for Scenario 1

Input:	Value:		
Study design:	Randomized controlled studies		
Asthma Only or All Costs:	Asthma-Related Medical Costs		
Cost Perspective:	Program / plan & patient		
Population Age/Gender:			
Male 1-4	6.20%	Female 1-4	9.10%
Male 5-17	15.00%	Female 5-17	21.90%
Male 18-34	9.20%	Female 18-34	13.70%
Male 35-44	4.60%	Female 35-44	6.70%
Male 45-54	3.70%	Female 45-54	5.60%
Male 55-64	1.80%	Female 55-64	2.50%
Population Race:			
White	43.80%		
Black	23.10%		
Hispanic	22.10%		
Asian/Pacific Islander	3.50%		
American Indian/Alaska Native	1.50%		
Other	6.00%		
Baseline Data:			
Annual emergency department visits per patient	0.12	Cost of an emergency department visit	$91.00
Annual hospital stays per patient	0.03	Cost of a hospital stay	$6,683.00
Annual outpatient visits per patient	1.06	Cost of an outpatient visit	$41.00
Annual cost of asthma medications per patient	$439.00	Annual cost of asthma-related ancillary services per patient	$28.00
Annual missed workdays per adult from asthma	5.53	Cost of a missed workday	$68.73
Annual missed schooldays per child from asthma	5	Cost of a missed schoolday	$37.38
Program Impact:			
Program impact on emergency department visits?*	-14.00%	Program impact on missed workdays per adult?*	-88.00%
Program impact on hospital stays?*	-48.00%	Program impact on missed schooldays per child?*	-58.00%
Program impact on outpatient visits?*	-9.00%		
Program impact on the cost of ancillary services?*	-66.00%		
Program impact on the cost of asthma medications?*	25.00%		

Results of the AHRQ Asthma Return on Investment Calculator for Care Management

This page summarizes the assumptions you made in the calculator and shows the impact of the asthma program. Results for other choices you may have made in this session and exported to Excel are on other tabs of this spreadsheet.

Choices Made:		Results:	
Population type:	Medicaid	**Health care savings:**	$42.60
Geographic location:	Nation	Emergency depart visits	14.69%
Asthma definition:	All asthma	Hospital confinements	924.86%
Adults and/or children:	Adults and Children	Outpatient visits	37.59%
Estimated persons with asthma:	3,816,893	Asthma-specific ancillary services	177.60%
Percent who will participate:	25.00%	Asthma medications	-1054.74%
Estimated program participants:	954,223		
Annual program cost per participant:	$421.86	**Productivity gains:**	$1,813.23
Years the program operations:	5	Productivity for adults	75.52%
Program phase-in period (years):	2	Productivity for children	24.48%
Discount rate for NPV and ROI:	3.00%		
Display totals or per participant:	Show averages per participant	**Program Cost over Years Program Opera**	$1,932.00
Include productivity gains:	Savings and Productivity		
		Overall Impact of Program:	
		Net Present Value (NPV)	-$76.16
		Return on Investment (ROI)	$0.96
		Break-Even Program Impact	-13.00%
		Break-Even Program Cost	$405.23

Summary of Steps in the Asthma ROI Calculator

Determine target population & studies to use in calculation (Req. Info.).

Target most expensive patients!

Use controlled study results to achieve most realistic results!

1. Estimate population
2. Estimate number of participants
3. Estimate baseline costs and utilization
4. Estimate impact of asthma program
5. Estimate program cost

Tips on using your own data:

- Ideally, find data from a single source
- If not feasible, be sure that the underlying populations that generated the data are similar
  - Use claims data to obtain number of eligible asthma patients and their baseline utilization and costs
  - Find evidence from studies of a similar population

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Comments From
Stephanie Lindsay
Medicaid Administrator
Alabama Medicaid Agency

Questions?

- **To ask verbal questions:**
Please press *1 on your phone to be placed in the queue for questions

OR

- **To ask electronic questions:**
Type your question into the Q&A box on the right-hand side of your screen

Additional Assistance

Technical Assistance:

- Margie Shofer, Marjorie.Shofer@ahrq.hhs.gov

  Senior Program Analyst, Office of Communications and Knowledge Transfer

Copy of calculator:

- Please visit http://statesnapshots.ahrq.gov/asthma/

Questions about the tool:

- Please e-mail quality_tools@ahrq.hhs.gov

For more information about AHRQ Quality Tools:

- Please visit http://www.ahrq.gov/qual/kt/