

University of Kentucky

From the Selected Works of Glen Mays

Spring May 10, 2012

Estimating QI Return on Investment in Public Health

Glen Mays, *bepress* (DC Admins)



Available at: https://works.bepress.com/glen_mays/9/

QI Return on Investment

2012 National Public Health Improvement Initiative
(NPHII) Grantee Meeting

May 10, 2012

Moderator: Glen P. Mays, PhD, MPH, Professor of Health Services and Systems Research, University of Kentucky

Panelist 1: Gene Smith, MBB CSSBB, Lean & Six Sigma Specialist, Manager of Healthcare & Government Services, North Carolina State University

Panelist 2: Theresa Green, AA-C, MBA, Director of Community Health Policy and Education, University of Rochester Center for Community Health

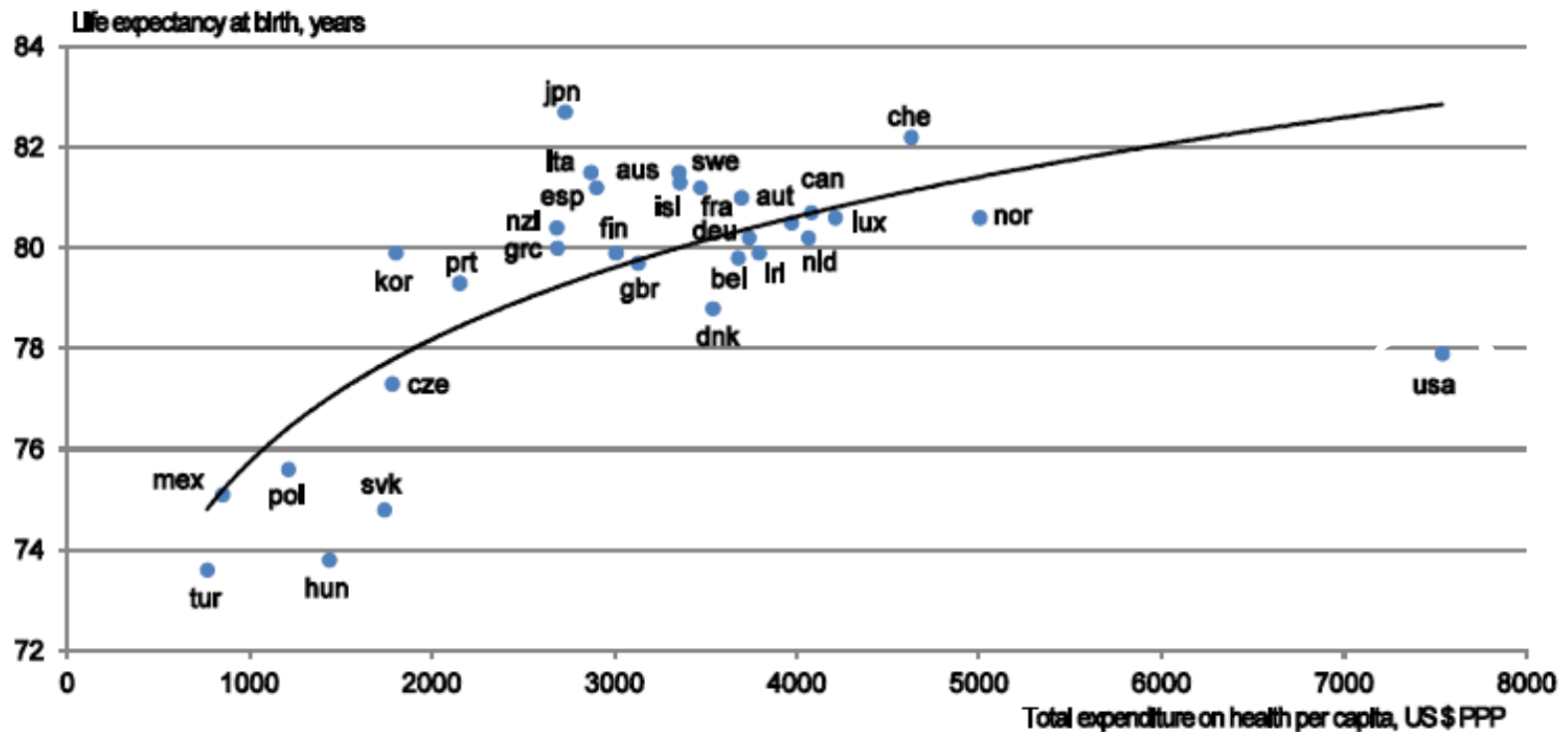
Estimating Value and ROI for Investments in Public Health

Glen P. Mays, PhD, MPH

Professor of Health Services and Systems Research
University of Kentucky

What the US gets for its investment

Figure 1. There are large differences in life expectancy and health care spending across OECD countries 2008¹



1. Or latest year available.

Source: OECD Health Data 2010.

Why estimate ROI in public health

- ◆ Do outcomes achieved by public health actions justify their costs?
- ◆ Where should new investments be directed to achieve their greatest impact?

Uncertainty and controversy in ROI

THE WALL STREET JOURNAL.

WSJ.com

JUNE 12, 2009

Prevention Efforts Provide No Panacea on Health Costs

By JANET ADAMY

Preventing Chronic Disease: An Important Investment, But Don't Count On Cost Savings

An overwhelming percentage of preventive interventions add more to medical costs than they save.

by Louise B. Russell

HEALTH AFFAIRS - Volume 28, Number 1

Prevention for a Healthier America:

INVESTMENTS IN DISEASE PREVENTION
YIELD SIGNIFICANT SAVINGS,
STRONGER COMMUNITIES



Challenges in demonstrating ROI in public health

- ◆ **Time lag** between costs and benefits
- ◆ **Distribution** of costs and benefits:
concentrated costs but *diffuse* benefits
- ◆ **Measurement** of costs and benefits
requires good information systems
- **Attribution** of benefits: the counterfactual

Estimating ROI in public health:

Key Ingredients

Investments

- ◆ Costs of implementing public health interventions
- ◆ Who's investments?

Returns

- ◆ Valuation of the outputs and outcomes attributable to public health interventions
- ◆ Who realizes returns?
- ◆ Over what time frames?
- ◆ Compared to what?

Estimating ROI in public health: Expectations

- ◆ **Cost savings** – a high bar
 - ◆ **Cost effectiveness** – value for dollars spent
 - Compared to status quo
 - Compared to other possible investments
 - Compared to doing nothing
- ...Key concept: opportunity costs

Estimating ROI in public health:

Types of Analyses

- ◆ **Macro-level analysis**
- ◆ **Infrastructure-level analysis**
- ◆ **Intervention-level analysis**
- ◆ **Process-level analysis**

Estimating ROI in public health: Macro-level Analysis



NATIONAL RETURN ON INVESTMENT OF \$10 PER PERSON (Net Savings in 2004 dollars)

| | 1-2 Years | 5 Years | 10-20 Years |
|-------------------|-----------------|------------------|------------------|
| U.S. Total | \$2,848,000,000 | \$16,543,000,000 | \$18,451,000,000 |
| ROI | 0.96:1 | 5.6:1 | 6.2:1 |

Source: Trust for America's Health, 2009

Estimating ROI in public health: Macro-level Analysis

Source

Cost per Life- Year Gained

Medical care spending, 1990-2000
(Cutler et al. NEJM, 2006)

\$36,300

Public health spending, 1993-2005
(Mays et al *Health Affairs* 2011)

\$12,200-\$25,600

THE NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

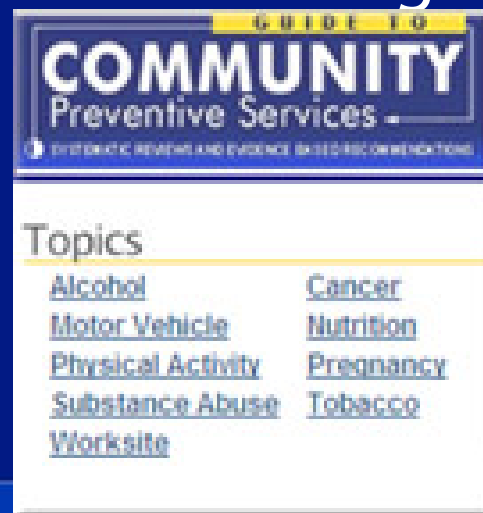
The Value of Medical Spending in the United States, 1960–2000

David M. Cutler, Ph.D., Allison B. Rosen, M.D., M.P.H., Sc.D.,
and Sandeep Vijan, M.D.

Estimating ROI in public health: Intervention-level Analysis

- Smoking cessation interventions cost an estimated **\$2,587** for each life-year gained
- \$1 spent on STD and pregnancy prevention produces **\$2.65** in medical cost savings
- \$1 spent on preconception care for diabetic women produces **\$5.19** in medical cost savings
- \$1 spent on childhood immunization produces **\$6.30** in medical cost savings

Source: Centers for Disease Control and Prevention
2008



Estimating ROI in public health: Existing Tools

AHRQ Asthma ROI calculator

<http://statesnapshots.ahrq.gov/asthma/Required.jsp>

CDC Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC)

<http://apps.nccd.cdc.gov/sammec/>

CDC LeanWorks Obesity Cost Calculator

<http://www.cdc.gov/leanworks/costcalculator/index.html>

RWJF Diabetes Self-Management ROI

<http://www.diabetesinitiative.org>

HIMSS Electronic Medical Record ROI

http://www.himss.org/ASP/ROI_Calc.asp

Estimating ROI in public health: National Public Health Improvement Initiative

- **Goal:** Develop ROI approaches to assess value of improvements in public health capacity, infrastructure, administrative processes
- **Near-term:** capture effects on labor costs, time costs, productivity
- **Longer-term:** capture effects on program delivery (reach, effectiveness), population health



Estimating ROI in public health: Key Considerations

Perspective

- ◆ Federal, state, health system, or societal?

Time Horizon

- ◆ How long can you wait to realize returns?

Types of Interventions

- ◆ Primary, secondary or tertiary prevention
- ◆ Cross-cutting infrastructure
- ◆ Administrative processes

Estimating ROI in public health: Key Considerations - Costs

Direct costs

- ✦ Cost of implementing intervention
- ✦ Cost savings attributable to the intervention

Indirect costs

- ✦ Economic value of productivity gains/losses or time savings/costs attributable to the intervention

Estimating ROI in public health: Key Considerations - Benefits

Efficiency gains (captured in cost measures)

- ◆ Reduced labor costs
- ◆ Reduced material costs

Productivity gains (captured in output measures)

- ◆ Services delivered Time in process
- ◆ Cases detected

Revenue gains (captured in financial measures)

Health gains (captured in outcome measures)

- ◆ Deaths averted
- ◆ Cases prevented
- ◆ Quality-adjusted life years gained

Estimating ROI in public health: Key Considerations

Break even

- ◆ How long does it take to recoup investment?

Maintenance/Persistence

- ◆ How long do the benefits last?
- ◆ Recurring costs?

Achieving ROI in public health: considerations

- ◆ **Economies of scale:** many public health interventions can be delivered more efficiently across larger populations
- ◆ **Economies of scope:** efficiencies can be realized by using the same infrastructure to deliver an array of related programs and services

Advancing ROI Analysis in Public Health

- Enhanced tracking of public health expenditures
- Enhanced monitoring of program performance
 - Reach/targeting
 - Effectiveness
 - Efficiency
 - Equity
- Analysis of cross-cutting infrastructure needed to implement/maintain programs

Economic Impact & Return on Investment

(As Applied in Public Health)

Gene Smith, MBB CSSBB
Lean & Six Sigma Specialist
Manager of Healthcare & Government Services

North Carolina State University
Industrial Extension Service
College of Engineering
Campus Box 7902
Raleigh, NC 27695-7902

336-420-9943
Gene_smith@ncsu.edu

Economic Impact / ROI History

- ✓ **NCSU has a longstanding history of capturing EI for improvement work in business and industry**
- ✓ **Used as a method to share the financial impact of project success**
- ✓ **Incorporated common EI categories into public health projects**

Terminology/Formula



EI (economic impact): Refers to costs and benefits of an activity.

$$EI = \text{Benefits} - \text{Costs}$$

ROI (return on investment): A performance measure used to evaluate the efficiency of an investment

$$ROI = \frac{\text{Benefits} - \text{Costs}}{\text{Costs}}$$



Standard Approach

- **Educate teams and leadership in EI / RI**
 - **Leadership @ Kickoff sessions**
 - **Teams at Workshops**
 - **Provide ROI instruction and assistance at project conclusion**
- **Promote data gathering throughout the project life cycle using:**
 - **Aim Statements / Project Charters**
 - **Project Economic Investment Form**

Discussion Points w/ Teams

- **Justification for our time / energy spent on project**
- **Display how successful our project was in today's financial state**
- **Great way to help "sell the concept of future improvement projects" and help finance those projects**
- **"What is on the minds of managers today?"**

Examples of Financial Improvement

- **The new scheduling process saved our organization \$50,000 per year in nursing expense**
- **Our new open access process have allowed us to see 10 more patients per day, increasing revenue and allowing us to improve our cost by \$35,000 per year**
- **Our new process for clinic has allowed us to eliminate temporary help saving \$20,000 per year**

Capturing Financial Improvement

- **Utilize the Economic Investment Form to capture data**
- **Reflect on your team's stated benefits for the project**
 - **Understand your baseline metrics from the project start**
 - **Determine the tangible and intangible benefits**
- **Determine the project savings due to improvement in financial terms**
- **Capture the cost you incurred to complete the project**
- **Compare the two**

Identify Benefits

- **A benefit is a positive change or improvement in outcomes**
- **Benefits Include:**
 - ✓ **Expand our capacity to service more clients / day**
 - ✓ **Free up staff time**
 - ✓ **Reduce operational cost**
 - **Productivity improvement / better efficiency**
 - **Improved accuracy / better reliability**
 - **Faster service times**
 - **Elimination of duplicate work**

Identify Benefits

- **Benefits can (cont.):**
 - ✓ **Provide cost avoidance**
 - ✓ **Improve our work environment**
 - **Improve staff satisfaction**
 - **Improve employee retention**
 - ✓ **Increase revenue**
 - ✓ **Help us meet our legal or regulatory obligations**

Benefit Categories

- **Increased Revenue**
- **Labor**
- **Overtime**
- **Temporary Labor**
- **Fringe benefits**
- **Supplies**
- **Employee Turnover**
- **Training Cost**
- **Hiring Cost Avoidance**
- **Reduce or Avoid Fines Levied**

Determine the Project Cost

- **Time of resources utilized for the project**
 - Meetings**
 - Kaizens**
 - Workshops / Webinars / Teleconferences**
 - Travel costs**
- **Equipment purchased**
- **Materials consumed**
- **Food**
- **Additional labor required**

Economic Impact Worksheet

QI 101 Project Economic Investment Form

QI Project Name: Improve Home Health Scheduling Process

QI Team Agency: ABC County Health Department
Fox Run, NC

Aim Statement: Improve the time to schedule home health nurses by 50% and customer satisfaction scores by 20% using quality improvement techniques and Lean tools learned in during QI 101

Baselines at Project Start:

- Nurse scheduling time = 2 hours
- Customer satisfaction survey scores = 62%
- Current visits / day = 3.79

Benefits Obtained / Outcomes Improved:

- Freed up 3 nurse team leaders to better perform supervisor duties.
- Streamlined intake process with better resource allocation.
- Staff nurses were able to see their first patient sooner in the day
- Staff nurses able to complete their daily work on time with less home computer work, and were more often able to start from home without having to come in to obtain their schedules.
- Ultimately gained more patient touch time.
- Greatly improved staff morale.
- The organization today is more profitable, seeing more patients, with the same staff. No staff lost employment due to the Kaizen work.

Economic Impact Worksheet

Tangible Financial Benefits (Yearly Basis):

- Scheduling time reduced from 120 minutes per day to 30 minutes, total nursing dollars spent saw a reduction of 12%, equaling 1 FTE from the part-time resource support, saving \$62,125 / year
- Paper cost and faxing time and expense were reduced saving \$10,380.
- New admission paperwork reduced from 3 hours to 1 hour saving \$12,300.
- The number of visits per day increased 18% (3.79 visits per day vs. 4.49 visits per day) generating \$21,250 in revenue / year

Project Cost:

- Project Funds Used:
 - Food, materials, Kaizen, travel \$7500
- Staff Project time \$5250
- New copier = \$500

Total Project Cost = \$13,250

Economic Impact of Project:

Project savings: \$62,125 + \$10,380 + \$12,300 + \$21,250 = \$106,055

Year 1 Impact = \$106,055 – Project Cost \$13,250 = \$92,805

Year 2 and beyond = \$106,055

Return on Investment Results:

For every \$1 invested on improvement, ABC County Health gained \$7.00 in financial improvement from this project.

ROI = (Savings – Cost) / Cost

= (\$106,055 – 13,250) / \$13,250 = \$7.00

Tobacco Prevention Project

Create an intervention program to help reduce tobacco use

- **Clinic Benefits Obtained**
 - Increased capacity to identify smokers
 - Questionnaire template imbedded in EMR for provider use
- **Tangible savings**
 - Clinic time savings of 5 min / visit (\$1080)
 - **Community Benefits (CDC)**
 - Medical / Workers Comp / Lost Productivity (\$92,142)
 - Increased Clinic Revenue (\$15,509)
 - Misc. (\$345)
 - **Total Savings (\$109,076)**

Tobacco Prevention Project

Project Costs

- **Additional Materials (\$325)**
- **Staff time (\$3400)**
- **Provider Time (\$2950)**
- **Misc. (\$155)**
- **Total Costs \$6830**

EI = \$102,246

ROI = \$14.97



Additional ROI Results noted in Jan / Feb 2012 issue of Journal of Public Health Management & Practice article

“Applying Lean Principles and Kaizen Rapid Improvement Events in Public Health Practice”

<http://journals.lww.com/jphmp/toc/2012/01000>

Improving Efficiency in Local Public Health with Continuous Quality Improvement

Theresa Green, AA-C, MBA, PhD Student

Director of Community Health Policy and Education
University of Rochester Center for Community Health

2012 National Public Health Improvement Initiative
Grantee Meeting – May 10, 2012



**Berrien County
Health Department**

Continuous Quality Improvement

Policy: The Berrien County Health Department will incorporate total quality management (TQM) philosophy into strategic planning, goal setting, program implementation and assessment. TQM involves both continuous quality improvement and quality assurance.

Berrien County Health Dept

- About 90 employees
- 3 general service areas with 3 administrative divisions
- County population of 140,000
- Annual budget of \$8 million

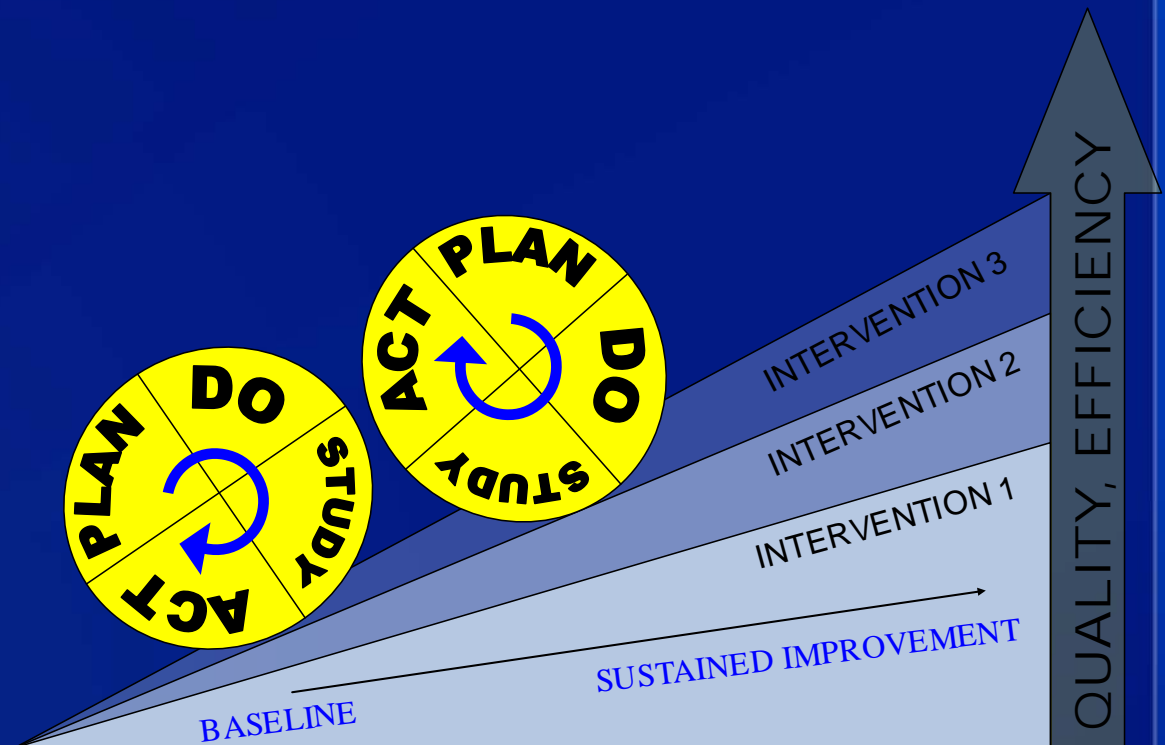


QI Logic Model and Methods

- *Rapid Cycle Improvements - PDSA*
- *Brainstorming*
- *5 Whys*
- *Fishbone Diagrams*
- *Process Mapping*
- *Strategic Planning*
- *Run Charts*

Measured by
Accreditation
Standards

Baseline set by
Accreditation Standards



Does CQI Improve Efficiency?

Robert Wood Johnson Foundation Opportunity

- Measure efficiency created with CQI:
 - Children's Special Health Care Services (CSHCS)
 - Environmental Health Food Services
 - Next department-wide intervention?
- Tenants of CQI – Model of Improvement
 - Impact and success are based on DATA (scientific approach throughout intervention)
 - Goal must be rooted in CUSTOMER SATISFACTION
 - Solutions are PROCESS oriented
 - All members of the TEAM are critical to each step

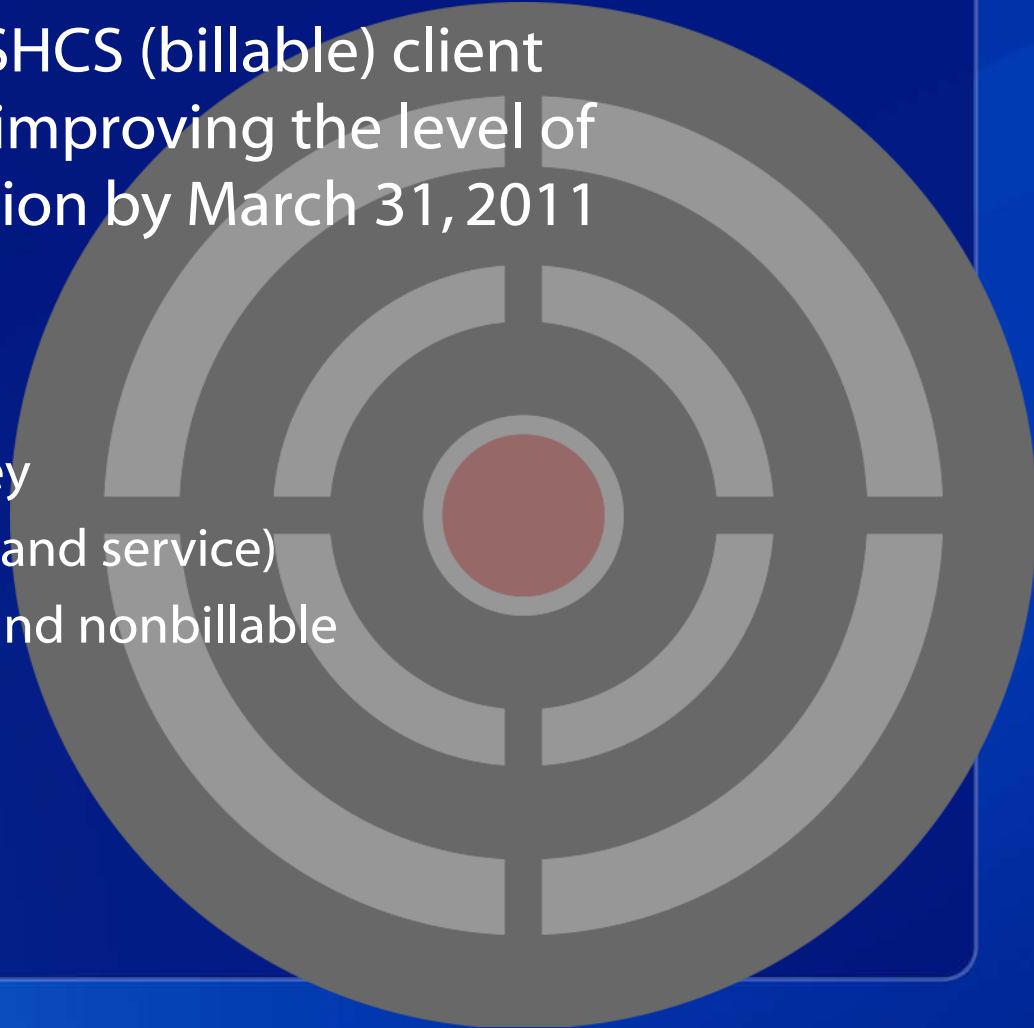
Children's Special Health Care Services (CSHCS)

- Problems:
 - Slow to respond to client calls
 - Manager was receiving client complaints
 - Staff overwhelmed and can't get to client care since they are busy with administrative work
 - Not able to generate billable service hours (and therefore fees) to sustain the program



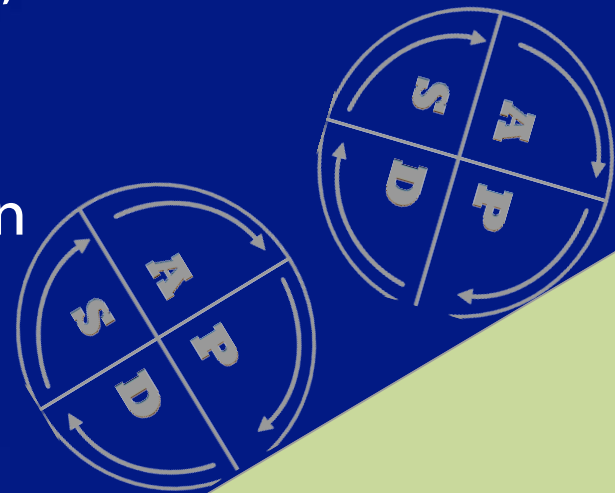
CSHCS: AIM Statement

- Increase the number of CSHCS (billable) client encounters by 20% while improving the level of current customer satisfaction by March 31, 2011
- Measures of change:
 - Customer satisfaction survey
 - Response times (return call and service)
 - Client encounters; billable and nonbillable
 - revenue



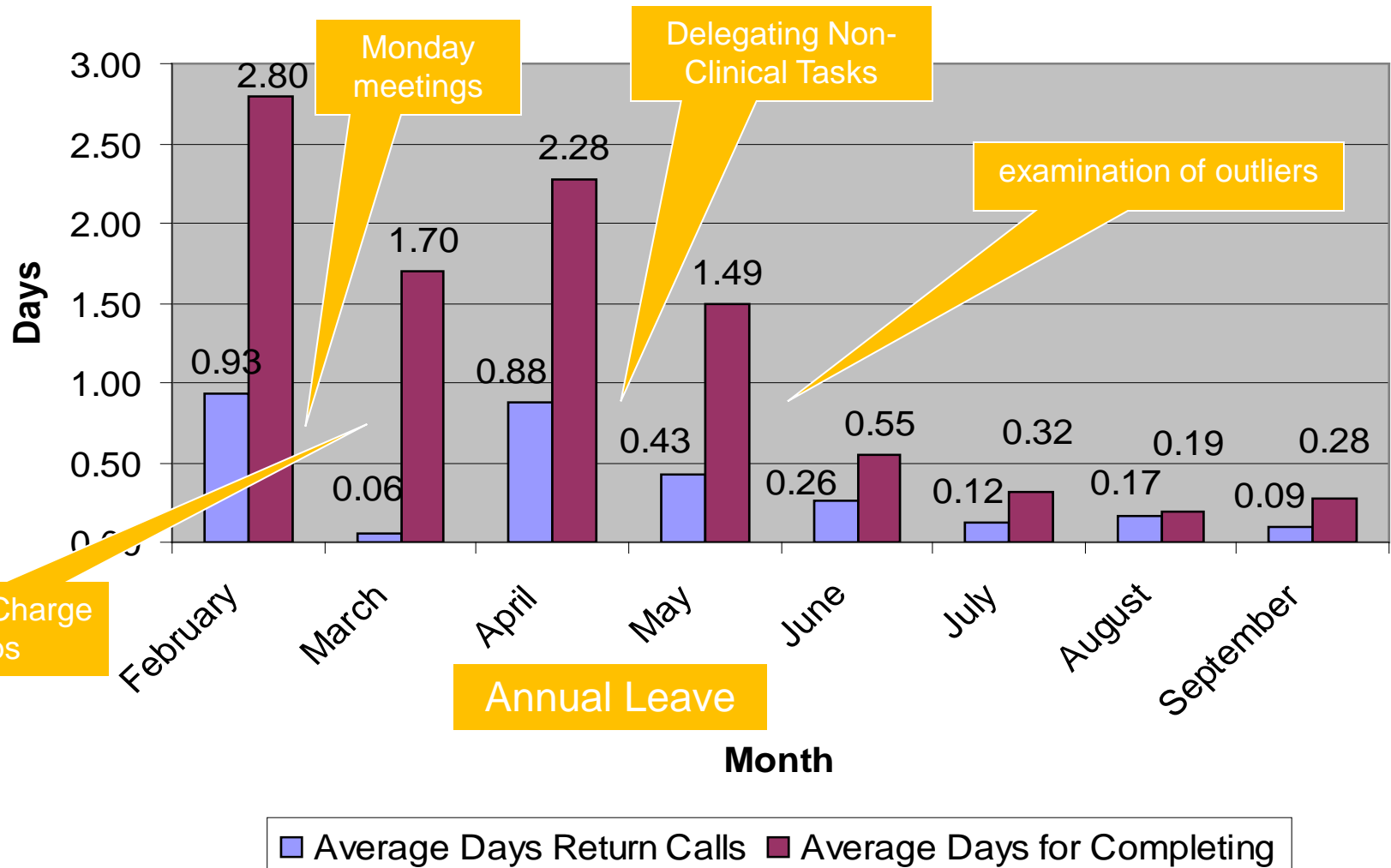
PDSA Key Quality Improvements

- Started tracking and analyzing data;
- Began meeting each week to coordinate efforts;
- Implemented a new billing charge slip that standardizes tracking, billing and response;
- Delegated billing and tracking duties to non-frontline staff to free clinical personnel;
- More effectively batch non-billable to billable;
- Changed phone message and maintain accurate in-house data base;
- Improve membership renewal process



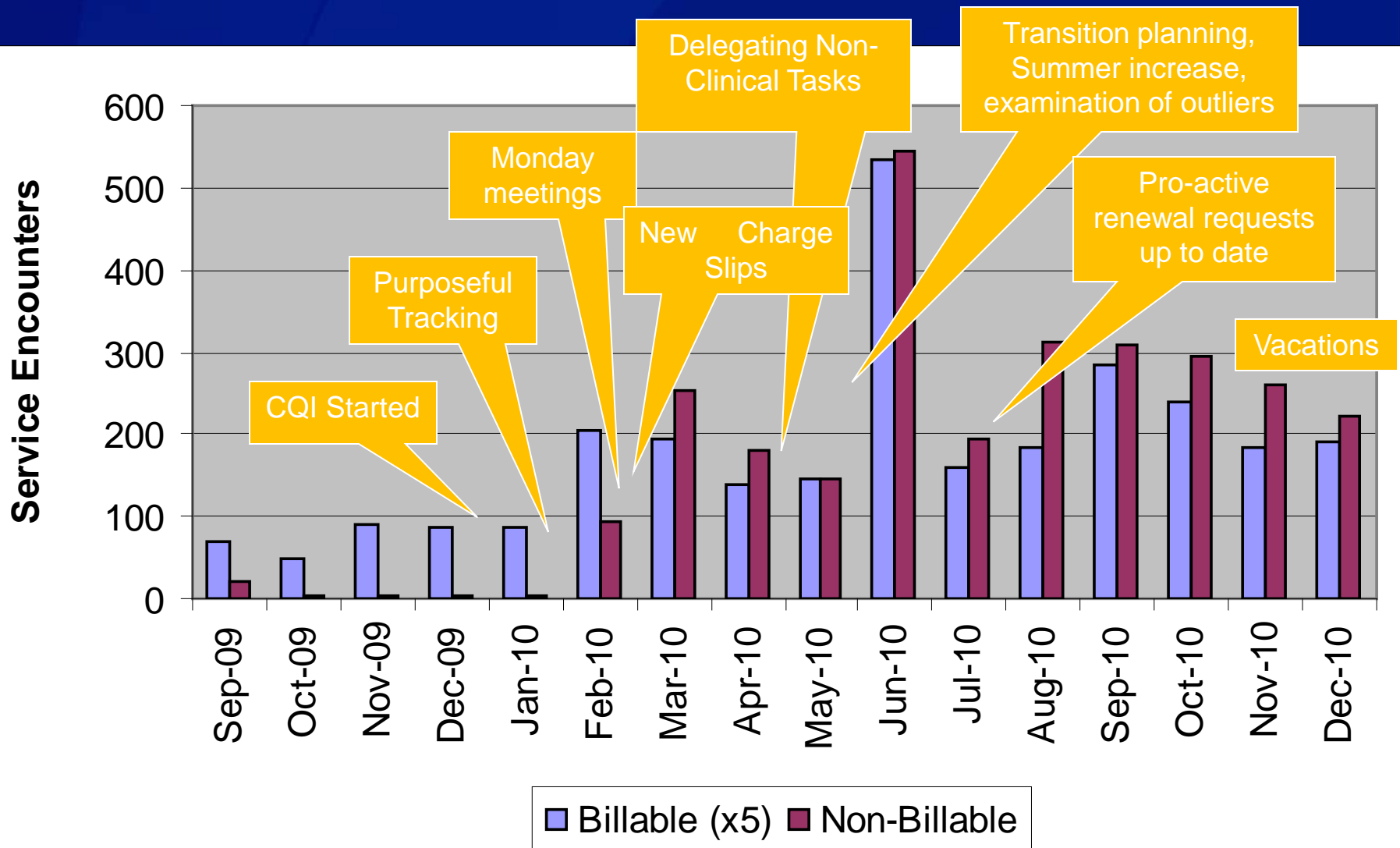
Time to Respond to Client's Inquiry

Monthly Response Time Average



Trend in Billable/Non-Billable Time

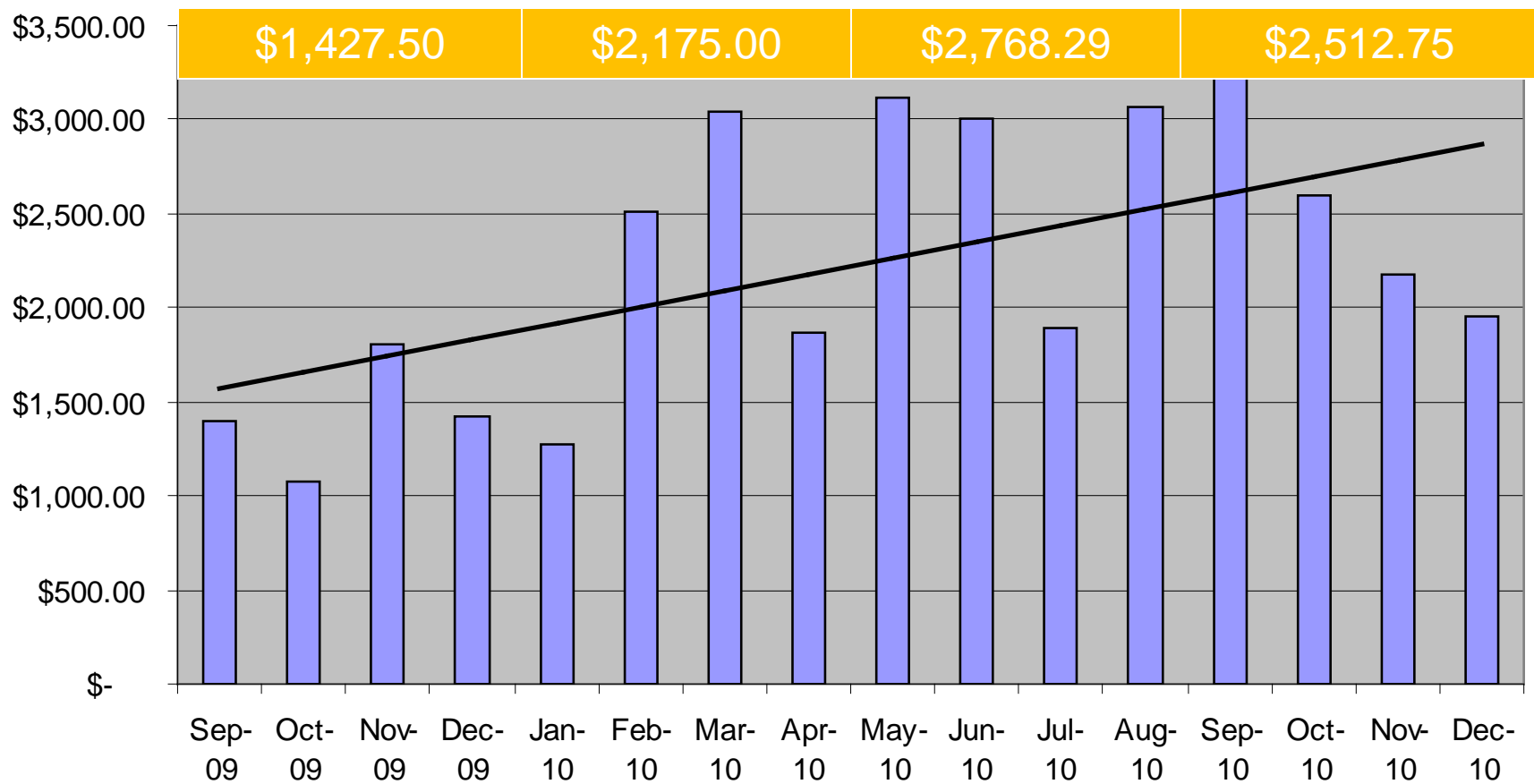
Evaluation Findings: Increased Encounters (Goal 20%)



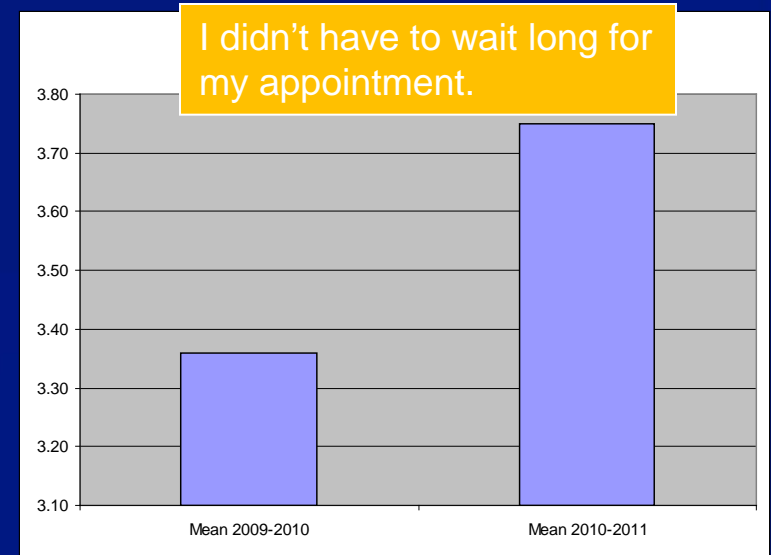
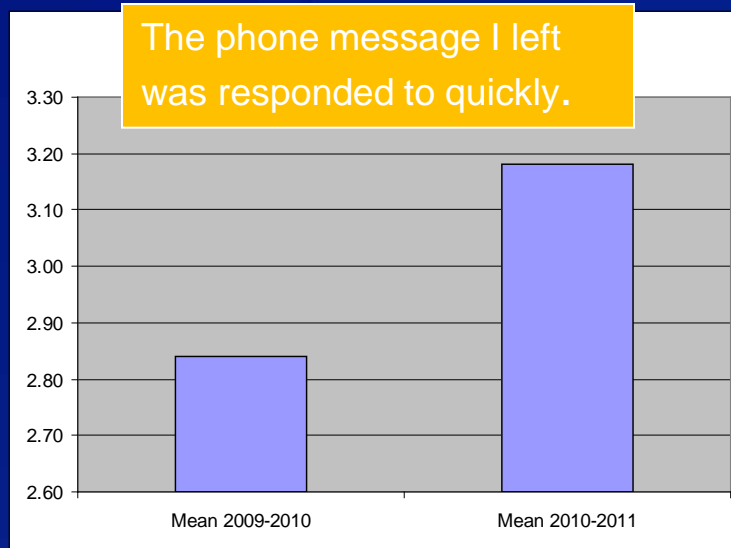
Evaluation Findings: Increase Revenue

Goal 20% Increase (\$1,712.40)

76% increase!



Customer Satisfaction Survey



Qualitative Assessment

- Quarterly and year-end reports are much quicker. Only took 3 hours to review 3 months worth of billing, otherwise would have taken 3 days. Only found 2 errors in 2400 encounters.
- Staff have more time for clients because they get to spend less time doing clerical work
- Change from meeting once/month for 2 hours, to once/week for 30 minutes. Much more effective, great for brainstorming and communication on clients
- Increased opportunities for billable events were discovered
- Other counties have called about using the billing slip because they had heard about it from state leadership.



Demonstrated Efficiency Improvements

- During the “DO” phase CSHCS collected **\$15,694.16** over baseline
- Shifted clerical and billing duties from CSHCS nurse to administrative assistant: 5 hours/week x 52 weeks x \$14.03 difference = **\$3,647.80**
- Audit difference from 3 days to 3 hours – staff time Supervisor difference and representative = **\$509.83** per incident

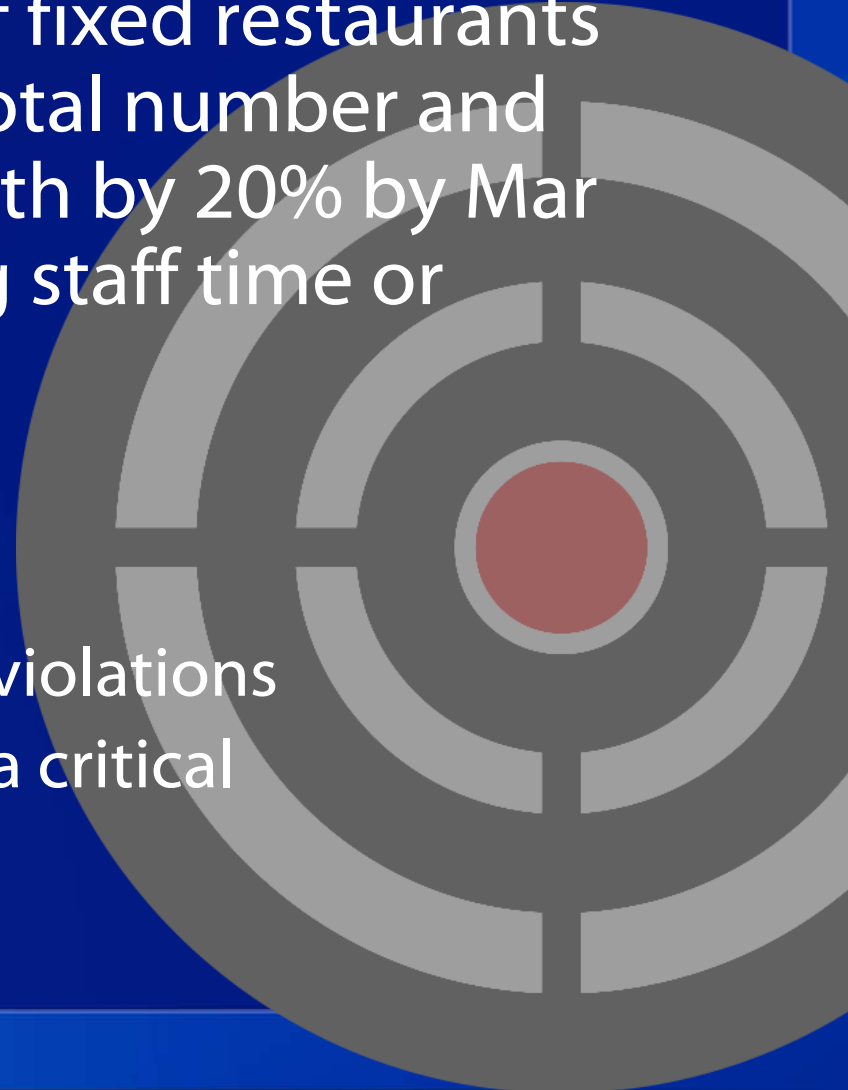
Environmental Health: Food Service

- Problems:
 - Difficulty coordinating inspections of restaurants with critical violations;
 - Inconsistency among sanitarians;
 - Slow to re-inspect restaurants with critical violations;
 - Too many critical violations, especially among repeat offenders.



Food: AIM Statement

- Decrease the occurrence of fixed restaurants with critical violations (total number and duration) in any given month by 20% by Mar 31, 2011 without increasing staff time or expense
- Measures of change
 - # of restaurants with critical violations
 - # of days til re-inspection of a critical



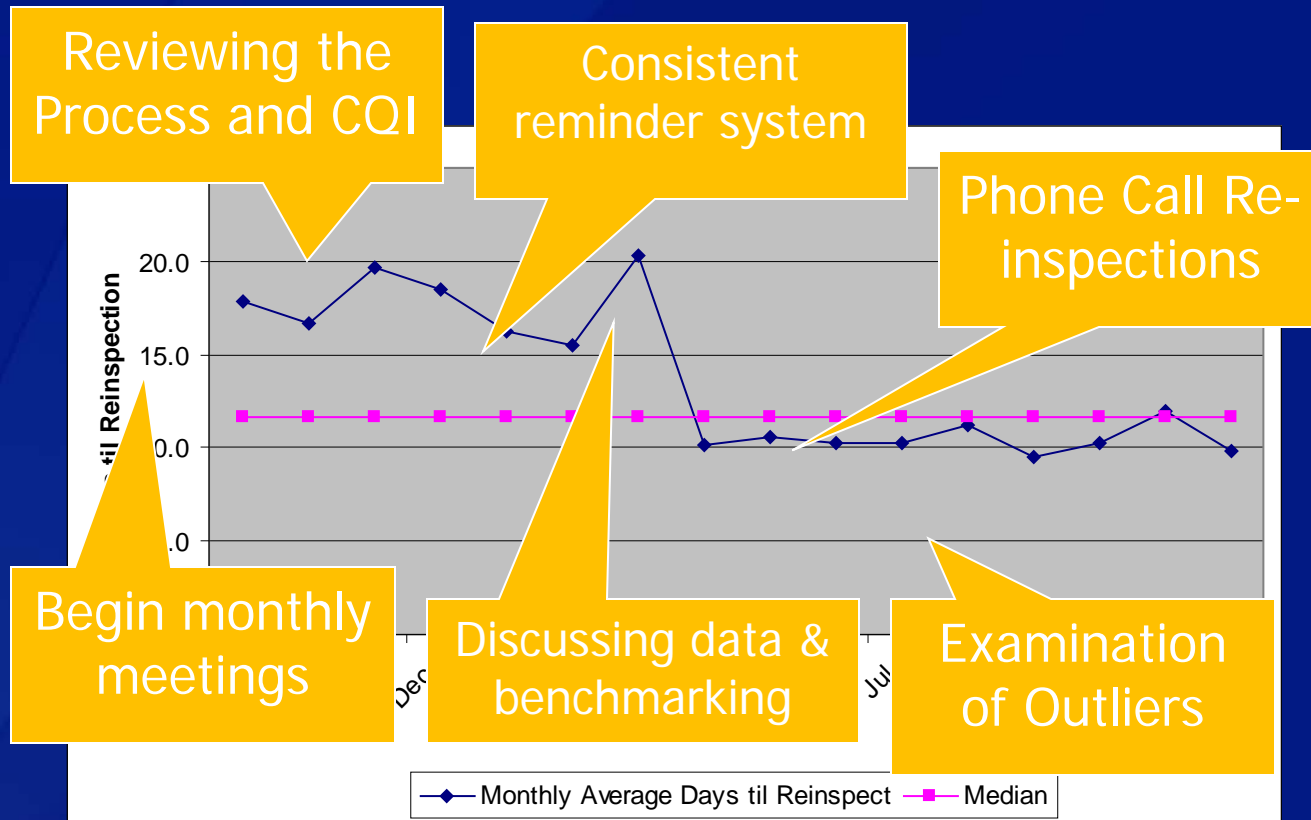
PDSA Key Quality Improvements

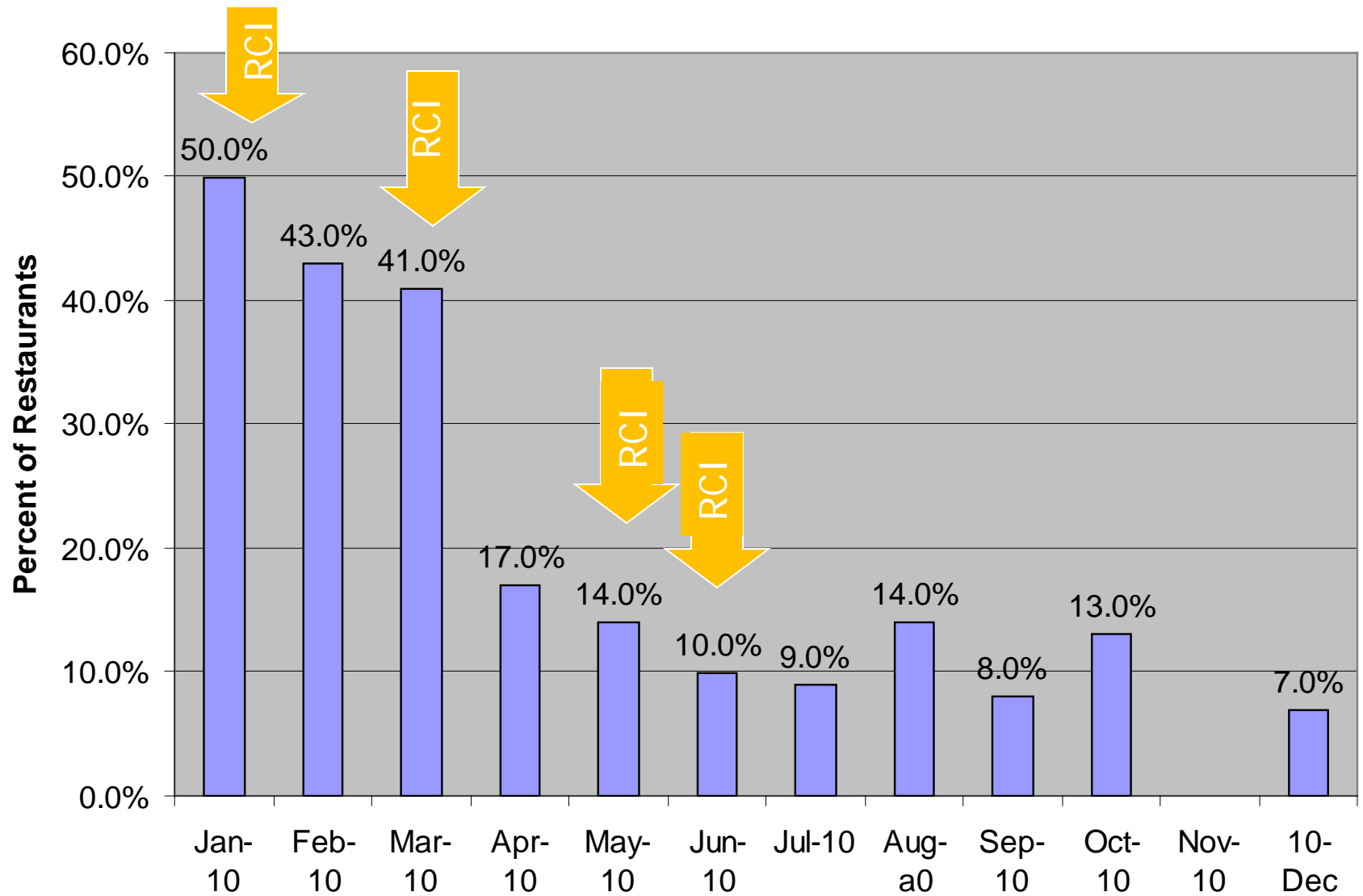
- Initiated monthly meetings of food staff;
- Track and analyze data for benchmarking;
- Consistent reminder system for re-inspections initiated;
- Implement call backs in re-inspection;
- Examine and correct outliers thru 5 whys;
- Developed a newsletter to educate restaurants;
- Promote standardized inspections with team leaders.



Evaluation Findings:

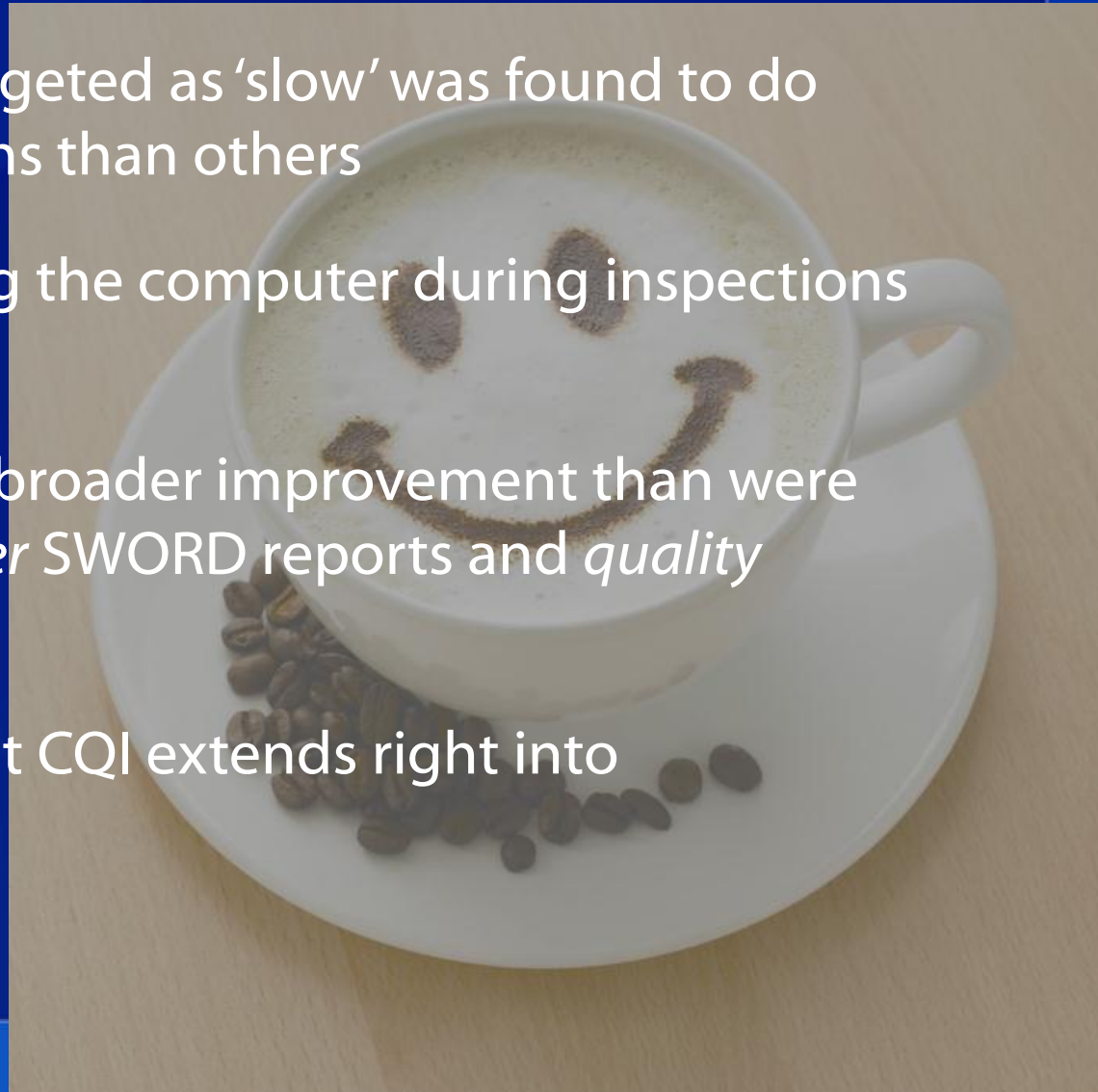
Average Days until Re-inspection





Qualitative Evaluation Findings

- David who is often targeted as 'slow' was found to do much more inspections than others
- Brian has started using the computer during inspections on his own
- Manager has noticed broader improvement than were targeted, such as *better* SWORD reports and *quality* inspections
- Staff have realized that CQI extends right into accreditation



Demonstrated Efficiency Improvements

- Using computer during on-site inspection decreases staff and travel time: $1.5 \text{ hour} \times 200 \text{ inspections per year} \times \$24.12/\text{hour} = \text{\$7236.00}$ per inspector
 - Travel average to and from restaurant = $15 \text{ miles} \times \$0.50/\text{mile} \times \# \text{ insp /year} = \text{\$1500}$
- Manager time tracking late inspections = $\text{Gary} \times 1 \text{ hour/wk} \times 52 \text{ weeks} = \text{\$1677.52}$
- Resource costs for averted foodborne outbreaks saved – difficult to quantify

Next Steps: Department-wide CQI

BCHD Total Quality Management Process

PROCESS

WHO

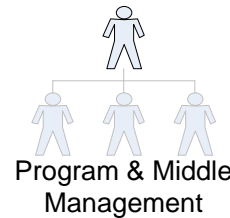
DOES WHAT

BCHD
STRATEGIC
PLANNING



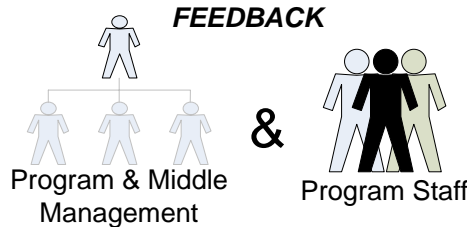
PRODUCES GOALS
CONDUCTIVE TO CQI

PROGRAM
STRATEGIC
PLANNING



TRANSLATES GOALS INTO
SPECIFIC, MEASURABLE
PROGRAM OBJECTIVES

PROGRAM
CQI
PLANNING



IDENTIFIES SPECIFIC
PROGRAM PROCESSES
FOR IMPROVEMENT TO
MEET OBJECTIVES

CQI
IMPLEMEN-
TATION



PLANS, IMPLEMENTS,
TESTS CQI PROCESSES

Department Wide Objectives

Berrien County Health Department Strategic Plan **Objectives 2011**

| Service Area | Objective Focus | Problem | Objective | Measure | Baseline | Improvement |
|-----------------------------------|--|--|--|---|--|--|
| SATS Treatment | Increase Group Sessions - Goal #3 Increase Efficiencies | Need for increased services with decreased state funding. | Increase efficiency in treatment service delivery by moving some of the total number of clients attending individual sessions to attending | Percent of total clients receiving group treatment | Total 09/10 - 128/1000 (12.8%) | Total 10/11 - 350/1000 (35%) |
| | | | | Percent of clients reporting abstinence at 90 day evaluation | 94% | >90% Currently 98% |
| CCHS Family Planning | BCCCP target population - Goal #4 Decrease Disparity | State has mandated that client shift must occur to serve more women in the 50-64 year demographic | Increase the number of 50-64 year old women who receive BCCCP services to 75% of caseload by September 2011 | Percent of BCCCP clients per month who are 50-64 years old | FY 09 = 135/304 (44%) FY10 = 159/300 (53%) | 75% Currently 76% |
| CCHS Sexually Transmitted Disease | STD turnaway rates - Goal #1 Provide Exceptional Service | with the addition of Rapid HIV testing, immunizations and decreases in staffing, the number of clients turned away daily at the STD clinic has increased | Decrease the number of patient turnaways in STD clinics | Total number of clients turned away per month (Niles + BH) on a three month average | 58 | no more than 2 clients per scheduled clinic. (20 x 2) Currently 23/month |

Each service area and administration area set at least one objective. There are a total of 14 Key Objectives.

Questions

Theresa Green, AA-C, MBA

585-224-2063

Theresa_green@URMC.Rochester.edu

Support for this project was provided by the Robert Wood Johnson Foundation in the Building the Evidence for Quality Improvement Initiatives in Public Health Practice program



**Berrien County
Health Department**