Return on Investment in Systems of Care: How to Collect and Use Data on Outcomes and Cost Savings

Simone Peart Boyce, Ph.D., National Evaluation Team
Katherine Grimes, M.D., M.P.H., Mental Health Services Program for Youth (MHSPY)
Geneva Strech, M. Ed., M.H.R., Oklahoma System of Care

Objectives

Speakers
1. To define economic evaluation analysis and its uses
2. To discuss the importance of analyzing costs and outcomes
3. To review strategies and findings on cost savings in systems of care based on multi-site studies and state and community analyses

Open/Small Group Discussion
1. To identify and describe pragmatic state and community methods for economic evaluation analysis
2. To identify potential state- and community-level data sources and develop action steps for exploring economic evaluation

Questions

1. How do you really know that you are maximizing your limited resources?
2. How do you choose between two promising program options when you can only afford one?
3. How do you demonstrate to stakeholders that the benefits of your program are worth the costs?

Return on Investment (ROI)

• Determines the amount of value gained from spending decisions
  – Calculates a dollar value of the benefit achieved by an investment and weighs that against its cost
• Subset of economic evaluation

What Is Economic Evaluation?

Cost analysis

- Changes in health states
- Saving of resources
- Creation of other value

Economic Evaluation
Why Conduct an Economic Evaluation?

- Resources are scarce, but wants are unlimited
  - Every choice has an associated opportunity cost
  - Trade-offs must be made
- Opportunity cost: Cost of what we give up in order to gain something else
- The objective of economic evaluation is to facilitate the use of scarce resources to maximize health outcomes

Value for Decision Making

- Planning phase:
  - Choose between competing interventions or programs
  - Determine whether a program might provide good value
  - Inform efficient allocation of resources between programs
- Evaluation phase:
  - Determine whether a program provided good value
  - Decide whether to continue, expand, reduce, or end a program or health intervention to make best use of resources

Relevance for Systems Of Care

- Known effectiveness of systems of care at child, family, and system level, with ambiguous cost implications
- Interest by SAMHSA in widespread adoption of systems of care
- Need for more systematic and reliable information on ROI by state policy makers

Advantages

- Forces the collection of quantified information
  - Health outcomes that result from the intervention
  - Health care utilization and costs
  - Costs borne by other sectors (e.g., child welfare, juvenile justice)
- Integrates the economic and clinical aspects of interventions to provide an understanding of trade-offs
- Emphasizes the scarcity of resources
- Makes returns on the interventions explicit

Disadvantages

- Requires quantification of factors that might not be easily quantified, e.g.,
  - Child/youth satisfaction with care received
  - Services provided by voluntary organizations
- Can only incorporate a limited number of factors
- Involves methodological challenges for rigorous application

Types of Economic Evaluation

- Cost minimization analysis (CMA)
  - Compares the costs of different interventions given that outcomes measures are equal
  - Focuses solely on cost
- Cost-effectiveness analysis (CEA)
  - Compares and compares the ratio of the difference in costs between two interventions to the difference in outcomes
  - Allows comparison of alternative interventions that achieve the same health outcomes.
  - Program A costs $50 additional dollars per added anxiety-free day compared to Program B
- Cost benefit analysis (CBA)
  - Measures whether financial benefits of program exceed the costs
  - Expresses all benefits, such as health outcomes and lives saved, in monetary terms
  - Can be expressed as a fraction (benefits/costs) or as ratio (benefits/costs)
  - Program A produces a net saving of $1,000 per child
- ROI
  - Similar to CBA where both benefits and costs are expressed in monetary terms
  - Can be expressed as a ratio (benefits/costs) or percentage showing benefits as a percent of costs
  - Program A produces a net return of 10%
Economic Evaluations Differ by Outcome Measure

<table>
<thead>
<tr>
<th>Outcome Measures</th>
<th>Economic Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/youth reached</td>
<td>Cost analysis (CMA)</td>
</tr>
<tr>
<td>$/hospital visit</td>
<td>Cost analysis (CMA)</td>
</tr>
<tr>
<td>$/child screened for depression</td>
<td>Cost of illness (burden-of-disease analysis)</td>
</tr>
<tr>
<td>$/ER visit averted</td>
<td>CEA</td>
</tr>
<tr>
<td>$/change scores on CBCL</td>
<td>CBA</td>
</tr>
<tr>
<td>$1.50 saved in health care costs for each $1 spent on prevention</td>
<td>CBA</td>
</tr>
<tr>
<td>$1.50 saved in health care costs for each $1 spent on prevention (or a return in investment of 50%)</td>
<td>ROI</td>
</tr>
</tbody>
</table>

Perspective of Economic Evaluation

- Viewpoint that economic evaluation will take to quantify costs and benefits
- Costs to whom? Benefits to whom?
- Types of perspective:
  - Child/youth and their caregivers
  - Provider or sector-specific stakeholders (e.g., health care system, mental health, child welfare, juvenile justice, education)
  - Insurance/Payer
  - Society

Child/Youth/Caregiver Perspective

- Costs borne by the child/youth/caregiver and benefits accruing to the child/youth/caregiver are relevant

Example: Should I enroll in systems of care?

Provider Perspective: Mental Health

- People or institutions providing mental health-related services (physicians, hospitals, public health clinics, and local and state health departments)
- Mental health provider costs and mental health provider benefits are relevant

Example: Should we offer peer counseling to children/youth suffering from emotional/behavioral disorders?

Payer Perspective

- Person or entity ultimately responsible for the financial costs (households, private insurers, Medicare or Medicaid, or government)
- Costs to the payer and benefits to the payer are relevant

Example: Should Medicaid expand services eligible for reimbursement to include individual and group mental health evaluation and treatment?

Societal Perspective

- This is the broadest perspective.
- Considers all costs regardless of who pays them and all benefits regardless of who accrues them
  - Includes costs and benefits borne by all sectors within systems of care (e.g., mental health, child welfare, juvenile justice, and education)
Data Collection and Analytic Issues

- Need for comparison group: “How would these children be served in the absence of the system of care?”
  - Pre-post comparisons
  - Business as usual care, e.g., out-of-home placement
- Costing services across systems/service sectors
  - Standardized costs across systems
  - Total costs versus silo costs
- Short-term versus long-term costs

Summary

- Economic evaluation can inform policy and program decisions by
  - Estimating cost per health outcome achieved
  - Identifying which of the competing interventions maximizes health gains
  - Determining efficient budgetary allocations given resource constraints
  - Providing evidence to key decision makers by demonstrating value of particular interventions

Literature on Cost Savings of Systems of Care

- Primarily based on cost savings from
  - Multi-site analyses
  - State and community examples
  - Projected cost savings
- Cost savings achieved from
  - Reduced health care utilization (inpatient psychiatric hospitalization, emergency rooms, residential treatment, and other group care)
  - Increased expenditures for home- and community-based care and care coordination
  - Decreased involvement in the juvenile justice system
  - Reduction in school failures
  - Improved family stability

Return on Investment: Capturing Value and Demonstrating Effectiveness in Systems of Care

Katherine E. Grimes, MD, MPH
Georgetown Training Institutes
Washington, DC
July 20, 2014

National Technical Assistance Center Report (Adapted to ROI)

- Step 1: Understand What to Measure—Includes engaging stakeholders, reviewing and refining a theory of change, and defining the analysis parameters
- Step 2: Prepare for the ROI Analysis—Includes determining a sample, identifying outcomes and indicators to be measured, establishing a data collection process (existing and/or new data), collecting outcome and cost data, and developing an impact map
- Step 3: Model and Calculate the ROI—Includes determining direct and imputed financial values and proxies, estimating impact, and calculating the ROI (my words in italics)

Health Care Reform: Opportunities for SOCs and ROI

- Environment: ACA bringing new reimbursement mechanisms, requiring new delivery system approaches (happily aligned with SOCs)
- Clinical: Pediatrics increasingly dominated by chronic illness, including mental health disorders; also, one of top five most common reasons for visit
- Financial: Global cap brings shared risk; pediatric expense multiplied in the presence of mental health needs (most expensive of the five “most common”)
- “Accountability”: Cost and quality will be key elements; can advance the knowledge base for child mental health
“The Whole World Wants to Know”
Diverse stakeholders looking for indications of “effectiveness” in children’s services:
- Purchasers - “getting what we paid for?”
- Providers – “are we doing a good job?”
- Policymakers – “is this the right place to put resources?”
- Consumers – “is this helping my child?”
- Researchers – “does either individual or population health status improve?”

Challenges to Finding Consensus
- Different measurement orientation (i.e. individual vs. population level outcomes)
- Different mandates (advocacy, fiscal oversight, scientific rigor)
- Access barriers to existing data (privacy issues, system compatibility, political sensitivity)
- Resource constraints re: programmers, analysts needed to integrate data, timeliness
- Lack of trust, lack of transparency, “rabbit holes”

Collaboration: Shared Outcomes
- “What would it look like (if goals were met)?”
- “How should we measure progress?”
- Build process to support goals (not vice versa)
- Ongoing joint-ownership of process and results
- Tie outcomes (good or bad) back to CQI process
- Everything measured should matter (recruit the team)
- Maintain reference point (“usual care”, “pre-post”, national trends) to assess/describe ROI

Example: the MHSPY Model
- Integrated Care Delivery: child has one Individualized Care Plan for all pediatric, mental health, substance abuse, school, juvenile justice and social services (collaboration on frontlines); specified goals and measures
- Shared governance: via state Steering Committee of HCHP, DCF, DYS, DMH, DOE, Family Organizations and Medicaid (also area-level interagency teams)
- Blended funding: allows service choices to be clinically driven, without “eligibility” barriers; jointly approved flexible dollars for individualized care + “wrap” process
- Outcome measures: chosen by consensus; transparent, continuous; baseline and every six months reports; CSMs

MHSPY: System Design (CQI)

Outcome Domains
- CARE EXPERIENCE
  Family AND Referring agency reports on process
- UTILIZATION
  All health care + any other service (i.e. foster care)
- CLINICAL FUNCTIONING
  Multiple validated child measures of functional status
- EXPENSE
  Total expense, within and beyond case-rate inclusion; estimated savings against “usual care” expense profiles
Results: Engagement

- Program voluntary enrollment rate of 99%; program retention rate of 97% (N=233)
- Average length of enrollment: 18 months
- Results from the Family Centered Behavior Scale survey indicate families scored their Care Managers at 80% or higher on all 26 questions
- 83% of parent/caregivers report things being “better or much better” at exit (compared to 31% satisfaction with previous care received)

MHSPY Admission Rates: Pre-Post Counts

<table>
<thead>
<tr>
<th>Hospital Placement (24 hour service types)</th>
<th>Total Hospital Placement Events 12 mos. Prior to Study Enrollment N</th>
<th>Average Events per Child</th>
<th>Total Hospital Placement Events after 12 mos. of Study Enrollment N</th>
<th>Avg. Events per Child</th>
<th>Percent Reduction in Events</th>
<th>Percent Reduction in Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Psychiatric</td>
<td>66</td>
<td>38</td>
<td>1.7</td>
<td>28</td>
<td>1.2</td>
<td>78%</td>
</tr>
<tr>
<td>Long-term Residential Care</td>
<td>11</td>
<td>11</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>62%</td>
</tr>
<tr>
<td>Acute</td>
<td>11</td>
<td>9</td>
<td>1.2</td>
<td>6</td>
<td>1.2</td>
<td>45%</td>
</tr>
<tr>
<td>Foster Care</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>67%</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
<td>44</td>
<td>1.5</td>
<td>38</td>
<td>1.2</td>
<td>60%</td>
</tr>
</tbody>
</table>

Note: N=507, unless noted otherwise in the study.

MHSPY vs. Usual Care: Polypharmacy

MHSPY Expenses vs. Usual Care

Capturing value and effectiveness

- Valid and accessible indicators regarding effectiveness can help to monitor quality, guide policy development, determine resource allocation and track expense
- Programs using Medicaid funds may only track Medicaid reimbursable services (leading to under-reporting of expense in “usual care”)
- Engage state leaders to obtain data on other service types accessed by Medicaid-enrolled youth, including estimated expense, to assist with planning and place outcomes in context
Issues and Opportunities: Your Projects

• ACA: Invitation to demonstrate ways to reduce unnecessary health care expense for children - while improving outcomes
• Define focus: what are your goals? What outcomes do you want to measure?
• Who are your “customers” for your results?
• What are your measurement/ data collection barriers?
• Who are your allies?
• What stakeholders do you need to engage?

Bibliography & Contact Info


katherine_grimes@hms.harvard.edu

Conclusions & Recommendations

• Financial pressures can create unexpected allies; be flexible
• Select indicators linked to expressed values and/or legal requirements; be strategic
• Integration of data across sources also improves frontline access to information; be inclusive
• Available, generalizable indicators allow comparison across interventions; be practical
• Accessible concepts generate broader support; be collaborative
University of Oklahoma

Oklahoma’s Care Management Project

The study population included 1,943 projected high-resource utilization youth 6-17 years of age eligible for Medicaid in 72 of 77 Oklahoma counties.

Characteristics of the study population were:
- average age, 13.0 years;
- 41% female;
- 10.8% diagnosed with an intellectual disability;
- 8.3% diagnosed with attention deficit disorder; and
- cumulative IP length of stay (LOS) 8.2.

Average total charges for the Care Management group were $28,633 per year versus $35,805 for the control group, a savings of $7,172 (21%) in the year during Care Management. There was a trend towards a greater reduction in average charges for the Care Management group over time (28% vs. 17%). However, this trend did not reach statistical significance ($ = .04).

Average total charges for the Care Management group were $23,685 per youth per year versus $28,609 for the control group, a savings of $4,924 (17%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).

Youth in the Care Management group averaged $30,169 in average outpatient charges in the year before Care Management and $12,892 in the year during Care Management. Youth in the control group averaged $26,805 in average outpatient charges in the year before Care Management and $23,479 in the year during Care Management. There was a trend towards a greater reduction in average charges for the Care Management group over time (52% vs. 42%). However, this trend did not reach statistical significance ($ = .04).

Average outpatient behavioral health charges for the Care Management group were $1,664 per youth per month versus $2,086 for the control group, a savings of $422 (20%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).

University of Oklahoma

Oklahoma’s Care Management Project

Average Total Inpatient Charges by Group and Time Period

Average outpatient behavioral health charges for the Care Management group were $1,664 per youth per month versus $2,086 for the control group, a savings of $422 (20%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).

Average total inpatient behavioral health charges for the Care Management group were $1,459 per month versus $1,920 per month for the control group, a savings of $461 (24%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).

University of Oklahoma

Oklahoma’s Care Management Project

Average Total Inpatient Charges by Group and Time Period

Average outpatient behavioral health charges for the Care Management group were $1,664 per youth per month versus $2,086 for the control group, a savings of $422 (20%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).

Average total inpatient behavioral health charges for the Care Management group were $1,459 per month versus $1,920 per month for the control group, a savings of $461 (24%) in the year during Care Management. This difference did not reach statistical significance ($ = .04).
**Oklahoma’s Care Management Project**

**Findings**

- **Inpatient Medical and Behavioral Health Hospitalizations:**
  - The Care Management Program resulted in statistically significant cost savings for inpatient hospitalizations over the course of the study. There was a 60% reduction in average total charges for the Care Management Group over time compared to a 17% reduction for the Control Group. This reduction in inpatient charges held regardless of whether youth were in the custodial system or not.

- **Inpatient Behavioral Health Hospitalizations:**
  - The Care Management Program resulted in statistically significant cost savings for inpatient behavioral health hospitalizations over the course of the study. There was a 60% reduction in average total charges for the Care Management Group over time compared to a 17% reduction for the Control Group. This reduction in inpatient charges held regardless of whether youth were in the custodial system or not.

- **Follow-up Care:**
  - There was a trend toward a higher proportion of Care Management youth enrolling in outpatient follow-up care within seven days of discharge from behavioral health hospitalization (76% of Care Management hospitalizations vs. 73% of the Control Group hospitalizations), which is in the desired direction; however, the difference was not large enough to reach statistical significance (p = .36).

- **Outpatient Medical and Behavioral Health Charges:**
  - There was a 16% increase in average outpatient charges for the Care Management group ($2,086) compared to the Control Group whose average outpatient charges decreased by 20% ($1,744; p = .05).

- **Outpatient Behavioral Health Charges:**
  - There was a 16% increase in average outpatient behavioral health charges for the Care Management group ($1,544) over time compared to the Control Group whose average outpatient behavioral health charges decreased by 17% ($1,380; p = .01).

- **Total Medical and Behavioral Health Charges:**
  - There was a trend toward a greater reduction in average total charges (combined inpatient and outpatient) for the Care Management group over time (15% vs. 10%); however, this trend did not reach statistical significance (p = .36).

- **Total Behavioral Health Charges:**
  - There was a significantly greater reduction in average total outpatient behavioral health charges for the Care Management group over time (60% vs. 52%; p = .05).

**Data**

- 76 system of care communities initially funded in 2005 and 2006 and 2008 to 2010
- Children and caregivers providing data every 6 months for up to 24 months after enrollment in systems of care
- Outcome indicators:
  - Health care utilization
  - Juvenile arrests
  - Grade repetition
  - School dropout
  - Caregivers’ inability to work due to their child’s mental health issues

**Methods: Benefits Only**

- Comparison of outcomes 6 months prior to intake into systems of care and 6 months prior to the 12-month follow-up interview
- Change in outcome monetized with a unit cost estimate derived from either the literature or from data provided by caregivers
  - Yields a change in average cost per child and percent change in cost
- Extrapolate cost to all children served in a CMHI-funded system of care
Health Care Utilization and Juvenile Arrest

- Health care utilization:
  - Less likely to receive psychiatric inpatient services
  - Less likely to visit an ER for behavioral and/or emotional problems
- Juvenile arrest:
  - Less likely to be arrested

Cost Savings: Health Care Utilization and Juvenile Arrest

<table>
<thead>
<tr>
<th>Outcomes and Cost Savings of Children/Youth Enrolled in CMHI-Funded Systems of Care</th>
<th>Inpatient Hospitalizations</th>
<th>ER Visits1</th>
<th>Juvenile Arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>1.26</td>
<td>0.13</td>
<td>0.32</td>
</tr>
<tr>
<td>12 Months</td>
<td>0.73</td>
<td>0.14</td>
<td>0.20</td>
</tr>
<tr>
<td>Difference</td>
<td>0.53↓</td>
<td>0.19↓</td>
<td>0.13↓</td>
</tr>
<tr>
<td>Unit Cost 2013 ($)</td>
<td>$1,708</td>
<td>$878</td>
<td>$3,056</td>
</tr>
<tr>
<td>Change in Average Cost per Child Served ($)</td>
<td>$1,433↓</td>
<td>$100↓</td>
<td>$718↓</td>
</tr>
<tr>
<td>Change in Average Cost per Child Served (%)</td>
<td>42%↓</td>
<td>57%↓</td>
<td>39%↓</td>
</tr>
<tr>
<td>Estimated Total Decrease for All Children Served</td>
<td>$77,144,831↓</td>
<td>$14,607,136↓</td>
<td>$10,567,711↓</td>
</tr>
</tbody>
</table>

1. 6-month period prior to interview
2. ER visits due to behavioral and/or emotional issues

Monetizing School-Related Outcomes

- After enrollment in a system of care, children were
  - Less likely to repeat a grade or drop out of school

Cost Savings: School-Related Outcomes

<table>
<thead>
<tr>
<th>Outcomes and Cost Savings of Children/Youth Enrolled in CMHI-Funded Systems of Care</th>
<th>Grade Repetition</th>
<th>School Dropout</th>
</tr>
</thead>
<tbody>
<tr>
<td>System of Care</td>
<td>6.30%</td>
<td>8.00%</td>
</tr>
<tr>
<td>National</td>
<td>9.60%</td>
<td>20.00%</td>
</tr>
<tr>
<td>Difference</td>
<td>3.30%↓</td>
<td>11.40%↓</td>
</tr>
<tr>
<td>Unit Cost 2013 ($)</td>
<td>$10,736</td>
<td>$380,839</td>
</tr>
<tr>
<td>Change in Cost Per Child</td>
<td>$358↓</td>
<td>$401,369↓</td>
</tr>
<tr>
<td>% Change in Cost Per Child</td>
<td>35%↓</td>
<td>57%↓</td>
</tr>
<tr>
<td>Estimated Total Decrease for All Children Served</td>
<td>$1,104,907↓</td>
<td>$382,416,926↓</td>
</tr>
</tbody>
</table>
Caregivers’ Inability to Work

- After enrollment in a system of care,
  - Caregivers missed fewer days of work due to caring for children with behavioral/emotional problems
  - Caregivers had a lower likelihood of being unemployed due to caring for children with behavioral/emotional problems

Cost Savings: Caregivers’ Inability to Work

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Missed Days of Work</th>
<th>Inability to Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit of Analysis</td>
<td>Number of days</td>
<td>Probability of unemployment</td>
</tr>
<tr>
<td>Population</td>
<td>Employed caregivers</td>
<td>Caregivers unemployed</td>
</tr>
<tr>
<td>Sample Size</td>
<td>1,451</td>
<td>471</td>
</tr>
<tr>
<td>Intake</td>
<td>-5.5</td>
<td>130.0%</td>
</tr>
<tr>
<td>12 Months</td>
<td>2.7</td>
<td>79.0%</td>
</tr>
<tr>
<td>Difference</td>
<td>-1.7↓</td>
<td>21.0%↓</td>
</tr>
<tr>
<td>Average Daily Wage</td>
<td>$102.83</td>
<td>$102.83</td>
</tr>
<tr>
<td>Change in Cost</td>
<td>$176↓</td>
<td>$10,171↓</td>
</tr>
<tr>
<td>% Change in Cost</td>
<td>39%↓</td>
<td>21%↓</td>
</tr>
</tbody>
</table>

Monetizing Caregivers’ Inability to Work

**STEP 1**

- Calculate difference in outcome prior to and post-intake

**STEP 2**

- Determine change in average cost

- Use imputed average daily wage of caregivers

Conclusion

- By monetizing outcomes, able to show cost savings from enrollment in systems of care due to savings from
  - Reductions in health care utilization
  - Decreased juvenile arrests
  - Improved school outcomes
  - Increased caregiver productivity and opportunity for employment
- Demonstrates value of investing in systems of care

The views expressed in written conference materials or publications and by speakers and moderators at conferences, do not necessarily reflect the official policies of the Department of Health and Human Services, nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.