Demonstrating Return on Investment for Community Health Worker Services: Translating Science into Practice

Katharine London
University of Massachusetts Medical School

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Demonstrating Return on Investment for Community Health Worker Services

Translating Science into Practice

May 11, 2017

The 8th Annual Community Health Worker/Patient Navigator Conference

Katharine London, MS, Principal
Kelly Love, JD, Senior Policy Analyst
Roosa Tikkanen, MPH, MRes, Policy Analyst
Center for Health Law and Economics, UMass Medical School
Opportunity

• Research shows CHWs can improve health outcomes and contain costs

• New payment methods make it easier to fund CHW services
  – Pay-for-Performance
  – Bundled Payments
  – Global Payments

• Providers and payers have flexibility to invest in new approaches if they are confident they will achieve:
  – Improved health outcomes
  – Positive ROI

• MassHealth Investment – time-limited!
Potential benefits to a variety of stakeholders

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Project goals

• Demonstrate the business case for CHW services
• Provide the detailed budget, financial and clinical analysis needed to justify funding
• Provide tools that users can adjust to meet their own specific needs
• Promote widespread adoption of CHW services
Overview of Analysis

• Identified Maine communities with unmet health needs
• Identified cost-effective CHW interventions in other states from published literature
• Applied results from other states to project outcomes in Maine
• Developed models for evidence-based, cost-effective CHW interventions for Maine
Key Terms

- **Financial Return on Investment (ROI):** For every $1 invested in the intervention, how much is returned
  - Calculated as: \( \frac{\text{Savings}}{\text{Program cost}} \)
  - Positive ROI: For $1 invested, return is greater than $1
  - Negative ROI: For $1 invested, return is less than $1

- **Social return:** Benefit to society: Healthy days and wages recovered

- **Target population:** People we most want to reach
To produce a positive ROI, intervention must target people who otherwise would use more services or more expensive services - a hypothetical example:
Developed 4 Models for Maine

1. Diabetes, Washington County
2. Asthma, children in Kennebec County
3. High utilizers, Aroostook County
4. Underserved individuals, Lewiston
Proposed Model 1: Diabetes in Washington County

Target population: 82 individuals with poorly controlled diabetes, all ages

CHW employer: Federally qualified health center (FQHC)

Model: University of Texas Community Outreach, Laredo, TX, that included home visits, counseling, group education, exercise classes

Program cost of CHW Intervention: $390,000 over 3 years

Projected outcomes (at Year 1):
- 60 percent will achieve good glycemic control
- Savings in direct medical costs: $520,000 over 3 years
- Financial ROI: $1.37 for every $1 invested over 3 years
- Social return: 11 recovered work days/worker, valued at $1,500/worker/year
Proposed Model 2: Asthma, children in Kennebec County

**Target population:** 112 children with poorly controlled asthma

**CHW employer:** Private group practice eligible for bonus payments for meeting asthma improvement targets

**Model:** Seattle-King County Healthy Homes, WA, 4-month intervention incl. home visits, environmental assessment, asthma supplies

**Program cost of CHW Intervention:** $220,000 over 3 years

**Projected outcomes (at Year 1):**
- 46% achieve well-controlled asthma, 53% reduction in hospitalizations
- Savings in direct medical costs: $47,000 over 3 years
- Financial ROI: $1.03 for every $1 invested over 3 years
- Social return: 3 school days & 1 workday/family/year, valued at $170/family

**Note:** ROI only positive if practice earns bonus payments for meeting quality targets. However, Seattle-King County’s recent model produced positive ROI.

Commonwealth Medicine
Proposed Model 3:
High utilizers, Aroostook County

**Target population:** 150 individuals with chronic conditions and high medical spending

**CHW employer:** 3 rural health centers

**Model:** Molina Healthcare/CARE NM, NM, 1-6 month intervention to connect patients to primary care providers and reduce ED visits

**Program cost of CHW Intervention:** $550,000 over 3 years

**Projected outcomes (at Year 1):**
- 83% reduction in hospitalizations; 23% increase in diabetes eye exams
- Savings in direct medical costs: $1,275,000 over 3 years
- Financial ROI: $2.31 for every $1 invested over 3 years
- Social return: 11 work days recovered/person/year, valued at $2,000/worker
Proposed Model 4:
Underserved individuals, Lewiston area

**Target population:** 260 “New Mainers” in the Somali community with language and cultural barriers to accessing health care

**CHW employer:** CBO working with several health care providers

**Model:** Cancer screening (cervical, MN; breast, MA; colorectal, TX) to Somali populations, patient navigator (TX), and community outreach (CO) interventions

**Program cost of CHW Intervention:** $178,000 over 3 years

**Projected outcomes (at Year 1):**
- Increases in: Mammograms (3x); colonoscopies (2x); primary care (+86%); 46% reduction in ED visits
- Savings in direct medical costs: $274,000 over 3 years
- Financial ROI: $1.54 for every $1 invested over 3 years
- Social return: Not modeled (insufficient data)
Model Development: Methods

Identified interventions from published literature that improve health and lower costs

- **Similar population** with similar needs: condition, insurance status, disease control, age group, ethnicity
- **Similar settings**: FQHC, CBO, hospital
- **Published recently**
- **Strong scientific evidence**
  - Statistically significant effect
  - Ideally: Outcomes vs. individuals who did not receive intervention
  - Reported effects on health care outcomes and cost (or utilization)
Disclaimer

• We made assumptions based on the best available evidence, however there is a risk of introducing error when combining results from different studies
• If these models are implemented, actual results may differ from projections
• There are many other sustainable models. The models presented here are merely examples
Model Development: Diabetes, Washington County

Source of Model

University of Texas developed this Community Outreach model with Mercy Clinic in Laredo, Texas.

Target population:
- Individuals with poorly controlled Type 2 Diabetes
- Primarily low-income adults, many in rural areas

Intervention:
- CHW home visits
- Classes co-taught by CHW and nurse, dietician or Zumba instructor
  - Diabetes self-management
  - Health education
  - Diet
  - Exercise

Model Development: Choice of model

Source of Model

Why did we choose the ‘University of Texas’ model?

• Dual Intervention focus: Individual goal-setting (home visits, counseling) + group classes
  – Social setting (classes) reinforces individual goals
  – Individual attention reinforces learnings in class

• Estimated the percent (%) of individuals reaching HbA1c levels
  – Allowed us to estimate medical cost savings
  – Based on per-person costs at different HbA1c levels

Model Development: Choice of model

Why did we choose the ‘University of Texas’ model?

<table>
<thead>
<tr>
<th>HbA1c control level</th>
<th>Direct medical costs attributable to diabetes / person / year (CT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7% Good</td>
<td>$10,805</td>
</tr>
<tr>
<td>7-9% Moderate</td>
<td>$11,346 (+16%)</td>
</tr>
<tr>
<td>&gt;9% Poor</td>
<td>$13,507 (+20%)</td>
</tr>
</tbody>
</table>

HbA1c control level
(National Committee for Quality Assurance, NCQA)

CT costs estimated based on Oglesby AK et al., Cost Effectiveness and Resource Allocation 2006, and Juarez, D, et al., Am J Pharm Benefits 2013

Model Development: Methods

- Identify target population
- Estimate Caseload: Patients / CHW
- Develop budget: Program costs
- Project health outcomes
- Project savings
- Calculate Financial ROI: Savings / Program costs
- Project social return: Healthy days gained
Identified public health need in community
Diabetes in Washington County

Washington has a:
- Higher rate of diabetes (prevalence)
- Higher rate of ED visits related to diabetes
- Higher rate of hospitalizations from diabetes long-term complications
- Higher rate of deaths related to diabetes

Compared to state-wide.
Model Development: Diabetes, Washington County

Caseload

<table>
<thead>
<tr>
<th>Population</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Billable hours per year</strong> <em>(minus admin, holidays, but incl. travel time)</em></td>
<td>1,696</td>
</tr>
<tr>
<td>CHW hours per total participant (persisting and drop-outs)</td>
<td>35</td>
</tr>
<tr>
<td>Participants per CHW (persisting and drop-outs)</td>
<td>48</td>
</tr>
<tr>
<td>Total participants (2 CHWs)</td>
<td>96</td>
</tr>
<tr>
<td>Persisting participants (2 CHWs)</td>
<td>82</td>
</tr>
<tr>
<td><strong>Caseload / CHW / 1 Year (persisting participants)</strong></td>
<td>41</td>
</tr>
</tbody>
</table>
Budget based on actual costs in Maine

Interviewed CHWs & Employers:
- Maine Migrant Health Program (FQHC)
- Maine General (Hospital)
- Portland Public Health (municipality)
- Maine Access for Immigrant Network (CBO)
- New Mainers Public Health Initiative (CBO)
- DFD Russell (FQHC)
- Spectrum Generation (CBO - Area Agency on Aging)

<table>
<thead>
<tr>
<th>Budget parameters</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours worked by full time CHWs (per week)</td>
<td>36.75</td>
</tr>
<tr>
<td>CHW benefits (% of income)</td>
<td>28%</td>
</tr>
<tr>
<td>CHW salary (hourly)</td>
<td>$19.00</td>
</tr>
<tr>
<td>CHW supervisor salary (hourly)</td>
<td>$24.50</td>
</tr>
<tr>
<td>CHW supervisor % time spent supervising</td>
<td>10%</td>
</tr>
</tbody>
</table>
# Budget for 1-year intervention

## Budget for 1-year intervention (82 individuals retained, 2 FTE CHWs)

<table>
<thead>
<tr>
<th>Costs</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHW Costs:</td>
<td></td>
</tr>
<tr>
<td>CHW Salary (2 FTEs @ ME median)</td>
<td>$77,800</td>
</tr>
<tr>
<td>CHW Fringe (28% for 2 FTEs)</td>
<td>$21,800</td>
</tr>
<tr>
<td>Travel, supplies, training</td>
<td>$4,200</td>
</tr>
<tr>
<td><strong>Total cost for 2 CHWs for 1 year</strong></td>
<td><strong>$107,300</strong></td>
</tr>
<tr>
<td>Supervision costs (ME median + fringe)</td>
<td>$13,000</td>
</tr>
<tr>
<td>Nurse/dietitian educator costs</td>
<td>$6,000</td>
</tr>
<tr>
<td><strong>Total Cost – Year 1</strong></td>
<td><strong>$126,300</strong></td>
</tr>
<tr>
<td><strong>TOTAL COST - YEARS 1–3</strong></td>
<td><strong>$385,600</strong></td>
</tr>
</tbody>
</table>

See Report Chapter 6 and Technical Appendix for further details on methods and model development.
Model Development: Choice of model

Why did we choose the ‘University of Texas’ model?

- Direct medical costs attributable to diabetes / person / year (CT)
  - <7% Good: $10,805
  - 7-9% Moderate: $11,346 (+16%)
  - >9% Poor: $13,507 (+20%)

HbA1c control level
(National Committee for Quality Assurance, NCQA)

CT costs estimated based on Oglesby AK et al., Cost Effectiveness and Resource Allocation 2006, and Juarez, D, et al., Am J Pharm Benefits 2013

Projected savings in medical costs for 82 enrollees over 1 year:
Assuming all participants have poor control at baseline (HbA1c >9%),* 60% achieve good control (<7%), 20% remain with poor control.**

<table>
<thead>
<tr>
<th>Cost savings</th>
<th>Baseline</th>
<th>Year 1</th>
<th>Cost vs. Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical cost without CHW intervention</td>
<td>$1,079,000</td>
<td>$1,108,000</td>
<td>+ $29,000</td>
</tr>
<tr>
<td>(Assuming no change in HbA1c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical cost with CHW intervention</td>
<td>$1,079,000</td>
<td>$939,000</td>
<td>- $140,000</td>
</tr>
<tr>
<td>Total savings</td>
<td></td>
<td></td>
<td>- $168,000</td>
</tr>
</tbody>
</table>

Group costs are rounded to the nearest thousand; costs have been adjusted for medical inflation using Medicare Economic Indices published by CMS.

* Poor control (HbA1c > 9%), definition by the National Committee for Quality Assurance (NCQA).
** Based on results from model study (Brown HS et al., *Prev Chronic Dis* 2012).
Model Development: Diabetes, Washington County
Projected Return on Investment (Year 1)

Year 1

Cost increase

Medical costs
Program costs
Saving

Baseline | With no CHW intervention | After CHW intervention
--- | --- | ---
$1,079,000 | $1,108,000 | $939,000

$49,000
Model Development: Diabetes, Washington County

Projected Return on Investment (ROI): Calculation

\[
\text{ROI} = \frac{\text{savings}}{\text{program costs}} = \frac{\$520,000}{\$379,000} = 1.37
\]

Savings from direct medical costs divided by program costs of CHW intervention.
# Model Development: Diabetes, Washington County

## Projected Return on Investment (ROI)

**Expected ROI of CHW Intervention over 3 years**

<table>
<thead>
<tr>
<th>Return on Investment</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total Years 1-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings from direct medical costs</td>
<td>$168,000</td>
<td>$173,000</td>
<td>$178,000</td>
<td>$520,000</td>
</tr>
<tr>
<td>Expected costs of CHW intervention</td>
<td>($119,000)</td>
<td>($128,000)</td>
<td>($131,000)</td>
<td>($379,000)</td>
</tr>
<tr>
<td>Projected financial ROI</td>
<td>$1.41</td>
<td>$1.35</td>
<td>$1.36</td>
<td>$1.37</td>
</tr>
</tbody>
</table>

Costs are rounded to the nearest thousand. Costs in years 2 and 3 increase relative to year 1 because they have been adjusted for inflation.

For $1 invested, CHW intervention is expected to return $1.37

*(does not include Social Return)*
Model Development: Diabetes, Washington County

Social Return

Improvement in HbA1c levels (control)

<table>
<thead>
<tr>
<th>Percent of individuals at A1c level</th>
<th>Baseline (before)</th>
<th>1 year (after)</th>
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<tbody>
<tr>
<td></td>
<td>100%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td></td>
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<td>20%</td>
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Days absent from work, per person per year:

- <7%: 6.9 days
- 7-9%: 10.0 days
- >9%: 21.7 days

HbA1c control level


Model Development: Diabetes, Washington County

Projected social return

Based on number of days lost from work by patient A1c control level,* valued at average wages in Washington County (BLS data).

<table>
<thead>
<tr>
<th>Estimated number of working adults</th>
<th>Baseline (per person)</th>
<th>Year 1 (per person)</th>
<th>Saving vs. Baseline</th>
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<tr>
<td>Recovered work days: No CHW intervention (Assuming no change in HbA1c)</td>
<td>$2,900</td>
<td>$3,000</td>
<td>- $100</td>
</tr>
<tr>
<td>Recovered work days: With CHW intervention</td>
<td>$2,900</td>
<td>$1,400</td>
<td>+ $1,500</td>
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<tr>
<td>Total recovered value of workdays</td>
<td></td>
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<td>+ $1,500</td>
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Costs and days have been rounded; costs have been adjusted for inflation.

* Based on glycemic control results (HbA1c) obtained in model CHW study (Brown HS et al., *Prev Chronic Dis* 2012) and average work days lost at each level of glycemic control (Tunceli K et al., *Diabetes Care*, 2007).
### Potential benefits to a variety of stakeholders

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Full report available at:

Full URL:  

Tiny URL:  bit.ly/2o0yC5W
Discussion & Feedback