Webinars
Series of scientific webinars that provide a forum for discourse on scientific issues.

Online Courses
Evidence-based online courses on a variety of children’s environmental health topics.

Resource Catalog
Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals.

Topics included: Air Quality, Pesticides, Natural Disasters, BPA, Mold, Lead, Mercury
What Was Old is New Again: A Home Visit Model Using Integrated Health Navigation for Children with Asthma

- **Allison Maytag MPH**, Institute for Health Research, Kaiser Permanente Colorado
- **Mark Anderson MD FAAP**, Rocky Mountain Region PEHSU, Associate Professor of Pediatrics UCSOM and UC/CSU School of Public Health, Denver Health and Hospitals Authority, PEHSU R8
Overview

- Background

- Experience with health navigators

- A specific navigator-driven program
  - Asthma home visits
  - Outcomes around expenses
Objectives

- Understand the value health navigators can bring to clinical programs and how they can interact with clinicians.

- State some of the effects on outcomes experienced with navigator-based programs and specific cost-avoidance seen with a home visit program for children with asthma.
PiER’s mission is to implement collaborative and meaningful evaluation and research by:

- designing projects which answer relevant evaluation questions
- providing results that help organizations learn and take action
- building the capacity of organizations to conduct evaluation

www.pier-evaluation.org
Health Navigators in Colorado
Cancer, Cardiovascular, and Pulmonary Disease (CCPD) Grants Program funded 7 grantees for HN/CHW work.

5 grantees participated in an in-depth, cross-site evaluation of health navigators and community health workers:

- 4 used HNs
- 1 used CHWs

Health outcomes included colorectal cancer screening, team-based care, asthma coordination, and care for cardiovascular disease.
1. How does engagement with the HN model impact health systems/organizations?

2. What are the processes to reach patients and clients through the HN model?

3. What impact did HNs have on care and use of services?
Every 6 months, grantees reported aggregate data

- # of patients/clients referred (or outreached) & # referred (or outreached) by medical or non medical resource
- # of services received by patient/client & type of services
  - Evidence-based intervention (e.g., Diabetes Prevention Program)
  - Medical resource (e.g., health insurance, dentist)
  - Non-medical resource (e.g., transportation, food bank)
- # & type of patient/client barriers assessed
Evaluation Methods: Key Informant Interviews

- Spring of 2016 and Spring 2018

- Purpose was to understand:
  1. strategies to reach target populations through HNs
  2. how health systems work with HNs and the impact on their health system/organization
  3. to learn about the barriers and facilitators when utilizing HNs
Grantees submitted workflows with step-by-step protocols for HNs to work with patients and clients.

Purpose was to understand:
1. the integration of HNs into the organization by assessing the roles of the HN
2. how HN collaborate with other health professionals
3. HN access to clinic resources such as patient registries or electronic health records
Evaluation Methods: Patient Satisfaction Survey

- 156 surveys were administered by HN grantees
  - Purpose was to assess patient satisfaction with their HNs
  - Each grantee administered their own survey
  - To synthesize the data across the tools, the questions were mapped into knowledge, attitudes, behaviors, and satisfaction with the HN and reported as positive or negative responses
Evaluation Questions & Methods

1. How does engagement with the HN model impact health systems/organizations?

2. What are the processes to reach patients and clients through the HN model?

3. What impact did HNs have on care and use of services?

Semi-annual report data

Key informant interviews

Workflow content analysis
Evaluation Questions & Methods

1. How does engagement with the HN model impact health systems/organizations?
2. What are the processes to reach patients and clients through the HN model?
3. What impact did HNs have on care and use of services?

Key informant interviews
Workflow content analysis
Key informant interviews
1. How does engagement with the HN model impact health systems/organizations?

Key informant interviews

Workflow content analysis

2. What are the processes to reach patients and clients through the HN model?

Key informant interviews

3. What impact did HNs have on care and use of services?

Patient satisfaction surveys
1. How does engagement with the HN model impact health systems and organizations?

1a. What is the process to integrate HNs into the system?

1b. What are barriers and facilitators to implementing a HN program?
1a. What is the process to integrate HNs into the system?

Health Navigators

Patient identification with EHR (n=9) → n=8

Patient Outreach (n=8) → n=5

Patient Assessment (n=5) → n=3

Patient Outreach (n=3) → n=2

Patient Education (n=3) → Patient Assessment

Care Coordination (n=6) → n=2

EHR Documentation (n=9)

Other clinic staff involved in this step
HN roles within clinics: Patient Callbacks

Patient identification with EHR

Patient Outreach → Patient Education

Care Coordination → EHR Documentation

Health Navigators: other clinic staff involved in this step
HN roles within clinics: Direct Patient Care

Health Navigators
+: other clinic staff involved in this step

Patient identification with EHR

Patient Outreach → Patient Education

Patient Assessment

Care Coordination

EHR Documentation
1a. What is the process to integrate HNs into the system?

- Patient Identification with EHR (n=9)
- EHR Documentation (n=1)
- Patient Outreach (n=8)
- Patient Education (n=3)
- Patient Assessment (n=5)
- Care Coordination (n=2)
- EHR Documentation (n=9)

Health Navigators

+ : other clinic staff involved in this step
1b. What are the barriers and facilitators to implementing a HN program?

Facilitators
- Formal and informal processes to integrate into the system
- Processes for documentation

Barriers
- Leadership or provider turnover
- Disengaged clinic staff
- Program cost

Opportunities for improvement
- Additional training in cultural competency for HNs
- Training in best practices for clinic staff
What did clinics say about working with HNs?

“Providers just started seeing it as like this is a vital part of the visit…I think it was just a little bit for her to be seen as an asset and as someone that should be in the room. ... It's been very effective.”
2. What are the processes to reach patients and clients through the HN model?

2a. How are patients identified and recruited?
2a. How are patients identified and recruited?

All HNs in this evaluation were connected to patients through medical resource referrals.

Clinics and providers used several common patient identification processes:

- Review of patient registries
- Advance review of patient schedules
- Team care approach
- Provider referrals
- Warm handoffs from providers
2a. How are patients identified and recruited?

“A lot of it is warm handoff from providers, when the patients are in office and the provider will tip me off if they need some help. I also go through the provider’s schedule for each day …and I add patients that I see, who may have a chronic illness or whether they are having trouble showing up for appointments or anything that I see might be an issue or something I can assist them with…then I just chat with them while they’re already here for an appointment.”

--Health Navigator
3. What impact did HNs have on care and use of services?

3a. What services and resources did patients and clients utilize?

3b. How does the HN model impact patient or client satisfaction?
3a. What services and resources did patients and clients utilize?

Services provided:

✓ HNs tended to provide more health risk assessments and provide health education than other services

Resources provided:

✓ Higher % of referrals by HNs to medical resources (compared to evidence-based programs and non-medical resources)
3b. How does the HN model impact patient satisfaction?

**Category**
- Knowledge
- Attitudes

**Example question**
- Did your Patient Health Navigator teach you what you need to know to improve your health?
- Did your Patient Health Navigator motivate you to take better care of yourself?

**Results**
- Knowledge:
  - 97% of patients reported that HN increased their knowledge about their condition or treatment (range 91%-100%)
- Attitudes:
  - 98% reported that their attitude of their health or treatment had improved as a result of the HN (range 94%-100%)
3b. How does the HN model impact patient satisfaction?

**Behaviors**

- **Example question:** Did your Patient Health Navigator help you meet your goals?

  - **Results:** 97% of patients expressed that they had adopted healthy behaviors due to the HN (range 94%-100%)

**Satisfaction**

- **Example question:** Overall, how satisfied are you with the services provided by your Patient Health Navigator?

  - **Results:** 91% of patients reported satisfaction with their HN (range 74%-100%)
Key takeaways

- HNs provide a variety of services and referrals
  - Opportunity to increase referral to evidence-based programs and non-medical resources

- Overall patients and clients are satisfied with HNs

- Leadership support is critical to the success of integrating HNs into the workflow
Background: 21st Century Innovations

Patients MMs

Tier 4
- Adult: 73%
- Peds: 27%
- 10,087

Tier 3
- Adult: 80%
- Peds: 20%
- 31,372

Tier 2
- Adult: 82%
- Peds: 18%
- 397,453

Tier 1
- Adult: 27%
- Peds: 73%
- 640,933

Baseline PMPMs

- Patient MM: $6,919
  - Adults: $7,801
  - Peds: $4,552

- Patient PMPM:
  - Adults: $3,035
  - Peds: $1,410

Staffing Model

- Multidisciplinary High Risk Health Teams and Clinics
  - PN, RN CC, PharmD, BHC, SW, HIT

- Comprehensive Care Management
  - PN, BHC, SW, HIT

- Care Management for Chronic Disease
  - HIT

- Population/Panel Management

Enhanced Clinical & HIT Services

- High Intensity Treatment Clinics, Intensive Services

Notes: Baseline period is July 2010 through June 2011. This initial "proof of concept" tiering algorithm was implemented by Milliman using CDPS predictive modeling tool thresholds to define tiers. Tier sizes were pre-determined according to estimated resource capacity. The attributed managed care population was identified through membership files, whereas the fee-for-service population was selected at a single point in time at the beginning of the time period and fixed for the duration. All attributed individuals were tiered. MM: Member months, PMPM: Per member per month, PN: Patient Navigator, RN CC: Nurse Care Coordinators, PharmD: Clinical Pharmacist, BHC: Behavioral Health Consultant, SW: Social Worker, HIT: Health Information Technology.


DHHA Proprietary and Confidential
1/11 children, 1/12 adults
- Disparities exist – e.g. AA 2 to 3 times more likely to die from asthma vs other race/ethnicities

- 439,000 asthma-related hospitalizations (2010); 1.8 million ED visits, 14.2 clinic visits
- 3,447 deaths (2007)
- $53 billion (2002), $56 billion (2007); Medicaid $10 billion/yr; $6600/stay
- Male hosp stays 54% > vs Female – children
  - Adults: Females 129% > vs Males
The Denver Health Asthma Management Program

Denver Health Asthma Line
"One phone line for all your Asthma needs"
"Una línea Telefónica para sus necesidades de Asma"

Phone: 303-739-1313
Pharmacy Refill Line: 866-347-3345
www.denverhealth.org

Denver, Colorado 80204
“Benefits from home-based, multi-trigger, multi-component interventions with and environmental focus can match or even exceed their program costs.” Nurmagambetov TA et al. AM J Prev Med 2011; 41(2S1):S33-S47.

“A RCT using CHWs to decrease exposure to IA asthma triggers, days with sx, UC sx, and missed school days resulted in the intervention group having an increase in sx-free days, improved QOL, and a greater decrease in visits to the healthcare system”…$707 invested with savings $1340.92 or ROI $1.90. Campbell JD, et al. Am J Publ Hlth 2015 Aug 13: e1 – e7A.

“A RCT crossover study to examine whether a home-based educational and environmental intervention delivered by lay health educators would improve asthma sx control in inner-city children with asthma”…30% dec ED, 53% dec hospital, improved IAQ issues in home…$450 to $500 (incl research professionals’ time) cost per family authors think less in non-research setting. Bryant-Stephens T, et al. Am J Publ Hlth 2009; 99 (suppl 3): S657 – S65.

“A model where nurses referred asthma patients who were not improving despite appropriate medical management to additional education services”…nurse case management to escalate coordination…bi lingual/cultural nurse supervised CHWs conducting home visits for asthma education, environmental assessment, environmental remediation materials (bedding covers, HEPA vac, extermination services)…12 mo outcome 68% dec ED, 84.8% dec hosp, 42.6% dec days with limitation, 41% dec missed school, 49.7% dec parent missed work…ROI $1.46. Woods ER, et al. Pediatrics 2012:129(3): 465-72.
Standard Work

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**Identify Patients**
- Daily review:
  - Referral Lists
  - Pediatric Asthma Admissions
  - Pediatric ED discharges for asthma
  - Determine eligibility

**Initial Outreach**
- Face to face (in-hospital) or by phone
- Description of program
- Permission granted by families
- Scheduling of visit
- Documentation if family declines

**Home Visit**
- Medical records reviewed and time confirmed prior to visit
- Environmental assessment of the home (Healthy Homes)
- Child asthma check
  - ACT scores
  - Medication review
  - Education
  - Teach back time

**After Visit/ Follow Up**
- Outreach encounter documented in EPIC
- Care management issues (scheduling visits, refill medications etc)
- Follow up phone call 4 weeks after home visit
## Results

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<td>57</td>
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<tr>
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* One pt. with symptoms identified at 4-wk f/u call.

** Numbers do not add up to total due to changes in protocols and inability to track all concerns.
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- Visits Completed
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  - Don’t have correct meds at home
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- Technique concerns
- Environmental concerns in the home
  - These can vary from minor to major

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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Families Contacted to Schedule Visits that Were Completed**</th>
<th>94</th>
<th>108</th>
<th>118</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home visit completed or home visit scheduled</td>
<td>53</td>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>Outreach started/pending contact</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Visit started/not completed (safety)</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Visit accepted, but not done (unable to confirm/not at home/cancelled, lost contact)</td>
<td>5</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Contact made; declined visit</td>
<td>13</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Contact made, then lost; no contact made</td>
<td>23</td>
<td>27</td>
<td>33</td>
</tr>
</tbody>
</table>

* One pt. with symptoms identified at 4-wk f/u call.
<table>
<thead>
<tr>
<th>Visits Completed</th>
<th>YEAR 3</th>
<th>Year 2</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child having symptoms while at the visit</td>
<td>8</td>
<td>5*</td>
<td>10</td>
</tr>
<tr>
<td>Medication issues</td>
<td>30</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>- Don't have correct meds at home</td>
<td>30</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>- Do not understand how/when to use</td>
<td>30</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>Technique concerns</td>
<td>38</td>
<td>34</td>
<td>28</td>
</tr>
<tr>
<td>Environmental concerns in the home</td>
<td>41</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>- These can vary from minor to major</td>
<td></td>
<td></td>
<td></td>
</tr>
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* One pt. with symptoms identified at 4-wk f/u call.
Determine the per-person cost avoidance of the asthma home visit program

Compare to a matched group of asthma patients not involved in the intervention

Pre/Post analysis of average annual rates of utilization: hospitalizations, ED visits, provider visits for both the intervention and comparison groups
**Intervention:** Kids with persistent asthma who were outreached to by PNs from 7/1/15 – 12/15/16 [N = 115]

**Comparison:** Kids hospitalized with persistent asthma from 7/1/12 – 6/30/13 [N = 539]
## Asthma Home Visit program vs control group

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in Years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 4</td>
<td>20 (17.9%)</td>
<td>99 (18.4%)</td>
</tr>
<tr>
<td>5 to 8</td>
<td>43 (37.4%)</td>
<td>163 (30.2%)</td>
</tr>
<tr>
<td>9 to 12</td>
<td>30 (26.1%)</td>
<td>138 (25.6%)</td>
</tr>
<tr>
<td>13 to 17</td>
<td>22 (19.1%)</td>
<td>139 (25.8%)</td>
</tr>
<tr>
<td><strong>P=0.35</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45 (39.1%)</td>
<td>219 (40.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>70 (60.9%)</td>
<td>320 (59.4%)</td>
</tr>
<tr>
<td><strong>P=0.77</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>29 (22.2%)</td>
<td>86 (16.0%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>65 (56.5%)</td>
<td>404 (75.0%)</td>
</tr>
<tr>
<td>White</td>
<td>9 (7.8%)</td>
<td>37 (6.9%)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (10.4%)</td>
<td>12 (2.2%)</td>
</tr>
<tr>
<td><strong>P&lt;0.0001</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>103 (89.6%)</td>
<td>474 (87.9%)</td>
</tr>
<tr>
<td>non-Medicaid</td>
<td>12 (10.4%)</td>
<td>65 (12.1%)</td>
</tr>
<tr>
<td><strong>P=0.62</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing comparison between intervention and control groups across various categories]
## Utilization Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Intervention (N= 115)</th>
<th>Comparison (N=539)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Mean Number of Hospitalizations</td>
<td>0.78</td>
<td>0.39</td>
</tr>
<tr>
<td>Mean Number of ED Visits</td>
<td>1.23</td>
<td>0.81</td>
</tr>
<tr>
<td>Mean Number of Provider Visits</td>
<td>5.67</td>
<td>3.37</td>
</tr>
</tbody>
</table>

### Graphs

- **Mean # of Hospitalizations**
- **Mean # of ED Visits**
- **Mean # of Provider Visits**
## Cost Inputs

<table>
<thead>
<tr>
<th>Cost Inputs*</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalizations</td>
<td>$8,976.00</td>
</tr>
<tr>
<td>ED Visits</td>
<td>$368.00</td>
</tr>
<tr>
<td>Provider Visits</td>
<td>$169.00</td>
</tr>
</tbody>
</table>

* PharMetrics mean cost for Medicaid patients age 3-17 (all costs inflated to 2016 USD)

## DH Costs**

<table>
<thead>
<tr>
<th>DH Costs**</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Costs</td>
<td>$161,888</td>
</tr>
</tbody>
</table>

**CCPD grant funding, including indirects, wages, and benefits awarded to DH for the 0.5 FTE RN and 1.0 FTE PN
## Return on Investment

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Costs</th>
<th>Avoided Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalizations</td>
<td>$0</td>
<td>$2,097</td>
</tr>
<tr>
<td>ED Visits</td>
<td>$14</td>
<td>$0</td>
</tr>
<tr>
<td>Provider Visits</td>
<td>$0</td>
<td>$394</td>
</tr>
<tr>
<td>Intervention Costs</td>
<td>$1,408</td>
<td>$0</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$1,422</td>
<td>$2,491</td>
</tr>
<tr>
<td>Net Cost avoidance</td>
<td></td>
<td>$1,069</td>
</tr>
</tbody>
</table>

One year per person costs and savings
Interpretation/break-even analysis

- For every $1.00 invested in the asthma home visit program, there was a “return” of $1.75.
- Largest driver of cost avoidance was from the reduction in hospitalizations.
- A break-even analysis showed that the intervention group would need to be associated with at least a 0.11 reduction in the annual hospitalization rate.
Asthma Home visits – solidifying the findings

Hospital Utilization

Utilization

Kids with persistent asthma 2011/2012

Utilization

Kids with persistent asthma 2016/2017

Asthma Home Visit

Observation Period

Continued ‘level’ utilization

$1.75 ($1)

Decreased utilization

$1.00 (57¢)
Limitations

- Targets asthma patients with hospitalization(s) due to asthma
  - Hospitalizations we ‘know’ about
- Pharmacy costs not included
- Only one year of pre- and post-utilization data was analyzed
- In a difference-in-difference analysis, pre-intervention parallel trends are assumed
  - If the trends are different prior to the intervention, a difference-in-difference analysis would be biased
Conclusion

• Positive Return on Investment
  • Efficient use of resources
• Likely mechanism
• Satisfaction
Project Team

- KP PiER Center and the PiER Center Project Manager, Jennifer Barrow
- Vantage Evaluation – Key Informant Interviews
- DH CCPD Team:
  - PI, Ray Estacio
  - Evaluator, Rachel Everhart
  - Analyst, Kristin Breslin
  - Asthma RN, Mischelle Janke
  - Asthma Navigators, Raquel Figueroa & Tereza Guedes
- Health Economist, Melanie Whittington (CU)
- Colorado Cancer, Cardiovascular, and Pulmonary Disease (CCPD) program
Disclaimer: This material was supported by the American Academy of Pediatrics (AAP) and funded (in part) by the cooperative agreement FAIN: U61TS000237 along with the American College of Medical Toxicology and funded (in part) by the cooperative agreement FAIN: U61TS000238 from the Agency for Toxic Substances and Disease Registry (ATSDR).

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CE Available

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Topics included:
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