An Enhanced Medical Home for High-Risk Chronically Ill Children: Reducing Costs While Improving Outcomes

Ricardo Mosquera, MD, Pediatric Pulmonologist
Cheryl Samuels, PNP, Pediatric Nurse Practitioner
Elenir Avritscher, MD, PhD, Healthcare Economist
Jon Tyson, MD, MPH, Neonatologist & Epidemiologist

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Topics

• Urgent need to develop new & better approaches to care for high-risk chronically ill children

• Benefits and cost-effectiveness of our program as demonstrated in our clinical trial

• Continued success with program expansion

• Critical factors for success for our program or similar programs to be established elsewhere

• Need for long-term financial sustainability
Disproportionate Costs of the Target Population of Medically Complex Children

% of High-Risk Children with Complex Medical Conditions: 0.4%

% of Pediatric Medical Expenditures: 40%

Kuo et al., Arch Pediatr Adolesc Med., 2011; Simon et al., Pediatrics., 2010
Family Burden Among High-Risk Chronically Ill Children

Lack of Evidence Base for a Conventional Medical Home

Although widely touted, systematic reviews of the medical literature have not shown medical homes to improve clinical outcomes or reduce medical costs in any population of low-risk or high-risk adults or children beyond infancy. Jackson et al., Ann Int Med, 2013; Homer et al., Pediatrics, 2008

However, one trial of comprehensive care in an enhanced medical home for VLBW infants showed decreased life threatening illness, pediatric ICU days, and costs. Broyles, et al., JAMA, 2000

Though often claimed, very few therapies or medical programs have been shown to improve outcomes and reduce costs in RCTs.
• ED visits, hospital admissions & days, pediatric ICU admissions & days all reduced by **47-69%**.

• Health system’s costs reduced by **$10,258/child-year**.

• Findings independently verified by NORC.
Study Objective

To assess whether an enhanced medical home providing comprehensive care (CC) to assure prompt effective care at all hours is highly cost-effective\(^a\) in preventing serious illness\(^b\) among high-risk chronically ill children compared to usual care (UC)

\(^a\) Improved outcomes without increased costs, reduced costs with unchanged outcomes, or both improved costs and outcomes.

\(^b\) Death, pediatric ICU stay, or hospital stay > 7 days.
CC in our Enhanced Medical Home

• To assure prompt effective care at any hour, pediatricians and PNPs who know patients well are available in person 40 h/wk & by phone 24/7

• Acute (same day) and chronic care in same clinic.

• Medical Director a Pediatric Pulmonologist.

• Pediatric subspecialists in clinic >once/mo and readily available by phone: Neurology, Surgery, Gastroenterology).

A model of care likely to be feasible only in major medical centers, particularly medical schools.
• Low provider to patient ratio (1:50-75) as needed for staff taking frequent or continuous call.

• Coordination of care by PNPs (not case managers)

• Social work and dietician

• Daily identification of children with ED visits and hospital admissions with prompt follow-up visits.

• Weekly scrutiny of prior and ongoing care of all patients with ED visits and hospitalizations to identify more effective ways to prevent these.
## Population

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion criteria</th>
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<tbody>
<tr>
<td>• &lt; 18 years age</td>
<td>• Comprehensive care already given by specialists</td>
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<tr>
<td>• Chronic illness</td>
<td>• Unrepaired complex heart disease</td>
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<tr>
<td>• High medical services (≥2 hospitalizations, or ≥1 PICU admission) in prior year</td>
<td>• DNR Status</td>
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<tr>
<td>• &gt;50% estimated risk of hospitalization in next yr (as judged by the clinic’s medical director to exclude children whose problems have largely resolved)</td>
<td>• Unwilling to leave current PCP</td>
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<tr>
<td></td>
<td>Comprehensive Care (N=105)</td>
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<tr>
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<tr>
<td><strong>Age – yrs, Mean (SD)</strong></td>
<td>4.6 (4.1)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>62%</td>
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<tr>
<td><strong>Medicaid</strong></td>
<td>92%</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
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<tr>
<td>Caucasian</td>
<td>10%</td>
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<tr>
<td>African-American</td>
<td>43%</td>
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<tr>
<td>Hispanic</td>
<td>48%</td>
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<tr>
<td><strong>Disorder</strong></td>
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<tr>
<td>Respiratory</td>
<td>81%</td>
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<tr>
<td>Neurologic</td>
<td>38%</td>
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<tr>
<td>Gastrointestinal</td>
<td>34%</td>
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<tr>
<td>Congenital</td>
<td>36%</td>
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<tr>
<td>Disorders of other organs</td>
<td>25%</td>
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<tr>
<td><strong>Treatment</strong></td>
<td></td>
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<tr>
<td>Mechanical ventilation</td>
<td>11%</td>
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<tr>
<td>Gastrostomy tube</td>
<td>31%</td>
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</table>
Trial stopped early by Data Safety Monitoring Committee for >95% probability that CC reduced both serious illness & health system costs.
Total ER Visits and Hospital Care per 100 Child-Years

<table>
<thead>
<tr>
<th>Metric</th>
<th>Comprehensive Care</th>
<th>Usual Care</th>
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</thead>
<tbody>
<tr>
<td>Total ER visits</td>
<td>90</td>
<td>190</td>
</tr>
<tr>
<td>Total Hospital admissions</td>
<td>69</td>
<td>131</td>
</tr>
<tr>
<td>Total hospital days</td>
<td>276</td>
<td>634</td>
</tr>
</tbody>
</table>

** p < 0.005
Total Serious Illnesses and PICU Care per 100 Child-Years

- **Comprehensive Care**
  - Total Serious Illness: 16
  - Total PICU admissions: 9
  - Total days in PICU: 28

- **Usual Care**
  - Total Serious Illness: 44
  - Total PICU admissions: 26
  - Total days in PICU: 103

*p<0.03
**p<0.01
Total Children with an Adverse Outcome per 100 Child-Years

- Deaths: 2 Comprehensive Care, 3 Usual Care
- Children with Serious Illness: 10 Comprehensive Care, 22 Usual Care
- Children with PICU admission: 8 Comprehensive Care, 15 Usual Care
- Children with a >7 day hospital stay: 7 Comprehensive Care, 16 Usual Care

* p=0.03
** p<0.01
Parental Ratings of Care (CAHPS)

- **Child always got appointment as soon as needed**: Comprehensive Care 94%, Usual Care 49%
- **Clinician always listened carefully**: Comprehensive Care 98%, Usual Care 73%
- **Clinician always knew important info about child’s medical history**: Comprehensive Care 94%, Usual Care 69%
- **Clinician always spent enough time with child**: Comprehensive Care 93%, Usual Care 67%
- **Clinician rating of 9 or 10**: Comprehensive Care 93%, Usual Care 59%

**p<0.01**
Estimated Clinic and Hospital Costs from Health System Perspective

Estimated savings with CC was $10,258 lower per patient-yr

** p=0.01
• Medicaid payments which reimburse part of total health system costs were reduced by $6,243 per child-year.

• Medical school losses (costs minus revenues) were $6,018 per child-year.
Continued Success in Improving Outcomes and Reducing Costs

• After the trial ended, prior UC patients and any newly identified high-risk children invited to join program.

• To date, patient panel has tripled, and staff expanded.

• Analyses continue. To date, program benefits and cost-effectiveness have been maintained if not improved as verified by NORC.
Critical Factors for Large Clinical Benefits and Cost Savings

1. Very high-risk, high-cost population who account for almost half of pediatric costs.

2. Low patient-provider ratio as needed for frequent or continuous call, detailed knowledge of each patient, 24/7 patient access, same-day care, and clinic visits lasting an average of \( \geq 45 \) minutes.
3. Highly experienced, multicultural, and bilingual pediatricians and PNPs who provide and coordinate care. No case managers.

4. Primary and subspecialty care in the same clinic.

5. Intensive weekly scrutiny of care to identify better ways to prevent unnecessary ED visits and hospitalizations.
Further Program Enhancements

• Ongoing trials to improve outcomes of patients with asthma.

• Initiation of patient consultation program to assist hospitalist care.

• Proposal for telemedicine program to assist physicians for patients living too far away to receive primary care in our clinic.
Long-Term Sustainability

• Currently supported by Network Access Improvement Program (NAIP) until Aug. 2017 in collaboration with Amerigroup, Community Health Choice, and United Healthcare.

• Long-term funding quite uncertain – a huge concern.

• Few--if any--institutions will implement or sustain such a demanding program without assurance of adequate long-term funding, particularly if it entails possibility of large losses ($6,243/child yr to Medical School during trial).
• A requirement to annually negotiate reimbursements annually with each Medicaid HMO would very likely fail and preclude programs like ours.

• However, our trial results indicate that this program would likely be sustained without increasing Medicaid expenditures simply by providing the Medicaid savings as capitation directly to program.
Trial Conclusions

• Our findings indicate that enhanced medical home providing CC to high-risk chronically ill children achieved the triple aim of improved care, improved outcomes, and lower costs.

• Such results likely only in large, well staffed centers with subspecialists & primary care givers who are available at all hours and give priority to preventing avoidable ED visits and hospitalizations.

• Adequate reimbursement mechanisms are required to sustain such care and promote the dissemination to such centers.