

**We Can Hear You**

**Now...**Improvement in outcomes by regular patient asthma tracking

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**Objectives**

- ▶ Describe components of an asthma home management plan of care
- ▶ Define association between weekly monitoring of child asthma symptoms and asthma control
- ▶ Create strategies to incorporate self-management of childhood asthma into a clinical practice

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Disclosure:  
 I have licensed software to "Symptom.ly",  
 a start-up company marketing and deploying  
 e-Asthma Tracker

My research group provides results  
 I have received no financial compensation

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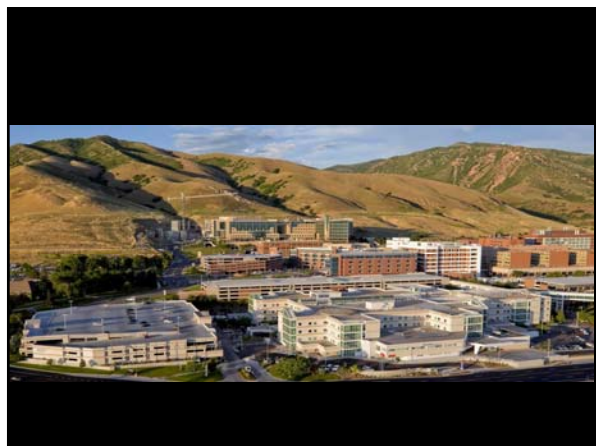
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### Pediatric Asthma: Epidemiology

- Most common pediatric chronic illness (prevalence: 13.8%)
- 7.1 million children < 18 years of age had asthma (2009)
- High health care use and costs (\$20.7 billion/year in total costs)
  - 640,000 ED and 456,000 hospital visits in children < 18 (2007)
  - Readmission rates: 10-30% at 6 months to 20-50% at 12 months
- Suboptimal chronic asthma control in the ambulatory setting

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### National Asthma Education and Prevention Program Expert Panel Report 3 (2007): Guidelines for the Diagnosis and Management of Asthma

- Establish Diagnosis
- Manage Components of Care
  - a) Assessment and Monitoring
  - b) Education
  - c) Control Environmental Factors and Comorbid Conditions
  - d) Medications

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## Global Initiative for Asthma (Recent Update 2014)

- Components of Care
- 1. Develop Patient/Doctor Partnership
- 2. Identify and Reduce Exposure to Risk Factors
- 3. Assess, Treat and Monitor Asthma
- 4. Manage Asthma Exacerbations

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## Working Definition

- Characterized by
- ① Variable and Recurring Symptoms
- ② Airflow Obstruction
- ③ Bronchial Hyper-responsiveness
- ④ Underlying Inflammation

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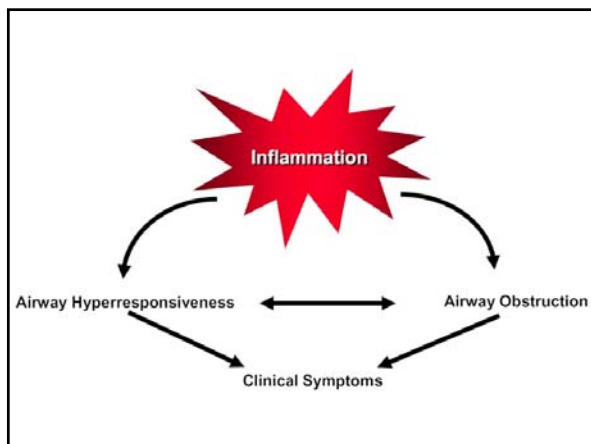
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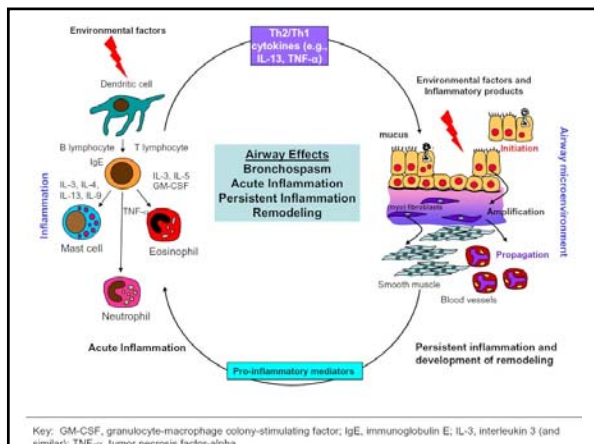
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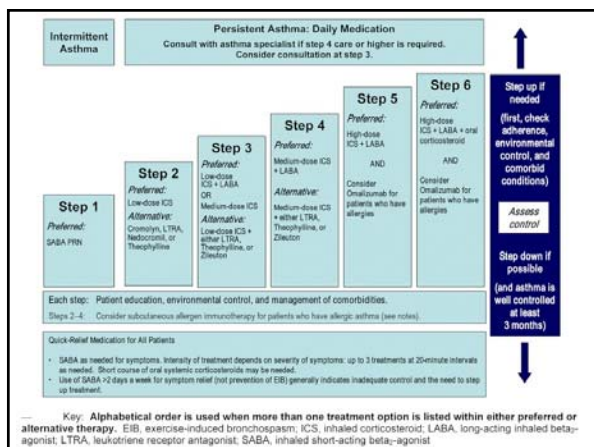
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### Centers for Medicare and Medicaid Services

Introduced three Children's Asthma Control core measures for implementation effective April 1, 2007. Data collection for the measure set began with April 2007 discharges.

Children's Asthma Care Core Measure Set

| Measure ID # | Measure Short Name                                   |
|--------------|--|
| CAC-1        | Use of Relievers for Inpatient Asthma                |
| CAC-2        | Use of Systemic Corticosteroids for Inpatient Asthma |
| CAC-3        | Home Management Plan of Care to Patient/Caregiver    |

CAC-3 was initially implemented as a test measure pending National Quality Forum (NQF) endorsement. CAC-3 was subsequently implemented as a production measure effective with July 1, 2008 discharges.

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Home Management Plan of Care to Patient/Caregiver

Document MUST address **all** of the following

1. Arrangements for follow-up care
2. Environmental control and control of other triggers
3. Method and timing of rescue actions
4. Use of controllers
5. Use of relievers

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Inpatient Asthma Interventions

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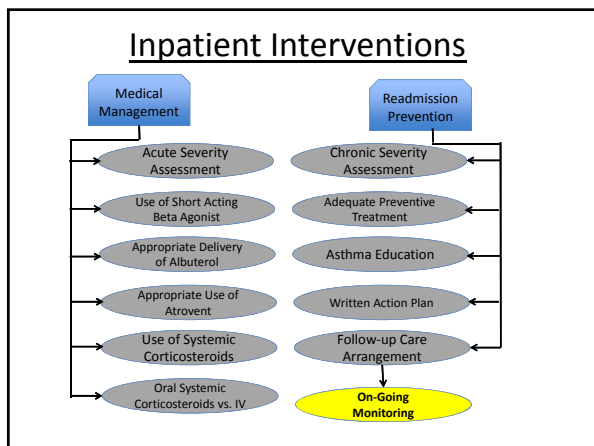
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### Asthma Quality Measures: PCH 2005

\* Nkoy et al. Pediatrics 2008

| Measure   | % compliance |
|---|--------------|
| <b>Inpatient specific care measures</b>                                 |              |
| 1. Documented asthma acute severity assessment at the time of admission | 38%          |
| 2. Use of Quick Relievers   | 98%          |
| 3. Use of systemic corticosteroid for all patients                      | 100%         |
| 4. Use of oral (not IV) systemic corticosteroids                        | 56%          |
| 5. Use of Ipratropium Bromide restricted to < 24 hrs after admission    | 24%          |
| 6. Use of albuterol delivered by MDI (not nebulized)                    | 23%          |
| <b>Re-exacerbation/readmission prevention measures</b>                  |              |
| 7. Documented chronic asthma severity assessment                        | 19%          |
| 8. Parental participation in an asthma education class                  | 39%          |
| 9. Written asthma action plan   | 5%           |
| 10. Scheduled follow-up appointment with the PCP at discharge           | 22%          |

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### Initiatives to Improve Asthma Care at PCH

- ❑ Developed and implemented an inpatient asthma care process model
  - ❑ Standardized Admission order set
  - ❑ Standardized Discharge order set
  - ❑ Standardized clinical care of:
    - ◆ Bronchodilators
    - ◆ Oxygen
- ❑ Developed measurement tools for CMS quality measures
  - ❑ Children's Asthma Care (CAC) Measures

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### PCH Compliance Post-CPM

| Quality Measures for Asthma Inpatient Care                              | 2005 | 2010 |
|---|------|------|
| <b>Inpatient specific care measures</b>                                 |      |      |
| 1. Documented asthma acute severity assessment at the time of admission | 38%  | 96%  |
| 2. Use of Relievers   | 98%  | 100% |
| 3. Use of systemic corticosteroid                                       | 100% | 100% |
| 4. Use of oral (no IV) systemic corticosteroids                         | 56%  | 90%  |
| 5. Use of Ipratropium Bromide restricted to < 24 hrs after admission    | 24%  | 97%  |
| 6. Use of albuterol delivered by MDI (not nebulized)                    | 23%  |      |
| <b>Re-exacerbation/readmission prevention measures</b>                  |      |      |
| 7. Documented chronic asthma severity assessment                        | 19%  | 95%  |
| 8. Parental participation in an asthma education class                  | 39%  | 75%  |
| 9. Written asthma action plan   | 5%   | 95%  |
| 10. Scheduled follow-up appointment with the PCP at discharge           | 22%  | 96%  |

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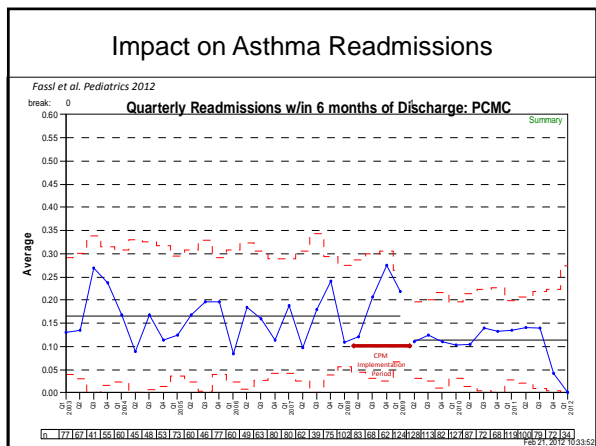
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### Overall Impact

Regression Analysis of Outcomes: Primary Children's Hospital

|                                 | Before Asthma CPM Implementation | After Asthma CPM Implementation |        |                  |
|---------------------------------|----------------------------------|---------------------------------|--------|------------------|
| VARIABLE                        | Mean SD<br>Median IQR            | Mean SD<br>Median IQR           | Beta   | p-value          |
| <b>Readmission (proportion)</b> | 0.17 (0.37)                      | 0.14 (0.34)                     | -0.164 | <b>0.034</b>     |
| <b>LOS (hours)</b>              | 50 (36-78)                       | 45 (33-70)                      | -0.121 | <b>&lt; 0.01</b> |
| <b>Costs (\$)</b>               | 1801 (1322-2560)                 | 1691 (1151-2914)                | -0.026 | 0.165            |

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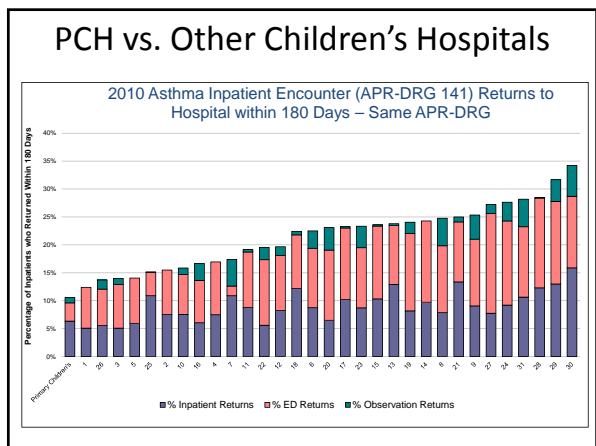
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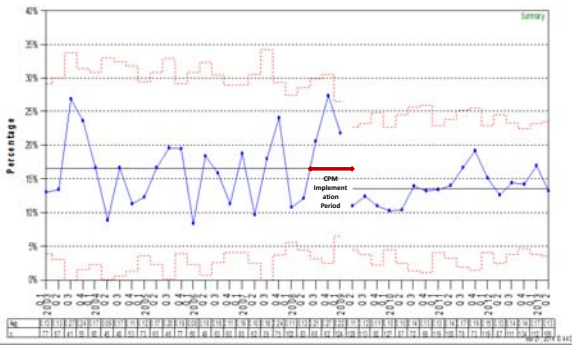
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### Impact on 6-Month Asthma Readmissions



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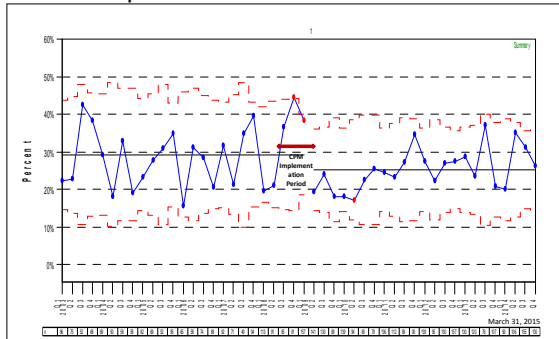
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### Management of Inpatient Asthma Impact on Asthma Readmission



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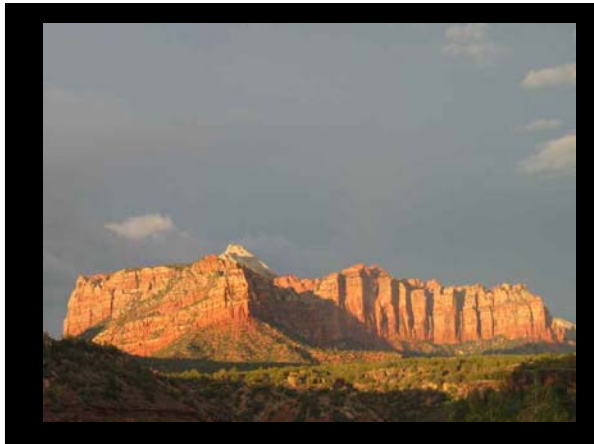
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**Outpatient Interventions  
(Moving to the Ambulatory Setting)**

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**Poor Ambulatory Asthma Control**

- 59% uncontrolled asthma (Chapman, 2008).
- 68% of children and 78% adults not well controlled (Carlton, 2005).
- 75% of uncontrolled asthma (Stempel, 2005).
- 56% poorly controlled asthma (Bloomberg, 2009).
- Inconsistency between patients' perceptions and NIH criteria: 71% vs. 29%. (Murphy, 2012).
- 75% not well controlled asthma (2011 PCH ED admissions).

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**Ongoing Monitoring--Challenges**

- Fragmented healthcare system
- Inherent focus on intermittent, "rescue" care vs. preventive care
- PCP's lack of resources, time and financial incentive
- Lack of tools to monitor children outside clinical encounters
- Busy modern lifestyle
- Existing studies have shown significant limitations in children

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## ONGOING SYMPTOM MONITORING: Rationale

- Ongoing proactive monitoring of patients outside clinical encounters is not common (Focus is on intermittent acute care)
- Chronic asthma symptoms fluctuate over time
- Asthma guidelines stress the importance of ongoing monitoring to reduce risk of exacerbations
- Ongoing monitoring can increase patient's awareness of symptoms and enhance compliance with asthma therapy
- Ongoing monitoring also can help PCPs to reassess and adjust asthma therapy in a timely fashion

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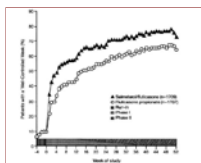
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## GOAL study (Bateman et al. 2007)



- >3000 patients with uncontrolled asthma
- Majority of patients with uncontrolled asthma can achieve control (**Graph**)
- Low rate of exacerbations (5% vs 23%) and maximal health status scores (AQLQ)
- Even patients who did not achieve total control but improved control had fewer exacerbations and better health scores
- 20-30% reduction of overall health care costs

### METHODOLOGY OF ACHIEVING CONTROL:

- Clinic coordinator: weekly calls
- "Dedicated Asthma caretaker"
- 4-8 weekly visits in escalation phase
- 12 weekly visits in Maintenance phase
- Frequent assessments and medication adjustments

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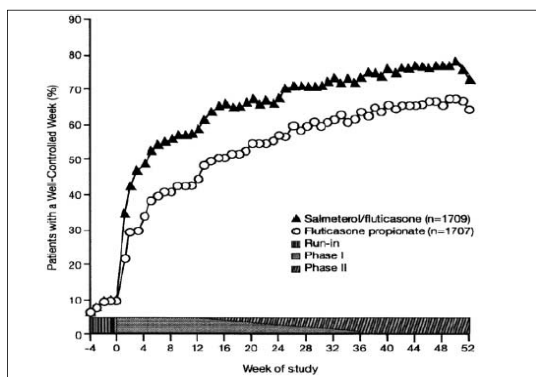
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## GOAL study (Bateman et al.)




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### Asthma Control can be Achieved

- Frequent assessments and ongoing monitoring of asthma symptoms.
- Early detection of signs of asthma control deteriorations.
- Timely action or appropriate treatment (prescriptions/adjustments).
- Frequent assessments + use of controller therapy= cornerstones treatment for persistent asthma.
- Asthma guidelines recommend **ongoing monitoring** and patient **self-management** of asthma symptoms and **partnership with a care provider** to allow appropriate and timely adjustments of therapy.

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### Ongoing Asthma Monitoring: Challenges

- **Parents:**
  - Difficult to recognize warning signs (less able to verbalize complaints).
  - Lack of tools for monitoring and recognizing warning signs.
  - No clear guide about when to seek help.
- **Care providers:**
  - How to monitor patients frequently outside clinical encounters?
  - Lack of time, incentives, tools and resources to monitor patients.
  - Complex guidelines (visit interval, how and when to add/adjust therapy).
- **Ambulatory Asthma care delivery:**
  - Not designed to support patient ongoing monitoring and self-management.
  - Reactive (primarily focusing on managing asthma attacks) vs. preventive care.

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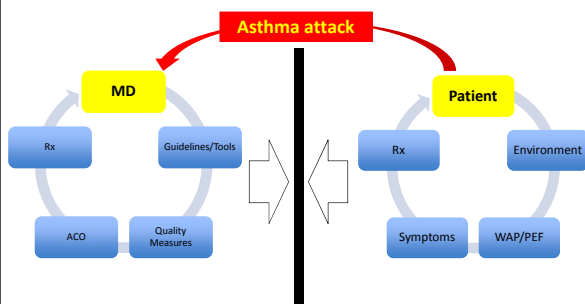
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### Current Ambulatory Asthma Care Model




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## Redesigning Ambulatory Asthma Care

- Establish a monitoring system that addresses the needs for **parents, care providers and healthcare delivery system, by:**
- Engaging **patients/parents** in ongoing **self-monitoring (and self-management)** of their child's asthma symptoms.
- **Enabling patients/parents** to identify and act early on warning signs.
- Creating partnership with **care providers** and providing them with **real-time**, objective data to allow timely medical decision-making.
- Implementing a **new ambulatory care model** that is **continuous and proactive**, focusing on preventing vs. managing asthma attacks.

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## Development of Asthma Tracker

- Involved a multidisciplinary team (physicians, nurses, asthma educator, researchers, QI experts, and graphic designers).
- Involved a national asthma expert.
- Modified an existing asthma questionnaire, added a graphical display section and decision support section.
- Developed (paper version), validate and tested the impact.
- Focus group (parents) & development of the electronic version.

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## Asthma Control Test (ACT)

**Asthma Control Test™**

This survey was designed to help you describe your asthma and how your asthma affects how you feel and what you are able to do. To complete it, please mark an  in the one box that best describes your answer.

- In the **past 4 weeks**, how much of the time did your asthma keep you from getting as much done at work, school or at home?
 

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| All of the time          | Most of the time         | Some of the time         | A little of the time     | None of the time         |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- During the **past 4 weeks**, how often have you had shortness of breath?
 

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| More than once a day     | Once a day               | Several times a week     | Once or twice a week     | Not at all               |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- During the **past 4 weeks**, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?
 

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 4 or more nights a week  | 2 to 3 nights a week     | Once a week              | Once or twice a week     | Not at all               |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- During the **past 4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as Albuterol, Ventolin®, Proventil®, Maxair® or Prospan® Mibe®)?
 

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 3 or more times a day    | 1 or 2 times a day       | 2 or 3 times a week      | Once a week              | Not at all               |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- How would you rate your asthma control during the **past 4 weeks**?
 

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Not Controlled           | Poorly Controlled        | Somewhat Controlled      | Well Controlled          | Completely Controlled    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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### Asthma Tracker (paper version)

**Asthma Tracker**

Every day, follow your Asthma Action Plan. Once a week, use this Asthma Tracker.

**Weekly ACT (Asthma Control Test)**

How well are you controlling your asthma? Answer the 5 questions below and plot your total score on the colored ASTHMA TRACKER chart.

**What to do based on your Weekly ACT Score:**

- Green (20-25):** Great! Keep doing what you're doing.
- Yellow (15-20):** Your asthma is getting worse. Check your inhaler and use it as directed. Call your doctor if you need it more often.
- Red (5-15):** Your asthma is getting worse. Call your doctor right away. You may need to change your Asthma Action Plan.

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### Modified ACT Questionnaire

**Weekly ACT (Asthma Control Test)**

1 Once a week, answer the five questions below and plot your TOTAL score on the colored ASTHMA TRACKER chart.

**During the past week:**

- How much of the time did your asthma keep you from getting as much done at home, school, or work?  
 1) All of the time  2) Most of the time  3) Some of the time  4) A little of the time  5) None of the time
- How often have you had shortness of breath?  
 1) More than once a day  2) Once a day  3) 3 to 5 times  4) Once or twice  5) Not at all
- How often did your asthma symptoms (coughing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?  
 1) 4 or more nights  2) 3 nights  3) 2 nights  4) 1 night  5) Not at all
- How often have you used your quick-relief inhaler or sublingual medication (such as albuterol, Ventolin®, Proventil®, or Maxair®)?  
 1) 3 or more times per day  2) 1 or 2 times per day  3) 2 or 3 times during the week  4) Once this week  5) Not at all
- How would you rate your asthma control?  
 1) Not controlled at all  2) Poorly controlled  3) Somewhat controlled  4) Well controlled  5) Completely controlled

2 To participate in the ASTHMA STUDY, fill out the following lines, fold this postcard on the dotted line, seal it with a sticker, and drop it in the mail.

Date: \_\_\_\_\_ Person filling this out:  Patient  Parent  Other (specify) \_\_\_\_\_

Number of days (0 to 7) of controller medication used this week: \_\_\_\_\_

Number of days (0 to 7) of rescue medication used this week: \_\_\_\_\_

This week, did you use anything besides your prescription medication to ease asthma symptoms?  No  Yes. If yes, please specify: \_\_\_\_\_

Any unscheduled sick visits to the doctor or hospital this week?  No  Yes

**TOTAL**

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### Advantages of Asthma Tracker

- Better understanding of patient’s asthma.
- Better understanding of patient’s needs.
- Better monitoring of response to asthma treatment.
- Allows appropriate and **timely** decision by parents/patients.
- Helps PCPs to make informed and **timely** medical decision (e.g. when to step up/step down asthma medications).
- Allows **personalized** asthma care.

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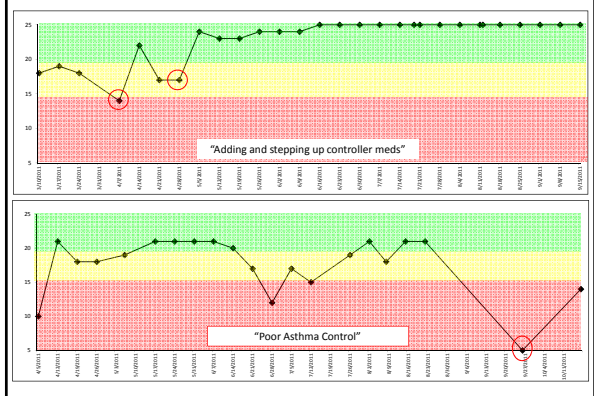
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### Understanding Patient's Asthma and Needs




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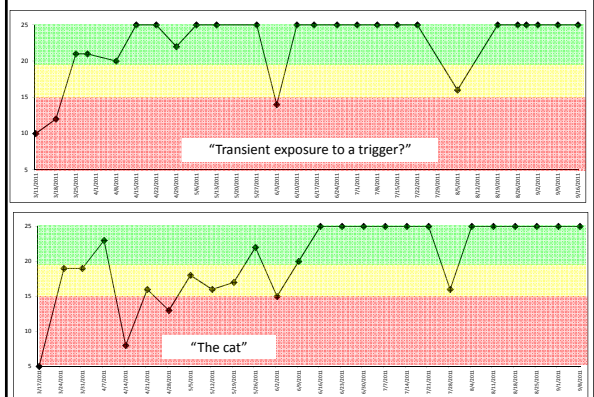
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### Understanding Patient's Asthma and Needs




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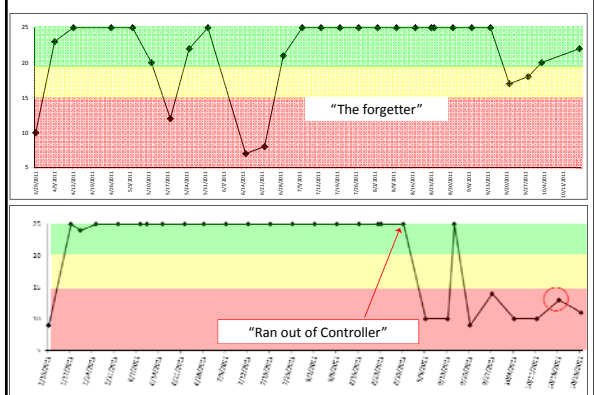
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### Understanding Patient's Asthma and Needs




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### Asthma Tracker (Impact)

- Prospective cohort study of children (2-17 years) admitted at PCH for asthma between February 2011 and May 2012.
- 210 children enrolled vs. 363 children not enrolled.
- Participants completed baseline assessments during hospitalization.
- Weekly assessments completed at home over 6 months.
- Compared time to first asthma readmission: users vs. non-users.
- Compared asthma admissions (6 months prior vs. 6 months while using asthma tracker).

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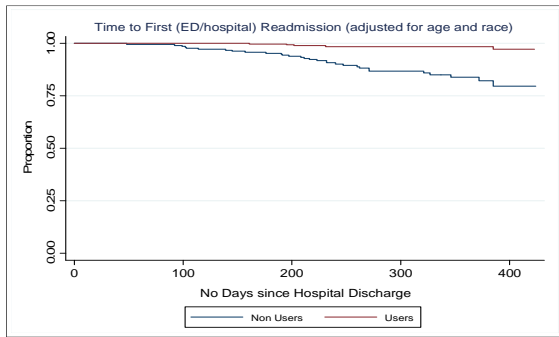
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### Asthma Readmissions: users vs. non users



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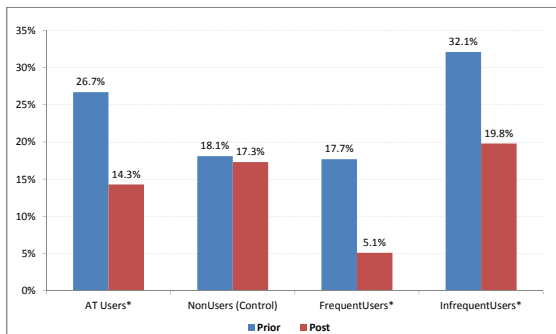
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### Asthma Admissions: Prior vs. post AT use



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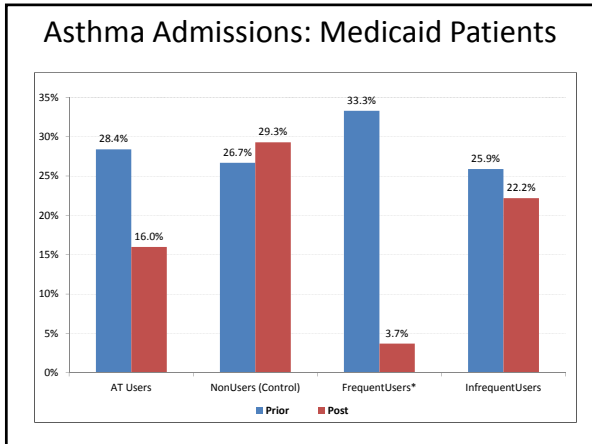
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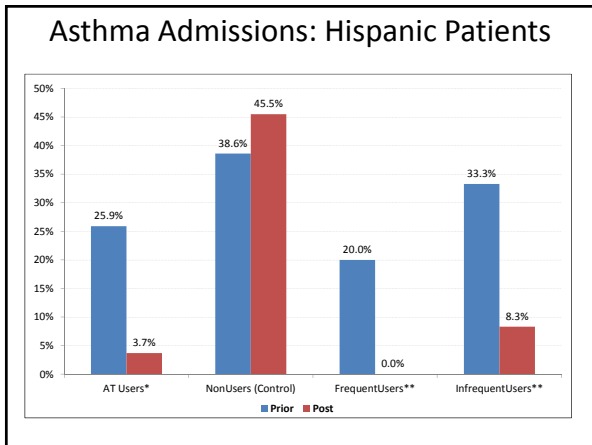
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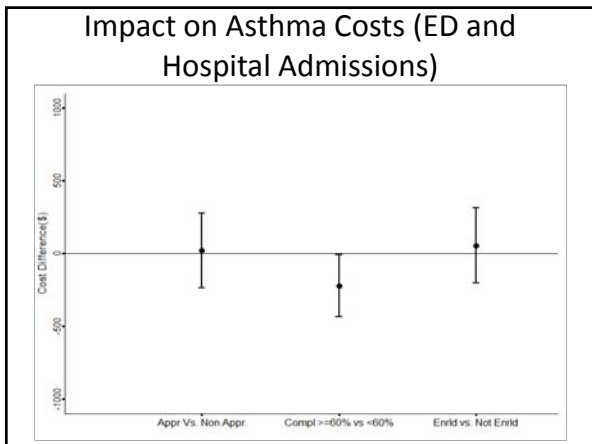
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## Focus Group and Parent Engagement

5 Parents of Children with Asthma

### Strength

- Very useful in helping parents better manage their child's asthma.

### Limitations

- No active prompts to parents (parents had to interpret results themselves).
- Lack incentives for sustained use, particularly if well-controlled.
- No way to quickly obtain care provider review (wanted a link to PCP).

### Other Parent's Questions and Concerns.

### Opportunity for Improvement (Patient/parent preference)

- Suggested an electronic version to automate Asthma Tracker.
- Provided a **wish list** with additional tasks to address their concerns.

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## Parent Questions and Concerns

- Do I have to keep using it when my child's asthma is under control?
- Is the tool effective in helping my child avoid an asthma attack?
- Need to motivate and engage parents/children in sustained use?
- Need reminders and alerts to facilitate use and immediate actions.
- How to involve and actively engage their child's PCPs?
- **Fear of low score** (is a low score a reflection of my parenting skills?).

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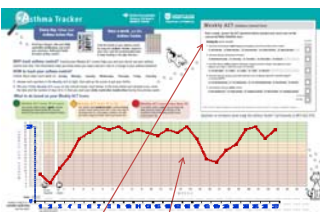
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## Asthma Tracker (AST)

- **Novel** tool to improve asthma control in the ambulatory setting and reduce the risk of future asthma exacerbations
- Weekly ACT asthma assessment plotted on a graph with instructions
- AST targets both the **patients/parents** and their **PCPs**



The AST has 2 main sections:

1. Asthma symptom questionnaire based on ACT → weekly score
2. Color-coded run chart to plot the score and facilitate medical decision-making.
  - Red zone – VERY POORLY CONTROLLED
  - Yellow zone – NOT WELL CONTROLLED
  - Green zone – WELL CONTROLLED

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### e-AT Development & Parent Engagement

- A multidisciplinary team created a list of requirements.
- Included requirements suggested by parents (**wish list**).
- Develop the first prototype of the e-AT.
- Involve **more** Patients/Parents in the e-AT design.
  - First usability test with **2** parents and **6** asthmatic children.
  - Second usability test/focus group with **8** parents of children with asthma.
- Modified and refined the e-AT to include user preferences.

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### Electronic Asthma Tracker or e-AsthmaTracker or e-AT

Patient View  
<http://youtu.be/5F5mc-cvxOI>

Clinic View  
[http://youtu.be/a4KC\\_jODP0g](http://youtu.be/a4KC_jODP0g)

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### e-Asthma Tracker (Features)

- Web based (w/ mobile web version) tool: **Patient & Clinic** views.
- Education about asthma and to address parent concerns, including fear of low scores.
- Real-time decision support for parents with pop-up messages.
- Reminders and real-time alerts for parents.
- Real-time alerts and Decision Support for PCPs (or office).
- Built-in incentives to motivate patients (parents) and PCPs.

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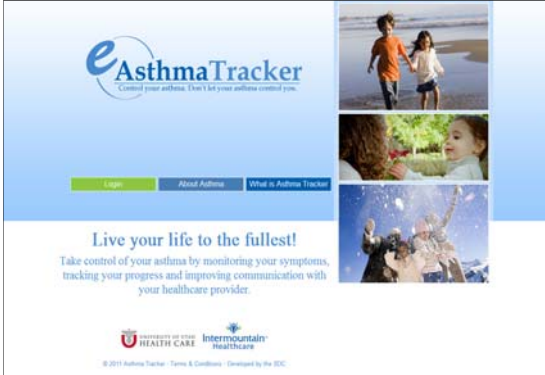
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## e-Asthma Tracker



The landing page features the e-Asthma Tracker logo with the tagline "Control your asthma. Don't let your asthma control you." Below the logo are navigation buttons for "Login", "About Asthma", and "What is Asthma Tracker". A central message reads "Live your life to the fullest! Take control of your asthma by monitoring your symptoms, tracking your progress and improving communication with your healthcare provider." The page includes three small images: a family walking on a beach, a child blowing bubbles, and a person using an inhaler. At the bottom, it lists the University of Utah Health Care and Intermountain Healthcare logos, along with a copyright notice for 2011 Asthma Tracker.

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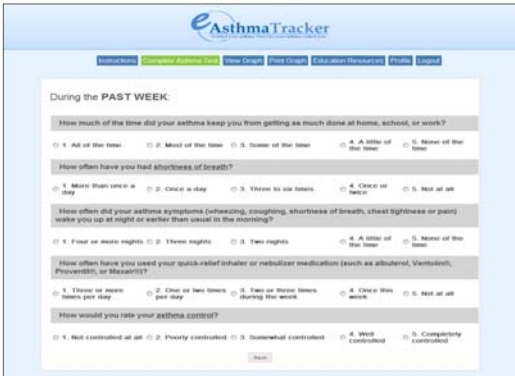
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## Survey Questionnaire



The screenshot shows a survey questionnaire titled "During the PAST WEEK:" with several multiple-choice questions. The questions cover: 1) How much time asthma kept you from getting as much done at home, school, or work? 2) How often you had shortness of breath? 3) How often asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning? 4) How often you used your quick-relief inhaler or nebulizer medication? 5) How well you rate your asthma control? Each question has five radio button options ranging from "All of the time" to "None of the time" or "Not at all".

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## Questions about Treatment



The screenshot shows a form titled "Your asthma score is 20" with a recommendation to complete questions below. The form includes several dropdown menus for: 1) Person filling this out (relationship to patient), 2) Did you use any controller medications this week?, 3) Did your asthma flare up this week causing you to take a steroid liquid or pill by mouth?, 4) This week, did you use anything besides your prescription medication to ease asthma symptoms?, 5) Any unscheduled sick visits to the doctor this week?, 6) Any unscheduled sick visits to the hospital (Intensive Care or Emergency Room) this week?, and 7) Question Submission Date? (For testing only). There is also a text field for "Comments (optional)" and "Previous" / "Next" buttons.

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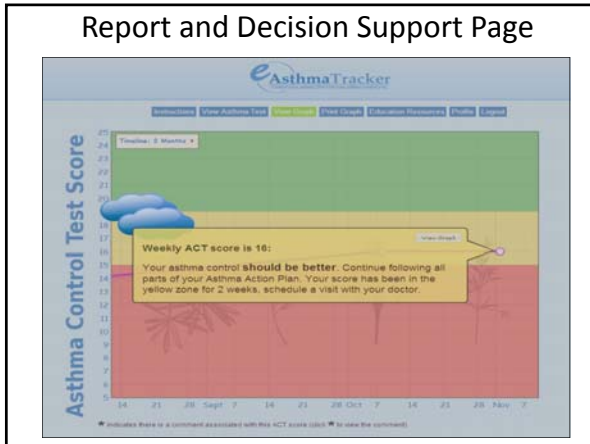
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### Report and Decision Support Page



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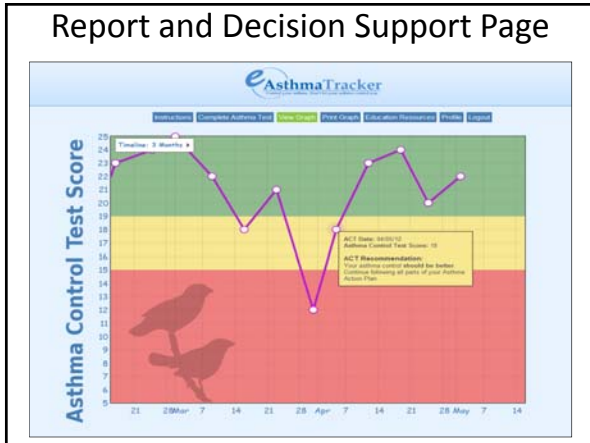
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### Report and Decision Support Page



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### Clinic View (Dashboard)

| Email                   | First Name | Last Name | Last 20 Days | Notes                                 |
|-------------------------|------------|-----------|--------------|---------------------------------------|
| eunhea.kim1@gmail.com   |            |           | 24           | add view.graph edit remove            |
| eunhea.kim1@gmail.com   | Tinker     | Bell      | 24           | add   view.(1) view.graph edit remove |
| eunhea.kim@hsc.utah.edu | John       | Doe       | 24           | add   view.(2) view.graph edit remove |
| eunhea.kim@hsc.utah.edu | Jane       | Doe       | 24           | add view.graph edit remove            |
| eunhea.kim1@gmail.com   | Donald     | Duck      | 19           | add   view.(3) view.graph edit remove |
| eunhea.kim@hsc.utah.edu | Goofy      | Goof      | 19           | add   view.(2) view.graph edit remove |
| eunhea.kim@hsc.utah.edu | Jim        | Jensen    | 24           | add view.graph edit remove            |
| eunhea.kim@hsc.utah.edu | Mickey     | Mouse     | 24           | add view.graph edit remove            |
| eunhea.kim@hsc.utah.edu | Minnie     | Mouse     | 24           | add view.graph edit remove            |
| eunhea.kim@hsc.utah.edu | John       | Smith     | 24           | add view.graph edit remove            |

Partnership with Primary Care Providers

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### Clinic View (Non-Compliant Patients)

**All Non-compliance Patients**

| First Name | Last Name | Contact                        | Last 20 Days (click to view) | Notes           |
|------------|-----------|--------------------------------|------------------------------|-----------------|
| Jim        | Jensen    | Send a Message<br>801-910-8793 | 16                           | add edit remove |
| Fonda      | Ripley    | Send a Message<br>802-651-7408 |                              | add edit remove |
| John       | Smith     | Send a Message<br>801-910-8793 | 3                            | add edit remove |
| Test       | User      | Send a Message<br>801-708-2748 |                              | add edit remove |
| Shane      | Willard   | Send a Message<br>801-296-9000 | 20                           | add edit remove |

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### Clinic View (Patients with Low Score)

**All Poor Control Patients**

| First Name | Last Name  | Contact                        | Last 20 Days (click to view) | Notes                      |
|------------|------------|--------------------------------|------------------------------|----------------------------|
| Jane       | Doe        | Send a Message<br>801-458-4295 | 15                           | add   view (1) edit remove |
| Donald     | Duck       | Send a Message<br>801-458-4295 |                              | add   view (1) edit remove |
| test       | test       | Send a Message<br>801-458-4295 | 8                            | add edit remove            |
| Snow       | White-Test | Send a Message<br>801-458-4295 | 13                           | add   view (3) edit remove |

Alerts

Partnership with Primary Care Providers

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### Mobile Web Version

**Mobile Web Version**

Left Screenshot: Home page with 'eAsthmaTracker' logo, 'About Asthma' button, and 'Live your life to the fullest!' text.

Right Screenshot: Survey question: "5) How would you rate your asthma control?" with options: 1. Not controlled at all, 2. Poorly controlled, 3. Somewhat controlled, 4. Well controlled, 5. Completely controlled.

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## Motivation and Incentives

- Real-time pop-up messages for patients/parents
  - What to do with a specific score.
  - Encouragement.
  - Congratulations.
- Reminders (daily or weekly) with link to the web to improve use.
- Real-time alerts (email and/or text) for parents.
- Real-time alerts (email and/or text) for PCPs.
- Incentives:
  - Gift certificate for patients and parents.
  - Progress bar with Leader Board
  - MOC for PCPs

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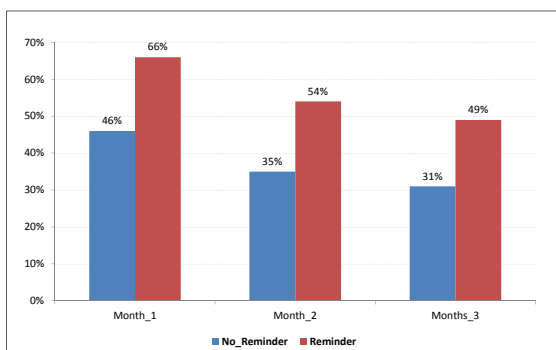
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## Daily reminder vs. No reminder




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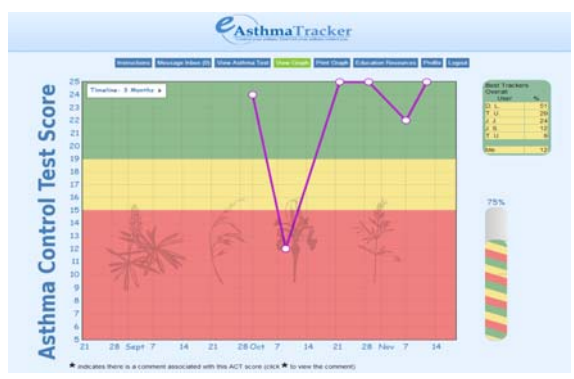
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## Progress Bar/Leader Board




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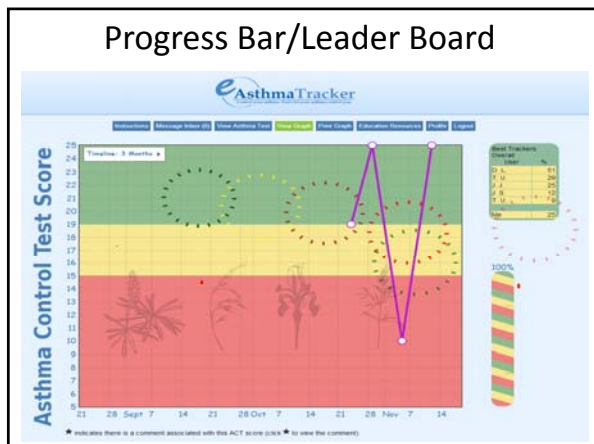
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### Progress Bar/Leader Board




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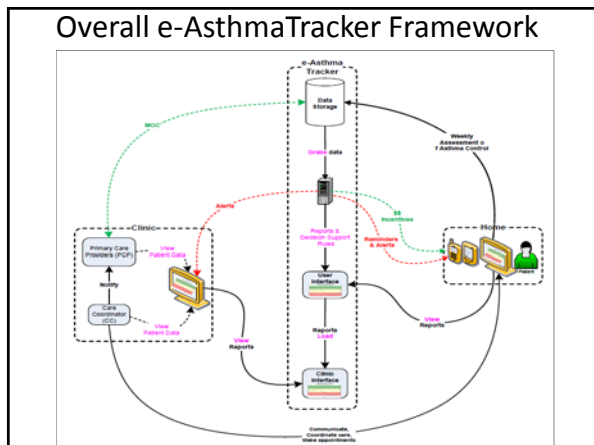
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### Overall e-AsthmaTracker Framework




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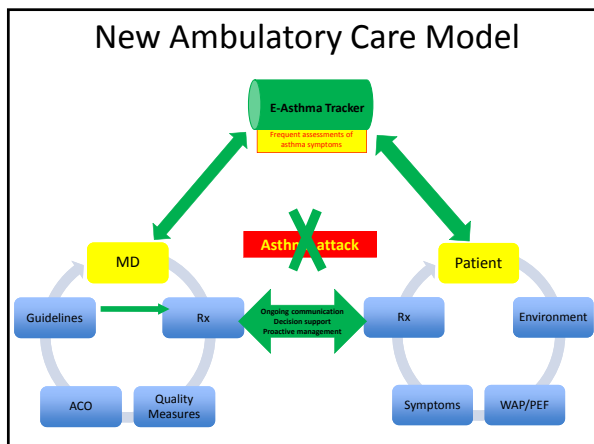
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### New Ambulatory Care Model




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### Dissemination of e-AT to clinics (PCORI)

Implement e-AT at 10 clinics using cluster randomization:

- 1) Assess the effectiveness of the **new ambulatory care model (using e-AT)**, by comparing outcomes to **usual care** for the:
  - a. Child (QOL, asthma control, missed school days).
  - b. Parent (satisfaction, parent missed work days).
  - c. Clinic (ED/hospital visits).
  
- 2) Assess whether the effect on child outcomes varies across parent characteristics. We will assess the effect between:
  - a. High vs. low health literacy.
  - b. Medicaid vs. Private insurance.
  - c. Frequent vs. infrequent users.
  
- 3) Determine (demographic and socio-economic) factors associated with sustained parent participation in their child asthma self-monitoring.

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### Conclusion

- e-AT empowers **parents/patients** (patient-centered) to recognize and act on warning signs.
  
- Enables **PCPs** to make informed decision about asthma therapy.
  
- Allows asthma care that is **personalized** to patient specific patterns of change.
  
- Allows a **new asthma care delivery model that is continuous, proactive** model, focusing on preventing asthma attacks.
  
- This new model of care can be applied to other chronic diseases.

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### Acknowledgments (Team & Stakeholders)

| NAME                         | ROLE   |
|------------------------------|--|
| Flory Nkoy, MD, MS, MPH      | Principal Investigator   |
| Bernhard Fassl, MD           | Co-Investigator (Clinic/physician education)   |
| Bryan Stone, MD, MS          | Co-Investigator (Clinic/physician education)   |
| Vicki Wilkins, MD, MPH       | Co-Investigator/Parent Engagement (Facilitated discussions)  |
| Chris Maloney, MD, PhD       | Co-Investigator  |
| Eun Hea Kim, BA              | Clinical Research Coordinator  |
| Justin Poil, PhD             | Parent Engagement (Surveys and Focus groups)   |
| Karmella Koopmeiners, RN, MS | Asthma Education and Clinic Outreach   |
| 6 Parents                    | Parent Stakeholders  |
| Joe Johnson, MD              | PCP Stakeholder  |
| Paula Haberman, MD           | PCP Stakeholder  |
| Utah Asthma Program          | Utah Department of Health Stakeholder (Kelli Baxter)   |
| Medicaid                     | Insurance Stakeholder (Gail Rapp)  |
| Select Health                | Insurance Stakeholder (Kellie Stevenson )  |
| Chuck Norlin, MD (UPIQ)      | Clinic Outreach  |
| Joe Hales, PhD               |  |
| Advisory Committee           | Brent James, MD, Mstat; Ed Clark, MD; Derek Uchida, MD; Lucy Savitz, PhD; Wayne Cannon, MD; Carolyn Reynolds, RN, MS |

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### Acknowledgments (Funding Support)

Projects about paper-AT and e-AT were supported by 3 research grants:

- 1) **1R18HS018166-01A1** PI: Nkoy Total Costs: \$ 892,000  
**Title:** Organizational Factors Associated with Improved Inpatient Pediatric Asthma Care. Duration: 2010 to 2013  
 Agency: AHRQ
  
- 2) **1R18HS018678-01A1** PI: Nkoy Total Costs: \$1.2 million  
**Title:** Improving Post-Hospital Transitions and Ambulatory Care for Children with Asthma. Duration: 2011 to 2014.  
 Agency: AHRQ
  
- 3) **CD-12-11-5530** PI: Nkoy Total Costs: \$1.9 million  
**Title:** Redesigning Ambulatory Care to Improve asthma control. Duration: 2013 to 2016  
 Agency: PCORI

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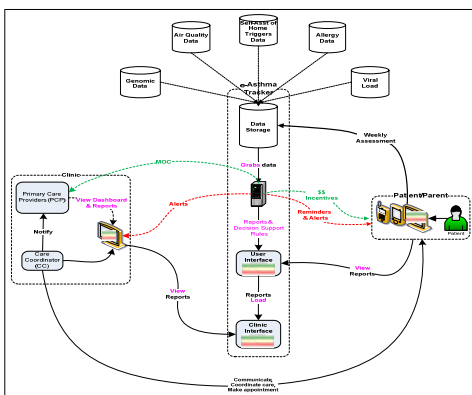
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### Future Plan: Trigger Integration




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Thanks

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