

# An Electronic Asthma Performance Indicator (e-API) Reporting System: Use of Standardized Medical Record Data at the Point of Care

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# Faculty/Presenter Disclosure

- **Presenters:** Ann Taite and Jessica Schooley
- **Relationships with commercial interests / commercial support:**
  - Nothing to Disclose
- **Potential for conflict(s) of interest: none**
- **Relationships with commercial interests:**
  - Nothing to Disclose
- **Mitigating Potential Bias:** Not applicable

# Learning Objectives

1. To learn how we implemented an asthma performance evaluation system that can seamlessly access asthma eTools and produce asthma indicator reports in a provincially certified vendor.
2. To gain an understanding of how quality asthma data can be captured at the point of care, is extractable and can populate an asthma indicator report used for benchmarking and quality improvement.
3. To discover the challenges of integrating a clinical assessment tool for asthma into a primary care EMR.

# The Problem

We identified the need to collect guidelines-based asthma performance outcome data (including quality of life) at the point of care to enable generation of reports supporting best practice and program evaluation.

# A Solution: Leveraging EMRs

- Despite guidelines .... care gaps remain!
- Performance measurement, benchmarking and continuous quality improvement are national health system priorities
  - practical systems which support chronic disease management are not routinely available.
- Electronic medical records (EMRs) are increasingly prevalent
  - novel opportunity to integrate guidelines into practice



# Primary Care Asthma Performance Indicators

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Patient Summary - 123456789

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**Patient Information**

**Global Unique Identifier**  
123456789-123456789-123456789-123456789

**Site Patient Identifier**  
123456789

**Provincial Health Insurance Number**  
123456789

**Date of Birth**  
Jan 01, 1963 (50yrs)

**Gender**  
Female

**Postal Code**

**Province**  
Ontario

**Site**  
KGH- Nurse Practitioner-Asthma Clinic

[Edit Patient](#)

**Study Notification(s)**

**Primary Care Asthma Performance Indicators**

\* No Questionnaires completed.

[Go to PC-API module >>](#)

**Primary Care Asthma Performance Form**

Patient visit date:  Patient Health Card Number: 123456789

Person who filled out this form:  Form filled out for:

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**Asthma Indicators**

1. PFT	a) Patient's asthma diagnosis was confirmed by PFTs (spirometry, peak flow or methacholine challenge test)	<input type="radio"/> Yes <input type="radio"/> No
	b) Patient was monitored with spirometry in last 12 months	<input type="radio"/> Yes <input type="radio"/> No
2. Medication Use	a) Patient is using inhaled corticosteroids (ICS)	<input type="radio"/> Yes <input type="radio"/> No
	b) Self-reported number of ICS prescriptions filled in last 12 months	<input type="text"/>
	c) Self-reported number of short-acting $\beta_2$ -agonist doses (2 puffs) per week in last 4 weeks	<input type="text"/>
	d) Self-reported number of $\beta_2$ -agonist-free days in last 4 weeks	<input type="text"/>
3. Asthma Control	e) Patient has demonstrated their inhaler technique regularly	<input type="radio"/> Yes <input type="radio"/> No
	a) Asthma symptom control was assessed in last 6 months	<input type="radio"/> Yes <input type="radio"/> No
	b) Patient's asthma has been well-controlled in last 4 weeks	<input type="radio"/> Yes <input type="radio"/> No
	c) Self-reported number of symptom-free days in last 4 weeks	<input type="text"/>
4. Exacerbations	d) Self-reported number of days missed from school or work due to asthma in last 12 months	<input type="text"/>
	Patent has had more than one asthma exacerbation in last 12 months	<input type="radio"/> Yes <input type="radio"/> No
5. Health Care Use	a) Number of ED visits for asthma in last 12 months	<input type="text"/>
	b) Number of urgent care visits for asthma in last 12 months	<input type="text"/>
	c) Number of primary care visits for asthma in last 12 months	<input type="text"/>
	d) Patient has a routine health care provider	<input type="radio"/> Yes <input type="radio"/> No
6. Action Plan	Patent has received a written asthma action plan	<input type="radio"/> Yes <input type="radio"/> No
7. Asthma Education	Patent has been referred to see a certified asthma educator	<input type="radio"/> Yes <input type="radio"/> No
8. Smoking Cessation	Patent has received advice to stop smoking	<input type="radio"/> Yes <input type="radio"/> No
	or patient is a non-smoker	<input type="radio"/> Yes
9. Quality of Life	Patent's assessment of their quality of life	<input type="radio"/> Excellent <input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor

For questions related to this form or this study, please contact:

Susan McLmont Research Project Manager Email: <a href="mailto:susan.mclmont@sickkids.ca">susan.mclmont@sickkids.ca</a>	Dr. Teresa To Principal Investigator & Senior Scientist Email: <a href="mailto:teresa.to@sickkids.ca">teresa.to@sickkids.ca</a>
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[Save](#) [Cancel](#)

Primary Care Asthma Performance Indicators (PC-API) Form, authored by Dr. Teresa To,  
© The Hospital for Sick Children, 2009, revised 2011 Version 2 date: 2011-10-28  
Report Generated By AsthmaInfo.com

# Asthma Management and Outcomes Monitoring System

**Provincially-certified vendor**

**Widely used**

**Open source**

**Assessment Indicator Guide**

- Controlled [Green Zone]
- Partially Controlled [Yellow Zone]
- Uncontrolled [Red Zone]
- Partially Complete Assessment [≤48 hours]
- Partially Complete Assessment [>48 hours]
- Late Entry Assessment

**Work Related Asthma**

Please Consider Completing A Work Related Asthma Survey.

**Allergy History**

- [No Allergy History]

# Step 1: Developed an OSCAR eTool

## Asthma Assessment Form for Primary Care

**Asthma Care Map for Primary Care Initial Assessment**

Date:

Patient's Name:

Date of Birth:

Medical record #:

Ethnicity:

**Asthma Diagnosis**

Objectively confirmed asthma → indicate method below:

Date confirmed:

Pulmonary Function Measurement	Children (6 years of age and over)	Adults
<b>PREFERRED: Spirometry showing reversible airway obstruction</b>		
Reduced FEV <sub>1</sub> /FVC	Less than lower limit of normal* (<0.809**)	Less than lower limit of normal* (<0.75-0.8)**
<b>AND</b>		
Increase in FEV <sub>1</sub> after a bronchodilator or after course of Controller therapy	≥ 12%	≥ 12% (and a minimum ≥200ml)
<b>ALTERNATIVE: Peak Expiratory Flow (PEF) variability</b>		
Increase after a bronchodilator or after course of control therapy	≥ 20%	60 L/min (minimum ≥20%)
<b>OR</b>		
Diurnal variation*	Not Recommended	OR
		>8% based upon twice daily readings, >20% based upon multiple daily readings
<b>ALTERNATIVE: Positive Challenge Test</b>		
a) Methacholin Challenge	PC <sub>20</sub> < 4mg/mL (4-16 mg/mL is borderline; >16 mg/mL is negative)	OR
<b>OR</b>		
b) Exercise Challenge		≥10-15% decrease in FEV <sub>1</sub> post-exercise

\*Based on age, sex, height and ethnicity.  
\*\* Approximate lower limits of normal ratios for children and adults.  
This information was originally published in Can Respir J 2012;19(2):127-164.

Asthma diagnosis for children (below 6 years of age)  
Confirmed asthma based on typical symptoms, lack of an alternative diagnosis:  
 and immediate response to bronchodilator confirmed by health care professional;  
 and/or immediate response to bronchodilator by parental history;  
 and/or gradual but clear response to anti-inflammatory therapy.  
This information was originally published in CMAJ 2010 Mar 9;182(4):E172-83.

Suspected (suggestive symptoms but not yet confirmed by spirometry and/or clinical response to therapy)

**History of Exacerbations**

Y N

Prednisone use ever

ED visits ever

Hospitalized ever

Near fatal episode (Coma / intubated / ICU / TCO<sub>2</sub>)

**Work Related Asthma**  N/A

Y N

Ever Worked?

≥ 13 years of age

Confirmed asthma

If YES to all 3, recommend individual complete a Work-related Asthma Screening Questionnaire (WRASQ(L))  
 Complete WRASQ(L) now  
 Complete WRASQ(L) later

**Family History of Asthma / Allergies**

Indicate parents, siblings, close relatives with:

Y N

Asthma

Eczema

Environmental allergies

Food allergies

**Smoking History**

Never smoked

Smoker  Ex-smoker

Age started:  Age quit:

Ask  Advise  Arrange

Pack years:  x  =

Years smoked:

Fagerström Test for Nicotine Dependence  
Score:   
<http://knowledge.gcmh.net/Pages/default.aspx>

Second hand smoke exposure (past or present / significant)  Prenatal smoke exposure

**Respiratory Medication History**  N/A

Number of ICS prescriptions filled in the last 12 months (prescription = a one month supply)

Y N

Is patient using inhaled Corticosteroids?

Beta-blocker → may exacerbate asthma

NSAIDS / ASA (non-steroidal anti-inflammatory) ⇒ potential trigger

Medic Alert bracelet

Epinephrine auto injector

Has drug plan

Place holder for logos and reference to adaptation of the Asthma Care Map with permission from the OLA

**Asthma Care Map for Primary Care Flowsheet**

Patient's Name:

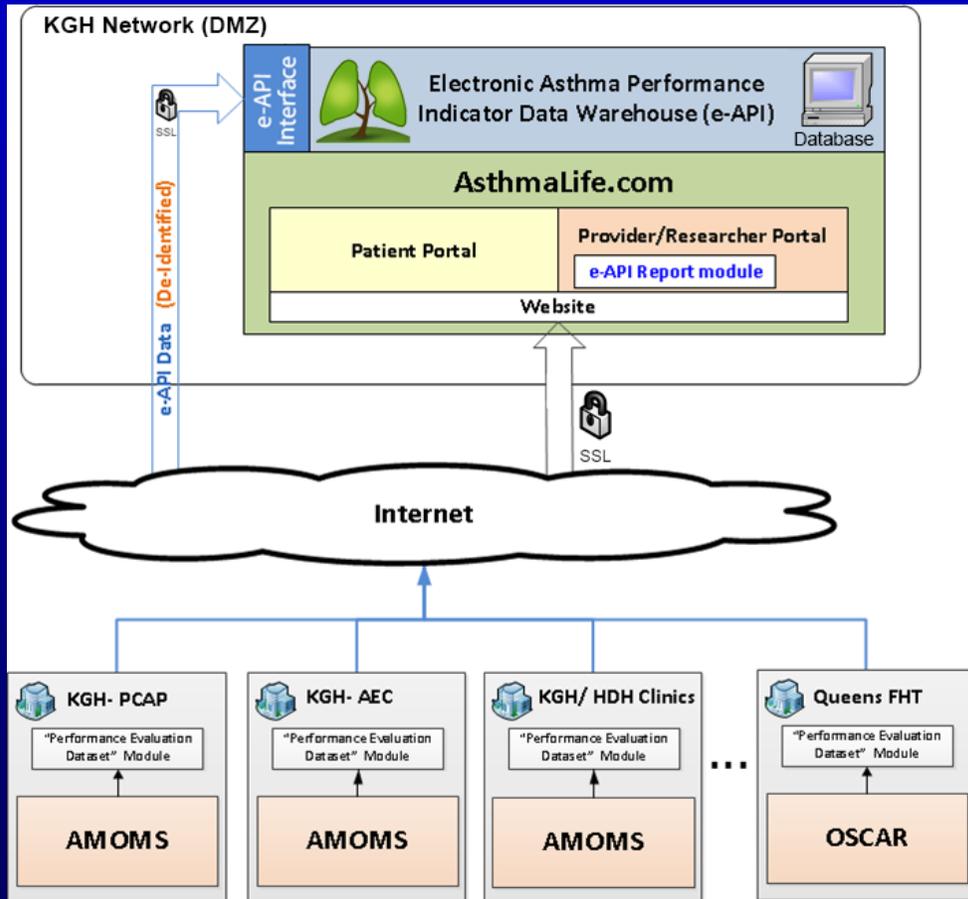
Medical Record #:

	Today's Visit	Last Visit	Initial Visit
	Yes No Notes	Yes No Notes	Yes No Notes
<b>Uncontrolled if:</b>			
Daytime symptoms ≥ 4 days/week (short of breath, cough, wheeze, tight chest) on average in the last 4 weeks	Y N # of Days per week	Y N # of Days per week	Y N # of Days per week
Night-time symptoms ≥ 1/week on average in the last 4 weeks	Y N # of Nights per week	Y N # of Nights per week	Y N # of Nights per week
Physical activity limited due to asthma on average in the last 4 weeks	Y N	Y N	Y N
Exacerbations within the last 12 months	Y N ED visit Walk-in Clinic / Urgent Care Hospitalized	Y N ED visit Walk-in Clinic / Urgent Care Hospitalized	Y N ED visit Walk-in Clinic / Urgent Care Hospitalized
School / work / social absence due to asthma within the last 12 months	Y N # of Days	Y N # of Days	Y N # of Days
Needs reliever ≥ 4 doses/week (incl. pre-exercise) on average in the last 4 weeks	Y N # of Doses per week	Y N # of Doses per week	Y N # of Doses per week
FEV <sub>1</sub> or PEF (< 90% personal best)	Y N Notes	Y N Notes	Y N Notes
PEF diurnal variation (> 15%) over a 2 week period	Y N Notes	Y N Notes	Y N Notes
Beta-agonist free day(s) in the last 4 weeks	Y N # of Days	Y N # of Days	Y N # of Days
Patient was monitored with spirometry in the last 12 months	Y N	Y N	Y N
Height / Weight / BMI (plot results on growth charts for children)	Ht: <input type="text"/> cm Wt: <input type="text"/> kg BMI: <input type="text"/>	Ht: <input type="text"/> cm Wt: <input type="text"/> kg BMI: <input type="text"/>	Ht: <input type="text"/> cm Wt: <input type="text"/> kg BMI: <input type="text"/>
Pre / post bronchodilator spirometry or peak flow results	Actual % Pred. Actual % Pred. LLN	Actual % Pred. Actual % Pred. LLN	Actual % Pred. Actual % Pred. LLN
Children (6 years and over) and Adults	FEV <sub>1</sub> FVC FEV <sub>1</sub> /FVC (Lower Limit of Normal = LLN) PEF		
<b>AQLQ</b>	Complete an Asthma Quality of Life Questionnaire today? (AQLQ) Y N (recommended)	Y N (recommended)	Y N (recommended)
Action plan provided	<input type="checkbox"/> Written <input type="checkbox"/> Revised <input type="checkbox"/> Reviewed	<input type="checkbox"/> Written <input type="checkbox"/> Revised <input type="checkbox"/> Reviewed	<input type="checkbox"/> Written <input type="checkbox"/> Revised <input type="checkbox"/> Reviewed
Yellow or Red zone of action plan followed since last visit	Y N # of times	Y N # of times	Y N # of times
<b>Action Plan</b>	Medications Green zone Yellow zone		
Patient's technique on inhaler device	<input type="checkbox"/> Reviewed <input type="checkbox"/> Corrected <input type="checkbox"/> Optimal	<input type="checkbox"/> Reviewed <input type="checkbox"/> Corrected <input type="checkbox"/> Optimal	<input type="checkbox"/> Reviewed <input type="checkbox"/> Corrected <input type="checkbox"/> Optimal
Definition/nature of asthma reviewed with patient	Y N	Y N	Y N
Triggers & environmental controls reviewed	Y N	Y N	Y N
Referral to Asthma/Respiratory educator	Y N	Y N	Y N
Other education (e.g. smoking cessation)			
Influenza vaccine	Y N	Y N	Y N
Pneumococcal vaccine	Y N	Y N	Y N

**Self-Management**

Adapted with permission (May 2015) from the Lung Association of Ontario's Asthma Care Map for Primary Care, November 2012 version.

# Step 2: New OSCAR Seamless Link to AsthmaLife® Portal/Repository



- Standardized data collected at point of care in AMOMS at KHSC or OSCAR EMR at Queen's Family Health Team
- e-API data populates secure AsthmaLife® repository (pushed every 24 hours)
- Single sign-on also allows access to AsthmaLife® eTools (WRASQ[L]© and eAQLQs)

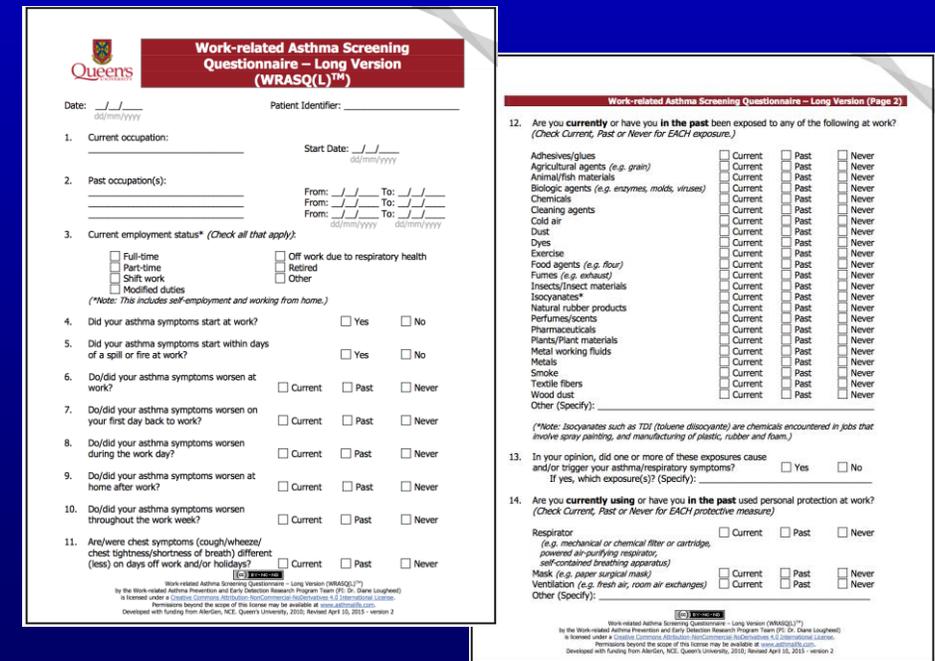
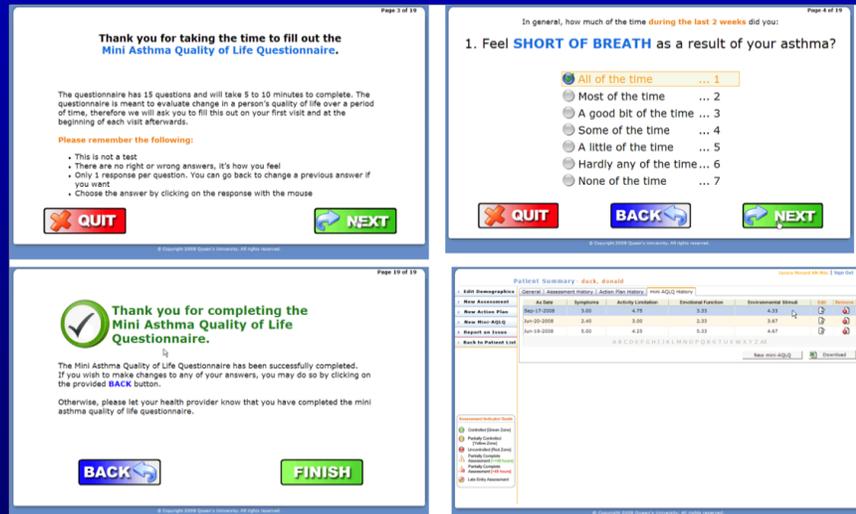
# Seamless links also allow access to *AsthmaLife*<sup>®</sup> Portal eTools

Electronic Asthma Quality of Life Questionnaires:

- eAdult MiniAQLQ

Electronic Work-related Asthma Screening Questionnaire (long version)

- WRASQ(L)<sup>®</sup>



Olajos-Clow et al. *Respir Med* 2010; 104(5): 658-67

Killorn et al. *J Asthma* 2014; 9:1-10;  
Killorn et al. *J Asthma* 2014;10: 1-9.

# Step 3: Designed a Reporting System

- Programmed Dr. Teresa To's Primary Care Asthma Performance Indicator (PC-API<sup>®</sup>) Form

- The system auto-populates Primary Care Asthma Performance Indicators (e-API<sup>®</sup>)
  - ✓ From AMOMS
  - ✓ From the OSCAR Asthma Assessment Form

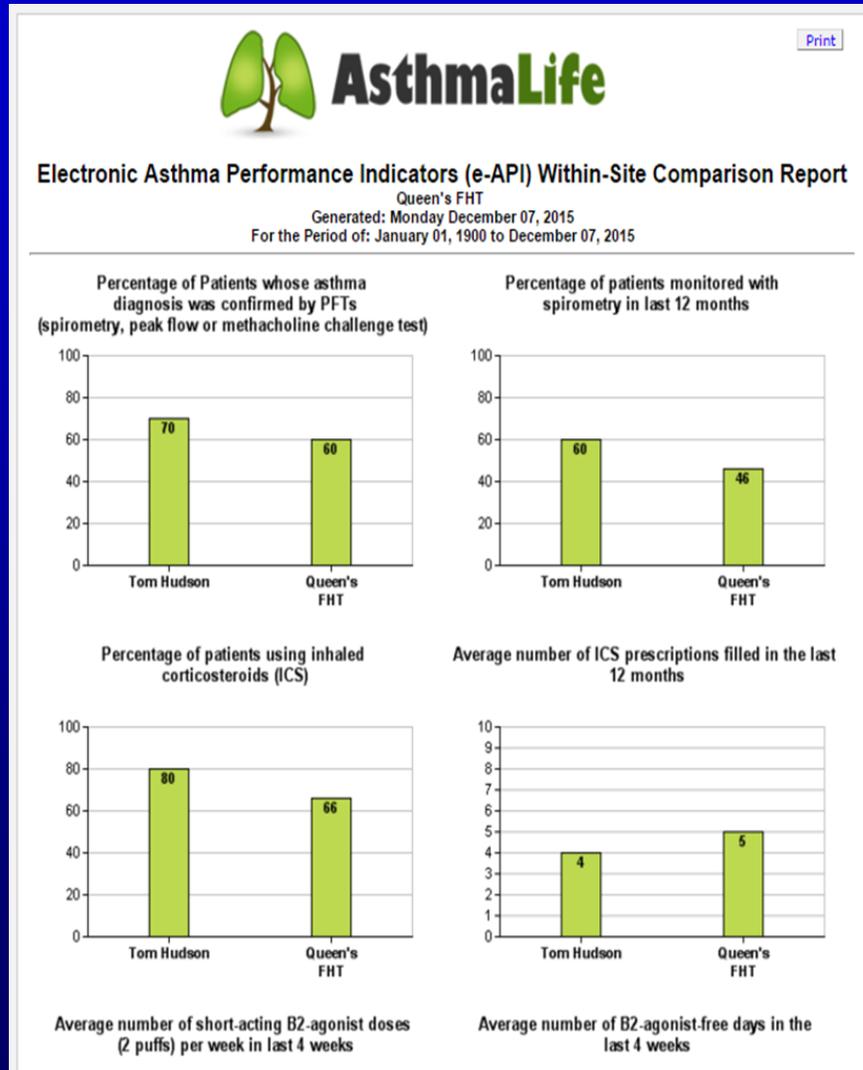
The screenshot shows a web application interface for the Primary Care Asthma Performance Indicators Form. The form is titled "Primary Care Asthma Performance Indicators Form" and is designed for patient completion. It includes a navigation menu at the top with options like Home, My Profile, My Patient List, Reports & Data, Administration, My Resources, Get Support, and About. The patient information section on the left includes fields for Global Unique Identifier, Site Patient Identifier, Provincial Health Insurance Number, Date of Birth, Gender, Postal Code, Province, and Site. The main form area contains sections for Asthma Indicators, Medication Use, Asthma Control, Exacerbations, Health Care Use, Action Plan, Asthma Education, Smoking Cessation, and Quality of Life. Each section contains specific questions with radio button or checkbox responses. At the bottom, there is a contact information section for Susan McLimont and Dr. Teresa To, along with a footer containing copyright and version information.

Electronic Asthma Performance Indicators (e-API)		
Provider's Within-Site Comparison Report		
Report Generated for Queen's FHT on December 07, 2015		
Asthma Indicators	John Doe (N=10.0)	Site (N=15.0)
<b>1. PFT</b>		
a) Percentage of patients whose asthma diagnosis was confirmed by PFTs (spirometry, peak flow or methacholine challenge test)	70.0%	60.0%
b) Percentage of patients monitored with spirometry in last 12 months	60.0%	46.7%
<b>2. Medication Use</b>		
a) Percentage of patients using inhaled corticosteroids (ICS)	80.0%	66.7%
b) Average number of ICS prescriptions filled in last 12 months*	4.4	5.3
c) Average number of short-acting $\beta_2$ -agonist doses (2 puffs) per week in last 4 weeks*	3.0	2.8
d) Average number of $\beta_2$ -agonist-free days in last 4 weeks*	1.0	5.5
e) Percentage of patients that have demonstrated their inhaler technique regularly	70.0%	60.0%
<b>3. Asthma Control</b>		
a) Percentage of patients whose asthma symptom control was assessed in last 6 months	90.0%	73.3%
b) Percentage of patients whose asthma has been well-controlled in last 4 weeks	50.0%	60.0%
c) Average of symptom-free days in last 4 weeks*	3.5	3.8
d) Total number of days missed from school or work due to asthma in last 12 months*	15.0	16.0
<b>4. Exacerbations</b>		
Percentage of patients that had <u>more than one</u> asthma exacerbation in last 12 months	50.0%	40.0%
<b>5. Health Care Use</b>		
a) Total number of ED visits for asthma in last 12 months	7.0	8.0
b) Total number of urgent care visits for asthma in last 12 months	6.0	7.0
c) Total number of primary care visits for asthma in last 12 months	0.0	0.0
d) Percentage of patients that have a routine health care provider	100.0%	100.0%
<b>6. Action Plan</b>		
Percentage of patients that have received a written asthma action plan	80.0%	66.7%
<b>7. Asthma Education</b>		
Percentage of patients that were referred to see a certified asthma educator	10.0%	13.3%
<b>8. Smoking Cessation</b>		
Percentage of patients who smoke	20.0%	40.0%
Percentage of patients who have received advice to stop smoking	50.0%	33.3%
<b>9. Quality of Life</b>		
Average quality of life assessment* or Mini AQLQ/PAQLQ score	3.1	3.1

\*Indicator is based upon patient's self-reported data.

Adapted with permission (May 2010) from the Primary Care Asthma Performance Indicators (PC-API 8) Form authored by Dr. Teresa To, The Hospital for Sick Children, 2009, revised 2011 Version 2 date: 2011-10-23. Report Generated By AsthmaLife.com

# e-API<sup>®</sup> Reporting System



- Extracts data elements from 2 different asthma e-records and generates e-API<sup>®</sup> reports
- Is an asthma performance evaluation system, integrated into the process of care in the Southeastern Ontario Asthma Care Network
- Documents performance

# Challenges and Barriers

- Multiple Firewalls
- OSCAR updates affecting programming
- Initial permissions (provider disclaimer)
- Frequent onboarding of new staff/residents
- Perceived need/utility
- Integration into the process of care

# Conclusion and Next Steps

- Despite the ever changing EMR landscape and numerous technological hurdles, it is feasible to collect guidelines-based outcome data at the point of care to enable report generation supporting best practice and program evaluation.
- We hope our findings have helped to inform this audience about the process and challenges in collecting quality primary care data from multiple EMRs that is extractable and reportable to enable continuous quality improvement.
- Future work could see our developed IT architecture and workflow design, demonstrating integration and interoperability, used by other OSCAR sites and EMRs in the province.

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