Clinical Pathways: A Platform for Continuous Quality Improvement

Jane Lavelle, MD
Aileen P. Schast, PhD
Office of Clinical Quality Improvement

Children's Hospital of Philadelphia
Checking In

• How many in the audience provide clinical care to patients?
• How many in the audience are hospital administrators?
• How many in the audience work at a hospital where clinical pathways are used?
The CHOP Philosophy

• The Clinical Pathways Program brings **multidisciplinary healthcare teams** together to create **standardized, evidence-based, shared mental models** of medical care.

• Our clinical pathways combine principles of quality improvement science, organized workflows, and clinical decision support tools to make it easier for healthcare teams to make the **best decisions for patients at the point of care**.

• Information measured from each pathway is **iteratively incorporated** into care delivery to **close the gap between evidence and practice**.
**Decision Support** — Make it easy to do the right thing

### AE Bronchiolitis Pathway

- **Supportive Care**
  - **Suction Nares per Nursing Standard**
    - Review bulb syringe with family and escalate to wall suction only if unable to clear with bulb.

### Mediations

- **Bronchodilators**
  - Not recommended for routine use. Suction and reassess before ordering. If used, document indication and response in ED provider note.
  - **Albuterol Bronchiolitis Trial**
  - **racemic EPINEPHrine 2.25 % neb**
    - ONCE

- **Steroids**: Not recommended for routine use

### Laboratory

- **Laboratory tests**: Viral testing not recommended for routine use
  - **Respiratory Viral Testing**

### Radiology

- **Radiology**: Chest X-rays are not recommended for routine use
  - **co-trimOXazol tablet**
  - 10 mg TMP/kg/24 hro, Oral, EVERY 12 HOURS for 1 dose
Pathway Development - ~6-9 months

1) Submit Pathway Request

2) Meet with assigned Improvement Advisor

3) Final Draft reviewed by Pathways Director & Program Manager

4) Final Draft Sent to Web Team
   Decide on Decision Support

5) Team Reviews Test Link, More Editing

6) Final Pathway Published Online!
   Decision support active in EMR

7) Pathway Education Roll-Out

8) Monitor & Maintain Pathway

This step is the most critical – and time consuming.
1. Must be multidisciplinary
2. Teams meet biweekly
3. Team reviews evidence and develops algorithm
4. Later drafts should be shared with broader stakeholder groups to ensure accuracy and acceptability
“What if we don’t change at all ... and something magical just happens?”
Improving the Evaluation of Shunt Obstruction

- Reduce radiation exposure of patients with VP shunt by:
  - Reducing unnecessary scans
  - Use of low dose radiation protocol
  - Reducing unnecessary shunt survey
- Reduce number of revisits in 72 hours
- Improve interdisciplinary team work and communication
Collaborative effort among ED, Radiology, and Neurosurgery providers produced clear pathway with recommendations including the use of a new lower dose CT scan protocol in addition to providing specific indications for obtaining a shunt series which included less images.

Order Sets

ED Ventricular Shunt Pathway

ED Ventricular Shunt Pathway

ED Ventricular Shunt Pathway Order

- ED Ventricular Shunt Pathway Order Set Started

Details

Imaging

- Imaging: Routine shunt series not recommended. Specific radiographs only with abnormality of shunt tubing or at Neurosurgery request to assist with revision.

- CT Brain Hydro W/O IV Contrast
- XR CHEST 1VW AP OR PA
- XR ABD 1VW AP SUPINE
- US Abd for Ascites

Laboratory

Pharmacy
Improvement

% Encounter receiving VP Shunt Survey at ED

- Mean Proportion
- Monthly Proportion
- UCL (+3 Sigma)
- LCL (-3 Sigma)
- # Monthly Visits

Month
Post-Operative Care for Spinal Fusion

• Goal: to standardize the post-operative care of the AIS patient undergoing a posterior spinal fusion.

• Focused on pain control and mobility

• Required collaboration among orthopedic surgeons, anesthesiologists, and nurses.
Decision Support

AIS Post-Operative Rapid Recovery Pathway

AIS Spinal Fusion Rapid Recovery Pathway Order Set Started

Rapid Recovery Pathway for Idiopathic Posterior Spinal Fusion patients:
1. Toradol - IV 2. Neurontin - PO 3. PO intake - Advance diet as tolerated
4. PT - OOB/ambulation POD # 15. Drains A. As per Plastics B. d/c ~ 30 mL shift C. d/c POD # 2
6. PCA pump d/c POD # 2, Pre-Procedure

Nursing

Activity/Mobility

- Log Roll
- EVERY 2 HOURS
- Sequential Compression Device
- Activity as tolerated

Patient to sit on edge of bed night of Post-op Day #0

- Begin Gait Training Post-op Day #1

Begin Gait Training Post-op Day #1

- Out of Bed to Chair Post-op Day #1

Out of Bed to Chair Post-op Day #1

Activity with brace - may remove brace while in bed. Please call NOPCO with any questions @ 47701.

Pt Care/Treatments

Vitals
Improvement

Post-operative LOS had been 5.5 days consistently....

Since pathway implementation, median LOS has consistently been 3.3 days

Evaluation of the Febrile Child for a UTI

- Decrease unnecessary laboratory tests, expenses
- Decrease use of expensive antibiotics and resistance in community
- Spare patients unnecessary testing, f/u, pain
Implementing the Pathway

POC urinalysis increased 20% to 64%

Lab urinalysis decreased 75% to 25%

Urine culture following a negative screen decreased 22% to 6%

First improvement focus was on how the urine sample was tested – wanted to decrease the slower and more expensive lab testing.

Next turned to decreasing culturing samples that screened negative.
In young children, a negative screen is almost always associated with a negative culture – but we are catheterizing hundreds of children every year!

Is there a better way to safely screen patients that does not use a catheterized sample?

<table>
<thead>
<tr>
<th>Number (Percent)</th>
<th>UA/POCT Positive</th>
<th>UA/POCT Negative</th>
<th>UA/POCT Equivocal</th>
</tr>
</thead>
<tbody>
<tr>
<td>URINE CULTURE Positive</td>
<td>149 (4.8%)</td>
<td>23 (0.7%)</td>
<td>22 (0.7%)</td>
</tr>
<tr>
<td>URINE CULTURE Negative</td>
<td>34 (1.1%)</td>
<td>2787 (90.3%)</td>
<td>39 (1.3%)</td>
</tr>
<tr>
<td>URINE CULTURE Equivocal</td>
<td>11 (0.4%)</td>
<td>11 (0.4%)</td>
<td>6 (0.2%)</td>
</tr>
<tr>
<td>URINE CULTURE Not Done</td>
<td>0</td>
<td>3 (0.1%)</td>
<td>0</td>
</tr>
</tbody>
</table>
Cathing’s a Drag – Use a Bag!

Target < 30%

Cathed | Converted | Bagged

<table>
<thead>
<tr>
<th>Date</th>
<th>Cathed</th>
<th>Converted</th>
<th>Bagged</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/18-10/22</td>
<td>0</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>10/23-10/31</td>
<td>6</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>11/1-11/18</td>
<td>10</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>11/19-12/3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>12/4-12/10</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>12/11-12/17</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12/18-12/24</td>
<td>14</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>12/25-12/31</td>
<td>16</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>1/1/17</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>1/8-1/14</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>1/15-1/21</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>1/22-1/28</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>1/29-2/14</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>2/2-2/11</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>2/12-2/18</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>2/19-2/25</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>3/1-3/11</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Children’s Hospital of Philadelphia, Office of Clinical Quality Improvement
Improvement Implementation

Project Timeline

- Project Start
- PDSA Cycles
- All ED roll out
- RN education module published
- Reminder to bag in EPIC
- Project Moves to Sustain

Graph showing patient percentages over time with markers for key events:
- Mean
- Monthly Average
- Upper Limit (+3 sigma)
- Lower Limit (-3 sigma)
More than 2000 children have been spared an unnecessary catheterization.
Other Improvements and Impact

As of 2015, approximately **68%** of children treated in ED or Main Hospital were cared for by Clinical Pathways

**Bronchiolitis Pathway**
- Albuterol use decreased from 70% to 18%

**Sickle Cell with Fever Pathway**
- Since 2014, admission rate decreased by 33%

**Oncology Patient with Fever**
- Admissions decreased by 16% in ED, 33% in Oncology clinic
- Days spent in hospital decreased by average of ~3 days

**Anaphylaxis Pathway**
- Since 2014, admission rate decreased by 60%

**Febrile Infant Pathway**
- The proportion of febrile babies who do NOT get an LP in the ED has doubled.
## Additional Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer-reviewed publications (since 2015)</td>
<td>9</td>
</tr>
<tr>
<td>Posters/Presentations (since 2014)</td>
<td>26</td>
</tr>
<tr>
<td>Book Chapters, Reviews</td>
<td>13</td>
</tr>
<tr>
<td>CHOP Staff involved in pathway development:</td>
<td>481</td>
</tr>
<tr>
<td><strong>Physicians</strong></td>
<td>274</td>
</tr>
<tr>
<td><strong>RNs, APPs</strong></td>
<td>98</td>
</tr>
<tr>
<td><strong>FLOCS</strong></td>
<td>98</td>
</tr>
<tr>
<td><strong>Pharmacists</strong></td>
<td>11</td>
</tr>
<tr>
<td>Physicians granted MOC credit for participation in pathway development in 2015-2016</td>
<td>138</td>
</tr>
</tbody>
</table>
Additional Impact

• **>14,000** Chop.edu/Pathways visitors per month
  – Avg 9,500/month external visitors
  – Avg 4,925/month internal visitors

• Average 8 email inquiries/month from outside hospitals
What Does it Take?

• Know which conditions are ripe for a pathway
  • Good guidance or need for consensus
• The right team
  • Strong lead, all stakeholders represented
• A good facilitator
  • Improvement Advisor who understands the milieu - does not need to be a content expert
• Informatics support
• Strong analytics team when it’s time to do QI
Find us at www.chop.edu/pathways or email us at pathways@email.chop.edu

Office of Clinical Quality Improvement
Katie Halkyard, MPH - Program Manager
Jane Lavelle, MD – Medical Director
Aileen Schast, PhD – Director, CQI
Ron Keren, MD – Vice President, Quality
Driving High-Reliability and High-Value Care via Clinical Pathways

Andrew R. Buchert, MD, FAAP
Gabriella A. Butler, MSN, RN

Clinical Resource Management
Children’s Hospital of Pittsburgh of UPMC
Who we are...

- **315-bed free-standing quaternary care pediatric hospital**
  41 bed ED and Trauma Center, 36 Bed PICU, 12 Bed CICU, 55 Bed NICU
  8 bed rehab unit located at a satellite facility

- **10-story, 300,000-square foot research facility**

- Department of Pediatrics with 19 Divisions, and also home to pediatric divisions of the Departments of Surgery, Radiology, Critical Care Medicine, Thoracic and Cardiovascular Surgery, Urology, Orthopaedic Surgery, and Pathology

- **Pediatric Residency and Fellowship Programs**
  - 85 General Pediatrics Residents, 16 Internal Medicine-Pediatrics Residents, 9 Triple Board Pediatrics-Psychiatry-Child and Adolescent Psych Residents
  - Pediatric Subspecialty and Surgical Subspecialty Fellowships

- **Clinical site for other non-pediatric residency training programs**
  - UPMC Surgical, Surgical Subspecialty, Anesthesiology, Radiology, Emergency Medicine, Family Medicine, Psychiatry, and Pathology residents
Commitment to zero harm to both patients and staff

High-value care

Develop evidenced-based, technology enabled clinical pathways that span the episode of care (pre-admission, during the admission, and post-admission) for high-cost and high-volume pediatric conditions.
Desired Outcomes

Reduce

• Unnecessary variation in care
• Unplanned Readmissions
• Acute care Length of Stay (LOS)

Improve

• Outcomes (Quality, Safety & Financial metrics)
• Continuity of care (pre and post admission)
• Patient, Family & Provider satisfaction

Eliminate

• Non-value added testing
## Clinical Effectiveness Guidelines

### Medical

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asthma</strong></td>
<td></td>
</tr>
<tr>
<td>201.01</td>
<td>General Information</td>
</tr>
<tr>
<td>201.04</td>
<td>ED Asthma Guidelines: Mild Symptom Algorithm</td>
</tr>
<tr>
<td>201.05</td>
<td>ED Asthma Guidelines: Moderate Symptom Algorithm</td>
</tr>
<tr>
<td>201.06</td>
<td>ED Asthma Guidelines: Severe Symptom Algorithm</td>
</tr>
<tr>
<td>201.07</td>
<td>Acute Care Inpatient Guideline</td>
</tr>
<tr>
<td>201.08</td>
<td>Critical Care - Status Asthmaticus</td>
</tr>
<tr>
<td>201.10</td>
<td>Asthma Weaning Protocol</td>
</tr>
</tbody>
</table>

| **Abnormal uterine bleeding** | |
| 236.04 | Abnormal Uterine Bleeding Algorithm |
| 236.05 | Adolescent Female with Dysfunctional Uterine Bleeding Narrative |

| **Anaphylaxis** | |
| 218.00 | Anaphylaxis treatment guideline -Algorithm |
| 218.01 | Anaphylaxis treatment guideline -Narrative |

| **Anxiolysis** | |
| 235.00 | Anxiolysis - Emergency Department Guidelines |

| **Bronchiolitis** | |
| 205.01 | Bronchiolitis Guideline Narrative |
| 205.02 | Emergency Department Guideline |
| 205.03 | Bronchiolitis Inpatient Guideline |
| 205.04 | Information Sheet for Parents |

| **Blood Pressure Table—Harriet Lane** | |
| 200.00 | BP Tables Boys & Girls age 1 to 17 |

| **Cellulitis** | |
| 207.00 | ED/Inpatient Simple Cellulitis/Absscess |
## Guideline vs Pathway

<table>
<thead>
<tr>
<th>Clinical Effectiveness Guideline</th>
<th>Clinical Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-Based</td>
<td>Evidence and consensus-based</td>
</tr>
<tr>
<td>Limited Education</td>
<td>Formal education and rollout</td>
</tr>
<tr>
<td>Variable interdisciplinary collaboration</td>
<td>Inter- and Multi-disciplinary</td>
</tr>
<tr>
<td>Focused settings of Care</td>
<td>Across the Continuum</td>
</tr>
<tr>
<td></td>
<td>Real-time measurement &amp; feedback loop</td>
</tr>
<tr>
<td></td>
<td>Strategic Alignment</td>
</tr>
</tbody>
</table>
Impact

Health of Patients
- Individual Patients
  i.e. Reducing readmissions, LOS, infection rates, central line utilization
- Population
  i.e. Reduce exposure to unnecessary care, focus on health promotion & wellness

Organizational Systems of Care
- Processes, workflow, patient flow
  i.e. Improving throughput, decrease bed utilization, enhance medication delivery
- Strategy
  i.e. Create buy-in for additional pathways, promote and support service-lines, grow market

Hospital and Health System
- Economics
  i.e. Improve revenue and decrease at-risk revenue, reduce variability of controllable costs
Process

1. Idea Generation
2. Identify Team
3. Gather Evidence
4. Design & Development
5. IT Build
6. Education & Rollout
7. Measurement & Feedback
8. Disseminate Knowledge
GOALS OF APPENDICITIS PATHWAY

Measureable Elements of Appendicitis Pathway

Pre-operatively:
- NPO
- Administration of Cefoxitin (Flagyl/Cipro for PCN Allergy) within 60 minutes of the incision

Post-operatively: Uncomplicated
- Order to DC IVF if taking PO
- Regular diet order before transferred to inpatient unit
- Order for OOB
- Order for PO Oxycodone/Tylenol
- Order for D5 ½ NS w/ 20KCL
- No antibiotics (unless fever, suspected sepsis)
- No additional labs

Post-operatively: Complicated
- Order for Strict Is/Os
- Order for Clear Liquids
- Order for OOB
- Order for D5 ½ NS w/ 20KCL
- Administration of Ertapenem for (min) 24 hours
- Order for PO Oxycodone/Tylenol
Appendicitis Pathway

Impact

Health of Patients
- Individual Patients
  Reducing readmissions, LOS, infection rates, central line utilization
- Population
  Decrease CT utilization (referring organizations)

Organizational Systems of Care
- Processes, workflow, patient flow
  Improving throughput, decrease bed utilization, medication delivery

Hospital and Health System
- Economics
  Improves revenue and decrease at-risk revenue
- Strategy
  Creates buy-in for additional pathways
**Goals**

- Limit IV Antibiotics post-surgery
- Eliminate use of central lines
- Limiting post-op labs
- Limiting IV Narcotics (encouraging PO)
- Encouraging ambulation
- Advancing diet after surgery

**What we changed**

- Provided retrospective clinical & financial data
- Developed standardized pre- & post-op management approach
- Supported design of new PowerPlan
- Implemented sustainable feedback loop

**What we didn’t change**

- Staff
- Surgeons
- Patient Population
- Surgical interventions

**Impact**

- 31% decrease ALOS
- 7% decrease in controllable cost
**Goals**

- Limit IV Antibiotics post-surgery
- Eliminate use of central lines
- Limiting post-op labs
- Limiting IV Narcotics (encouraging PO)
- Encouraging ambulation
- Advancing diet after surgery

**What we changed**

- Provided retrospective clinical & financial data
- Developed standardized pre- & post-op management approach
- Supported design of new PowerPlan
- Implemented sustainable feedback loop

**What we didn’t change**

- Staff
- Surgeons
- Patient Population
- Surgical interventions

**Impact**

- 17% decrease ALOS
- 3% decrease in controllable cost
Increasing NICU Demand

- Average Daily Census 52.5
- Inpatients: 1074 FY15 *(rolling 12 months April15-Mar16: 1253)*
- Observation Patients: 45/year
- ALOS: 18.2 days (excludes Obs pts)
Comparison: NICU Days

Patients that had one day in the NICU

<table>
<thead>
<tr>
<th></th>
<th>All Children’s Hospitals</th>
<th>Select Peer Hospitals</th>
<th>CHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>1020 patients out of 3865 (26%) spent at least 1 day in a NICU</td>
<td>171 patients out of 625 (27%) spent at least 1 day in a NICU</td>
<td>41 patients out of 87 (47%) spent at least 1 day in the NICU</td>
</tr>
</tbody>
</table>

Patients with Principal Dx Hyperbilirubinemia 7/1/14-6/30/15
Isolated Hyperbilirubinemia

**Goals**
- Decrease inappropriate admissions to the NICU
- Decrease LOS
- More efficient resource utilization
- Align management approach with peers

**What we changed**
- Standardization of patient placement
- Developed standardized management approach
- Implemented sustainable feedback loop
- Provided education for targeted staff

**Impact**
- 14% decrease in LOS
- 5% decrease in controllable cost
Planned Cholecystectomy

Goals
- Decrease post-operative admissions and overnight stays
- More efficient resource utilization
- Proactive and consistent pain and nausea management

What we changed
- Clear, consistent expectations discussed pre-operatively
- Patient/family education
- Shifting case times to first case
- Developed standardized management approach with anesthesia
- Provided education and nurse-activated future orders in SDS
- Implemented sustainable feedback loop

Impact
- 53% decrease in LOS
### Current Pathways

<table>
<thead>
<tr>
<th>Pathways</th>
<th>Impact &amp; Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complicated Appendicitis</td>
<td>7% decrease controllable costs since July 2015</td>
</tr>
<tr>
<td></td>
<td>31% decrease LOS since Jan 2015</td>
</tr>
<tr>
<td>Uncomplicated Appendicitis</td>
<td>3% decrease controllable costs since July 2015</td>
</tr>
<tr>
<td>Eating Disorders</td>
<td>33% decrease controllable costs since March 2016</td>
</tr>
<tr>
<td>Initiation of Propranolol for Hemangioma Patients</td>
<td>33% decrease controllable costs since Aug 2015</td>
</tr>
<tr>
<td>Isolated Hyperbilirubinemia</td>
<td>5% decrease controllable costs since December 2015</td>
</tr>
<tr>
<td>Planned Cholecystectomy</td>
<td>52% decrease in LOS</td>
</tr>
</tbody>
</table>
Predicting potential impact through the analysis of actual clinical & financial data, per CHP DataWarehouse, Cost Management System, & PHIS

Compiled a list of 21,696 patients that occupied a bed in FY16 (via DW)

- Determined their Final Diagnosis & LOS
- Determined cost/patient in Cost Management System
- Grouped patients into related-diagnosis categories

 Generated “opportunity score” for each category based on:

- Volume
- Controllable Cost
- LOS
- Variation
Is this potential pathway practical at this time?
  • Do we have the capacity?
  • Would all of the stakeholders have buy-in?

Do we have the resources to support this potential pathway?
  • To perform an analysis of the current state/weigh pros and cons
  • To develop and support the pathway - includes data analysis, PowerPlan development & QlikView dashboard

What evidence is available?
  • Is this an existing (In-house) clinical effectiveness guideline?
  • Is there peer-reviewed, published evidence?
  • Do any of our peer institutions have a clinical pathway or guideline?
Improving Asthma Care Across the Continuum
Improving Asthma Care Across the Continuum

• Create consistency in definitions, workflows, management
  – When to Step-Up / Step-Down therapy
  – When to refer

• Improve the patient/family experience
  – Common educational materials and Action Plan
  – Appropriate expectation setting

• Enhance communication

• Mitigate barriers to optimal health
Improving Asthma Care Across the Continuum

ASTHMA CONTROL IS OUR GOAL

INSIDE

3  Asthma Control is Our Goal

ASTHMA
7  What is Asthma?
9  Asthma Symptoms
10  Asthma Control
11  Asthma Attacks

TRIGGERS
13  What is a Trigger?
14  Allergies
15  Controlling my Asthma

MEDICINES
17  What Medicine Should I Take?
19  Medicine Tips
20  Asthma Medicines
22  Asthma Medicine Procedures
28  Be Ready!
29  Important Phone Numbers
30  National Asthma Resources
Questions?