A Tale of Two Cities
Development and Implementation of a Pain Protocol

American Society for Pain Management Nursing®
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Conflict of Interest Disclosure Information

- Theresa DiMaggio has no conflict of interest, or anything to disclose.
- Lucinda Brown has no conflict of interest, or anything to disclose.
Development of Two Pathways

- Standardized Rapid Recovery Pathway (RRP) for Adolescent Idiopathic Scoliosis (AIS)
- Standardized Recovery Pathway for Nuss procedure

Adolescent Idiopathic Scoliosis

- Adolescent idiopathic scoliosis is the most common spinal deformity in the world
- Surgical correction is done for patients with a curve > 40 degrees
  - Spinal fusion with hardware placement

Adolescent Idiopathic Scoliosis

- Rapid mobilization pathways described by several studies
- Accelerated Discharge Pathway implemented in Atlanta
  - Emphasized early mobilization, early diet advancement, early transition to oral pain medications
  - LOS was reduced by almost 1/3 without increase in early complication rate
  - Pain scores were not reported (Fletcher et al., 2014)
Improving Quality of Care

- Collaboration between Orthopedics and Anesthesia/Pain Management at CHOP
- Hypothesized implementation of RRP consisting of standardized multimodal analgesic and rehabilitation protocol would facilitate earlier functional recovery while maintaining effective analgesia
- Reduction in LOS while improving quality of recovery of post-operative AIS patients
- First implemented in November 2013, pathway finalized in December 2014
- Revisions ongoing

Instituting Change

- Pre-operative interventions
  - Educate patients and families
  - Oral gabapentin & acetaminophen X 1 dose am of surgery
  - Intra-op: IV methadone and IV acetaminophen

- Post-operative interventions
  - IV acetaminophen X 24 hrs
  - IV ketorolac POD1 X 48 hrs
  - Begin Physical Therapy(PTh) on POD1
  - Wean PCA by POD2
  - Advance diet as tolerated on POD3
  - Discharge home with drain

Order sets in electronic health record

Spinal Fusion Pathways

**Before**
- **Standard Pathway**
  - Pain Management
    - Post-op-PCA, oxycodone, diazepam
    - Drains
    - Leave in until less than 30 mL/day
    - Antibiotics
    - 24 hours only
  - Diet
    - NPO x 24 hrs then start ice chips
    - POD2 diet, advance as tolerated
  - Activity
    - POD2 gentle as tolerated
    - POD2 gait training
  - Bowel regimen
    - Post-op ped diet (except one surgeon)

**After**
- **Rapid Recovery Pathway (AIS patients only)**
  - Pain Management
    - Pre-op acetaminophen and gabapentin X 1 am of surgery
    - Intra-op: IV methadone and IV acetaminophen
    - Post-op-PCA, IV acetaminophen, gabapentin, diazepam, and oxycodone
  - Antibiotics
    - 24 hours only
  - Diet
    - POD1 advance diet as tolerated
  - Activity
    - POD1-OOB X3, begin gait training
  - Bowel regimen
    - Post-op solid diet (except one surgeon)
AIS Rapid Recovery Pathway

Available on the internet and www.chop.edu

Patients and caregivers can access for education prior to surgery.

Outcomes

- Significant improvement in post-op pain management
- Notable decrease in LOS
- No significant differences in post-op complications identified thus far

CHOP Clinical Quality Improvement Course

- Advanced formal training in QI methods are a key component for building capability in conducting CQI
- Many clinicians traveled to outside programs to obtain training
- CHOP CQI Course (for CHOP employees) developed and modeled after the mini-Advanced Training Program offered at Intermountain Healthcare
- Participants are required to identify, lead and report on a CQI project of their choice
Improvement Frameworks

CHOP Improvement Framework

- Define
- Diagnose
- Test and Implement
- Sustain

Model for Improvement

- Plan
- Do
- Study
- Act

What change can we make that will result in an improvement?
How will we know that a change is an improvement?

CHOP Improvement Framework: Check List

1. Charter
   Date completed:
2. Governance Structure
   □
   Date completed:
3. Communication Plan
   □
   Date completed:
4. Project Plan
   □
   Date completed:
5. RACI (Roles and Responsibilities)
   □
   Date completed:

1. Process Map
   □
   Date completed:
2. Key Driver Bundle
   □
   Date completed:
3. Data Collection Plan
   □
   Date completed:
4. Pick one:
   a) PDSA Worksheets
      □
      Date completed:
   b) Key Driver Change Plan (updated)
      □
      Date completed:
5. Data Analysis and Trending
   □
   (link from Data Collection Plan)
   Date completed:

1. Transition Plan
   □
   Date completed:

Recovery for patients undergoing Nuss procedures

- Based on success of the AIS pathway for PSF patients, the potential for a standardized pathway for patients undergoing a Nuss procedure for Pectus Excavatum repair was investigated as part of a formal CQI course at CHOP
Pectus Excavatum

- Pectus excavatum is the most common congenital chest wall deformity (~1 in 1000 births)
- Two surgical corrections:
  - Ravitch procedure: open procedure with excision and reshaping of ribcage
  - Nuss procedure: minimally invasive procedure involving placement of stainless steel or titanium bar underneath sternum to reshape the chest wall

Management Challenges

- Pain is often difficult to control after Nuss procedure
  - Significant impact on capacity for deep breathing, ambulation, opioid consumption and length of stay
  - Some kids do well, but many did not
  - Dependence on high dose opioid analgesia
  - Significant side effects: sedation, anxiety, ileus, constipation, nausea/vomiting
- Despite using a limited multimodal approach patients continued to struggle

Phase 1: Define

- What are we trying to improve or accomplish?
- State the problem or opportunity
- Establish the project goal
- Define the project objectives
  - Specific
  - Measurable—how will we measure success?
  - Attainable and agreed upon
  - Realistic and relevant
  - Time bound—by when?
- Determine resources
Development of an Enhanced Multimodal Pathway for Patients Undergoing Pectus Excavatum Correction

- **Plan**
  - Assemble multidisciplinary team
  - Systematically look at the process for patients having a Nuss procedure
    - Process map
    - Driver diagram
  - Generate charter to guide project

**Stakeholders**

- Identify the individuals and groups within CHOP who will be:
  - interested in
  - affected by
  - needed to help with the project
- Building a consensus with stakeholders
  - Request for more data to justify interventions
  - Unifying the mental model of the issues

**Team Members**

- Scott Adzick, MD (surgeon)
- Karen Barnaby CRNP (surgical NP)
- Theresa DiMaggio CRNP (pain management NP)*
- Scott Dubow MD (anesthesiologist)*
- Carolyn Fazzini RN (staff RN)
- Blair Kraus (process manager)
- Gina Kroepplin CRNP (surgical NP)
- Ty Muhly MD (project manager)*
- Nikki Veitzi PT (physical therapist)
- Jennifer Waters PsyD (psychologist)
Charter Components

- Team
  - Project Lead(s)
  - Improvement Advisor
  - Team Members (name, division, role)

- What are we trying to accomplish
  - What is the problem to be addressed?
  - What are the expected outcomes?
  - Aim Statement
    - How much? For whom? By when?

- How will we know that a change is an improvement?
  - Outcome Measures
  - Process Measures
  - Balancing Measures

Charter

Project Name: Nuss "pathway"
Exec. Sponsor: Enter Executive Sponsor here

Opportunity:
• Postoperative pain in the Nuss procedure is often difficult to manage despite using multimodal pain management.
• Significant dependence on opioid analgesia. Opioids have significant side effects including nausea and constipation. Some discharges are delayed due to constipation, and others are not mobilized early due to nausea.
• Extended length of stay (approximately 2-3 days)

Goal Statement/Aim:
We would like to standardize the care of the Nuss patient with a resulting decrease in length of stay (LOS) and patient reported pain scores by 10% in 3 months from 6/15/15 to 9/15/15.

Metric:
- Decreased LOS
- Decreased pain score

Risks/Assumptions:
- Readmission risk
- Sedation
- Change in intraoperative time

Scope (In/Out):
• In Scope: Nuss patients
• Out of Scope: Nuss patient presenting with a pain disorder or mental health issue.
Describe the process

- Create a flowchart or process map of the current process
- Validate the flowchart or process map with:
  - the "owners"
  - users
  - and "customers" of the process
Phase 2 Planning: Diagnose

- What do we need to learn so that we can narrow our focus to a few critical drivers?
  - Primary drivers are system components
  - Secondary drivers are processes within the systems
  - What changes do we hypothesize will result in improvement?

Driver Diagram
Phase 3: Test and Implement

- What changes should we make that will result in an improvement?
- Test the changes and evaluate if the changes result in improvement
- Small scale testing-no guarantee of success
- Is it okay to trial this strategy in a subset of our Nuss population?
- How small is too small? Relatively small number of patients having this procedure
- Implement what works
- Make changes based on feedback minimizes risk and facilitates rapid change
- The Plan-Do-Study-Act cycle tests a change in the real work setting by:
  - planning it
  - trying it
  - observing the results
  - acting on what is learned

A Model for Improvement: AIS Recovery Pathway

- Fundamental Tenants
  - Preoperative
    - Gabapentin and acetaminophen the morning of surgery
  - Intraoperative
    - Methadone
    - IV acetaminophen
  - Postoperative
    - Gabapentin
    - IV acetaminophen
    - Ketorolac beginning POD#1 for 48 hrs
    - IV PCA discontinued POD#2
    - Early mobilization

Run Chart
Phase 4: Sustain

- How do we ensure that the changes are sustained?
  - Create a strategy to sustain changes
  - Transition accountability where appropriate to local leaders
  - Conduct on-going performance monitoring
- Do we need to spread to any other areas?
  - Plan for spread beyond the initial setting (if indicated)

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Pain Management Team
Mia Malavolta (NP in training)

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Lucinda Brown, DNP, RN, CNS
Acute/Chronic Pain and Palliative Care
In spinal fusion for scoliosis, a series of rods, hooks, wires, or screws are attached to the curved part of the backbone and the spine is straightened. Bone grafts are placed in the spine which will grow together with the spinal bone. This process fuses the spine together. Most surgeries last 6-8 hours.

Although the basic procedure is the same, a variety of specialized techniques are used to treat spinal fusion. Different types of instrumentation are utilized. The method chosen depends on a number of things, including the child's age, spinal maturity, the location and severity of the curve, the clinical opinion of the surgeon, and the preference of the child and parents.

Idiopathic scoliosis patients are healthy teenagers who need spinal fusion to straighten their spines in order to prevent future problems. Bracing may first be implemented to straighten the curve. Severe scoliosis is defined by a curvature which is greater than 40-45 degrees. Surgery is recommended in these cases.

Congenital/neuromuscular scoliosis patients are those who have scoliosis due to a condition that has occurred either at birth or due to another diagnosis such as cerebral palsy, muscular dystrophy or one of many other genetic syndromes. These patients need surgery to correct a severe curvature due to respiratory compromise or other health issues.
Types of curvatures

Spinal fusion surgeries create significant pain !!!!

Choosing a type of Continuous Quality Improvement (CQI)

Ask Three Questions:

- What are we trying to accomplish?
- How will we know whether a change is an improvement?
- What changes can we make that will result in an improvement?

*** Most hospitals utilize various types of CQI based on the problem or issue identified.
Examples of types of CQI

- Clinical practice improvement (CPI) to systematically change care
- Root cause analysis to retrospectively examine what went wrong
- Failure modes and effects analysis to prospectively consider what might go wrong

Methods for CQI at Dayton Children’s Hospital (DCH)- Clinical Practice Improvement

DCH process is an internal one and led by the Quality Management department

DCH definition of a clinical practice guideline:

- A systematically developed, step-by-step process that assists providers/staff in making decisions regarding a plan of care for patients with a significant clinical diagnosis.
- It provides an algorithm for care which is standardized but also leaves room for individualized patient needs

Why a Clinical Practice Guideline or Pathway for CPI ???

- Provides for standardization of care
- Supports best practice as referenced in the literature
- Establishes consistency in care among health care staff
- Improves quality outcomes for patients
Clinical Practice Guideline or Pathway

Overall goal of a Clinical Practice Guideline (CPG) is continuous organizational performance improvement to provide excellent patient care!

- Involves measuring the function of important processes/services
- Identifying changes to enhance performance
- Incorporating those changes into existing work processes/services
- Monitoring the improvements through data collection
- Sustaining the identified improvements
- Identifying any changes that need to be made in processes/services over time

DCH Process cont. ..... 

Application to the Quality Steering Committee is in the FOCUS format

- Each CPG must have senior leaders (vice presidents) owner as well as clinical owner(s)
- An application is submitted to the quality steering committee of the Board of Trustees

DCH Process cont. ..... 

FOCUS application format includes:

- Finding a process to improve
- Organize a team
- Clarify current knowledge
- Understand sources of variation
- Select the process improvement

- Study Population (Patients with a Particular Disease)
Finding a process to improve - processes are identified through quality review reports, high risk or high volume procedures or problem prone diagnoses or patient populations.

Organize a team - each team must have an owner(s), team leader(s), facilitator(s). Other team members need to be people that work closest to the process. Make sure that all key stakeholders are either on the team or available as a consultant to the team.

Clarify current knowledge - Understand the current process, identify the steps in the process that need to be improved

Understand sources of variation - Review differences in the current management of the patient population/patient diagnosis

Select the process improvement(s) - Make a list of needed improvements and consider the barriers to the process

Teams and Teamwork are an essential part of the process

Selection of the team members is one of the most important steps in the CPG

Team members need to have a vested interest in the patient population, diagnosis or problem at hand

Team member roles need to be reviewed by all team members at the start of the CPG so that expectations are understood

Team member roles:

- process owner, team leader, team member, facilitator and time keeper & recorder (usually rotated between all members)
Each team formed is complicated!!!

Members must work out personal differences, find strengths upon which to build, balance commitments to the project against other job requirements and learn how to improve quality.

Teams need to understand the importance of developing themselves as a team.

Teams that run smoothly are able to focus on the assignment with efficiency.

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**Stages of Team Growth:**

- Forming
- Storming
- Norming
- Performing

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**What is a team charter, when is it needed and why is it needed??**

A charter contains purpose of the team/frequency of meetings, purpose of the guideline and strategies for education.

- It is initiated as the first step in the CPG process.
- It serves as the guideline for the team and meeting process.
General Guidelines to have productive meetings include:

- Clarify the objective for each meeting
- Review the roles for each member
- Review the agenda
- Work through agenda items
- Review the meeting record
- Plan next agenda
- Evaluate

The PDSA cycle is a tool to utilize for CPI

- An advantage of this tool is the ability to try small tests of change throughout the project vs. implementing all changes at the end

- Planning the Improvement
- Doing (implementing) improvements and educational programs
- Studying, analyzing the improvements made
- Acting to sustain the progress made with the improvement and/or modifying the improvement as needed

Our team consists of:

- Physician representatives from Orthopedic surgeons, Pediatric Intensivists, Hospitalists, Anesthesiologists
- Nursing representatives from Perioperative Services, Pediatric Intensive Care Unit, Intermediate Care Unit, General Pediatric Surgery Unit, Continuity of Care, Advanced Practice Registered Nurses
- Dietitians, Respiratory Care, Physical Therapy, Child Life
DCH Charter

- An improvement opportunity exists with spinal deformity patients who are having instrumentation inserted to correct curves. These patients will be separated into two categories: healthy adolescents who have a curvature due to idiopathic reasons and patients who have a curvature due to a neuromuscular/congenital reason.

- This team process will begin in August 2013 and will end with a completed CPG in September 2014.

- The current process creates inconsistency in pain management with the utilization of an epidural catheter, various opioid and other non-opioid medications that varies depending on the orthopedic surgeon.

- This improvement will result in a consistent, unified pain plan utilized for all patients with the ability to individualize based on the patient's needs.

Initial Team Meetings

- Instruction from Corporate Education staff regarding our CPI process
- Handbooks were supplied to all members
- Team spent time establishing the team process including rules for discussion, timelines and commitment

SPINAL ROD PAIN PATHWAY

- Based on the literature
- Reviewed approximately 50 articles
- Development of the pathway took approximately 3 months
- Initiated October 2014 as a part of the entire spinal rod improvement pathway
Initial Spinal Rod Pain Pathway

Data Collection 2016-Process Data
Goals of new pain pathway:
- Provide better pain control without significant sedation
- Initiate a variety of different medications which focus on both central and peripheral pain receptors
- Improve ability of patients to be up and out of bed earlier to prevent pulmonary and circulatory complications
- Decrease time to discharge for idiopathic patients

Acute Pain Service Team will manage pain in all spinal rod patients/evaluate patients 3 weeks prior to surgery for pain plan
- Idiopathic/Neuromuscular patients will be pre-medicated with gabapentin
- Idiopathic patients will have a PCA with hydromorphone started in PACU. These patients will come directly to the surgical unit after PACU. Other medications include scheduled IV methadone, IV methocarbamol
- Neuromuscular patients will have a PCA with hydromorphone, but will receive intrathecal duramorph. These patients will go to the PICU after surgery

Patients have IV ketorolac and IV acetaminophen in addition to opioids
- Patients utilize oxycodone and gabapentin for pain control when tolerating PO
- Patients receive a Child Life Consult for distraction techniques
- If needed, psychology consult may be obtained for relaxation and breathing exercises
- Additional planned changes in Fall 2017 related to utilization of liposomal bupivacaine in the insertion site.
Changes in Pain Pathway June 2017

- Overall, pain pathway changes have worked well and have decreased sedation, improved pain control, increased ability to be up in chair/walking and decreased length of stay.

- One challenging issue has been related to management of constipation with traditional care, adding methylnaltrexone/naloxegol to the pathway.

Data –Pathway Changes 2017

- Initial comments from patients, families, providers and staff have been very positive regarding the pain process.

- Concurrent changes in the pathway have occurred as small tests of change.

- Collecting both process and outcome data, will be updated and reported December 2017.

References


Questions /Sharing

THANK YOU!

- Lucinda Brown DNP, CNS
- brown@childrensdayton.org