Implementing Electronic Preoperative Packets
WHAT WE ARE TRYING TO ACCOMPLISH?

OUR AIM STATEMENT

The aim of this project is to decrease the number of joint service orthopaedic pre-surgery resident call-backs due to incomplete and/or missing pre-surgical paperwork by 50% by January 2017.

(Provide complete, legible, useable data from clinic to hospital = ↑ quality)
(Improve “DRG weighting” = correctly bill (↑$) for our sicker patients)
<table>
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<th>Task</th>
<th>Timeframe</th>
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<tr>
<td>Team Established</td>
<td>July 2016</td>
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<tr>
<td>AIM Statement Created/Finalized</td>
<td>August - September 2016</td>
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<tr>
<td>Process Map/Fishbone Diagram Created</td>
<td>September 2016</td>
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<td>Baseline Data Collected</td>
<td>September 2016 - Current</td>
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<td>Driver Diagram Created</td>
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<td>Intervention Implemented</td>
<td>December 2016</td>
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<td>Data/ROI Analysis</td>
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<td>January 2017</td>
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Despite major investments in computers, paper preoperative forms (including History & Physical form, Form 92, and surgical consent) are still the major form of information transfer at the MARC Orthopaedics Clinic.

Paper forms that are faxed to University Hospital prior to a patient’s surgery often result in incomplete items or missing paperwork.

Orthopaedics residents are called by the nursing staff at University Hospital when a patient’s preoperative paperwork is incomplete or missing.

Lack of medical history can result in under billing by hospital.
Consent form

Current preoperative packet:

- Handwritten
- Faxed to hospital
- Carried by resident
PROBLEMS WITH PAPER

- Poor use of RN/MD time and decreased job satisfaction
- Delayed starts/RN/MD calls*
- Poor quantity/quality of medical information
  - Rumors of legibility problems
  - Medical errors ~ complications/readmissions
  - Incomplete hospital coding of medical issues
    - Less revenue due to “under-coding”*
    - Inaccurate “risk adjustments” for quality metrics*

(* Potential metrics for CSE course time frame)
Incomplete or missing paperwork and the resulting resident call-backs can be a source of surgical delays as well as dissatisfaction with the current system.

Issa et al., 2005

- 27% of completed paper consent forms had unacceptable or undocumented procedures, purposes, and benefits
- 49% of completed paper consent forms were missing alternative treatment options; remaining 51% were significantly deficient
- 8.3% of completed paper consent forms were missing documentation of patient prognosis
- Concluded that paper consent forms frequently contain incomplete, illegible and/or misleading information
PREOPERATIVE PAPERWORK PROCESS
MARC Orthopaedics Clinic to UHS

EPIC generates preoperative packet:
- H&P
- Form 92
- Consent

Clearance needed?

Ortho consent & scheduling

Preop packet to hospital EMR “Direct Address”

Day of surgery: Preop RN & Anesthesia

Criteria met?

Task(s) Completed

RN calls resident

Criteria met?

Patient to room

Hospital plan:
- Financial check
- PAC Option
- PT
- Risk Eval/Adj
- POP order recs

Preoperative clinic

Ortho consent & scheduling

N

Y

N

Y

N

N
Create dedicated electronic site for orthopaedic pre-op packets
Coordinate with UHS RNs to create a single destination for packets
Develop electronic consent form
Use clinic computer to act as a “checklist” for:
1) Text/laterality of procedure
2) Standard risks
3) Automatic placement of date/time
Develop electronic H&P form
Incorporate H&P templates into EPIC:
1) Transfer summary clinical data from EMR to H&P
2) “Forced fields” for critical elements

Interventions
Primary Drivers
Outcome

Make it easier for UHS team to find surgical patient’s pre-op packet
Increase comprehensiveness of consent form to reduce issues of legibility, laterality, date/time, etc.
Increase completeness of H&P form to reduce clinic time and form space issues

↓ “call-backs” by 50%
(↑ DRG w/CC or MCC)
(↓ complications/readmissions)
Nursing staff completed a brief electronic survey on REDCap or on paper every time that an orthopaedics resident had to be called due to missing or incomplete preoperative paperwork. Because resident calls occur relatively infrequently, the number of days between calls were calculated. The number of days between calls before the intervention is implemented will be compared to the number of days between calls after the intervention is implemented.

Additionally, short electronic REDCap surveys were sent to orthopaedics residents, nursing staff, and anesthesiologists at University Hospital. Using Likert-type scales to address questions on both style of forms (i.e., paper vs. electronic), respondents indicated their satisfaction, the form’s legibility, and the completeness of the medical information on the form.
Orthopaedics Preop Survey

Were you called by a preoperative RN or anesthesia team member prior to a patient’s surgery due to incomplete or missing patient information?
- Yes
- No

Was the call for an elective case (MARC or Trauma Service) or urgent/emergent surgery case (Trauma Service/ER)?
- Elective (from the MARC)
- Elective (from the Trauma Service)
- Urgent/Emergent (from the Trauma Service or ER)

Which of the following was the reason why you were called?
- H&P form
- Form 92
- Surgery consent form
- Marking
- Other
Rate your level of satisfaction with the completion process of the current version of the preoperative packet (i.e., H&P, Form 92, surgery consent).
- Not at all satisfied
- Slightly satisfied
- Moderately satisfied
- Very satisfied
- Extremely satisfied

Rate your assessment of the legibility of the current version of the preoperative packet.
- Poor
- Fair
- Good
- Very good
- Excellent

Rate your assessment of the completeness of the medical information provided in the current version of the preoperative packet.
- Poor
- Fair
- Good
- Very good
- Excellent
G-CHART OF BASELINE DATA (FROM REDCAP)

Days Between RN Call-Backs to Orthopaedic Residents

- **Average, 7.00**
- **UCL, 29.45**

Days Between Events

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
G-CHART OF BASELINE DATA (FROM PAPER FORMS)

Days Between RN Call-Backs to Orthopaedic Residents

- Average: 7.43
- UCL: 31.17
PARETO CHART OF BASELINE DATA

Reason for Resident Call-Back

- Consent Form: 40%
- H&P Form: 70%
- Form 92: 90%
- Marking: 100%
100% of RNs and anesthesiologists responded that they were either “slightly satisfied”, “moderately satisfied”, or “not at all satisfied” with the paper version of the preoperative packet.

- No RNs or anesthesiologists were “very satisfied” or “extremely satisfied”
75% of RNs and anesthesiologists rated legibility of paper packet as “fair” or “poor”

75% of RNs and anesthesiologists rated completeness of medical information provided in the paper packet as “fair” or “poor”
% OF PATIENTS WITH CC/MCC
(RISK ADJUSTMENT FROM ADEQUATE CODING)

University Health System
Comparison of DRGs with and without CC/MCC
% OF PATIENTS WITH CC/MCC
(RISK ADJUSTMENT FROM ADEQUATE CODING)

University Health System
Comparison of DRGs with and without CC/MCC

~85% without

~15% with
**Intervention:** Convert paper forms to electronic forms

Work with EMR and IT infrastructure to:

- Build electronic preoperative packets into EPIC
- Use existing patient data in EPIC to populate electronic forms
- Electronically send data from EPIC to Sunrise/OnBase convenient to RNs/Anesthesia
Converting from paper to EMR challenged by:

1. 2 EMR systems (that don’t yet communicate well)
2. Overtasked IT staff
   - Not directly dependent on clinical efficiency
   - Competing priorities
3. EMR vendors’ sense of proprietary needs
4. HIPPA: challenges in “data sharing”
DO: IMPLEMENTING THE CHANGE
KEY TIMELINE

- April 2016 - First contact EPIC and Sunrise IT teams
  - EPIC national: Options given
  - EPIC local: “Upgrading” to new version priority
- August 2016 - EPIC local commits to support project:
  - CMIO “I can give you up to 80 hours”
- August 2016 - UHS VP Clinical Services provides hospital IT contacts
- October 2016 – First EPIC analyst meeting
- November 8, 2016 - Meeting of Sunrise and EPIC IT leaders: “This can be done”
  - Option 1: OnBase (PDF bank) via fax
  - Option 2: “Meaningful Use”
    - CCD - Continuity of Care Document = “data document standard”
    - HL7 (leader in healthcare IT standards)
- December 19, 2016 – “Go live” Beta version of EPIC H&P
- December 20, 2016 – First electronic patient H&P created for use
Office Visit

Marc M. Dehart, MD
Orthopaedic Surgery

Status: Signed

Status post total left knee replacement +1 more
Dx

Follow Up  
Referred by Swetha Pathi, MD
Reason for visit

Patient ID: [redacted]
is a(n) 26 y.o. female.

HPI:
TKA by DeHart Sept 2016 did better for 3 months then progressive pain, fever and swelling in knee. Seen in Houston: ESR 50, CRP 152 aspiration. WBC 4940 Segs 95%
+ Group A Beta Hemolytic Streptococcus (susceptible to PCN)

Conservative Treatments Tried in the Past: S/P Right and Left TKA at UHS
Prior Surgery on operative side: Sept 2016 L TKA

PMH:

Medical:
Past Medical History
Diagnosis Date
• Asthma
• Rheumatoid arthritis (714.0)

Surgical:
Past Surgical History
Procedure Laterality Date
• Hx knee replacement (total)
  Right 06/28/2016
• Hx knee replacement
  Left 09/19/2016
Office Visit
Marc M. Dehart, MD at 12/20/2016 8:30 AM
Status: Signed

Patient ID: [redacted] a(n) 26 y.o. female.

HPI:
TKA by DeHart Sept 2016 did better for 3 months then progressive pain, fever and swelling in knee. Seen in Houston: E aspiration. WBC 4940 Segs 95% + Group A Beta Hemolytic Streptococcus (susceptible to PCN)

Conservative Treatments Tried in the Past: S/P Right and Left TKA at UHS
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PMH:
Medical:
Past Medical History
Presenting Symptoms: Left knee pain with swelling
Past Medical History
Diagnosis
• Asthma
• Rheumatoid arthritis (714.0)

Surgical:
Past Surgical History
Presenting Symptoms: Left knee pain with swelling
Past Surgical History
Procedure
• Hx knee replacement
• Hx knee replacement
• Hx knee replacement
Laterality Date
Right 06/28/2016
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PMH:

Medical:
- Past Medical History
  - Diagnosis
    - Asthma
    - Rheumatoid arthritis(714.0)

Surgical:
- Past Surgical History
  - Procedure
    - Hx knee replacement
      - Right
      - Left

Social History:

Occupational History
- Not on file.

Social History Main Topics
- Smoking status: Never Smoker
- Smokeless tobacco: Not on file
- Alcohol use: Yes
  - Comment: occasionally
- Previous surgeries: No
This is some of the info needed to correctly code the comorbidities for proper billing of DRG (important for ROI later...).
Current Medications:
Current Outpatient Prescriptions

<table>
<thead>
<tr>
<th>Medication</th>
<th>Sig</th>
<th>Dispense</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydrocodone-acetaminophen (NORCO)</td>
<td>take 1 Tab by mouth</td>
<td>60 Tab</td>
</tr>
<tr>
<td>10-325 MG Oral per tablet</td>
<td>EVERY 6 HOURS AS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NEEDED for Pain.</td>
<td></td>
</tr>
<tr>
<td>gabapentin (NEURONTIN) 100 MG Oral capsule</td>
<td>take 100 mg by mouth 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TIMES DAILY.</td>
<td></td>
</tr>
<tr>
<td>celecoxib (CELEBREX) 100 MG Oral capsule</td>
<td>take 100 mg by mouth 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TIMES DAILY.</td>
<td></td>
</tr>
<tr>
<td>acetaminophen-codeine (TYLENOL #3)</td>
<td>take 1 Tab by mouth</td>
<td></td>
</tr>
<tr>
<td>300-30 MG Oral per tablet</td>
<td>EVERY 4 HOURS AS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NEEDED for Pain.</td>
<td></td>
</tr>
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</table>

No current facility-administered medications for this visit.

Allergies / Adverse Reactions: No Known Allergies
Non-Prescription Medications: No

Review of Systems:
Surgical Review of Systems:
Negative for anesthetic related issues
Negative for DVT/PE
Negative for Easy bleeding/bleeding disorders

Physical Examination:
Mental Status: Alert and Oriented
Heart: Regular Rate
Lung: Moving air freely, clear
HEENT: within normal limit
Abdomen: soft, benign, nontender
Genital/Urinary System: deferred

Musculoskeletal:
Gait: Normal Community Ambulator
Ambulatory aids: None
Skin: Dry and intact, Well healed surgical scar, anterior and Erythema
G-CHART OF POST-INTERVENTION DATA

Days Between RN Call-Backs to Orthopaedic Residents

Days Between Events

UCL, 27.95
Intervention Begins on 12/20/16
Average, 6.63
C-CDA IG Purpose: Single Source for CDA Templates

<table>
<thead>
<tr>
<th>Document Template</th>
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<tr>
<td><strong>Continuity Of Care Document (CCD)</strong></td>
<td>Allergies, Medications, Problem List, Procedures, Results, Advance Directives, Encounters</td>
</tr>
<tr>
<td><strong>History &amp; Physical (H&amp;P)</strong></td>
<td>Allergies, Medications, Problem List, Procedures, Results, Family History, Immunizations, Assessments</td>
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Section templates in GREEN demonstrate CDA’s interoperability and reusability.


Document Templates: 9
- Continuity of Care Document (CCD)
- Consultation Note
- Diagnostic Imaging Report (DIR)
- Discharge Summary
- History and Physical (H&P)
- Operative Note
- Procedure Note
- Progress Note
- Unstructured Document

Section Templates: 60
Entry Templates: 82

Office of the National Coordinator for Health Information Technology
C-CDA IG Purpose: Single Source for CDA Templates

**HL7 Implementation Guide for CDA R2:**
IHE Health Story Consolidation, DSTU
Release 1.1
(US Realm)
July 2012

**Document Templates:** 9
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<td><strong>Continuity Of Care Document (CCD)</strong></td>
<td>Allergies Medications Problem List Procedures Results Advance Directives Encounters Family History Functional Status Immunizations Medical Equipment Payers Plan of Care</td>
</tr>
<tr>
<td><strong>History &amp; Physical (H&amp;P)</strong></td>
<td>Allergies Medications Problem List Procedures Results Family History Immunizations Assessments Assessment and Plan Plan of Care Social History Vital Signs History of Present Illness History of Present Illness</td>
</tr>
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Section templates in GREEN demonstrate CDA’s interoperability and reusability.
CCDA = the vehicle for transfer

CCDA = “EMR certified” = $ 

Advancing Care Information = $ 

(Used to be: “Meaningful Use”) 

($ allows an ROI for our CS&E project)
Average Differences in PAYMENTS COLLECTED (not charges) per case between primary total hip/knee with and without comorbidities:

($ for 469 with CC) – ($ for 470 without CC) = varies by payer

Medicare = $13,158
Medicaid = $1,306
HMO/PPO = $23,716
Carelink/UHS/self pay = $0
Bedwell payer mix:

- Medicare: 38%
- Medicaid: 14%
- HMO/PPO/BCBS: 11%
- Carelink/UHS: 29%

Actual payer mix for primary joints during last ~2 years:

- Medicare: 38%
- Medicaid: 14%
- HMO/PPO/BCBS: 11%
- Carelink/UHS: 29%

Average # primary joints per year ~ 130

For every 1% increase in CC ~ $10K
% OF PATIENTS WITH CC/MCC
(RISK ADJUSTMENT FROM ADEQUATE CODING)

University Health System
Comparison of DRGs with and without CC/MCC

~85% without

~15% with
Using only costs of programmers:

Epic Analyst = ~$70K per year
+30% benefits
46 weeks/year 5 days/week 8 hours/day
= ~ $3800 for 80 hours
RETURN ON INVESTMENT

\[
\text{ROI} = \left( \frac{\text{Marginal Revenues} - \text{Marginal Expenses}}{\text{Implementation Expenses}} \right) \times 100
\]

Programmer costs only:

\[
\text{ROI} = \frac{\$10K - \$3800}{\$3800} = 161\%
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\]

Programmer costs only:

\[
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\]

Total costs of CSE project:

programmer 80 hours + student participants \times 9 days
(1 Staff + 2 Residents + 1 Research Assistant)

\[
ROI = \frac{\$10K - (\$3800 + \$27800)}{\$31600} = -68\%
\]
RETURN ON INVESTMENT

ROI = \frac{\text{Marginal Revenues} - \text{Marginal Expenses}}{\text{Implementation Expenses}} \times 100

Programmer costs only:
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Total costs of CSE project (1 Staff + 2 Residents + 1 Research Assistant):

- Programmer 80 hours
- Additional costs

ROI = \frac{$10K - ($3800 + $27800)}{($31600)} = -68\%

Need ↑4% CC or 4 years to get + ROI
Return on Investment:
The Intangibles: Things Difficult to Measure

Quality issues:
- Legibility for Anesthesia and Perioperative RN staff
- Will better information translate into less complications/readmissions?
Quality issues:
- Legibility for Anesthesia and Perioperative RN staff
- Will better information translate into less complications/readmissions?

Efficiency issues:
- Clinic orthopaedic residents/staff
- Computer use for creation
- Electronic document saved in set location
- Single site location for “electronic H&P” C-CDA (Awaiting SUNRISE/EPIC support)
LESSONS

1. Everything takes longer than anticipated
2. In large systems, nothing happens without high-level leadership support
   \[ \text{leadership} = \text{project “horsepower”} \]
3. Select a metric that:
   - System is already collecting and matters
   - System is invested in collecting
   - All parties believe matters
4. Solutions that solve multiple problems can gather more system support
5. Rome wasn’t built in a day
   - Simple, little projects are easier/faster
   - Effort/time increases exponentially with # of systems/departments involved
• Late implementation of intervention foils extensive post intervention measurement
ACT: SUSTAINING THE RESULTS AND FUTURE PLANS

- Plans to continue electronic H&P:
  - Measurement of CC vs no CC – routine hospital function
  - Measurement of readmissions ongoing

- If “Beta-version” useable:
  - Share pilot program with other units in department
  - Share pilot program with other EPIC using clinics

- Relationship with EPIC team enhanced and groundwork for outcomes collection established, pending admin approval/leadership support
TEAM

Braden Boyer  Ryan Egbert  Sarah Speicher  Marc DeHart, MD  John Toohey, MD
Thanks to some of the many folks who helped:

Sherry Martin: Consultant

Claudia Thames – Orthopaedic Clinical Operations MARC
Sue Adams – Ortho Benefits Coordinator

UTHSCSA Computer Gurus: Tim Barker MD CMIO
Diana Burnett – CIS Analysis
Heather Grosjean EpicCare Analyst

UHS OR RNs: Polly Smith, Preop RN lead
Joann Piliado, RN
Lenora Bartley, Preop Admin Assistant

UHS Number Crunchers: Heidy Colón-Lugo, PhD – Health Analytics
Bill Bedwell - Exec Dir Reimbursement Treasury

UHS Computer gurus:
Bill Phillips, Chief Information Officer
Paula Herring, On Base Directing Manager
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“Elves and nurses do have something in common. We do all the work and one guy in an over-sized coat gets all the credit.”