Reducing Readmission: What Strategies Will Work?

Sharon Weber, MD
Tim and MaryAnn McKenzie Chair of Surgical Oncology
Vice Chair of Academic Affairs, General Surgery
Director of Surgical Oncology, UW Carbone Cancer Center
University of Wisconsin School of Medicine and Public Health

Outline

• Readmission and the ACA
• Scale of the problem
  – Risk factors
  – Predictive models: Accuracy
• Interventions to reduce readmission
• Systems engineering evaluation of readmission
  – Adaptation of transitional care protocol
    • Future intervention trial
Readmission and the ACA

- 2008: Medicare Payment Advisory Committee (MedPAC) encouraged bundling of care around episodes to reduce costs of care.

- 2010: Patient Protection and Affordable Care Act
  - Pay for performance through hospital value based purchasing
  - Overall emphasis on value over volume

- 2012: Hospital Readmission Reduction Project initiated by CMS
  - Hospitals penalized for higher than benchmark readmissions
    - Payment linked to outcome
    - Acute MI, CHF, and pneumonia
  - Benchmark rate July 1 2008 – June 30 2011

Readmission and the ACA

- HRRP 2015: Now includes surgical procedures
  - Total hip/knee arthroplasty added 2014
  - CABG next
  - All-cause readmission reported

- Concerns:
  - Number of hospitals impacted
    - Initial reports estimated 5% of hospitals were outliers but currently 2/3 of hospitals are penalized
  - Disproportional impact on at-risk population
  - SES not included in calculation
    - Safety net hospitals and minority-serving hospitals disproportionately impacted

Weber SM Surgery 2014;156(5):1066-8
Merkow, JAMA, 2015;313:483-95
Hospital Compare

Readmission after hip/knee surgery

[Diagram showing readmission rates for different hospitals]

https://data.medicare.gov/data/hospital-compare

Hospital Compare

All-cause (hospital-wide) readmission

[Diagram showing readmission rates for different hospitals]

https://data.medicare.gov/data/hospital-compare
Care Coordination Initiatives

- IOM estimates $240 billion in annual savings from enhanced care coordination initiatives
  - CMS: Accountable Care Organizations and Meaningful Use Attestation for Care Coordination
  - NCQA: 6 care coordination standards
  - NQF: 5 endorsed care coordination measures
  - AHRQ: Care Coordination Framework

Is The Focus on Readmission Working?

- Medicare data
  - 100,000 fewer readmissions from 2013-14
- Surgery specific data
  - Jencks, et al 2009
    - 2003-04 CMS data: 15.6% of surgical patients readmitted
  - Tsai, et al 2013
    - 2009 CMS data: 13.1%

Jencks SF et al. NEJM 2009;360:1418-28
Tsai et al. NEJM 2013;369:1134-42
Defining The Extent and Cause of Problem

- Nearly 500,000 patients
  - Bariatrics, colectomy/proctectomy, hysterectomy, total hip or knee replacement, ventral hernia repair, LE vascular bypass
- Unplanned readmission 5.7%
  - Only 2.3% due to complication that occurred in hospital
  - Most were due to post-discharge complications
  - Most common
    - SSI 20%
    - Delayed return of bowel function 10%
    - Bleeding 5%

Merkow, JAMA, 2015;313:483-95

Risk-adjusted surgical readmission rates vary widely: Why?

Distribution of Risk-Adjusted 30-Day Readmission Rates for Six Surgical Procedures across U.S.

CABG, Lobectomy, endovascular or open AAA, colectomy, hip replacement

Tsai, NEJM, 2013;369:12
Surgical volume has a strong inverse relationship with readmission rates

Higher surgical volume and lower mortality rates independently associated with readmission

A Valid Surgical Quality Metric?

- What does readmission measure in surgical patients?
  - Post-discharge complications drive readmission
  - Patient-specific socio-demographic factors play important role
    - Insurance, poverty, race
    - Not measured well in administrative databases
- Are readmissions a valid marker of poor quality?
  - No:
    - Likely enhance the quality of care for complications
      - Failure to rescue
    - Patients do not see readmission as an issue
  - Yes:
    - Volume/mortality relationship

Tsai, NEJM, 2013;369:12
Merkiow, JAMA, 2015;313:483-95
Tsai et al. NEJM 2013;369:1134-42
Preventable Readmissions

• What readmissions are preventable?
  – MedPAC definition:
  – Readmission could have been prevented by
    • Provision of quality care in the hospital
    • Adequate discharge planning
    • Adequate follow up
    • Improved care coordination

Readmission Reduction: Interventions

• No study in surgical patients exclusively
• Medical data:
  – Systemic review, 2011 and 2014
  – 47 intervention trials
  – Minor representation of surgical patients
    • No analysis of differences between medical and surgical patients

Hansen, Ann Int Med 2011;155:520-8
Targets In Existing Intervention Trials

- **Inpatient Stay**
  - Discharge
    - **PredischARGE Interventions**
      - Patient education
      - Med reconciliation
      - Discharge planning
    - **Bridging Interventions**
      - Transition coach
      - MD continuity (Inpt/outpt)
      - Patient-centered discharge instructions
    - **Postdischarge Interventions**
      - Follow-up call
      - Patient-activated hotlines
      - Timely follow-up visit

Intervention Trials

- Simple (single) interventions not effective
  - Complex interventions needed
    - Multiple components
    - Involving more individuals in care process
    - Supporting patient capacity for self-care
- Tested interventions effective at decreasing readmissions
  - RR 0.82 (95% CI 0.73-0.91)
  - Trials published before 2002 more effective
    - Likely reflecting institutional efforts aimed at reducing readmission over time
    - Changing culture

Hansen, Ann Int Med 2011;155:520-8
Leppin, JAMA Int Med, 2014;174:1095-1107
Risk Prediction: Mixed Medical/Surgical

• Systemic review
• Mixed medical and surgical patients

Overall, poor performance for risk prediction, regardless of when or how data was obtained

Models that included functional and social variables improved model discrimination  
Kansagara, JAMA, 2011;306:1688-98

<table>
<thead>
<tr>
<th>n: Trials</th>
<th>Data Source</th>
<th>Timing</th>
<th>C-statistic</th>
<th>Risk Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Retrospective administrative data</td>
<td></td>
<td>0.55-0.65</td>
<td>POOR</td>
</tr>
<tr>
<td>7</td>
<td>Real time admin data/primary data</td>
<td>Early during hospitalization</td>
<td>0.56-0.72</td>
<td>MODERATE</td>
</tr>
<tr>
<td>5</td>
<td>At discharge</td>
<td></td>
<td>0.68-0.83</td>
<td>MODERATE</td>
</tr>
</tbody>
</table>

Surgical Models: Risk Prediction

2011 NSQIP Data

• Complex and parsimonious data set: equal performance
  – LOS/2 + ASA class
  – PPV poor but reasonable NPV

TABLE 3. Area Under the Receiver Operator Curve for Complex All-Variable Prediction Model and Parsimonious Readmission Score

<table>
<thead>
<tr>
<th>Generation Sample</th>
<th>Complex Model Readmission Score</th>
<th>Validation Sample</th>
<th>Complex Model Readmission Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.721</td>
<td>0.696</td>
<td>0.724</td>
</tr>
<tr>
<td>General surgery</td>
<td>0.713</td>
<td>0.687</td>
<td>0.710</td>
</tr>
<tr>
<td>Upper GI</td>
<td>0.699</td>
<td>0.659</td>
<td>0.666</td>
</tr>
<tr>
<td>S&amp;L intestine</td>
<td>0.650</td>
<td>0.591</td>
<td>0.640</td>
</tr>
<tr>
<td>HPB</td>
<td>0.657</td>
<td>0.598</td>
<td>0.583</td>
</tr>
<tr>
<td>Vascular</td>
<td>0.696</td>
<td>0.637</td>
<td>0.690</td>
</tr>
<tr>
<td>Thoracic</td>
<td>0.700</td>
<td>0.597</td>
<td>0.576</td>
</tr>
</tbody>
</table>

*Readmission score = LOS/2 + ASA class, rounded up. ASA indicates American Society of Anesthesiologists; GI, gastrointestinal; HPB, hepatopancreatobiliary; LOS, length of stay; S&L, small and large.

TABLE 4. Overall Readmission Rate, Sensitivity, and Specificity by Readmission Score in the Validation Sample

<table>
<thead>
<tr>
<th>Readmission Score</th>
<th>Readmission, % (95% CI)</th>
<th>Sensitivity, % (95% CI)</th>
<th>Specificity, % (95% CI)</th>
<th>PPV, % (95% CI)</th>
<th>NPV, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.2 (42.5,17)</td>
<td>100</td>
<td>9</td>
<td>8</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>2.4 (103/14,69)</td>
<td>96</td>
<td>6</td>
<td>10</td>
<td>98</td>
</tr>
<tr>
<td>3</td>
<td>6.1 (199/16,05)</td>
<td>92</td>
<td>28</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>8.1 (144/14,27)</td>
<td>77</td>
<td>52</td>
<td>12</td>
<td>97</td>
</tr>
<tr>
<td>5</td>
<td>11.4 (180/13,18)</td>
<td>55</td>
<td>73</td>
<td>15</td>
<td>95</td>
</tr>
<tr>
<td>6</td>
<td>14.6 (17/19,40)</td>
<td>85</td>
<td>85</td>
<td>17</td>
<td>94</td>
</tr>
<tr>
<td>7</td>
<td>17.2 (53/3,80)</td>
<td>71</td>
<td>92</td>
<td>22</td>
<td>93</td>
</tr>
<tr>
<td>8</td>
<td>20.3 (40/3,94)</td>
<td>97</td>
<td>97</td>
<td>31</td>
<td>93</td>
</tr>
<tr>
<td>9</td>
<td>22.2 (69/3,97)</td>
<td>100</td>
<td>100</td>
<td>22</td>
<td>92</td>
</tr>
<tr>
<td>10</td>
<td>46.0 (28/2,5)</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>7.4 (2,23/46,76)</td>
<td>100</td>
<td>100</td>
<td>22</td>
<td>92</td>
</tr>
</tbody>
</table>

Surgical Models: Risk Prediction
*Single Institutional Data: University of Wisconsin*

2006-2011

UW NSQIP

3,188

30 day mortality

28 (0.88%)

Alive at 30 days

3,158

Urgent Case

350

Elective Case

2,808

Planned Readmission

9

Unplanned Readmission

265 (10.2%)

No Readmission

2,514

Study population = 2,799 patients

Tevis, JAMA Surg, 2015; Apr 22

Predictive Nomogram Developed

Tevis, JAMA Surg, 2015; Apr 22
### Validated Retro- and Prospectively

<table>
<thead>
<tr>
<th></th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
<th>C statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrospective Validation</td>
<td>1.082</td>
<td>1.032-1.134</td>
<td>0.001</td>
<td>0.668</td>
</tr>
<tr>
<td>Prospective Validation</td>
<td>1.194</td>
<td>1.115-1.278</td>
<td>&lt;0.001</td>
<td>0.787</td>
</tr>
</tbody>
</table>

Tevis, JAMA Surg, 2015;Apr 22

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### Negative Predictive Value High

<table>
<thead>
<tr>
<th>Predicted Readmission Risk</th>
<th>Study Population</th>
<th>Retrospective Validation Group</th>
<th>Prospective Validation Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td></td>
<td>PPV NPV</td>
<td>PPV NPV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2% 94.8%</td>
<td>12.9% 94.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.5% 96.9%</td>
<td></td>
</tr>
</tbody>
</table>

Tevis, JAMA Surg, 2015;Apr 22
Surgical Risk Prediction: Limitations

- Limited sociodemographic information
  - Social support, insurance status, self-efficacy, caregiver availability missing
- NSQIP: 30d postoperative readmission rate

Current Research Focus: Readmission Reduction
Transitional Care: Definition

- A set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care in the same location.

Coleman. JAGS. 2003

Transitional Care Services Combat System Fragmentation

- Health care staff bridge the hospital and home.
- Post-hospital home visits to teach patients about their care and conditions.
- Decrease rehospitalizations by 30%.

Naylor, JAMA, 1996; Coleman, Archives, 2005
Enhancing Transitional Care

- Surgical readmissions different from medical readmissions, beyond inciting factors (complications)
  - Active issues at time of discharge
    - New patient education NOT part of chronic medical illness
    - Unpredictable
    - Patient vulnerable: Altered cognition
  - Planned/elective surgery: opportunity for pre-op education
  - Same surgeon follows postoperatively
- Transitions of care
  - High impact target for quality improvement
  - “Care between visits”
- Readmission prediction tools are inaccurate

Prior studies have neglected the patient perspective:
Can including the patient’s perspective enhance our understanding of readmission?

Kansagara, JAMA 2011;306:1688-98

A Systems Engineering Evaluation of Readmission Following Complex Abdominal Surgery
Engineering/Health Care Partnership

  - U.S. healthcare industry has neglected engineering strategies
  - Identify engineering tools and technologies for delivering safe, effective, timely, patient-centered, efficient and equitable care (2001 IOM Report Crossing the Quality Chasm)

Systems Engineering Initiative for Patient Safety (SEIPS) Framework

Pascale Carayon, PhD

Structure

WORK SYSTEM

PROCESS

OUTCOMES

External Environment

Technological and Tools

Organization

Patient

Physical Environment

Task

Patient Outcomes: quality of care - patient safety

Employee & Organizational Outcomes

Carayon, Qual Saf Health Care, 2006

CQPI

Center for Quality & Productivity Improvement
Methods

• Mixed-methods approach
  – Patient and clinician-provider perspective
  – Medical record review
  – Convergent parallel design

• Key informant interviews
  – Readmitted within 30 days of discharge following colorectal, pancreas, liver or esophageal surgeries
  – Face-to-face interviews within 48 hrs of readmission, guided by SEIPS model
  – Focus group of clinician providers

Methods

• Interview and focus group content analyzed for emergent themes, guided by the SEIPS model
  – Content subjected to thematic analysis
  – Repeated review and constant comparison by 2 reviewers to identify emergent themes
    • Initial coding framework developed from content

Acher, JACS, 2015 Oct;221(4):810-20
Study Participants

- Patients: 21 approached, 18 enrolled
  - 86% accrual

- Focus Group Participants
  - Physicians (2 surgical residents)
  - Inpatient nurses (2)
  - Case manager
  - Pharmacist

- 6/6 agreed to participate

Patients

<table>
<thead>
<tr>
<th>Surgical procedures</th>
<th>n (%)</th>
<th>n (%) cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal</td>
<td>8 (44%)</td>
<td>3 (38%)</td>
</tr>
<tr>
<td>Pancreatectomy</td>
<td>7 (39%)</td>
<td>6 (86%)</td>
</tr>
<tr>
<td>Hepatectomy</td>
<td>2 (11%)</td>
<td>0</td>
</tr>
<tr>
<td>Esophagectomy</td>
<td>1 (6%)</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>10 (56%)</td>
</tr>
</tbody>
</table>
Patient Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Median or n (%)</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs</td>
<td>62</td>
<td>24-82</td>
</tr>
<tr>
<td>Female</td>
<td>10 (56%)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>17 (94%)</td>
<td></td>
</tr>
<tr>
<td>Index length of stay, days</td>
<td>7</td>
<td>5-38</td>
</tr>
<tr>
<td>Time to readmission, days</td>
<td>8</td>
<td>1-25</td>
</tr>
<tr>
<td>Interview length, minutes</td>
<td>34</td>
<td>20-110</td>
</tr>
</tbody>
</table>

Patient Encounters Prior to Readmission

- Majority of patients (72%) were readmitted before their scheduled surgical follow-up appointment
  - Readmitted 1-13 days (median 7d) before scheduled appointment
Principle Diagnosis

<table>
<thead>
<tr>
<th>Principle diagnosis for readmission</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td>Abscess/intra-abdominal fluid collection*</td>
<td>9</td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>6</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1</td>
</tr>
<tr>
<td>Urinary tract infection [UTI]*</td>
<td>1</td>
</tr>
<tr>
<td>Small bowel obstruction</td>
<td>2</td>
</tr>
<tr>
<td>Delayed gastric emptying</td>
<td>2</td>
</tr>
<tr>
<td>Dehydration*</td>
<td>3</td>
</tr>
<tr>
<td>Palliative care/failure to thrive</td>
<td>1</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>1</td>
</tr>
<tr>
<td>Possible hemorrhage</td>
<td>1</td>
</tr>
</tbody>
</table>

*Recorded > 1 diagnosis: UTI and intra-abdominal fluid (1), dehydration and UTI (1), dehydration and diarrhea (1), dehydration and steroid withdrawal (1)

Summary: Themes

- Poor understanding/unrealistic expectations for recovery
- Altered cognition contributed
  - Anxiety
  - Illness severity
  - Pain medication

Acher, JACS, 2015 Oct;221(4):810-20
Summary

• Multiple areas of focus for systems improvement!
  – Discharge preparation
  – Educational process and materials
  – Care team structure/communication
    • Variability in expertise for teaching
  – Service coverage
• What we are providing the patient is not enough to meet their needs
  – Need to enhance care between visits
• Caregiver involvement essential

Future Intervention: Reduce Readmission through Enhanced Transitional Care

• Implementation science:
  – ‘the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and hence, to improve the quality and effectiveness of health services’

Coordinated-Transitional Care Program (C-TraC)

- Principles of telemedicine and nurse case management
- Modified Coleman Care Transitions Intervention™ model
- Protocolized phone-based program utilizing
  - Specially-trained RN nurse case manager
  - Transitional care protocols

Coleman, Archives, 2005
Kind, Health Aff, Dec 2012;31:2659-68

C-TraC Goals

Coleman’s Four Pillars of Transitional Care:

1. Educate and empower the patient/caregiver in medication management
2. Ensure the patient/caregiver has follow-up appointments
3. Educate the patient/caregiver regarding red flags
4. Ensure the patient/caregiver knows whom to contact if questions arise

Coleman model: Readmission reduced by 40% but:
45 - 86% refuse home visits
Geographic reach problematic
Coordinated Transitional Care Protocol (C-TraC): In-Hospital Visit

Protocol: Telephone Follow-up

- Initial call is 48-72 hours after discharge with caregiver/patient to reinforce
  - Medication management
  - Medical follow-up
  - 3 red flags
  - Contact information for CTraC RN

- Medication discrepancies or red flags prompts contact to the MD office
Protocol: Telephone Follow-up

• Patient called every few days to weekly
  – Reinforce the 4 major transitional care goals (as in first call)

• Process ends when:
  – Patient sees PCP or
  – Patient and TCM agree that no further telephone follow-up is needed or
  – Four weeks pass

Coordinated Transitional Care Model (C-TraC): Results

• William S. Middleton VA, Madison, WI
  – 731 pts, 2010-2012
  – 90% of enrollees reached (engagement)
  – 47% medication discrepancies
  – Readmission
    • 34% (baseline group) vs 23%, p=0.013
    • Cost avoidance $1225/patient

Kind, Health Aff, Dec 2012;31:2659-68
C-TraC Results: UW Hospital 11/13-2/15
Readmission Rates: CHF, Pneumonia, COPD

CTraC (n=1,128) vs. Control (n=1,059)
Overall readmission 10.3% vs 18%, p <0.05

Coordinated Transitional Care Model (C-TraC)

• Can a readmission reduction program that has been proven to reduce medical readmissions be successful in surgical patients?
• Modification to address surgery-specific issues

Surgical C-TraC (sC-TraC)

IMPLEMENTATION SCIENCE:
- Protocolized adaptation
- Modified Replicating Effective Programs (REP) implementation theory model
- Test feasibility in patients undergoing complex abdominal surgery
Protocolized Adaptation of C-TraC

- Differences in context, culture, and resources across delivery sites
- Sustainability occurs only if new programs are sensitive to these differences and to ultimate goals
- If wide dissemination is to occur, adaptation should be protocolized
  - Need balance of local adaptation and fidelity of intervention’s core steps


Key Adaptation Phases

- Pre-conditions
  - Local program champion, understand resources
- Pre-implementation
  - Stakeholder buy-in, customizing delivery, hiring/training/coaching
- Implementation
  - Program launch with process improvement (fidelity/barriers to implementation), continuous data assessment
- Maintenance and Evolution
  - Sustainability
- Following adaptation, plan multisite RCT
Adaptation of C-TraC: Current Status

Pre-conditions

- Stakeholder meetings
  - Chair of surgery, WiSOR chief, colorectal, surgical oncology representatives, hospital administration
    - Every 2 week meetings
  - Director, sCTra-C named
  - Meetings with colorectal and surgical oncology inpatient and outpatient teams
    - Nursing, surgery residents
    - Key informant interviews
      - Care coordination
sC-TraC Enrollment Criteria

- Colorectal and Surgical Oncology patients undergoing complex abdominal surgery
  - Type of surgery:
    - All pancreatectomy, new ostomy patients enrolled
  - Home with drain
  - Major in-house complication
  - Clinical discretion (with explanation, eg no caregiver)

sC-TraC: Pre-Implementation

- RN training: 5 weeks
  - Inpatient and outpatient: Colorectal and Surg Onc
    - OR, clinic, floor
  - Shadow current CTra-C nurses

- 1st patient enrolled 10/12/2015
  - Weekly adaptation meetings with clinical and research team
  - Ad hoc meetings
    - Hospital administration
    - Nursing
    - Surgeons
sC-TraC: Implementation Results
10/12/2015-1/10/2015

- Enrollment: 100%
  - 100 patients
- Engagement: 95%

- Readmission: 11/95 pts (11.6%)
  - Historical data FY2014:
    • Colorectal 12%
    • Surg Onc 20%
    • Combined readmission rate 14.5%

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatectomy</td>
<td>12</td>
</tr>
<tr>
<td>New ostomy</td>
<td>44</td>
</tr>
<tr>
<td>Bowel resection</td>
<td>16</td>
</tr>
<tr>
<td>Ostomy takedown</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>203</td>
</tr>
</tbody>
</table>

sC-TraC: Implementation Next Steps

- Complete protocol adaptation
  - Focus group stakeholders/clinician providers
    • Barriers/facilitators to implementation
    • Process mapping
- Pilot test final protocol
  - Acceptability evaluated
    • Focus group clinician providers and patients/caregivers
    • Assess patient activation
    • Interrupted time series analysis: Unplanned health care utilization (readmissions/ER visits)
- Multisite RCT
Conclusions

• Readmission prevention is a complex undertaking
  – Culture change is occurring
    • Decreased readmissions over time
  – Risk prediction imprecise
  – Lack of current effective surgical interventions
  – Transitional care surgery-specific protocols: focus for future intervention RCT

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Paul Rathouz, PhD

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Tammy LeCaire, PhD
Stephanie Campbell, PhD
Sasha Acher, BS
Sarah Tevis, MD
Vanessa Nomellini, MD
Quotes

- **Patient/caregiver understanding**
  - I didn’t really know what questions to ask, I think that is the other hard part. For not being a surgery patient ever before in my life, I had no idea what to expect.
  - ...the medicines you’re on make you just a little foggy sometimes and you know you just don’t know or remember what they said...

- **Discharge Preparation**
  - She flipped through the whole thing in my room… but it was... but like not enough time, not enough time… felt pressured you know… to hurry up and get it done.

- **Educational Content**
  - I think that the book that we got, and it was only like four pages…. when we were discharged. It just had the general things to watch for… like four or five pages with very little information in it.

- **Inadequate transitional care**
  - I don’t know, I mean I don’t know if there is kind of an in-between, if just felt like, hospital to home and having the home health nurse come to check your vitals, just felt a little, I don’t know... a little … like there should have … I don’t know if there is an in-between...

  Acher, JACS, 2015 Oct;221(4):810-20

Discharge Planning

- **Patient-centered discharge instructions**
  - Assure caregiver is present

- **Multiple opportunities for teaching**

- **Planned, methodical strategy**
  - Designed to overcome patient’s altered cognition
Manage Complications as Outpatients

• Many are result of expected complications
  – Dehydration after ileostomy
• Early postoperative follow up visit
• For regional patients, provide residential bridge (eg hotel) to allow for close FU visits
• Wound care clinic
• New ostomy: protocolized care with IVF as needed

Follow-Up

• Early post-operative clinics, flexible availability, managed by APP’s
  – High risk patients may need more frequent monitoring
  – Recruit PCP’s or patients themselves for enhanced monitoring
    • Orthostatics
    • Wound check
What is Unique to Surgical Patients?

- Post-hospitalization syndrome
  - Sleep deprivation, stress, poor nutrition, pain, physical deconditioning
  - Contributes to altered sensorium
- Post-operative cognitive dysfunction
  - Deficits in
    - Short-term memory
    - Attention span
    - Level of consciousness
  - Occurs in up to 50-60% of patients

Vulnerable Patients!!

Possible Strategies

- Involve the caregiver!!
  - Patients 5x more likely to complete transitional care intervention if caregiver included

- No single best approach
  - Must account for institutional differences in patient population
Readmission Reduction Strategies

• Decrease complication rates
• Manage post-discharge complications as outpatient
• Focus on ‘preventable’ readmissions
• Transitional care protocols
  – Emphasis on high risk patients: Risk prediction

Methods

• Patient interviews
  – Semi-structured (open and fixed-response)
  – Guided by the SEIPS model: post-operative care, preparation for discharge and etiology of readmission
  – Interview tool refinement
    • First guide utilized in Nov 2013-Feb 2014—12 patients
    • Revised guide to remove many fixed-response questions and promote in-depth discussion, April-May 2014—6 patients

Acher, JACS, 2015 Oct;221(4):810-20
Route of Readmission

- Local Hospital Emergency Dept: 39%
- UWHC Emergency Dept: 17%
- Scheduled Surgical Follow-up Appt: 16%
- Other Clinic Appt: 28%

86% live > 50 miles from UW

Themes: SEIPS Model

CQPI
Center for Quality & Productivity Improvement

Acher, JACS, 2015 Oct;221(4):810-20
Time to Readmission

Mean (SD) 8.8 (6.2) days
Median 7 days

Patient Chief Complaint

<table>
<thead>
<tr>
<th>Chief complaints at readmission</th>
<th>n (%) of patients reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain*</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>Nausea &amp; vomiting*</td>
<td>7 (39%)</td>
</tr>
<tr>
<td>Diarrhea*</td>
<td>2 (11%)</td>
</tr>
<tr>
<td>Fever*</td>
<td>3 (17%)</td>
</tr>
<tr>
<td>Fatigue*</td>
<td>3 (17%)</td>
</tr>
<tr>
<td>Dehydration/mental status changes</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Bleeding from drain</td>
<td>1 (6%)</td>
</tr>
</tbody>
</table>

*Reporting > 1 symptom: pain with nausea & vomiting (4), pain with diarrhea (1), pain with fever (1), pain, fever, fatigue (1), fever with fatigue (1), fatigue with nausea (1)

Acher, JACS, 2015 Oct;221(4):810-20
Other Transitional Care Interventions

- Smart phone wound application
  - K.C. Kent, MD, S. Fernandes-Taylor, PhD
- Commercially available applications
  - Biosensors to evaluate vital signs and feedback to providers
  - Enhancing patient education/expectations tool
- Tele-health

---

Readmission Nomogram: PPV & NPV

*2006-2011 Patients*

<table>
<thead>
<tr>
<th>Readmission Risk Cutoff (decile)</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.83% (10)</td>
<td>10.8%</td>
<td>96.1%</td>
</tr>
<tr>
<td>5.37% (20)</td>
<td>11.8%</td>
<td>95.7%</td>
</tr>
<tr>
<td>6.08% (30)</td>
<td>12.2%</td>
<td>94.8%</td>
</tr>
<tr>
<td>6.98% (40)</td>
<td>14.6%</td>
<td>94.5%</td>
</tr>
<tr>
<td>7.55% (50)</td>
<td>14.9%</td>
<td>94.6%</td>
</tr>
<tr>
<td>9.51% (60)</td>
<td>15.9%</td>
<td>93.6%</td>
</tr>
<tr>
<td>11.6% (70)</td>
<td>17.4%</td>
<td>92.9%</td>
</tr>
<tr>
<td>14.4% (80)</td>
<td>19.4%</td>
<td>92.3%</td>
</tr>
<tr>
<td>19.1% (90)</td>
<td>25.2%</td>
<td>91.4%</td>
</tr>
</tbody>
</table>

PPV = TP/(TP+FP)  
NPV = TN/(TN+FN)  

Tevis, JAMA Surg, 2015; Apr 22
Improved Transitional Care

- Active issues at time of discharge
  - New patient education NOT part of chronic medical illness
  - Unpredictable
  - Patient vulnerable
- Problems with seamless transition
  - Intake discontinuity
  - Inadequate information to local providers
    - Unfamiliar with complex surgical care
- Planned/elective surgery: opportunity for pre-op education

Preoperative, Intraoperative, and Postoperative Factors Contribute to Risk for Readmission

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steroids</td>
<td>1.543</td>
<td>1.034 – 2.316</td>
<td>0.036</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>1.444</td>
<td>0.886 – 2.306</td>
<td>0.131</td>
</tr>
<tr>
<td>Bleeding Disorder</td>
<td>2.591</td>
<td>1.587 – 4.228</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Procedure Length &gt;277 mins.</td>
<td>1.623</td>
<td>1.206 – 2.184</td>
<td>0.001</td>
</tr>
<tr>
<td>Specialty*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorectal</td>
<td>1.323</td>
<td>0.767 – 2.284</td>
<td>0.314</td>
</tr>
<tr>
<td>General Surgery</td>
<td>1.263</td>
<td>0.738 – 2.213</td>
<td>0.394</td>
</tr>
<tr>
<td>HPB/Soft Tissue-Oncology</td>
<td>1.142</td>
<td>0.642 – 2.033</td>
<td>0.601</td>
</tr>
<tr>
<td>ASA (1-4)</td>
<td>1.104</td>
<td>0.837 – 1.456</td>
<td>0.483</td>
</tr>
<tr>
<td>Wound Class†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Contaminated</td>
<td>1.410</td>
<td>0.952 – 2.089</td>
<td>0.088</td>
</tr>
<tr>
<td>Contaminated</td>
<td>1.176</td>
<td>0.709 – 1.977</td>
<td>0.541</td>
</tr>
<tr>
<td>Dirty</td>
<td>1.858</td>
<td>0.896 – 3.854</td>
<td>0.096</td>
</tr>
<tr>
<td>Prolonged LOS &amp;/or In Hospital</td>
<td>2.032</td>
<td>1.544 – 2.674</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Complication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent Functional Status</td>
<td>1.074</td>
<td>0.675 – 1.708</td>
<td>0.763</td>
</tr>
<tr>
<td>After Higher Care at Discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Surgical Readmissions

- Nearly 1 in 7 patients readmitted within 30 days of discharge
  - In general surgical patients, highest rates occur following complex cancer-related resections
    - Pancreatectomy, 18-29%
    - Hepatectomy, 15-19%
    - Colorectal cancer surgery, 14-21%

Tsai et al. NEJM 2013;369:1134-42
Increased Number of Post-operative Complications Correlates with Readmission Risk


Readmission after Discharge

- 2008: Medicare Payment Advisory Committee (MedPAC) encourages bundling of care around episodes to reduce costs of care
- 2010: Patient Protection and Affordable Care Act
  - Pay for performance through hospital value based purchasing
- 2012: Hospital Readmission Reduction Project initiated by CMS
  - Hospitals penalized for readmissions for patients with acute MI, CHF and pneumonia
Transitions of Care

• Definition: Transitional care is defined as a set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location.

• Problem: Standard postoperative followup of 2 weeks fails a subset of patients.

Next Steps and Future Directions

• Identify patients at high risk for readmission prospectively
  – Nomogram smart phone app under development
  – Implement early followup for those patients at high risk

• Exploit current resources to decrease readmission
  – Hospital owned hotel
  – Advanced practice provider for phone/in person followup— in home visit?
Creation of New Resources
Submit

Pictures/data imported into:
1) PACs
2) Patient's medical record

Midlevel or physician review

Smartphone Photograph Review

Janice Jones
Fred Paul
Marjorie Smith
Tom Crook

Prompt patient reminder
Prompt patient contact
Potential Outcomes

- Monitor – no tx
- P.O. Antibiotics
- Visiting nurse
- Clinic evaluation
- ER evaluation
- Admission