The operation you get often depends on where you live

Medical research questions just how informed patients are about surgeries before going under the knife

By Dan Morgan
USA TODAY

When Diane Armstrong discovered a lump in her breast, a diagnosis of cancer was followed quickly by a local surgeon's recommendation: mastectomy. Complete removal.

What Armstrong didn't know then, four years ago, was that a lumpectomy, a less-invasive alternative, had been recommended by the woman's doctor in Georgia. Armstrong, long-distance runner, said she was frequently in the hospital in Georgia, and said she's never been back there.

And the surgeon, she says, didn't tell her the survival rate was the same for both procedures.

Games' ratings listless

Megan's reaction: 'I just WON!'
How do we treat these conditions in 2015?
Can we establish a collaborative comparative performance platform for quality, value & safety in neonatal surgery?
Who is in the audience today?
Cost and morbidity burden of neonatal surgical diseases:
Implications for the prioritization of comparative effectiveness research and collaborative QI efforts

Shawn J. Rangel, MD, MSCE
Department of Pediatric & Thoracic Surgery
Boston Children’s Hospital

AAP Joint Session - Improving care of the neonatal surgical patient
October 24th, 2015
Disclosures

I have **no relevant financial relationships** with the manufacturer of any commercial product and/or provider of commercial services discussed in this CME activity.
What am I going to cover?

• Why do we need to prioritize at all?
• How should we approach prioritization?
• Setting a framework for prioritization
  – Contribution of neonatal surgical conditions to cost and morbidity burden
  – Contribution of neonatal surgical conditions to revisits and readmissions
So, is it really necessary to consider prioritizing neonatal surgical conditions?

Annual cost of participating in NSQIP: $29,000 + 1.0 FTE of data collection effort!

CHND – Even more!!!
What outcomes should be considered as a basis for prioritization?

The argument for safe surgical care...

“The patient in the next bed is highly infectious. Thank God for these curtains.”
What outcomes should be considered?

The argument for cost-effective surgical care...

Source: OECD Health Data 2013.
Produced by Veronique de Rugy, Mercatus Center at George Mason University.
As children's hospitals expand, costs and questions rise, too

By Gilbert M. Gaul, Kaiser Health News
Posted Sept. 27, 2011, at 12:17 p.m.

WASHINGTON – Rising from a 60-acre field of old cypress swamp and cattle pasture near the Orlando airport, the seven-story Nemours Children's Hospital will be a monument to “best-in-class” care, its leaders boast.

That may be the case. But at a cost of about $400 million, the equivalent of $4.2 million for each of its 95 beds, Nemours also will rank among the more expensive children's hospitals ever built when it is completed next year. Some people believe construction never should have begun.

Florida health planners twice rejected Nemours' applications for a new hospital, noting that Orlando already had two children's hospitals; most cities have only one. A third hospital could duplicate existing services, driving up costs for insurers, employers and policyholders.

The regulators reversed themselves in 2008, however, after Nemours, a wealthy Jacksonville-based foundation, mounted an extensive marketing campaign and lined up scores of politicians and civic boosters, including former Gov. Jeb Bush.

"It's a case of excess here in Orlando," said Becky Cheeney, until recently the head of the Florida Health Care Coalition, a statewide business group concerned about the impact of rising health spending. "We don't have anything against Nemours. But central Florida doesn't need another children's hospital."

The battle over Nemours reflects the transformation of children's hospitals from small, struggling charities to huge, often profitable businesses. From their humble origins more than a century ago, many of the nation's biggest and best-known children's hospitals today are health care corporations.
Can we identify surgical procedures where there are great opportunities for both cost and morbidity reduction?

Identify pediatric surgical procedures with the greatest relative complication burden

Identify pediatric surgical procedures with the greatest relative cost variation burden

High “Event Burden” Procedures

[Case Volume X Event Rate]

High “Cost Burden” Procedures

[Case Volume X Average Cost Variation]
How do we identify pediatric surgical procedures with the greatest potential for improvement from a public health perspective?

Which are associated with the highest event rates?

Which are responsible for the greatest event burden?
Methods: Data source & cohort

- ACS-NSQIP-Pediatric 2011-2013
  - 55 hospitals; 68,234 patients
  - Random sampling of 35 cases / 8-day cycle
  - 640 procedures captured (by CPT code)
  - Event rate and burden analyses performed for cohort of patients undergoing general surgery procedures

Stey, AM, Moss, RL, Hall, BL, Vinocur C, Kraemer, K, Ko, CY, Rangel, SJ. (Manuscript in Preparation)
30-day postoperative outcomes

• Mortality

• Serious Adverse Events
  – Unplanned reoperation
  – Reintubation
  – Cardiac arrest

• Hospital Acquired Infections
  – Surgical site infection
  – Pneumonia
  – Urinary tract infection

Stey, AM, Moss, RL, Hall, BL, Vinocur C, Kraemer, K, Ko, CY, Rangel, SJ. (Manuscript in Preparation)
Prioritization framework based on procedure-related risk and morbidity burden

Increasing morbidity (adverse event) burden →

Increasing morbidity rate ↑

- High-priority procedures (high risk & high morbidity burden)
- Lower priority procedures (high morbidity burden, but low risk)
- Lower priority procedures (low risk & low morbidity burden)
- Lowest priority procedures (low risk and low morbidity burden)
So, which pediatric surgical procedures do you think are responsible for the most harm?
According to data from NSQIP, which two procedure have the highest 30-day postoperative mortality rate and contribution to overall mortality burden, respectively, in the entire scope of general pediatric surgical practice?

1. Highest rate = CDH repair; Greatest burden = gastroschisis repair

2. Highest rate = CDH repair; Greatest burden = small bowel resections

3. CDH repair has the highest rate & mortality burden
According to data from NSQIP, which two procedures have the highest 30-day postoperative mortality rate and contribution to overall mortality burden, respectively, in the entire scope of general pediatric surgical practice?

1. Highest rate = CDH repair; Greatest burden = gastroschisis repair

2. Highest rate = CDH repair ; Greatest burden = small bowel resections

3. CDH repair has the highest rate & mortality burden
Mortality Prioritization Grid
(All general surgery procedures)

Mortality rate (%)

Relative Contribution to cumulative mortality burden (%)

- Diaphragmatic procedures
- Small bowel resection & enterostomies
- Repair of abdominal wall defect
- Colorectal procedures & colostomies
- Gastrostomy
- Antireflux & hiatal hernia procedures
- Uncategorized procedures
- Adhesiolysis for small bowel obstruction
- Esophageal procedures
- Peritoneal dialysis catheter placement
- Pancreatic procedures

Quartile
Median
According to NSQIP, which two procedures have the highest 30-day postoperative serious adverse event (SAE) rate and contribution to overall SAE burden, respectively, in the entire scope of general pediatric surgical practice?

1. CDH repair has both the highest rate & burden

2. Highest rate = Esophageal procedures ; highest burden = Colorectal procedures

3. Esophageal procedures have both the highest rate & burden
According to NSQIP, which two procedures have the highest 30-day postoperative serious adverse event (SAE) rate and contribution to overall SAE burden, respectively, in the entire scope of general pediatric surgical practice?

1. CDH repair has both the highest rate & burden

2. Highest rate = Esophageal procedures ; highest burden = Colorectal procedures

3. Esophageal procedures have both the highest rate & burden
Serious Adverse Events (SAE) Prioritization Grid
(All general surgery procedures)

Serious Adverse Event Rate (%)

Relative Contribution to cumulative Serious Adverse Event burden (%)
Hospital Acquired Infection Prioritization Grid
(All general surgery procedures)

Relative contribution to cumulative HAI burden (%)
What we found....
A relatively small number of procedures are responsible for a disproportionate burden of morbidity & mortality in general pediatric surgery.

Abdominal Wall Defects
Diaphramatic Procedures
Small Bowel Procedures

Colorectal Procedures

Eosophageal Procedures
Appendectomy
Gastrostomy
But what about the bottom line?
How do we prioritize pediatric surgical conditions for comparative effectiveness research on the basis of cost and cost variation?

Which are associated with the highest median cost and variation in median cost between hospitals?

Which are responsible for the greatest relative burden of overall cost and cost-variation burden?
Methods: Assessing cost and cost burden

- PHIS cost analysis 2013
  - 44 freestanding children’s hospitals
  - Hospital costs associated with 30 most expensive pediatric surgical procedure/diagnoses pairs (index operative admission)
  - Costs adjusted for CMS price/wage index
  - Encounters included in the analysis if:
    - They had a preop LOS of two days or less
    - The targeted procedure/diagnosis pairs were recorded as the principal procedure and diagnosis for the entire encounter

Cameron DB, Sidhwa F, Glass CC, Feng M, Karki M, Rangel SJ (manuscript in preparation)
Cost-driven framework for prioritization:
Define opportunities where the cost variation between hospitals is great and where the relevance of this variation is high

- **Lower priority procedures** (high cost variation/case, but low cost variation burden)
- **Highest priority procedures** (high cost variation/case & high cost variation burden)
- **Lowest priority procedures** (low cost variation/case & low cost variation burden)
- **Lower priority procedures** (high cost variation burden, but low cost variation/case)
So, which pediatric surgical procedures do you think are the most costly??
According to 2013 pooled data from 44 children’s hospitals, the two procedures associated with the widest variation in hospital cost per case (index encounter) were:

1. CDH repair and TEF/EA repair
2. CDH repair and gastroschisis repair
3. Gastroschisis repair and TEF/EA repair
According to 2013 pooled data from 44 children’s hospitals, the two procedures associated with the widest variation in hospital cost per case (index encounter) were:

1. CDH repair and TEF/EA repair

2. CDH repair and gastroschisis repair

3. Gastroschisis repair and TEF/EA repair
Procedures as ranked by median hospital cost

- **CDH**: median hospital cost $120,681; IQR $181,554 [$70,843, $252,397]
- **Gastrochisis**: median $108,320; IQR $124,365 [$70,944, $195,309]
- **TEF/EA**: median $75,959; IQR $110,866 [$49,406, $160,272]
- **Small bowel atresia**: Median $73,687; IQR $93,520 [$50,236, $143,756]

Cameron DB, Sidhwa F, Glass CC, Feng M, Karki M, Rangel SJ (manuscript in preparation)
Calculation of cumulative procedure-related cost variation burden across hospitals

Procedure-related cost variation burden =
Sum of all $Δ$’s across all patients undergoing a specific procedure

Median cost from the entire cohort
Procedures as ranked by their relative contribution to cumulative cost variation burden from all procedures

Neonatal conditions accounted for >33% of aggregate cost-variation burden

Cameron DB, Sidhwa F, Glass CC, Feng M, Karki M, Rangel SJ (manuscript in preparation)
Prioritization framework based on cost variation

Inter-quartile range (IQR) of median hospital cost

0% 5% 10% 15%

Relative Contribution to Cumulative Cost Variation Burden

Bubble size = relative case volume

Cameron DB, Sidhwa F, Glass CC, Feng M, Karki M, Rangel SJ (manuscript in preparation)
Conclusion
A relatively small number of procedures are responsible for a disproportionate amount of hospital cost and cost variation burden

- Esophageal Procedures
- Reflux procedures
- Diaphragmatic Procedures
- Complicated appendicitis
- Abdominal Wall Defects
- Colorectal Procedures
- Small Bowel Procedures
What about revisits and readmissions?

EDITORIAL
Revisiting Readmissions — Changing the Incentives for Shared Accountability
Arnold M. Epstein, M.D., M.A.

CMS
CENTERS for MEDICARE & MEDICAID SERVICES

BlueCross BlueShield
Methods: Assessing readmissions and burden

• PHIS revisit analysis 2013
  – 44 hospitals
  – 90-day ED and inpatient revisits evaluated for 30 most common general pediatric surgical conditions
    • Revisit rates calculated for each procedure as a measure of potential “actionability” through revisit-reduction strategies
    • Cumulative revisit-associated hospitals days calculated for each procedure as a measure for public health relevance

Cameron DB, Sidhwa F, Glass CC, Feng M, Karki M, Rangel SJ (manuscript in preparation)
Neonatal conditions accounted for >25% of revisit hospital day burden.
Prioritization framework based on revisit rates and revisit-associated hospital-day burden

Revisit Rate (%)

Relative contribution to hospital revisit day burden(%)

Higher priority
- Small intestine atresia

Lower priority
- Anorectal malformations
- Complicated appendicitis
- Fundoplication
- Fundoplication + GT
- TEF
- CDH ≤30 days
- Meckel's diverticulum
- Gastrostomy
- Hirschsprung's disease
- Gastrochisis
- Intussusception
- Malrotation/volvulus
- CDH
- Meckel's diverticulum

Bubble size = Number of index encounters

Prioritization framework based on revisit rates and revisit-associated hospital-day burden.
Global prioritization framework based on morbidity and cost variation burden

Cost variation burden

Morbidity (adverse event) burden

High-priority procedures??
(high morbidity & cost burden)
CDH, TEF/EA, Gastoschisis
Colorectal & SB procedures

Lower priority procedures
(high cost/low morbidity burden)

Lowest priority procedures
(lower morbidity/low cost burden)

Lower priority procedures
(lower cost/high morbidity burden)
Isn’t it obvious?

Neonatal surgical diseases have profound public health relevance within the scope of pediatric surgical practice.
Thank you!

Shawn J. Rangel, MD, MSCE
Department of Pediatric & Thoracic Surgery
Boston Children’s Hospital

AAP Joint Session - Improving care of the neonatal surgical patient
October 24th, 2015