NP Led Peri-Operative assessment model at Stanford

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Introductions

We are:

• Krisa Hoyle Elgin
Introductions

We are:

• Chloe Journel
Disclosures

• We wish we had something to disclose

• Give us a couple years, we are working on it

• This presentation represents Krisa and Chloe’s personal and professional views, and is not intended to represent the views, opinions of LPCH, SHC or SU
Introductions

You are:

• Hospital based

• Private practice

• _NP
What we are talking about today

Presentation has two main parts

1. The NP led peri-operative assessment model at LPCH

2. Clinical peri-operative pearls learned along the way
Objectives for today

• Expanding awareness around new and evolving roles/models for the NP

• Enhancing peri-op knowledge base, to help you help your patients for an upcoming surgery or anesthetic

• Increased fluency in understanding: Anatomic, infectious and med class that are high risk for surgery or anesthesia
A little background

• LPCH opened in 1991

• ‘Mom and Pop shop’ until two congenital heart surgeons came from UCSF

• Acuity skyrocketed overnight with first cv surgery case
A little background

• Now the youngest children’s hospital in the USA to be ranked in top 10 by US World News & Reports
  – #7 Nephrology
  – #8 Cardiology and Heart Surgery,
  – #10 Pulmonology
A little background

Six Centers of Excellence at LPCH

– The Heart Center
– Transplant
– Cancer
– Brain and Behavior
– Pregnancy and Newborn
– Pulmonary
A little background

• 12,600 admissions in 2013

• Just over 4000 births

• 3,300 inpatient surgeries

• 150,000 outpatient visits
A little background

• We are highly sub-specialized, so not surprisingly…..

• We are the most expensive children’s hospital in the USA
A little background

• 147 NP’s (mix of PNP, FNP, ACNP)

• ~50 residents

• Lots of fellows

• ~800 MD’s (faculty, community)
Evolving NP practice models
Anecdotally

• The shortage of MD’s in primary care is due to the low income potential (1)

• NP’s are most known/widely known for filling in gaps in primary care
  – Not surprisingly, the most robust data on the value (safety/quality/outcomes) of NP care comes out of the primary care setting

Anecdotally

• 44% of Rural area’s are experiencing shortage of primary care providers (1)
• Shortage of providers + long wait for visit, or limited time with provider once visit occurs = chronically difficult situation with less or uncontrolled co-morbidities in the population served (2)
• Primary care has:
  • The highest concentrations of non-surgical malpractice claims (3)
  • The highest rate of burnout (4)
  • On average, Medicaid pays only about two-thirds of what Medicare pays, though this varies by state (some states as low as 1/3 of what Medicare pays) (5)
  • On average, commercial insurance pays 130% of Medicare’s reimbursement (6)
• So, when compared to other specialties, primary care hallmarks are: Higher odds of being sued, longer days, burnout, lowest pay (relative to other specialties)

2. Common sense
6. http://www.aha.org/content/00-10/081209costshift.pdf
Anecdotally

According to Health Resources and Services Admin (HRSA), “By 2020, demand is set to outstrip supply in several specialties, with nonprimary care specialties in general projected to experience a shortage of 62,400 doctors” (1)

- General surgery is predicted to be among the hardest hit, with a shortage of 21,400 surgeons. The number of practicing general surgeons is expected to fall to 30,800 by 2020 from 39,100 in 2000.
- Ophthalmology and orthopedic surgery are each expected to need more than 6,000 additional physicians over current levels.
- Urology, psychiatry, and radiology all are expected to see shortfalls of more than 4,000 physicians, according to the HRSA figures.

Anecdotally

There is a role, opportunity and need for the NP in any healthcare setting, including those that tend to:

– Reimburse providers well
– Encourage or require professional development and autonomy
– Have a higher associated work satisfaction / work-life balance.
What the literature says

NP’s demonstrate equal or improved outcomes when compared to traditional MD models in a variety of hospital based (amongst other) healthcare settings

3. The role of the NP in congenital heart surgery. Pediatric Cardiology. 2007; 28:88-95
5. Comparison of procedural complications between resident physicians and advanced clinical providers. Journal of Trauma and Acute Care Surgery. 2014; 77(1):143-7
What the literature says

There is a significant and growing need for increased value in the delivery of healthcare, which NP’s/PA’s can and do deliver in practice, and in the literature

5. Community health centers employ diverse staffing patterns, which can provide productivity lessons for medical practices. Health Affairs. 2015; 34(1): 95-103
6. Relative productivity of NP and resident physician care models in the peds emergency department. Ped Emerg Care. 2015, 31(2):101-6
Value-based pricing (VBP)

Current state of our health care system:
• Fragmented, inefficient and with huge variation in quality and in cost
• It rewards illness and penalizes health improvement
• Fee for service incentivizes providers to endorse the flawed system

Future state – Value based healthcare/purchasing/pricing
• Payers (CMS, insurance companies, etc.) will reimburse for services based on quality, service, and cost, rather than cost alone,
• VBP is intended to catalyze a system re-design towards a value-driven system of population health improvement and management
• The goal of VBP is ever-increasing quality of care, achieved at the lowest possible cost.
Value-based pricing (VBP)

• Value in healthcare: Quality/Cost = Value
  – Fee for service model going away
  – Quality of care will increasingly be one factor determining rate of reimbursement

• How NP’s factor into the value equation?
  – NP’s must continue to become synonymous with and intrinsic to new models of care that increase value, decrease cost, enhance patient experience
Lets do the math!

(Those who can’t or won’t move away from politics and turf issues) +
(Refusal to acknowledge expertise and contribution of non-MD colleagues)

= Wave bye bye!
Lets do the math!

(Current MD centered model is really expensive!)

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(Nowhere near enough MD’s to staff the really expensive medical model)

= Whoa. Houston, we have a problem
Let's do the math!

We know that VBP ≠ current model. Thus, we propose:

• $\Sigma$ (Role of NP in increasing value has been proven over and over in literature) and (NPs are proven to be awesome) > (Current nutty model)

• We conclude: Opportunity is knocking
Cardiac Anesthesia at LPCH
Our team’s story

1996: 1 cardiac location a day, 1 attending with cardiac experience
2000: Gained 2 more attending's, slow increase volume
2001: Two congenital cards surgeons came, brought the credibility. EP, MRI, CT, Cath, PH, Heart Failure, CVICU, etc. built up around our two surgeons volume
2001: With 4 attending's, 1 NP, 1-2 locations daily and 200 cases/year
2003: Work hour restrictions for residents (capped to 80 hours), meanwhile, volume still increasing!!!
2005: Super fellowship in cards anesthesia begins.
2009: With 6 attending's, 3 NP’s, 2-3 locations daily, 1300 cases/year
2013: With 8 attending's, 3 NP’s, ~five locations daily, 2300 cases/year
2014: Hired another NP, now at 3.2, service volume continues to grow
2015: We are looking to hire another full time NP!!!
Our team

9 Cardiac anesthesia attending’s
3 to 4 Residents a month
1 to 2 Super fellows a year
3.2 (soon to be 4.2) NP’s
=One awesome team!!
Our team

• High functioning team
• Trust is earned
• Communication is key
• Mutual respect
• Safe/clinical growth supported and encouraged
• Fully autonomous role
• NP’s functioning as full partners in research and improvement activities
• MD and NP colleagues expect us to perform at the highest level we are licensed for
Why cardiac anesthesia?

• Cardiac + pediatric = highest possible risk.

• Children with CHD are born with anomalies in their valves, large defects/holes that blood will shunt through, stenotic and/or missing vessels, as well as many genetic conditions and syndromes.

• Anesthesia decreases SVR, which in turn creates pressure changes that can cause shifting of blood flow and considerable hemodynamic disturbances that are life-threatening.

• Peds cardiac patients need a subspecialized periop team care for them and their highly specialized needs
Congenital Heart Disease

Most common type of birth defect
(8 out of every 1000 live births)

Range from simple to complex including:
• The interior walls of the heart
• The valves inside the heart
• The arteries and veins that carry the blood to the heart or body

• http://www.nhlbi.nih.gov/health/health-topics/topics/chd/types
Congenital Heart Disease HOT groups

• Williams syndrome (At high risk for sudden death with anesthesia, thought to be due to arrhythmias and poor coronary perfusion)
• Single Ventricle (HLHS, etc.) kids between Norwood and Glenn have a high incidence of mortality
• Dilated or hypertrophic cardiomyopathy with outflow obstructions.
• Heart failure with ejection fractions less than 40%
• PHTN (risk of PH crisis with induction)
• Unrepaired TOF, risk of tet spells
• Eisenmenger Syndrome from unrepaired VSDs
• More…
Cards Anesthesia NP

- MD’s are in the OR (2-5 locations a day)
- NP’s cover the rest (clinics, inpatients, OR, consults, triage, referrals, coordination and run daily schedule)
- NP’s presence allows MD’s to focus on being in the OR, and training the residents.
Cardiac Anesthesia NP

A day in the life: Day starts early, get a sense of what happened overnight in hospital, any changes to the day’s schedule. Make up a plan, divvy up the cases and GO!!!

Rest of the day:
• Fielding/catching consults
• See inpatients, ‘on the radar’ patients, outpatient clinics for upcoming diagnostic studies or OR cases
• Not easily predicted, always changing, rarely in office, usually passing through most hospital locations before the end of the day
• A team effort!!!
Cardiac Anesthesia NP

- One of us ‘runs the schedule’ and holds ‘the cards anesthesia phone’, and may see a few cases

- The other two NP’s manage the cases as they come

- Can see 2-3 patients in a day, or 10-15. Depends on the day

- Cases/clinics tend to be pretty sick – take time
Cardiac Anesthesia NP

A team of 3.2 (soon to be 4.2) cover:

- Inpatients (CVICU, NICU, PICU, stepdowns, heme/onc)
- Assist in the OR/Cath/EP/MRI/CT
- Pre-procedure/OR clinics (cardiac kids going for any procedure requiring anesthesia)
- Inpatient and outpatient consults and triage
- Schedule (for all anesthesia locations)
- Coordinating complex cases
Review of key points

• There is a need for NP’s in atypical care settings, especially in sub-specialized settings (such as pediatrics cardiac anesthesia)

  • National shortage or all providers, especially those that can fill roles that require a high degree of specialized skill and training (which for NP’s, is typically taught/mentored on the job)

• A combination of VBP and increasing shortages of providers will accelerate these changes in current models, resulting in increasing opportunity for the NP
Getting ready for anesthesia or surgery

• Equipment
• What we do, and how we do it
• Medication pearls
• Pearls by system
• Red flags!!!
Equipment

- Mask
- LMA
- ETT
- Flavors!
- Lines
How we do it: Consults

• Have a central email and phone for contact

• Referring providers need clear and consistent communication around which documents we need (ECHO within 6 months, recent cardiology note, etc.) from them to triage a case

• Systematic approach and management very helpful in dealing with expectations and volume

• We are a service based on detail and this utilizes resource and manpower

• Model constantly evolving and changing
Case example: Consult

We have a 21 year old female (52 kg) presenting to hematology/oncology department with dehydration.

She is sp chemo treatment for ALL. Has been in remission for 2 months. History of AVC sp repair now with a mechanical aortic valve and anti coagulated on PO Coumadin with an INR goal of 2.5 (INR today 3.2). Her most recent echo with moderately depressed LV fxn. Meds: Lasix (recently increased upon recent echo findings).

Current labs with PLTs-5 (post transfusion), HGB-8, INR 3.2
Current exam lethargic appearing. Hepatosplenomegaly
I need a Bone Marrow Aspirate to determine etiology of symptoms. Suspicious for return of disease or worsening CHF?
How we do it: Pre-op

- History/physical
- CXR
- LABS: CBC, Chem Panel, Coags, CRP, type and cross, respiratory swab if concern
- UA
- Echo, sometimes sedated
- EKG
- Pacemaker interrogation, if necessary
- Child life, if necessary
Case example: Pre-op

• 12 yo female with T21, hypothyroidism, and ASD in clinic

• She needs a device closure of her ASD in the cath lab under anesthesia

• Sounds pretty straightforward……???
Case example: Pre-op

**CONCERNS FOR PREOP:**
- Hypothyroidism well-controlled?
- Cervical stability? Need cervical x-rays?
- OSA?
- Level of development, will she take premed or IV?
- Pregnancy test?

**PLAN:**
- Confirm thyroid euthyroid
- Order Cervical XR to assess status of axial instability
- If OSA then what’s the current tx? Child will need ICU bed post procedure to accommodate CPAP.
- Every hospital should have policy for pregnancy test to abide by
- Likely oral premed with mask induction, parental presence
- Communicate with attending
How we do it: Diagnostics

• Have to be an expert!!!! Understand the normal values to identify abnormal, which helps further identify the risky patients
  – Echos
  – Cath results
  – PM settings and interrogations
  – Exercise stress tests (EKG and Echo)
  – Lung perfusion scans
  – MRI/CT results
  – Labs
  – Renal and Head US in newborns
  – Any other result pertinent to the work up and case
How we do it: Coordination

Coordination is a big part of what we do every day:

• Coordinate multiple procedures with multiple services to one anesthetic

• Work closely with NP’s of other CV services (surgery, cath, EP, CVICU, step down) to get patients on the schedule

• Coordinate complexity

• Coordinate schedule
Case example: Coordination

56 yo obese and mildly delayed male (120kg) w remote history of TOF, last CVS >40 years ago, lost to follow up for last 10 years, no health insurance for last 5 years, now covered thanks to obamacare

Now presenting with symptomatic CHF medically managed with progressive RV dysfxn, seen in clinic for pre-operative visit.

Other comorbidities and considerations: Obesity, HTN, diabetes, recently quit a one pack/day smoking habit of 30 yrs. Homeless with minimal resources and is a Jehova’s Witness.

He is not a heart transplant candidate, will eventually die of this condition, and is high risk for anesthesia. He is however, a VAD candidate. It's different story each time...

What might me coordinate with a case like this???
How we do it: Assist

• Our NP team is expected to step in and fill an empty space in the OR

• Airway (masking, airway/intubation)

• Access (line placement, PIV to lines)

• Attending’s supportive, very willing and motivated to teach
Setting peri-op expectations

• The day before

• The big day

• What comes after surgery?
Medication Pearls
Medications: Asthma meds

• A risk of anesthesia/intubation is bronchospasm. We don’t want anesthesia induced bronchospasm on top of asthma induced bronchospasm!
  – Continue with home regimen until day of surgery
  – Use inhalers morning of surgery, even if a PRN user

• If you have a patient with frequent URI or who does not adhere to asthma treatment plan, TUNE THEM UP!

• Prepare them for anesthesia and surgery by ensuring respiratory system in good shape, no exacerbations within 4 weeks prior to anesthetic (if possible)
Medications: Diuretics

• Holding diuretics night prior to surgery to minimize dehydration in setting of fasting for anesthesia and/or poor diastolic function

• Holding diuretics night before surgery also makes it easier to place IV in the morning!
  – Aldactone is potassium sparing, minimizes electrolyte disturbances
  – Lasix is frequently used in heart disease/congenital heart disease
Medications: Anti-Coagulants

• In peds, anti-coag’s most often used when patient has:
  – Mechanical valves
  – Is s/p Fontan x 6 months
  – PH, anticoag given to decrease clots in distal bed from high pressures
  – Cardiac shunt dependent
  – A history of clotting disorder

• What kind of blood thinners?
  – Coumadin needs to be **transitioned** to heparin if for AV.
  – Plavix/ASA is **discontinued** 1 week prior to surgery
  – Not necessary to d/c ASA for cath procedures
Medications: PHTN meds

• Pulmonary Vasodilators (Sildenafil, Bosentan, Tadalafil, etc.) need to be given as scheduled on the day of anesthesia or surgery
  
  – We never hold these medications, PH crisis can result if meds are not given as scheduled

• Remodulin infusions SQ remain in place and can be discontinued for a short period of time as their half-life permits

• Flolan, on the other hand, has an extremely short half life and cannot be discontinued
ACE and ARB

• Reduce afterload/have vasodilatory effect
• We **always hold** ACE/ARB inhibitors prior to procedure. Generally hold evening and am doses

Why?

• Anesthesia causes vasodilation
• Combination of ACE inhibitors and anesthesia results in hypotension on induction, often necessitating volume resuscitations in setting of possibly poor heart function
Gerds medications

- Give Gerd meds as scheduled if the patient is dependent on them for control of symptoms, especially true if naso-gastric tube or gastric tube/nissen

- Those pts w Gerd are higher risk of aspiration under general anesthesia, which can lead to PNA and prolonged intubation
Antiarrythmics

• Amiodarone, propranolol, etc.

• We usually recommend these be taken as scheduled within NPO period if needed (with a sip of water).

• Exception is adult CHD patient in chronic afib, will sometimes get a loading dose of Amiodarone and maintenance dose during anesthesia

• EKGs are closely monitored during cases for any arrhythmias and ST changes/cardiac ischemia
Interesting pharm pearls:

• Meth depletes your catecholamines and blunts your stress response during GA. Test your users.

• Sevoflurane gas dilates peripheral vessels. Very helpful for PIV starts.

• Benzo and pain dependent patients are (not surprisingly) more difficult to sedate and achieve pain control.

• Versed is used in kids as a ‘pre-med’ for surgery or procedure. It provides amnesia as well as drowsiness and decreased any anxiety.

• Response to anesthesia can be different each time: Past history of problems/events related to anesthesia are always asked about.

• Post-op side effects can vary. Can have N/V with one anesthetic, agitation with another and then nothing with the third. Different sided effects for different age groups.

• Kids tend to do really well from a pain standpoint with incision, etc. We don’t deal see a lot of issues in our patients. We see more of this in the adult CHD.
Review

• Tune up your asthma kids

• PHTN meds will never be held

• Heparin bridge needed for Coumadin

• We always hold ACE/ARB pre-anesthetic
Surgery and Anesthesia: Pearls by system

- Respiratory
- Anatomic
- Medical devices
- Neuro/developmental
- Immune system
- Endocrine
Respiratory Pearls

- Asthma triggers, and is it well-controlled?
- URI? If so, risk of bronchospasm is heightened for up to 4-6 weeks post active symptoms
- **Snoring?** If so, sleep study? If so, central or obstructive OSA? If so, what support? **CPAP?**
- Assessing positioning of pt at night - sleeps in recliner? Sleeps with more than two pillows?
- Oxygen requirements (why?-PH for pulmonary vasodilation, hypoxemia, CLD)
- Sats (normal for diagnosis, low), pink or cyanotic?
- COPD needs recent work up and tune up pre-anesthetic, if an adult
- Chronic lung disease, Trach pts need recent pulmonology visit, and transplant patient need to see their team prior to an anesthetic
Anatomic Pearls

- Micrognathia, retrognathia
- Difficult to mask or airway abnormalities?
- Poor ROM:
  - Cervical instability in T21
  - Scoliosis (unable to lay flat?)
  - Contractures or nerve injuries?
- Obese?
- Known urinary anomalies for Foley placement
- Asplenia, polysplenia- should be on daily prophylaxis
- Rash to groin, neck or area of incision?
Medical Device Pearls

• Pacemaker or ICD?
  – Where?
  – What settings?
  – Pacemaker dependent?
  – Most recent interrogation?
  – Re-program for surgery?

• Dental appliances
• Prosthetic limbs
• Trach
• GT
Neuro/Developmental

- Sensory defects (blind, deaf)
- Developmental/cognitive delay?
  - If blind/deaf and delayed, how to approach patient?
- Elevated ICP
- Acute or evolving bleeds
- Seizures: Hx and etiology, controlled? How?
- Strokes, fevers and are they well-controlled and how?
Immune System Pearls

• On steroids?

• Frequent infections?

• Known immune deficiency (Digeorge, HIV, immunosuppressed, etc.)

• History of heart/other organ transplant on antirejection, still on steroids? Last biopsy results?
Endocrine Pearls

- Hypo/hyperthyroidism and current Rx

- Recent labs, confirm euthyroid
  - Otherwise can cause hyperdynamic circulation with hyperthermia, tachycardia, and hypertension under anesthesia
Let's review: RED FLAGS!!!!

Who gets cancelled?
• Rash in area of incision or line placement
• Did not stop anti-coag’s
• Current URI (viral or bacterial) or GI illness
• Asthma exacerbation
• New patient shows up with stridor, hot potato voice or weak cry and no prior w/up.
• UTILIZE other specialties. Get an ENT consult prior to proceeding!
Preparing your patient

For the NP:

- Tune up respiratory (asthma, COPD, PH, etc.) cases
- Take care of dental issues prior to referral
- Treat and clear any rash in area of incision
- Alert inpatient surgery/anes team of any recent URI or GI illness
- Advise patients to avoid sick contacts, limit exposures
- Alert difficult airway or diagnosis
- Ensure updated medication list (if not sharing EMR)
- Be strategic on envisioning/planning work up and treatment – combine as much as possible under one anesthetic.
Review

- Be aware that highly specialized teams often have a need and highly specialized role for the right NP
  - The cardiac anesthesia NP model is but one example of many new and evolving roles/models for the NP

- New and unique roles for the highly skilled and versatile NP are going to grow in parallel to demand for value and services – get ready!
Review

• Today we built on your peri-op knowledge base, which will help you set some expectations and prepare patients for an upcoming surgery or anesthetic

• Finally, we reviewed and reinforced a high level understanding of pharmacologic and anatomic concerns that increase the risk surrounding surgery or anesthesia