16th Douglas T. Miller Symposium on Organ Donation and Transplantation
Donor Management Track

Innovations For Maximizing The Gift
To Brain Death and Beyond!

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UW Organ and Tissue Donation
Doug Miller Symposium 2017
Objectives

• Gain better understanding of the brain death process
• Review signs and symptoms of impending brain death
• Introduction to the T4 Protocol
• Post herniation hypertension management
Expert Opinion Question: Who makes the best super hero?

• A) Buzz Lightyear
• B) Batman
• C) Bedside ICU Nurses
• D) UW Organ and Tissue Donation Staff
• E) Everyone at Doug Miller 2017
What is all this talk about brain death?

- Irreversible loss of cerebral and brainstem function
  - Legal time of death in WI
- Brain death is a rare phenomenon
  - Approximately 10 comatose patients per 1,000 acute admissions evolve into brain death
- 60-80% of donors at UW OTD are BDD
Pathophysiology of Herniation

Increase ICPs → Cushing Triad → Autonomic Storm
What increases intracranial pressure?

- Normal ICP $\leq 15$ mmHg in Adults

Neurological Injury

- Intracerebral hemorrhage
- Large ischemic strokes with edema
- Herpes simplex encephalitis
- Global brain swelling after
  - Acute hepatic failure
  - Reyes syndrome
  - Hypoxia

https://www.google.com/search?q=CT+scan+impending+herniation&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj5vLyhuoFTh0AhVhzoMKHVPLD7MQ_AUIBigB&biw=1920&bih=911#imgrc=GkCjVYPz3DLr1M: &spf=191
Cushing Triad

- Sometimes called Cushing Reflex
- Mixed vagal and sympathetic stimulation
- Bradycardia, hypertension, and respiratory depression
Autonomic Storm

• Catecholamine release
  – Levels as high as 1200-fold
  – Elevated levels of epinephrine, norepinephrine, and dopamine

• Severe hypertension and tachycardia
  – Massive peripheral vasoconstriction

• Short lived
Loss of Autonomic Regulation

- Due to destruction of sympathetic spinal cord tracts
  - Results in peripheral vasodilation
  - Leads to a decrease in heart rate, blood pressure, and contractility
Levothyroxine (T4)

- “Hormone Replacement Therapy”
- Helps stabilize cell wall during herniation/catecholamine storm
- Herniation causes significant reduction in hormonal and endocrine systems
  - Loss of thyroid hormones (T3 and T4), Cortisol, ADH, and Insulin
Levothyroxine (T4) Protocol

<table>
<thead>
<tr>
<th>IV MEDICATIONS CONTINUED</th>
<th>COMPLETED</th>
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<tr>
<td>DO NOT INITIATE MEDICATIONS UNTIL AN OPO COORDINATOR INITIATES</td>
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Levothyroxine (T4) protocol:

- **Phase 1 - Bolus:**
  - Methylprednisolone 15 mg/kg IV x1 (skip if already receiving every 12 hours).
  - Levothyroxine 20 mcg IV x1.
  - Regular human insulin 20 units IV x1.
  - Dextrose 50% 25 grams IV x1, then begin phase 2.

- **Phase 2 - IV infusion:**
  - Levothyroxine 200 mcg in 500 ml 0.9% NaCl.
  - Initiate infusion at 40 mcg/hr (100 ml/hour).
  - Titrate 10 mcg/hr – 20 mcg/hr every 15 minutes to keep SBP > 100 and MAP 60.
  - Do not exceed 80 mcg/hr (200 ml/hour).
**T4 Protocol Highlights**

**Takeaways**
- Insulin, D50%, and Methylprednisolone given with initial bolus
  - Helps push T4 into cells
- Should see effects within 30 minutes
- Run for 6-8 hours prior to Echocardiogram
- Donor may become hyperdynamic
  - Tachycardic and hypertensive
  - Stop infusion after consulting OPC

**T4 Infusion**
- 200 mcg in 500 ml NS
  - May put in D5% if hypernatremic
- Start at 40 mcg/hr
- Max dose 80 mcg/hr
- Liberal titrations
  - 10 mcg/hr
- Lots of fluid!
  - May double/quadruple concentrate
- K+ depleting
Taking care of brain dead donors is hard!

- Cardiovascular instability
  - Hypotension
  - Arrhythmias
- Neurogenic pulmonary edema
- Diabetes insipidus
- Coagulopathy/DIC
- Hyperglycemia
- Hypothermia
- Acidosis
What do you mean we’re not treating a blood pressure of 185/95?!

• Hypertension post herniation is not uncommon
  – Can be transient and labile
  – Concern for “bottoming out”
  – No immediate injury to organs

• Treatment options
  – Can administer prn IV medications if longstanding
    • Labetalol and Hydralazine most commonly used
  – May have to start continuous infusion
    • Rare occurrence
Recall Test Question: The process of herniation that leads to brain death is the same for every patient

• A) True
• B) False
• C) “I’m sorry Kayla, you’re really nice but I have no idea what you’re talking about”
Questions?
References


• Vyas, Harish, Nakagawa, Thomas. Management of the potential pediatric organ donor. In: UpToDate, Mallory, George (ed), UpToDate, Waltham, MA. (Accessed on April 11, 2017)
Lung Donor Management: Current Practices

Adam K. Schneider, DNP
Senior Organ Procurement Coordinator

UW ORGAN AND TISSUE DONATION
Connect to Purpose

• Recipient of a Lung

“I’m a husband, father of 3, and grandpa to 5. I was stuck at home with oxygen at all times and my life was going down hill fast. The day I received your loved ones lung will always be a day I keep with me, as it is the day I started my second chance at life. As my grandkids say: ’We have our grandpa back.’ I think of your family and my donor (A REAL HERO) every day and will forever.
**Connect to Purpose**

- Donor Father

“Today is Father’s day and it is a hard day for me as I am missing my only son. I have a daughter and two grandchildren. It warms my heart that you received my son’s lung and you are doing well so far. My son loved music and played the guitar. He lived life to the fullest and enjoyed every minute he shared with his family and friends. He loved golf.

He had graduated from college. He was intelligent, compassionate, and fun. He loved animals, nature, video games, and just started seeing an amazing woman. Perhaps we will meet someday. We would be open to that in the future. Continue improving and know that we are grateful for the opportunity our son gave to you.”
The Larger Clinical Problem

• What is the problem?
  – 1402 individuals waiting on national lung transplant list
  – Average person waits 500 days for a lung transplant
  – Low procurement rate of lungs available for transplant (Angel et al., 2006; Paries et al., 2012).
Pathophysiology

• Brain death causes a release of inflammatory cytokines causing inflammation.
• Fluid shifts and resulting pulmonary edema
• Mechanical ventilation, aspiration, infection, trauma can cause injury
• Apnea testing can cause major decompensation of lungs requiring aggressive recruitment maneuvers
• Catecholamine storm causes increased systemic and pulmonary vascular resistance and instability.
General Lung Donor Criteria

- Under age of 70
- No COPD/Emphysema
- Asthma is acceptable
  - Unless admitted for an asthma attack
  - Not multiple hospitalizations for exacerbations
- Smoking is acceptable
- Po2’s greater than 300, if not, perform aggressive pulmonary toilet, PEEP maneuvers, lasix for fluid overload, vest/percussion therapy.
  - EVLP may allow for Po2’s less than 300
Lung Evaluation

- Medical history
- Daily CXR with lung measurements
- Your assessments (auscultation, secretions)
- Frequent ABGs
- Bronchoscopy with sputum culture and gram stain
  - Diagnostic
  - Therapeutic
- May request chest CT
- O2 challenges
Oxygen Challenge

• Normal Ventilator Settings
• Set FiO2 to 100% and PEEP to 5 for 30 minutes
• Draw Blood Gas
• Return to normal ventilator settings
• Goal is to have PaO2 challenges of at least 300 mm Hg
• Want them to consistently be > 300
• Intervene with recruitment maneuvers or medications if dropping
Why were lungs ruled out?

- 68 brain dead donors reviewed who did not donate lungs so far last year:
  - Age
  - Anatomy of Donor
  - OR Findings
  - Airway disease

- Chest CT Results
- Injury Related
- Smoking History
- List Exhausted
- Timing halted or affected allocation
- Management Related
Non-reversible?

- OR Findings of contusions on bronchoscopy despite pO2s in 400s
- Green mucous abscess found in lungs
- Asthma who has been prescribed and uses multiple inhalers regularly
- Chest CT showing 5mm nodule concerning for cancer
- Diffuse alveolar filling pattern either from hemorrhage or aspiration with pO2s in 290’s
- Large amount of food particles resembling stomach contents with bilateral infiltrates
- 80 pack year smoking history
Reversible?

- Low PO2s, 224 on 100%, had been as high as 312. Only one peep maneuver documented. In 67,373, Out 57,043
- Lungs too “heavy” in OR. pO2 546. In 10,173, out 4667
- Instability, oxygenation plummeted. Po2 78 on 100%. In 52,600, Out 27,274
- PO2 68 on 100%. 2 PEEP maneuvers documented. In 27,853, Out 17,784.
Literature

• Literature reviewed by UW OTD. Focused on how to:
  – Improve oxygenation
  – Minimize complications of brain death diagnosis and testing
  – Minimize adverse effects of an extended ICU stay
Routine Lung Management

- Literature varied with routine lung management but recommended continuing the following basic strategies:
  - Therapeutic Bronchoscopies with bronchoalveolar lavage
  - Frequent suctioning
  - Chest physiotherapy
  - Vasopressin and T4 increases donors
First Recruitment Maneuver

EVIDENCE (Paries et al. (2012))

- Studied recruitment maneuvers immediately after brain death testing
- 27 in control – No RM after BD testing
- 27 in treatment – RM after BD testing
- Apnea test was “associated with marked decrease in PaO2/FiO2 ratio, which could be restored by a RM immediately after reconnection to the ventilator.
- Potential donors decrease by 58% in those who do not receive a RM after reconnection

RECOMMENDATION:

- RM is performed immediately after BD testing if patient is BD.
Ventilator Settings

**EVIDENCE** (Miñambres et al. (2015))
- Studied implementing lung protocol in brain dead lung donors
- 453 in control – Retrospective without protocol
- 165 in treatment – Protocol Implemented
- Protocol included: PEEP 8-10 with TV 6-8ml/kg. Hourly RM and after any disconnection from ventilator. Bronchoscopy with BAL. CVP < 8. Methylprednisone 15mg/kg.
- Worse outcomes associated with tidal volumes of 8-10 ml/kg. This only overinflates the lungs and causes lung injury.
- Number of lung donors doubled after implementation.

**RECOMMENDATION:**
- Adopt these ventilator settings.
Medication Reconciliation

EVIDENCE (Ware et al. (2014))
• Studied administration of albuterol in brain dead lung donors
• 246 in control – Albuterol
• 260 in treatment – No albuterol
• Primary outcome measure was improve alveolar fluid clearance with albuterol.
• Albuterol does not improve donor oxygenation or donor utilization of lungs and causes potential complications such as tachycardia.

RECOMMENDATION:
• Do not use albuterol in lung donors(Discontinue and do not order unless Asthma or COPD exists)
Brain Dead Lung Management
Instructions and Tips for Direct Care Providers

Brain death causes a release of pro-inflammatory cytokines and a catecholamine storm which results in complications such as acute pulmonary edema. Apnea through brain death testing or ventilator disconnections can cause alveolar collapse. Our goal to place the lungs is to prevent these complications and to have PaO2 challenges of at least 300 mm Hg.

Tips for Lung Management

- Perform recruitment maneuver after any ventilator disconnections; notify Organ Procurement Coordinator.
- Take good care of the pulmonary system. Perform frequent suctioning and chest physiotherapy every 4 hours.
- We will monitor and keep goal CVP < 8 with diuretics. Notify the coordinator if you are concerned for fluid overload.

Recruitment Maneuvers

Recruitment maneuvers allow for the re-opening of atelectasis induced by apnea through an intentional transient increase in trans-pulmonary pressures. PEEP maneuvers should ONLY be performed in brain dead patients who are apneic. Observe patients throughout the procedure. Abort the maneuver if they become hemodynamically unstable.

Recruitment Maneuver A

1. Turn the PEEP to 20 cmH2O
2. Hold for 1 minute
3. Decrease PEEP by 2 cmH2O every minute until back to PEEP of 8.
4. Then increase TV to 1.5 times the set volume for 10 breaths.
5. Perform O2 Challenge.

Recruitment Maneuver B

1. Set PEEP to 12 cm H2O for 1 hour (monitor closely for instability)
2. Perform O2 Challenge

O2 Challenge

1. Normal ventilator settings
2. Set FiO2 to 100% and PEEP to 5 for 30 minutes
3. Draw blood gas
4. Return to normal ventilator settings
Normal Ventilator Settings

- Tidal Volume 6-8ml/kg based on IBW
- PEEP of 8
- Rate to maintain normal pH
- FiO2 to maintain sats > 95% and PaO2 > 90. Adjust to lowest FiO2.
- Settings to maintain PIP < 32
- PC or PRVC as ordered by OPO coordinator
- Inflate cuff on ETT to 10cm H2O over normal for patient
Recruitment Maneuver A

- Turn the PEEP to 20 cmH2O
- Hold for 1 minute
- Decrease PEEP by 2 cmH2O every minute until back to PEEP of 8
- Increase TV to 1.5 times the set volume for 10 breaths
- Perform O2 challenge
Recruitment Maneuver B

- Set PEEP to 12 cm H2O for 1 hour
- Perform O2 challenge
Question 1

- What is normal ventilator setting’s tidal volume?
  - A. 4-6 ml/kg
  - B. 6-8 ml/kg
  - C. 8-10 ml/kg
  - D. 10-12 ml/kg
Question 2

• A patient has a 25 pack year smoking history. The patient should not be evaluated for lung donation.
  – A. True
  – B. False
Question 3

• After an O2 Challenge, the PEEP should be set at ___ during normal ventilator settings.
  – A. 5
  – B. 8
  – C. 12
  – D. 20
References

Donation... 30% of the time is DCD

Kathy Roberg, RN, MS, CPTC
Objectives

• Discuss the intersection of the OPO managing the procedure while the Donor Hospital manages the patient and the End-of-Life process
• Describe the role of the Donor Hospital staff throughout the stages of the DCD procedures
• Discuss and consider responses to usual family questions/statements related to the DCD process
• Discuss the unique support process for supporting a “good death” in a critical care unit
“hospice” is now …. institutional

- 2.4 million deaths occur each year
- 30 - 80% of these deaths in hospital/NH
- 20% of ICU patients die
- NEJM – “one in five deaths occurs in the ICU”

Dying with Dignity in the Intensive Care Unit: Deborah Cook, M.D., and Graeme Rocker, D.M.
Donation after Circulatory Death

• Families may go 10-20 years without experiencing death – and DCD deaths are usually sudden….

• Death – doesn’t happen every day in the ICU

• Donation after Circulatory Death is even less frequent (<1/100 deaths DCD donation)

• This rare occurrence – is moved out of your “milieu”

• This rare experience is moved to a place even less experienced with death… i.e. the OR
• How many times have you been the RN that goes to the OR for a DCD recovery?
SO…..combining

✓ Unexpected death for a family
✓ Death in an ICU
✓ Death in the OR
✓ DCD recovery ….

We have successfully made everyone uncomfortable.
Death is no longer the occasion of a ritual ceremony, ....over which the dying person presides, 

Death is a technical phenomenon obtained by the cessation of care – 
.......by hospital and team... 
.......oh, and the family
A “Good Death” in the ICU

- Not die alone
- Not have pain
- Understanding/acceptance of prognosis
- Knowing and following patient wishes.

Constraints to making this happen.....

- Patient’s preferences not known
- Not enough time – staffing patterns
- COMMUNICATION –
  - about prognosis, about treatments
    - “less than truthful”
    - “somewhat unrealistic”
DCD happens when...

- Patient has suffered an irreversible, catastrophic brain injury or other end-stage condition
- Family members, in consultation with the patient’s physician, decide to WLST
- Then – a decision can be made about organ donation.
This is an increase of 1.2% to 16.5% of all donations /OPO

In 2015, DCD donors provided 2,876 life-saving organ transplants

Source: Based on OPTN data through December 31, 2015. Data subject to change due to future data submission or correction.
U.S. Organ Donor Experience – DBD & DCD Donors
2002 – 2015

Total Deceased Organ Donors = 109,659

BD (n=97,943)  DCDs (n=11,716)

Source: Based on OPTN data through December 31, 2015.
# UW DCD Donor %

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<td>Number of Brain Dead Donors</td>
<td>96</td>
<td>89</td>
<td>94</td>
<td>91</td>
<td>80</td>
<td>118</td>
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<tr>
<td>Number of DCD Donors</td>
<td>40</td>
<td>29</td>
<td>32</td>
<td>36</td>
<td>26</td>
<td>32</td>
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<tr>
<td>% of DCD donors</td>
<td>42</td>
<td>33</td>
<td>34</td>
<td>40</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td># of attempted DCD donors</td>
<td>5</td>
<td>13</td>
<td>15</td>
<td>20</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Total % of DCD actual/attempted donors</td>
<td>47</td>
<td>46</td>
<td>49</td>
<td>60</td>
<td>44</td>
<td>35</td>
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The process of withdrawing life-sustaining therapy and providing appropriate palliative care for a dying patient should be the same, irrespective of the patient's donor status.
Family Decisions

- Information
- Emotional and Spiritual Support
- Empowered Decision Making
Procedures in the OR

• Every minute makes a difference for WIT
• ICU RN is in charge of the patient (not the OR RN)
  – Transport to OR
  – Transfer to OR table (medicate first)
  – Position, prep, drape, ?cutdown (medicate)
  – OTD surgeon leave the room,
  – Family enters room
  – Final meds, withdraw ETT –
In the OR .. Cont

- Patient reaches “cardiac standstill/PEA”
- Family is told, say their last goodbyes, leave
- RN/MD wait and confirm five minutes later
  - Autoresuscitation
  - CTOD is 5 minutes after start of PEA
  - Consider if a DCD lung recovery
- MD must write CTOD note
- RN and MD can leave OR.
So, what if they don’t pass….

• Where will patient go? Back to ICU or Palliative unit?

• What do you say when the family says – “this was all for nothing…..”
• The family says:

• “I wish we would have never done this, it didn’t do any good anyway.”

• And you say………. 
Holding Space

• Difficult to describe
• Space is Intangible ~~
• Holding is symbolic
This “space” you hold....

.... is not necessarily where answers are grasped or understood. Rather it is where...

questions are asked, conversations occur, rituals are perpetuated and silence is heard—

....all in the attempt to find answers. But this, in itself, raises further questions!
Holding Space

• Opening from your core
• Letting go of judgment
• Letting go of desire to fix
• Allow another to have THEIR experience
  – Pain, confusion, sense of loss, fear, turmoil
• Giving attention.
“Improv” techniques....

You

Improv-ise - every day
• ... improv is all about listening.
• Don’t listen to answer a question –
• Listen to hear what was said......
• Knowing what to say – involves hearing what was said
• And then ask another question.
Rituals

• Hand prints, Hand molds, Finger prints
• Lock of hair
• Recording of a heart beat
• Blankets on the bed – make hand outlines on blanket
• Having music in the room
• Grief cart – food cart
• Flag raising
Rituals....

- Brushing their hair, bathing, mouth care, nail care
- Reading to the person, spiritual, other...
- Tibetan Buddhist practice –
- Photos of hands, flowers....
- Gather, review photos
- Sing songs, cuddle in bed
- Plan ritual for leaving unit, make up a ritual
- MOS, what will be last thing read, what will be last songs
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• It is not just about physical care, it is about the rituals, the memory-making, the keepsakes, the stories.
• Who would they want with them
• If they look worried, what reassurance do they need.
• Some conversations will be difficult
• What options, establish goals, care plan
• Goal to make these last hours that they have – be experienced.

• Precepts underlying hospice care are essential principles for all end-of-life care. Such precepts include
  – Assume that individuals live until the moment of death;
  – that care until death may be offered by a variety of professionals; and
  – that such care is coordinated, sensitive to diversity, offered around the clock, and gives attention to the physical, psychological, social, and spiritual concerns of the patient and the patient's family.
• The family and service dog were dressed appropriately for the OR.

• Family and the service dog were escorted to patient’s side for extubation.

• Death was determined 15 minutes later
• Death ---- is a natural, accepted and honored part of life…

• Death with dignity….
  – Requires reflection, time, and space to create connections that are remembered by survivors long after a patient's death.

• …Calls for humanism …to promote peace during the final hours or days of a patient's life and to support the bereaved family members.

Ensuring death with dignity in the ICU epitomizes the art of medicine and reflects the heart of medicine...
How many points did you learn that you will share with your co-workers – please write them down on the handout provided.
A hero is within each of us.
An everyday hero.

Consider your Call to Action

Guardian of the Gift
Icon of Innovation
Voice of Valor
Illuminator of Life
Idol of Inspiration
Face of Fortitude