Gift of Life's Vision
For Increasing
Lung Recoveries in Michigan

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Keystone Symposium
Suburban Collection Showplace
May 30, 2013
“Your vision will become clear only when you can look into your own heart. Who looks outside, dreams; who looks inside, awakes”  

Carl Jung
Kerry’s Story
What if your next breath might be your last?
But what if you can’t?

Note to self: Just Breathe!
Objectives

- Review Michigan’s lung transplant volume and waiting list deaths
- Compare Gift of Life Michigan’s lung transplant outcomes with other OPOs
- Discuss current evidence-based donor lung management
- Explore the potential for expanding the lung donor pool with DCD donors
Abbreviations

- **OPO** = organ procurement organization
- **DCD** = donation after circulatory death
- **ECD** = Expanded criteria donor
  - donor > 60 or
  - donor age 50-59 with two of the following:
    - history of hypertension
    - creatinine greater than 1.5
    - death resulting from CVA
Challenges in Lung Transplantation

- There is a critical mismatch between the number of donor lungs and the demand for lung transplantation.
- Donor lungs are especially susceptible to injury:
  - due to its direct external contact
  - due to the development of neurogenic edema
  - proinflammatory changes caused by brain death
- Lungs are transplanted in only 15-20% of all donors
Question

- How many patients in Michigan are currently waiting for a lung transplant?
  
a) 83  
b) 50  
c) 100  
d) 1000  
e) None of the above
Michigan patients waiting for transplants as of May 1, 2013

- Kidney 2,561
- Liver 347
- Lung 83
- Heart 78
- Kidney/Pancreas 45
- Pancreas 14
- Kidney/Liver 12
- Intestine 4
- Kidney/Heart 3
- Pancreas/Liver/Intestine 3
- Heart/Liver 1
- Pancreas/Intestine 1

TOTAL 3,152
Lung Transplantation in the State of Michigan

SPECTRUM HEALTH

University of Michigan Health System

Henry Ford Health System
Michigan Lung Transplant Volume by Year - 2002-2012

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<tr>
<th>Year</th>
<th>Number of Transplants</th>
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Gift of Life Michigan
Lung Exports: 2011-2012

2011: 75
2012: 52
Lung Waiting List
Deaths in Michigan: 2007-2012

The power to heal lives.
A Life Saved Through Lung Transplantation

Ben Hayes
Hale, Mich.
Double lung recipient
11 years

“My left lung had shut down and my right lung was at 10 percent. I knew I was going to die, and I made my peace.”
Question

What is the primary factor limiting the number of lung transplants performed?

a) Shortage of suitable donors
b) Not enough recipients
c) Not enough transplant centers
d) None of the above
e) All of the above
Percentage of All Donors who were Lung Donors in 2012

- All: 20%
- SCD: 30%
- ECD: 10%
- DCD: 0%

Michigan
USA
How does Gift of Life Michigan Compare to other OPOs in Lungs Transplanted per Donor?
Gift of Life Michigan vs. 58 OPOs: Lungs Transplanted per Donor 2012 for All Donors

Gift of Life Michigan

0.39
Gift of Life Michigan vs. 58 OPOs:
Lungs Transplanted per Donor in 2012
Standard Criteria Donors

Gift of Life Michigan
Strategies to Maximize Lung Donors

- Expand donor selection criteria – standard versus extended criteria donors
- Maximize organ procurement
  - all donors considered for recovery and placement of lungs
- Optimization and standardization of donor management protocols
- Improved communication among and between hospitals, OPOs and transplant centers
Standard ISHLT Donor Lung Criteria

• Age < 55
• Clear chest x-ray
• Normal gas exchange (P/F > 300)
• Absence of chest trauma
• No evidence of aspiration
• Absence of purulent secretions at bronchoscopy
• Absence of organisms on sputum gram stain
• No history of primary pulmonary disease
• Tobacco history < 20 pack years
Extended Criteria Lung Donors

- Age > 55
- Abnormal CXR due to atelectasis or infiltrate
- Smoking history > 20 pack years
- Impaired gas exchange (P/F < 300)
- Airway colonization with organisms
- Secretions present at time of bronchoscopy
Gift of Life Michigan vs. 58 OPOs:
Lungs Transplanted per Donor in 2012
Expanded Criteria Donors

Gift of Life Michigan

0.38
Strategies to Maximize Lung Donors

• Expand donor selection criteria – standard versus extended criteria donors
• Optimization and standardization of donor management protocols
• Maximize organ procurement
  • all donors considered for placement of lungs
• Improved communication among and between hospitals, OPOs and transplant centers
“Knowing is not enough; we must apply. Being willing is not enough; we must do”

Leonardo da Vinci
Evidenced-based Best Practices for Donor Lung Management

- Effect of a Lung Protective Strategy for Organ Donors on Eligibility and Availability of Lungs for Transplantation
  - JAMA 2010;304(23):2620-2627
- Airway Pressure Release Ventilation and Successful Lung Donation
  - Arch Surg. 2011;146(3):325-328
Richard Martin who received a double lung transplant. His donor was a 26-year-old woman from New Jersey. He is still recovering, but is grateful for his gift.
Novel Approaches to Expanding the Lung Donor Pool

- Donation after circulatory death (DCD)
- Ex vivo lung perfusion (EVLP)
  - provides the opportunity to evaluate donor lungs under physiologic conditions
  - allows time to optimize donor lungs with the potential for repair effects to occur
Donation after Circulatory Death

- Represents a growing source of organs for transplantation
- Opportunity for further expansion
- Challenges:
  - Identification of potential donors
  - Management within an ethical framework
  - Minimize warm ischemia
  - Maximize the number of transplantable organs
DCD Lung Transplant History

• 1963: First lung transplant was performed by James Hardy using a lung from a DCD donor who died of myocardial infarction
  • Predated the concept of brain death
• 1995: Love and colleagues reported the first successful experience using a DCD lung donor
Primary Advantage of DCD Lung Donation

• Avoid brain death induced lung injury
  – Neurogenic pulmonary edema
  – Proinflammatory cytokine induced lung injury
    • IL-6
    • IL-8
DCD Donor Lung Evaluation

- Medical history
- Arterial blood gases
- Chest radiograph
- Bronchoscopy
- Direct examination of the lungs in the operating room
Gift of Life vs. 58 OPOs

Lungs Transplanted per Donor in 2012

DCD Donors
Incidence and Distribution of Transplantable Organs from Donors after DCD

• To assess the maximal potential supply and distribution of DCD organs in U.S. ICUs
• Population-based cohort study among a randomly selected sample of 50 acute care hospitals in the highest volume DSA in the US.
• Identified all potentially eligible donors dying within 90 minutes of the withdrawal of life-sustaining therapy from July 1, 2008 to June 30, 2009

Incidence and Distribution of Transplantable Organs from DCD

• Findings:
  • If only optimal DCD organs were used, the deceased donor supply of lungs could increase by up to 22.7%
  • If optimal and suboptimal DCD organs were used, the corresponding supply of lungs could increase by up to 50%
What are the Clinical Outcomes of DCD Lung Transplantation?

Growing Single Center Experience with Lung Transplantation Using Donation after Cardiac Death

Growing Single Center Experience with Lung Transplantation using DCD Donors

- Cleveland Clinic experience- 2004-2011
- 32 lung transplant recipients from DCD donors
- Results:
  - Survival was 97% at 30 days, 91% at 1 year, 91% at 2 years, and 71% at 3 and 4 years
  - “recipient survival and early graft function using DCD lungs is excellent”
  - “Concerns over diminished organ quality are unfounded, and use of DCD lungs should be expanded”

Forever Changing Lives

Tim Parker
Troy, Mich.
1989-2007
Saved 7 lives

“We could envision the people on the other side getting the phone call that would forever change their lives.”

– Lynn Parker, Tim’s mom
Conclusions

• Patients continue to die while waiting for a life saving lung transplantation
• Donor lung management matters
• DCD lung donors are an important source to increase the number of lungs recovered for transplantation
• Gift of Life Michigan must embrace novel strategies to improve the number of lung recoveries
  • EVLP
“Life is not measured by the number of breaths we take, but by the moments that take our breath away”