Preserving the Donation Option: The Impact of Targeted Critical Care

Putting the Pieces Together: A Donation and Transplantation Symposium

Denver – November 15, 2012

Darren Malinoski, MD Associate Professor of Surgery Oregon Health & Science University



Faculty Disclosure Information

- I have no financial relationship with any manufacturer of any commercial product and/or provider of commercial services discussed in the CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product or device in my presentation.
- My views do not represent those of the Portland VA Medical Center or U.S. Government

Goals for this presentation

- Emphasize the importance of organ donation for both recipients and donors
- Identify the role of critical care providers in organ donation and discuss how their involvement improves outcomes
- Recognize donor hospital best practices



Numbers to Remember





120 in 2012

Case Presentation

- 22 year old male with self-inflicted GSW to the face.
- Before arriving at UCI, the patient was taken to a nearby hospital for airway stabilization.
 - Asystole upon arrival, which responded to intubation, correction of hypoxia, epinephrine, atropine, and CPR
 - No medications required: no gag or spontaneous movements
 - Transferred to UCI



Case Presentation

Upon arrival to UCI:

- A. Endotracheal tube placement was confirmed
- B. Equal breath sounds bilaterally
- c. HR 152, BP 50/palp, introducer placed
- D. Pupils fixed and dilated, no spontaneous movement/reflexes
- E. Active hemorrhage noted from the mouth and nose with a defect in the posterior hard and soft palate and no exit wound.
- The oropharynx was packed
- Foley catheters were inserted into bilateral nares, inflated and pulled to create tamponade.



Resuscitation

A nearly continuous infusion of blood products was required to help maintain blood pressure:

- PRBCs 11 units
 FFP 10 units
- Cryoprecipitate 10 units
- Platelets
 2 units
- Novo-7 1 dose
- Normal saline
 3 liters
- 3% saline
 500 cc
- Hormone Replacement protocol instituted
 Bleeding from oropharynx continued



Control of Hemorrhage

- Plastic surgery fellow on "Face Call" was in the ED
- Bilateral external carotid artery ligation was performed.
- Bleeding slowed, however →



Abdominal Compartment Syndrome

- Pulse oximetry fell from the 90's to the low 80's.
- Peak airway pressures went from normal to 40mm Hg.
- Systolic blood pressure was in the 50s.
- Bladder pressure was >40 cmH $_2$ 0.
- Decompressive laparotomy was performed with an immediate improvement in vital signs and ventilation.

Outcome

- The patient's blood pressure stabilized and he was transferred to the ICU.
- The patient's family was informed of his condition and that brain death testing would be initiated.
- Brain death was declared 2 hours later in the ICU and One-Legacy was present to help the family.
- He went on to donate 18 hours after arrival.







I'VE DECIDED TO BE AN ORGAN DONOR

How Do We Narrow the GAP?

- Hospital process measures
- Aggressive critical care management of patients with catastrophic brain injuries
- Research



Goals of the Organ Donation Breakthrough Collaborative

- 3.75 organs transplanted per donor (OTPD)
- 10% donors after cardiac death (DCD)
- Increase conversion rate up to 75%
- Increase donations by 1,900/year
- Increase transplants by 6,000/year



Hospital Requirements

- Centers for Medicare/Medicaid Services & American College of Surgeons
 - Notification process
 - Declaration of brain death
 - Organ procurement organization (OPO) relationship
 - Performance Improvement (PI) program
 - Patient/family opportunity to donate



Impact of Timely Referral on Conversion Rates

Timely Referral*	Eligible Deaths	Eligible Donors	Conversion Rate		
Yes	20109	14167	70.5%		
No	3619	2080	57.5%		
Total	23728	16247	68.5%		
*Based on OPO's definition of timely referral					
OPTN data January 2008-June 2010					

Impact of Effective Request on Conversion Rates

Effective Request*	Eligible Deaths	Eligible Donors	Conversion Rate		
Yes	18947	14334	75.7%		
No	3998	1870	46.8%		
Total	23728	16247	68.5%		
*Based on OPO's definition of effective request					

OPTN data January 2008-June 2010

Numbers to Remember

>75% of families consent to donate when appropriately approached



120 in 2012

A Multidisciplinary Organ Donor Council and Performance Improvement Initiative Can Improve Donation Outcomes

ALLEN P. KONG, M.D.,* CRISTOBAL BARRIOS, M.D.,* ALI SALIM, M.D.,† LYNN WILLIS, M.H.A.,* MARIANNE E. CINAT, M.D.,* MATTHEW O. DOLICH, M.D.,* MICHAEL E. LEKAWA, M.D.,* DARREN J. MALINOSKI, M.D.*

> From the "University of California, Irvine, Medical Center, Orange, California; and †Cedars-Sinai Medical Center, Los Angeles, California

	2006	2007	2008		
Number of referrals	96	139 (p<0.01 vs. 2006)	143 (p<0.01 vs. 2006)		
Timely notification rate	64%	83% (p<0.01 vs. 2006)	83% (p<0.01 vs. 2006)		
DCD rate	0%	11 (p=0	%).07)		

THE AMERICAN SURGEON October 2010

A Multidisciplinary Organ Donor Council and Performance Improvement Initiative Can Improve Donation Outcomes

ALLEN P. KONG, M.D.,* CRISTOBAL BARRIOS, M.D.,* ALI SALIM, M.D.,† LYNN WILLIS, M.H.A.,* MARIANNE E. CINAT, M.D.,* MATTHEW O. DOLICH, M.D.,* MICHAEL E. LEKAWA, M.D.,* DARREN J. MALINOSKI, M.D.*

> From the "University of California, Irvine, Medical Center, Orange, California; and †Cedars-Sinai Medical Center, Los Angeles, California



OTPED = effectiveness of an organ donation program

Considers conversion rate & donor management

THE AMERICAN SURGEON October 2010



Instituting a User-Friendly Protocol - 1998

Aggressive Donor Management

Early identification



Dedicated team fluids, pressors, T₄

ICU admission

The Journal of TRAUMA® Injury, Infection, and Critical Care

Aggressive Organ Donor Management Significantly Increases the Number of Organs Available for Transplantation

Ali Salim, MD; George C. Velmahos, MD, PhD, FACS; Carlos Brown, MD; Howard Belzberg, MD; and Demetrios Demetriades, MD, PhD, FACS

J Trauma. 2005;58:991-994.

	Pre-ADM	Post-ADM	Percent	p-value*
	(1995-1998)	(1999-2002)	Change	
Referrals for donation	341	537	+ 57%	< 0.001
Potential donors	214	255	+ 19%	0.01
Actual donors	57	104	+82%	< 0.001
Family Decline (%)	109 (51%)	106 (42%)	- 9%	< 0.05
Donors lost due to	39	5	- 87%	< 0.001
cardiovascular				
collapse				
Medically unsuitable	9	40	+344%	< 0.001
Organs recovered	217	370	+ 71%	< 0.001

How Can I Adopt This In My ICU?

Devastating Brain Injury Guidelines or CBIG's: Catastrophic Brain Injury Guidelines





Aggressive Organ Donor Management Protocol / DuBose, Salim

UNIVERSITY of CALIFORNIA, IRVINE MEDICAL CENTER



Hormone Replacement Protocol (to be initiated only

Devastating Brain Injury Pathway

GOAL

To maintain hemodynamic stability in patients with devastating brain injuries



Benefit to Patients/Families

Hemodynamic Stability

- Apnea test/Confirmatory Test
- Locate family
- Time to grieve/decide on next steps
- Some patients clinically improve and survive
- Preserves option of donation if chosen ***
- Donors and their families want to donate
 - >75% of families consent
 - >45% of U.S. adults are registered donors

Numbers to Remember

>75% of families consent to donate when appropriately approached

>45% of U.S. adults are already registered to be organ donors

120 in 2012







Transportation

Exploring the psychological effects of deceased organ donation on the families of the organ donors Shaila J. Merchant^a, Eric M.

Shaila J. Merchant^a, Eric M. Yoshida^{a,b}, Tim K. Lee^{a,c}, Penny Richardson^b, Kari M. Karlsbjerg^b and Elsie Cheung^d

98% would choose donation again

- 92% identified positive aspects to the donation process/experience
- Majority agreed that donation was comforting
 - Associated with less depression

Copyright © 2008 Blackwell Munksgaard

Clinical Transplantation





Impact of Compliance with the American College of Surgeons Trauma Center Verification Requirements on Organ Donation-Related Outcomes

Darren J Malinoski, MD, FACS, Madhukar S Patel, SCM, Stephanie Lush, RN, MSN, M Lynn Willis, MHA, Sonia Navarro, Danielle Schulman, MPH, Tasha Querantes, MBA, Ramona Leinen-Duren, Ali Salim, MD, FACS

- Compliance with ACS 67%
 - 5.1 vs. 5.3 donors/1000 trauma admits (p=0.88)
- Trauma Surgeon on Donor Council 67%
 - 6.0 vs. 4.2 donors/1000 trauma admits (p=0.04)
 - 21 vs. 11 donors/1000 ICU admits (p=0.03)
- Catastrophic Brain Injury Guidelines 48%
 - 6.3 vs. 4.2 donors/1000 trauma admits (p=0.04)
 - 69 vs. 62% conversion rate (p=0.01)

Additional Research topics

- First-person consent
- Family member consent/grieving
- Optimal Donor Management strategies
 - Glucose control
 - Resuscitation with SVV/PPV
- Donor Management Goals*
- The inflammatory response to brain death

BACKGROUND

Shortage of organs for transplantation

 National average of three organs transplanted per donor (OTPD)

Inconsistent donor management practices

BACKGROUND

Checklists have demonstrated utility in several arenas

Standardized critical care endpoints

Donor Management Goals (DMGs)

Region 5 DMGs

Phase 1 – retrospective – 2007-2008

 Achieving Donor Management Goals (DMG) Prior to Deceased Donor Procurement is Associated with More Organs Transplanted per Donor





Darren J. Malinoski, MD, Michael C. Daly, MSc, Madhukar S. Patel, ScM, Chrystal Oley-Graybill, Clarence E. Foster III, MD, and Ali Salim, MD

	TABLE 1	. Donor	Management	Goals
--	---------	---------	------------	-------

Critical Care End Points	DMG	Proportion of Donors Meeting DMGs (%)
Mean arterial pressure	60–100 mm Hg	83
Central venous pressure	4–10 mm Hg	60
Ejection fraction	>50%	50
Pressors	≤ 1 and low dose*	75
Arterial blood gas pH	7.3–7.45	70
PAO2:FIO2	>300 on PEEP = 5 cm H ₂ O	43
Serum sodium	135–160 mEq/L	89
Blood glucose	<150 mg/dL	43
Hemoglobin	>10 mg/dL	59
Urine output	1-3 mL/kg/h for preceding 4 h	73

SD standard deviation





Darren J. Malinoski, MD, Michael C. Daly, MSc, Madhukar S. Patel, ScM, Chrystal Oley-Graybill, Clarence E. Foster III, MD, and Ali Salim, MD







Darren J. Malinoski, MD, Michael C. Daly, MSc, Madhukar S. Patel, ScM, Chrystal Oley-Graybill, Clarence E. Foster III, MD, and Ali Salim, MD

TABLE 2. Impact of DMGs on Organ Yield							
	DMGs Met	DMGs Not Met	р				
% SCDs with \geq 4 OTPD	70.1%	38.7%	< 0.001*				
Mean OTPD \pm SD	4.35 ± 1.61	3.32 ± 1.56	$< 0.001^{+}$				
Transplanted							
Right lung	37.1%	14.3%	< 0.001*				
Left lung	36.1%	14.3%	< 0.001*				
Heart	56.7%	30.5%	< 0.001*				
Liver	93.8%	81.6%	0.005*				
Pancreas	40.2%	24.7%	0.005*				
Right kidney	95.9%	87.4%	0.021*				
Left kidney	94.8%	88.8%	0.088*				
Intestine	2.1%	1.3%	0.641‡				





Achieving Donor Management Goals Before Deceased Donor Procurement Is Associated With More Organs Transplanted Per Donor

Darren J. Malinoski, MD, Michael C. Daly, MSc, Madhukar S. Patel, ScM, Chrystal Oley-Graybill, Clarence E. Foster III, MD, and Ali Salim, MD

	OR		
DMG/Variable	(<u>></u> 4 OTPD)	95% CI	p value
Continuous Variables			
Age (years)	0.944	0.923 – 0.966	< 0.001
Creatinine (mg/dL)	0.636	0.409 – 0.987	0.044
Categorical Variables			
Thyroid Hormone use	1.969	1.082 – 3.582	0.026
CVP 4 – 10 mmHg	1.897	1.021 – 3.527	0.043
EF > 50%	3.988	2.095 – 7.592	< 0.001
P:F > 300 on PEEP 5	4.591	2.478 – 8.506	< 0.001
Na 135 – 160 mEq/L	3.352	1.141 – 9.851	0.028
"Goals met"	4.394	2.497 – 7.732	< 0.001

Region 5 DMGs

- Phase 2
 - Prospective
 - Three time points
 - Modified DMGs
 - June 2008 January 2009

-	A	В	С	D	E	F	G	Н		J	K	
1	Region #	5 Donor Ma	anagement Goal Out	tcome l	Measu	re (DM	G)W	orkshe	et (> 1	3 years old)		
2		At Consent 12-18hrs into case Prior To O. R.										
3	Donor Date	DMG / other data points	Parameters	DMG met	Value	DMG met	Value	DMG met	Value	Additional Comments		
4		MAP	60-100									
5	UNOS ID	CVP	4 to 10									
6		EF	>50%									
7	Age (years)	ABG	PH: 7.3-7.45									
8		PF Ratio	>300									
9	Gender	Serum Sodium	135-155									
10		Glucose	<150									
11		Urine Output	0.5-3cc/kg/hr over 4 hours									
12		Number of Vasopressors	=1 pressor used and<br Dopa =10mcg/kg/min or<br Neo =60 mcg/min or<br Norepi = 10 mcg/kg/min</th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>									
13	Donor Type		Dopamine									
14		Dosages	Neosynephrine									
15	РТС		Norepinephrine									
16		Creatinine	Serum level			ľ						
17	OPO	T4	used/infusing dose (mcg/hr)									
18		Vasopressin	used/infusing dose (units/hr)									
19		DMG'S MET	total number (out of 9)	0		0		0				
20	Organs	Recovered	Tx'd	Decline	e Cođe	С	omment	s / Reaso	n			
21	Heart							· ·				
22	Left Lung											
23	Right Lung											
24	Liver 1											
25	Liver 2											
26	Pancreas											
27	Intestine											
28	Left Kidney											
29	Right Kidney											Ţ
• •	DMG-Wr	orkSheet Guidance (DocumentDMG-Worksheet	Variable Wo	orksheet	DMG-DATA	/ 🔁 /				► Ī	
4	🛃 Start 🔰 🖉 🚱 😰 🛅 🔞 » 🐼 2 Mi 🔹 🔂 2 Wi 🔹 🏹 5 In 🔹 3 Mi 🗸 🔯 3 Mi 🗸 🔯 Search Desktop 🔎 😰 🛱 🔇 🛃 1:20 AM											

σx

-

Region 5 DMGs

Phase 2 – Prospective Data

The Impact of Meeting Donor Management Goals Prior to Consent on the Number of Organs Transplanted per Donor



The impact of meeting donor management goals on the number of organs transplanted per donor: Results from the United Network for Organ Sharing Region 5 prospective donor management goals study

Darren J. Malinoski, MD, FACS; Madhukar S. Patel, MD, MBA, ScM; Michael C. Daly, MSc; Chrystal Oley-Graybill; Ali Salim, MD, FACS; on behalf of the UNOS Region 5 DMG workgroup

Variable	OR	95% CI for OR	p <u>value</u> ^a
Analysis using DMGs "met"			
Donor age	0.948	0.932-0.963	<0.001
DMGs "met" at time of consent	2.034	1.066-3.881	0.031
DMGs "met" 12-18 hours later	1.481	0.888-2.470	0.132
DMGs "met" prior to organ recovery	2.344	1.430-3.843	0.001
Creatinine prior to organ recovery	0.746	0.606-0.918	0.006
Analysis using change in DMG's			
Donor age	0.951	0.936-0.966	<0.001
Change in DMG's from consent to	1 1 2 0	1 001 1 277	0.048
12-18 hours later	1.130	1.001-1.4//	0.040
Creatinine prior to organ recovery	0.727	0.595-0.889	0.002

Region 5 DMGs

Phase 2 – Prospective Data

 The Impact of Donor Hospital Management on the Development of Delayed Graft Function in Deceased Donor Kidney Transplant Recipients

BACKGROUND

 Organs transplanted per donor is not an ideal outcome measure

Graft function is a better endpoint



Kidneys are the most commonly transplanted organ

 Delayed Graft Function (DGF) occurs in approximately 25% of deceased donor kidney recipients

DMGs and Delayed Graft Function in Kidney Recipients

Variable	OR	95% CI	р
Age (per year)	1.02	1.01-1.03	0.003
Creatinine prior to recovery (per mg/dL)	1.4	1.1-1.6	0.001
ECD	0.9	0.5-1.5	0.664
Cold ischemia time (per hour)	1.03	1.01-1.05	0.011
DMGs met at consent	0.5	0.3-0.9	0.019

- 2011 PCSA, Submitted to American Journal of Transplantation

Darren-

Pursuant to your request for info regarding Thursday's meeting, I was able to obtain some preliminary information about the recipients. As you know, the lungs were not transplantable due to excessive aspiration in the field. The pancreas was not transplantable due to transfusions- this is quite common for our pancreas placements. Perhaps we could have used islet cells for a transplant study- City of Hope has been quite successful- but the family did not consent to research. The remaining organs were distributed strictly according to UNOS policy as follows:

The heart went to a 59 year old female patient who was #1 on the list. She was listed as "Status 1A," the most desperate category of need. Status 1A patients are always admitted, usually on moderate to high pressors, and have a substantial risk of imminent death if not transplanted. This heart arrived just in time for her.

The liver went to a 49 year old male patient who had a MELD score of 23 prior to transplant.

There was an extremely high interest in the kidneys of this donor as he was well taken care of prior to procurement. His age combined with his excellent lab results and diligent hydration/renal perfusion status were all factors in the successful transplant of both kidneys. One kidney went to a 12 year old female. The other went to a 51 year old female who was a high-antibody recipient. The cross matches on other donors had not gone well for this recipient prior to this case. Had she not been such a good match to this donor, she was not likely to receive a kidney for a very long time. She was lucky this time.

"The Liver and Heart recipients made it out of the ICU and are doing well. The 12 y/o girl suffered from nephrotic syndrome and enjoys computers, music and football!"

Sec 1 1/2 At 2.1" Ln 7 Col 82 REC TRK EXT OVR English (U.S 🚇

s 🕸 🔇

Ms. Anne Gulotto





Summary

- Making donation a priority improves outcomes
- Aggressive donor management / CBIGs affect the number and quality of organs available for transplantation
- Donation benefits OUR patients/families

Numbers to Remember

75% of families consent to donate when appropriately approached

>45% of U.S. adults are already registered to be organ donors

■ 120 Million in 2012 → >50% of the adult U.S. population will be registered

THANK YOU

Darren Malinoski, MD malinosk@ohsu.edu

www.healthcarecommunities.org/donationtoolbox

