

Organ and Tissue Donation and Recovery



Keys to successful organ procurement: An experience-based review of clinical practices at a high-performing health-care organization

Abstract

Organ procurement (OP) from donors after brain death and circulatory death represents the primary source of transplanted organs. Despite favorable laws and regulations, OP continues to face challenges for a number of reasons, including institutional, personal, and societal barriers. This focused review presents some of the key components of a successful OP program at a large, high-performing regional health network. This review focuses on effective team approaches, aggressive resuscitative strategies, optimal communication, family support, and community outreach efforts.

Key Words: Organ donor optimization, organ procurement, team approaches, team effectiveness, transplantation

INTRODUCTION

Organ procurement continues to be the only hope for thousands of patients awaiting life-saving transplantation procedures. There are approximately 120,000 individuals awaiting organ transplantation in the United States alone [Figure 1].[1] In addition to significant improvements in recipient quality of life, organ transplantation also offers substantial health-care savings at the societal level.

From January to December 2016, out of 36,474 total transplants performed in the United States, 27,630 (82.2%) originated from deceased donors, and 5,982 (17.8%) originated from living donors.[1] Deceased organ donations originate primarily from trauma patients who have succumbed to their injuries and those who experienced devastating cerebrovascular accidents (CVAs). Of importance, in the more recent past, a significant shift toward organ recovery from donors who suffered anoxic brain injury has been noted, as exemplified by data from the Organ Procurement and Transplantation Network and our local organ procurement organization (OPO), Gift of Life (GoL) Donor Program, Philadelphia, Pennsylvania [Table 1a

and [b](#)].^[1] The ongoing need for transplantable organs and the evolving demographics of potential organ donors mandate proactive approaches to both hospital-wide education and process improvement surrounding the organ donation process.

In GoL Donor Program's donor service area of eastern Pennsylvania, southern New Jersey and the state of Delaware, timely referrals of potential organ donors and planned family approaches with organ donation opportunities, combined with hemodynamic optimization and maintenance of effective end-organ perfusion have resulted in 48.6 organ donors per million population (PMP) and 127.2 transplants PMP [[Table 2a](#)].^[2] Our institution's partnership with GoL facilitates ongoing efforts to critically analyze the organ donation process, focus on meaningful clinical education, and implement effective process improvement initiatives.

The goal of this manuscript is to focus specifically on donation practices implemented at a high-performing, university hospital with a sustained track record of regional leadership in organ procurement [[Table 2b](#) and [c](#)]. After an initial effort to hardwire highly effective processes into our institutional culture, we were able to increase the authorization rate from 64% in 2012 to 81% in 2016. Our conversion rate increased from 46% in 2012 to 75% in 2016 remaining consistently high since 2013 [[Table 2d](#)].

ORGAN PROCUREMENT ORGANIZATIONS

Given the great importance of the organ recovery process to the maintenance of the critical lifeline of organs, key components of the overall organ donation paradigm must be optimized and streamlined.^[3,4,5] As shown schematically in [Figure 2](#), the overall process of organ procurement is both highly structured, quite complex, and must include public and health-care team education, sensitivity to the family's needs, clinical expertise, and logistical factors surrounding organ recovery, distribution, and transplantation.^[3] Regional OPOs coordinate the procurement process within and between participating institutions.^[4] In addition to OPOs, bedside care teams play a crucial role in facilitating the overall process and maintaining the culture of acceptance for organ procurement.^[5] Such teams are interdisciplinary, consisting of nurses, physicians, advanced practitioners, respiratory therapists, pastoral care, OPO personnel and other health-care professionals – all working toward the common goal of providing comfort to the grieving relatives of the potential organ donor while maintaining hope that another life can be saved in the process.^[5] In addition to their consultative role in the overall guidance of the care of potential organ donors, OPOs also ensure that appropriate ethical and clinical standards are followed during the procurement process and that key quality indicators are being continuously monitored and reported, with appropriate follow-up actions promptly instituted.^[6]

THE HEALTH-CARE TEAM'S FOCUS ON FAMILY CARE AND SUPPORT

For families of the potential organ donor, the Intensive Care Unit (ICU) period is often too brief, making it difficult to fully and completely comprehend the magnitude of events taking place. Regardless of the duration of the patient's admission, the clinical staff's aptitude to foster a safe haven for relatives is critically important.^[7] At our institution, this support starts from the moment the family arrives in the emergency department or ICU. Families are especially susceptible when a nonsurvivable neurological injury or illness occurs suddenly in their loved one.^[8] This is often associated with emotional exhaustion, which can be further compounded when the question of organ donation comes up.^[9] Throughout the patient's stay, pastoral care is present to provide supportive care to families of critically ill patients, addressing their physical, emotional and spiritual needs, and preparing them for next steps should organ donation become a possibility.

OPTIMAL WORKING RELATIONSHIP WITH OUR REGIONAL ORGAN PROCUREMENT ORGANIZATION

We have learned that it is critical for our team to refer potential organ donors to the OPO in a timely fashion while the bedside team continues to support the patient and the family. In practical terms, potential donors are identified by certain “trigger events,” or clinical occurrences that are more likely to result in brain death; most frequently significant traumatic brain injury, CVAs, and conditions resulting in anoxia [Figure 3]. These events prompt bedside staff to notify the OPO in anticipation of either imminent brain death or potential donation after circulatory death (DCD).[10] Early interactions with the family and a gradually escalating, stepwise approach by staff members adequately trained in standards and practices of organ donation are of great importance. It is standard procedure for our clinical team to inform GoL of potential organ donors in as timely a manner as possible. During this process, our team continues to be discrete, sympathetic, and respectful of family moral values and views. Our institution utilizes a family communication protocol that helps facilitate the difficult step-wise process of notifying families of the gravity of their loved one's condition [Figure 4]. The protocol is designed to address any potential concerns of family members and health-care providers and is now a part of the standardized procedure that is used throughout our OPO's entire coverage area. In addition, our hospital staff is well aware of state and federal legislation, including Pennsylvania Act 102 of 1994 and the Centers for Medicare and Medicaid Services Conditions of Participation for Organ, Tissue and Eye Procurement (as well as the underlying US Department of Health and Human Services statute, the Social Security Act, Section 1138) which requires hospitals to refer all deaths and imminent deaths to OPOs and limits requests for donation to trained OPO personnel or designated requestors. We abide by these laws and utilize GoL to proceed with all donor requests on behalf of our institution.

Our OPO acquires basic information on the potential organ donor through the phone, and then, dispatches a coordinator to the hospital. Our staff has a universal understanding that timely referrals provide both the organ procurement and the bedside teams with the time they need to optimally support the family while preserving their opportunity to donate. Through frequent team huddles, the bedside team and the OPO coordinator discuss the unique needs of the family and clinical management strategies. They incorporate these findings into family and donor care plans.

The process of offering the opportunity for organ donation to families has matured over the years. Well-trained, specialized OPO coordinators now perform this role with the support of our care team. OPO coordinators screen for medical suitability, acquire authorization from next of kin, coordinate allocation and recovery of organs while providing emotional support to families, and attending to the physiological needs of potential donors.[11] As a team, we work together closely and support each other in these efforts.

Regarding practical aspects of the implementation of procurement procedures, effective education of the potential donor's family and the subsequent conversations are key steps toward successful donation. Authorization is more likely to be obtained when the family approach is done in a sensitive, appropriately timed manner,[12] specifically by a trained employee of the OPO accompanied by a member of the patient's care team.[13] All those who speak with the family are trained to respond to questions or concerns in a calm and reassuring fashion. Discretion and sympathy with respect to family cultural, religious, and moral values and views are strictly observed during each conversation.[9]

The OPO coordinator and clinical staff must be well aware and respectful of the challenges that families of potential organ donors face, including the realities of funeral arrangements, limited financial resources, and the fear of physical body alterations following the donation process.[13] We rely on our OPO coordinator to take the lead in addressing these concerns with families, providing them support during these important conversations.

Although the OPO coordinator takes the lead in explaining the donation pathways to potential donor families, it is critical for clinical staff to be knowledgeable of both donation after brain death and DCD. A reference guide to both pathways is also provided for ICU residents [Figure 5]. Professionalism, experience, and familiarity with the process lead to increased organ donation authorization and conversion

rates.[14] Better knowledge and understanding of the overall process, including common themes experienced through both medical and social interactions, all help facilitate clinical care of the potential donor, professional and team development, as well as greater involvement in organ procurement and related advocacy.[15] Conversations within and between all involved teams help facilitate awareness, attentiveness and promote the overall support for donor families and organ donation. The cultivation of a constructive dialog regarding the donation process and maintenance of proficiency among health-care providers creates an atmosphere of support for the donation process. Team communications should clearly emphasize that the work and dedication of both ICU and OPO staff are fully recognized and greatly appreciated.[16] Our experience working with the local OPO has allowed us to cultivate a culture of trust and collaboration. This, in turn, provides a foundation which drives organ donation outcomes, achieving some of the best donation authorization and conversion outcomes in our region [Table 2b and c].

UNDERSTANDING KEY PRINCIPLES OF BRAIN DEATH

It has been postulated that a significant source of confusion associated with the process of organ donation is the misinformation and/or lack of understanding regarding the concept of brain death.[17] It is essential that those involved in direct patient care have a full conceptual grasp of brain death, skill and experience in pronouncement procedures, and familiarity with the principles of organ optimization and maintenance.

Physicians and ICU nurses have a fundamental responsibility to establish care and support for the patient's relatives and to educate family members on the gravity of their loved one's condition, including steps that will be taken to determine brain death [Figure 4]. Authentic and comprehensive education, including clarifications and explanations of what brain death entails, will assist relatives in recognizing the finality of this condition.[18] When possible, addressing the family in a private setting, and at a time deemed suitable by the family, is critically important.

When the attending physician provides the family with a transparent explanation of prognosis, testing, and pronouncement of death, it must be emphasized that strict policies and numerous safety procedures are in place to ascertain an accurate diagnosis.[19] The concept of brain death must be clearly differentiated from “vegetative state” or coma.[12] Once brain death has been determined, providing the family with the date and time of death is critical to their understanding. Of importance, communication with the family must be consistent across all members of the clinical care team.

It is critical for both healthcare and OPO teams to establish trust with a potential donor's family, especially for the purpose of educating on the concept of brain death.[17] ICU teams consisting of physicians, nurses, and pastoral care, build and sustain a respectful, supportive, and reverent atmosphere for the patient and family, providing space and time for adequate reflection and grieving. The ICU nurse maintains a presence during meetings with family members and is always available to answer questions and address concerns. Pastoral care lends a calming presence and listening ear. The OPO coordinator is often present during family meetings. Of importance, after team members communicate the presence of brain death, a thorough assessment of the family understanding of this concept helps in establishing family readiness for a conversation about donation opportunities.

Delays in the determination of brain death can be stressful to the family and may impede successful organ procurement. To standardize this procedure and encourage its timely conduct, our institution has instituted a multipoint, well-organized checklist that outlines established steps required for the diagnosis of brain death [Figure 6]. We also have a comprehensive brain death policy that ensures clinical uniformity and process standardization within our institution.

Determination of a patient's eligibility for either donation after brain death or DCD should be carefully evaluated by “ruling donors in” rather than “ruling them out”. When the health-care team believes brain death is imminent, waiting until the patient becomes brain dead eliminates the family's burden of having to

make a withdrawal decision and often extends the number of organs their loved one is able to donate. At our institution, we offer this option to the family in a collaborative conversation with the OPO coordinator.

STANDARDS OF PRACTICE FOR MANAGEMENT OF THE ORGAN DONOR

To determine medical suitability, we work with our OPO coordinator to secure blood for immunologic and other pertinent testing, as well as donor-to-potential recipient match characteristics. All vital organs are physiologically “protected” during the entire process by specifically directed, protocol-driven therapeutic maneuvers, guided by established donor management criteria and performed under the supervision of trained intensivists and OPO personnel.[4,20,21,22]

Each hospital equipped with critical care facilities should have established guidelines to identify potential organ donors, notify OPO staff, and provide critical care services needed to maintain physiologic stability of the brain dead or potential DCD donors.[22] Great attention must be paid to ensure that potential donors continue to be effectively resuscitated and appropriately managed. Any untoward clinical events, such as hypoxia or hypotension, should be primarily prevented or promptly addressed before end-organ damage occurs. Invasive central venous catheters, sonography-based hemodynamic assessments[23,24,25,26] as well as other methods of noninvasive hemodynamic monitoring[27,28,29] should be employed liberally when appropriate clinical indications are present for their deployment.

Although many cases of organ donor optimization will not involve intensive hemodynamic support, some organ donors may require the high levels of treatment intensity and investment of both time and resources to provide an adequate “bridge” between the determination of organ donor status and the subsequent surgical organ recovery. Hypothermia is commonly encountered in the brain-dead patient. Consequently, maintenance of body temperature greater than 35°C is important,[30] especially when attempting to optimize procurement of more physiologically sensitive organs (e.g., heart and lung). Although our current ability to sustain organ viability varies greatly according to organ type, it is important to remember that both organ viability and the number of organs procured per donor correlate with the quality of organ donor optimization by the ICU team.[31,32,33,34]

STANDARDIZED DONOR MANAGEMENT PROTOCOLS

The importance of standardized clinical management protocols cannot be overemphasized in the context of maximizing organ yield per donor.[34] Not only do such protocols improve the outcome and quality of organ recovery but they also provide a benchmark based on which organizations can learn, self-improve, and ultimately be compared. To that end, organ procurement management goals have been incorporated into our institutional protocols to ensure that uniform procedures are applied for each potential and confirmed organ donor. This paradigm consists of a multipoint organ donation checklist and a set of standardized orders that have been successfully implemented and are followed with a high degree of compliance. Both organ donor management goals [Figure 7] and protocol-based order sets [Figure 8] help facilitate a smooth clinical transition from our institution's ICU staff to the regional OPO's staff. It is very likely that our performance as an organ procurement institution is, at least in part, due to the strict adherence to established protocols and guidelines.

AROUND-THE-CLOCK INTENSIVIST SUPPORT

The continuous availability of an intensive care specialist is especially important to all metrics of successful organ procurement process discussed above. We also believe this helps maximize the number of viable organs recovered from each donor.[35] Intensivist presence facilitates the performance of advanced bedside procedures to assist in organ optimization and allocation such as echocardiography, bronchoscopy,

central venous hemodynamic monitoring, or transesophageal echocardiography.[26,28,36,37,38,39] Not only are our intensivists available 24 h a day to assist in procedures and critical decision-making but also their presence is vital as they provide support for the families and hospital staff.

TRANSITION FROM INTENSIVE CARE UNIT TO THE OPERATING ROOM

Close cooperation between ICU staff, members of the OPO, and the operating room (OR) personnel is paramount to optimize procurement. The duration between family authorization and the donor's transport to the OR can be up to 24–36 h. At our institution, we strive to provide the family with as much time as possible at their loved one's bedside prior to the organ procurement. For donation after brain death, we support the family whenever they want to accompany the donor to the OR door, and for DCD, we support the family's presence in the OR suite from the time of withdrawal of support until cardiac death is declared, all based on the family's wishes and in accordance with our specific institutional policies.

While preparing for DCD in the OR the patient is sterilely draped with face and hands uncovered to allow contact with family should they decide to be present after the withdrawal of life support. Every effort is made to prepare the OR environment in a way that facilitates the family's comfort and end-of-life observances. The bedside care team extubates the prospective donor and administers care and comfort medications as they would in the ICU. The donor is closely monitored by the staff. Once death is determined and declared, the family is taken to a designated private area where continued support services are offered. For brain dead donors, the patient is taken to the OR, and routine processes are followed by the combined surgical, anesthesiology, and organ recovery teams.

CARE TEAM EXPECTATION FOR DONATION EDUCATION AND CASE FOLLOW-UP

The clinical knowledge and expertise of all critical care staff play an important role in the identification and subsequent care for potential donors as well as providing much-needed support for the affected families.[40,41] Our institution provides training for all new nurses during both the Trauma Nurse Course and Critical Care Nurse Course. We also collaborate with GoL Donor Program to provide regular in-servicing for nursing staff. This approach allows us to ensure that new nurses have adequate foundational knowledge of the organ donation process, with ample continuing education opportunities throughout their employment. Our residents receive educational training that includes all aspects of the donation process, including timeliness of referrals, explaining brain death, collaboration with the OPO, family support and approach for donation, and donor management. Educational meetings with respiratory care staff keep them abreast of new clinical developments and thus help favorably affect donor management and transplant outcomes. As part of routine clinical pastoral education (CPE), pastoral care residents are presented with a broad range of scenarios pertinent to the organ donation process as well as their specific roles in family support.

Follow-up communication with GoL Donor Program is essential in continuing to engage staff in the donation process. This follow-up includes case reviews with physician leaders and clinical staff in addition to sharing donation outcomes and up-to-date process quality data at donation council meetings, as well as other standing clinical forums. Among key factors in the overall process, the care team's ability to evaluate their family communication and clinical management strategies helps determine any opportunities for improvement and guides future approaches to further improve donation outcomes.

IMPACT OF ORGAN DONATION ON CARE TEAM

It is critical to remember that ICU nurses are tasked with multiple, often competing priorities and responsibilities while providing care to their patients, predisposing bedside personnel to significant amounts of emotional stress.[15] Above and beyond their regular bedside duties, the organ donation process often calls on nurses to contribute in numerous other ways, including the provision of care for next

of kin, coordinating multiple bedside teams, and ensuring that organ optimization strategies are actively utilized. Not infrequently, bedside nurses focus significant energies on addressing the needs of the potential donor's relatives.[14]

Many physicians, advanced practitioners, nurses, respiratory therapists, and pastoral care staff find the ability to provide comfort and modify relevant processes in accordance to a family's wishes both gratifying and empowering. The ability to focus on the promise of a better life for the potential organ recipients allows the care team cope with the high complexity, increased workload, and stress of the overall situation. Critical care nurses have described the organ donation process as one with a profound effect on the patient's caregivers, an undertaking which tests their personal skills and professional capabilities alike.[14] A positive attitude of health-care workers toward organ donation shapes their compassion and care toward a donor and the family. In summary, the physician, nurse, and support staff who are thoughtful, receptive, sensitive, and sympathetic are pivotal in aiding families during the difficult and emotionally taxing transition, from accepting their loved one's death to embracing the concept of organ donation.

COMMUNITY AWARENESS OF ORGAN DONATION AND DONOR DESIGNATION

Education that contributes to raising the awareness of organ and tissue donation and transplantation in general, and more specifically to encourage the public to designate themselves as organ donors is very important to the continued viability of organ procurement efforts.[42,43,44] Appropriate resources should be utilized to educate the public, especially middle- and older-aged persons, to ensure they understand that their organs may be equally valuable in the setting of life-saving transplantation. Finally, it is a relatively common misconception that the health-care team will not provide optimal care for someone who is donor designated.[45]

In Pennsylvania, donor designation on a driver's license, state-issued identification card, or living will constitute legal first person consent. Evidence of previously expressed disposition from the potential donor not only helps health-care professionals understand the donor's wishes but also helps guide family members and removes the burden of not knowing their loved one's predetermined wishes.[9] Consequently, our OPO provides this information to us at the time of a referral for a potential organ donor since in most cases, they can retrieve it from the state's department of motor vehicles (DMV) database. When the time is appropriate for a family to be approached about donation, the OPO coordinator informs them of their loved one's decision to become an organ donor. The family is supported by our team and the OPO as they complete a disclosure form. It is essential that our teams carefully collaborate during this time so that this information can be shared with the family in a way that is supportive to them while respectfully fulfilling the wishes of the donor.

Our hospital network, spearheaded by clinical staff, participates in local community events to disseminate accurate information about donation and transplantation and to encourage donor designation. During National Donate Life month, we hold an annual flag raising event which is well-attended by the public and hospital staff alike. We inspire and educate attendees through various focus groups, sessions, and on-field presentations at local sporting events, including minor league baseball games and professional indoor football games.

Two areas of opportunity for outreach expansion include young people and minorities. In this context, focused programs in the Lehigh Valley region (Pennsylvania, USA) began including organ donation presentations for driver's education and biology students and at several local high schools. Minority outreach must be enhanced as well, especially because an underlying sentiment may still be present that discrimination prevents minority patients from receiving the organ transplants they need.[45]

ONGOING COMMITMENT TO ORGAN DONOR AND DONOR FAMILIES

Organ donors are heroes and their gifts to others are truly unique. GoL Donor Program pays tribute to donors and their families in donor remembrance ceremonies, with our health-care team joining as invitees. During such events, families are provided with materials to display at their loved one's funeral or memorial service to recognize them for their life-saving gifts. Specific examples include a certificate of recognition, a donor medal, lapel pins, and Donate Life bracelets.

GoL Donor Program through its Hearts of Gold volunteer initiative helps make memorial quilts to pay tribute to the memory of the organ donors. Donor families are encouraged to honor and remember their loved one by constructing a quilt square for the "Threads of Love" memorial quilt. GoL allows the quilt to be displayed at various locations throughout the region to help advance organ donor awareness.^[46] Our hospital displays the sections of the quilt that contain patches commemorating donors from within our network's campuses. This is extremely meaningful to our hospital staff and visitors.

By collaborating with GoL Donor Program on hospital-wide donation awareness events, we are able to better understand the selflessness of donors and families involved in the organ donation process. Along with continued communication and interactions with families, GoL also offers grief counseling as well as opportunities for families to become involved in various organ donation educational and advocacy programs by sharing their loved one's story with others.^[45]

Our hospital network collaborates closely with GoL Donor Program to provide an annual celebration of life during which donor families, transplant recipients, and hospital staff gather to share their stories and experiences related to donation and transplantation. Being able to celebrate the lives of our donors and recipients provides inspiration to our care team, support staff, and administration.

CONCLUSIONS

Well-managed and maintained organ donation programs in acute care hospitals are essential to the success of organ transplantation efforts. Despite favorable laws, regulations, and the universal investment in organ procurement networks, significant challenges and opportunities for improvement exist. This manuscript presented key components of a successful organ donation program, as exemplified by our hospital network. The cornerstones of our success include continued institutional commitment to a high quality organ donation program and a strong, collaborative relationship with our OPO that encourages timely referrals and working toward common goals.

These efforts include ongoing clinical staff education that incorporates all aspects of the donation process. We also organize inspirational events where the health-care team has the opportunity to hear stories from donor families and transplant recipients whose lives they have directly or indirectly touched. Our clinical staff is further involved by spearheading community outreach efforts to dispel different organ donation myths and encourage donor designation. Thus, our providers are able to contribute well beyond their primary clinical duties and responsibilities, and to improve the understanding of organ donation among various local audiences.

In the clinical setting, our strengths include focused patient and family care, consistent family communication with proactive support systems, and adherence to guideline-driven, standardized resuscitative and donor management strategies. Well-attended and engaged donation council meetings, physician leadership forums and after action reviews, supported by GoL Donor Program staff, allow our health-care team to have frank conversations that highlight the importance of maintaining optimal practices and fostering the culture of continuous process improvement.

Conflicts of interest

There are no conflicts of interest.

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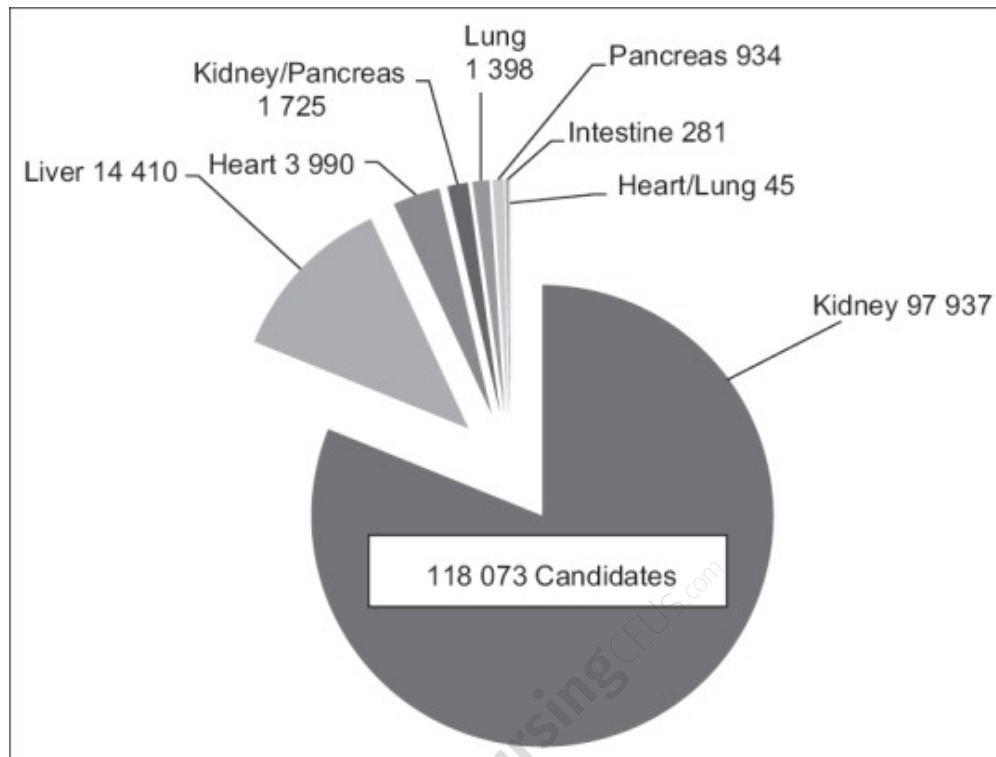
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Figures and Tables

Figure 1



The United States transplant waiting list candidates by organ type, based on Organ Procurement, and Transplantation Network (OPTN) data as of March 29, 2017



Table 1

National and local organ procurement statistics by cause of death for years 2011-2016

a) The United States organ donors by cause of death – 2011-2016						
Year	Anoxia	Head trauma	CVA	Tumor/other	Total organ donors	Percentage anoxia of organ donors
2016	4,028	2,783	2,828	332	9,971	40.4
2015	3,426	2,711	2,673	369	9,079	37.8
2014	2,900	2,648	2,781	267	8,596	33.7
2013	2,599	2,682	2,760	227	8,269	31.4
2012	2,436	2,628	2,833	246	8,143	29.9
2011	2,278	2,685	2,932	231	8,126	28.0

b) GLDP organ donors by cause of death – 2011-2016						
Year	Anoxia	Head trauma	CVA	Tumor/other	Total organ donors	Percentage anoxia of organ donors
2016	309	88	142	1	540	57.2
2015	244	102	131	6	483	51.5
2014	206	87	148	6	447	46.0
2013	190	108	147	2	447	42.5
2012	171	124	120	2	417	41.0
2011	166	130	141	4	441	37.6

Increasing proportion of patients with "anoxia" listed as cause of death. Source: Based on OPTN data as of March 29, 2017. OPTN: Organ Procurement and Transplantation Network, CVA: Cerebrovascular accident, GLDP: Gift of Life Donor Program



Table 2

Organ procurement statistics reflecting donation outcomes of our local organ procurement organization, Gift of Life Donor Program, and St. Luke's University Health Network-Bethlehem

a) GLDP organ donation outcomes, January 1 to December 31, 2016, ^[2] population adjusted to reflect shared Camden County (PMP)					
OPO	Population served (million)	Organ donors	Organs transplanted	Organ donors PMP	Transplants PMP
GLDP	11.1	540	1 412	48.6	127.2

b) Comparison of SLUHN-Bethlehem process measures compared to hospitals with ≥ 10 potential organ donors per year in GLDP's donor service area from January 1 to December 31, 2016			
Hospitals	Referral rate* (%)	Percentage timely notification*	Percentage planned approach*
SLUHN - Bethlehem	100	94	87
Range of GLDP hospitals with ≥ 10 potential donors/year (n = 29)	87-100	63-96	55-100

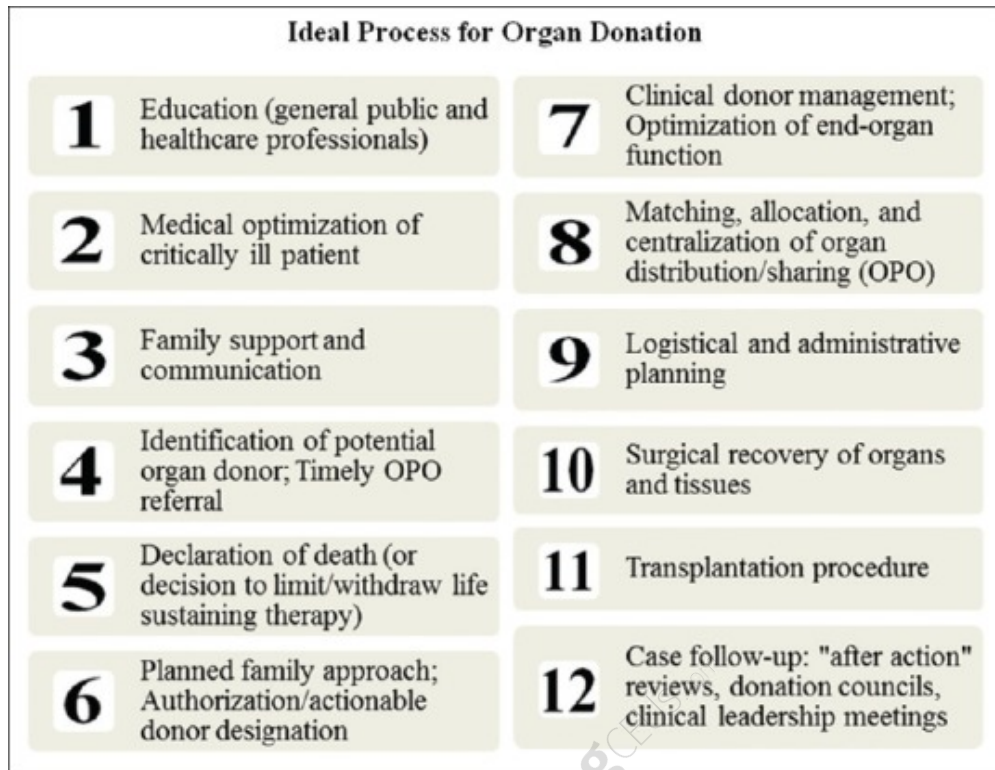
c) Comparison of SLUHN-Bethlehem outcome measures compared to hospitals with ≥ 10 potential organ donors per year in GLDP's donor service area from January 1 to December 31, 2016				
Hospitals	Potential donors*	Organ donors	Authorization rate* (%)	Conversion rate* (%)
SLUHN-Bethlehem	32	24	81	75
Range of GLDP hospitals with ≥ 10 potential donors/year (n = 29)	10-60	3-42	37-100	25-81

d) Potential organ donors, authorization rate, and conversion rate SLUHN-Bethlehem - historical trend from January 1, 2012, to December 31, 2016					
SLUHN-Bethlehem	2012	2013	2014	2015	2016
Potential donors	13	20	22	26	32
Authorization rate (%)	64	79	80	96	81
Conversion rate (%)	46	75	68	81	75

*Definitions - Potential donors: Patients of any age who appeared brain dead and were medically suitable for organ donation plus all DCD donors, Referral rate: Percentage of potential organ donors that were referred to the OPO, Timely notification rate: Percentage of potential organ donors that were referred in time for the OPO's onsite intervention, before a brain death exam and before a DNR or withdrawal of support conversation with the family, Planned approach: Percentage of potential organ donors whose families were first approached about donation by an OPO coordinator or were family initiated, Authorization rate: Percentage of authorized organ donors as compared to potential donors, Conversion rate: Percentage of actualized organ donors as compared to potential donors. Data and definitions provided by GLDP. GLDP: Gift of Life Donor Program, SLUHN: St. Luke's University Health Network, PMP: Per million population, OPO: Organ procurement organization, DCD: Donation after circulatory death



Figure 2



Schematic representation of the organ procurement and transplantation process. OPO: Organ procurement organization



Figure 3

ORGAN AND TISSUE DONATION PROCESS



**Consult Gift of Life on all Vent-Dependent Patients w/a
Non-Survivable Neurologic or Anoxic Injury/Illness**

To preserve the organ donation option for patients/families,
call **1-800-KIDNEY-1** according to the following criteria:
(regardless of age, medical history, current hospital course, hemodynamic status)

- ✓ At the first indication the patient has suffered a non-survivable neuro or anoxic injury/illness (pt. begins to lose some neuro reflexes)
- ✓ Prior to the first formal brain death examination
- ✓ Prior to family discussion of DNR or withdrawal of support
- ✓ Patient has suffered: Anoxia, CVA, Head Trauma

**Call Gift of Life – 1-800-KIDNEY-1
(1-800-543-6391)**

In collaboration with the care team, Gift of Life will initiate the first mention of organ donation (after determination of medical suitability for donation and a family communication plan is developed.)


 

Laminated donation process information card provided to all health-care providers who have the potential to interact with potential organ donors during their daily work. Shown are referral triggers for identifying and referring potential organ donors to our Organ Procurement Organization




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Figure 4



FAMILY COMMUNICATION PROTOCOL



5 Phases of Communication with Families of Potential Organ Donors

Phase I (Serious Injury) _____ has suffered severe damage to his/her brain. We are doing everything we can but he/she may not recover.	Phase II (Grave Prognosis) Despite everything we have done, things are getting worse. There is nothing more we can do to save your loved one's life. Ensure that Gift of Life has been notified.	Phase III (First Exam) _____ appears to be dead as there is no brain function. We have begun a series of tests to confirm this. We want to be extremely thorough and careful to ensure that we are absolutely correct. (Provide the family with information about additional testing and timeframes.)	Phase IV (Pronouncement) We have finished the testing and found that _____ has died @ _____ (time). (Where appropriate, repeat clinical exam with the family present.)
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Show pictures of CT scan or perfusion scan to help family understand the grave prognosis.


Team Huddle
 Care Team Introduces the Gift of Life Coordinator

Phase V
 This is _____, a member of our team and a specialist who works with families such as yours.

Provide up-to-date information in small amounts. Set aside time to answer questions.

Use visual aids to describe the brain injury. When possible, bring the family to the bedside to observe clinical tests.

Choose words carefully when discussing the patient's condition.



Do not mention donation until a systematic, timed, collaborative approach can be orchestrated with Gift of Life and a member of the care team.

COLLABORATE WITH GIFT OF LIFE TO DETERMINE MOST APPROPRIATE TIME TO APPROACH FAMILIES ABOUT DONATION OPPORTUNITIES

Family communication protocol incorporated as a part of our global institutional approach to support families of potential organ donors



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Figure 5

St Luke's ORGAN DONATION PATHWAYS		GIFT OF LIFE DONOR PROGRAM	
DONATION AFTER BRAIN DEATH		DONATION AFTER CARDIAC DEATH (DCD) (Formerly Non-Heart Beating Donation)	
<ul style="list-style-type: none">• Procedure whereby organs are surgically recovered following the determination of death utilizing neurological criteria<ul style="list-style-type: none">- Exam consistent with brain death- Death declared on neurological criteria- Ensure family understands brain death- Approach family about donation options (Gift of Life & Care Team)- Support family through informed decisions-making process- Support patient during organ evaluation & allocation- Patient transferred to OR on mechanical ventilation- Surgical recovery of organs and tissue		<ul style="list-style-type: none">• Procedure whereby organs are surgically recovered following the determination of death by cardiopulmonary criteria<ul style="list-style-type: none">- Exam not consistent with brain death- Care Team and family discuss grave prognosis & withdrawal of life sustaining therapies- Ensure family understands grave prognosis- Approach family about donation options (Gift of Life & Care Team)- Support family through informed decision making process- Support patient during organ evaluation & allocation- Patient transferred to OR where withdrawal of life sustaining therapies occurs- Death is determined by cardio-pulmonary criteria- Surgical recovery of organs and tissue	

Standardized protocol for facilitating organ donation based on the two procurement approaches – donation after brain death and donation after cardiac death




Figure 6

ADULT BRAIN DEATH DETERMINATION	
BRAIN DEATH CRITERIA <ul style="list-style-type: none">• Definition: "Irreversible cessation of all brain function, including the brain stem"• Evaluate and correct potentially reversible causes of abnormal neurological evaluation:<ul style="list-style-type: none">– Absence of hypotension/shock, hypothermia, metabolic disturbances, significant drugs or medications known to cause CNS unresponsiveness• Determination is to be made by a physician specialist during a recommended observation period of at least 6 hours• Confirmatory studies and apnea test must be performed by a specialist• Injuries or injuries that may result in non-survivable neurological injuries:<ul style="list-style-type: none">– Head Trauma– Cerebrovascular accident (embolic or hemorrhagic)– Localized brain tumor– Cerebral anoxia 2° drowning, smoke inhalation, or prolonged cardiac arrest 	BRAIN STEM REFLEX TESTING <ul style="list-style-type: none">• No Pupillary reflex• No Corneal reflex• No Oculocephalic (doll's eyes) reflex• No Oculovestibular (cold or iced calorics) reflex• No Pharyngeal and laryngeal reflexes (cough and gag)• No Response to painful stimuli (<i>excluding spinal cord reflexes</i>) APNEA TESTING <ul style="list-style-type: none">• Pre-oxygenate with 100% FIO₂ for 20 minutes• Normalize PaCO₂, draw baseline ABG• Disconnect ventilator and provide passive O₂ via cannula @ 8-12 L/min-Observe for spontaneous breathing• Draw ABG at 5 and 10 minute intervals; conclude test when a PaCO₂ ≥ 60 mmHg is obtained or if patient becomes hemodynamically unstable*• Reconnect the ventilator. Test is consistent with brain death if PaCO₂ ≥ 60 mmHg (or 20 mmHg greater than baseline), and there is no breathing. <p>*If patient becomes hemodynamically unstable, immediately draw ABG and reconnect the ventilator. Consider other confirmatory tests.</p>

Brain death determination guidelines included in our institution's organ donation process information card



Figure 7

StLuke's
**ORGAN DONOR
MANAGEMENT GOALS**


Maintain Systolic BP > 100
 Rehydrate with crystalloids to maintain CVP 4 - 8. May use vasopressors to maintain systolic BP >100 (maintain SBP > 130 if history of HTN); Dopamine preferred
 • Transfuse with packed cells to maintain hemoglobin ≥ 10 and hemacrit ≥ 30

PaO₂ ≥ 100
 Increase FIO₂ in order to adequately maintain a PaO₂ ≥ 100 and saturation > 95%. Monitor ABGs frequently, at least Q4 hours to assure proper oxygenation is being maintained. PEEP may also be used to help maintain adequate PaO₂ levels.

Treat Excessive Urinary Output / Diabetes Insipidus
 Replace previous hour's output cc/cc with IV fluid infusion plus 100 cc (e.g. urine output +100cc +cc/hr). May start aqueous Pitressin IV infusion (preferred) or patient can be given DDAVP 2 - 4mcg Q6hrs IV push.

Vasopressors in Donor Management
 Dopamine is preferred. Additional vasopressor support may be considered to maintain SBP, once Dopamine has reached 10 ug/kg/min. Additional vasopressor support may include Phenylephrine. Norepinephrine is a last consideration secondary to its effects of severe peripheral and visceral vasoconstriction, decreased renal perfusion and decreased urine output.

MAP/Systolic	60 / >100
CVP	4 - 8
CO	4 - 8
CI	2.5 - 5

Na ⁺	<150
ECHO	EF >45%
pH	7.30-7.45
CXR	Clear

O₂ Challenge > 300
Urine Output:
1 - 3 cc/kg/hr

Organ donor management goals. Once a potential organ donor is identified, all clinical personnel involved in direct bedside care work with the organ procurement organization coordinator to follow these guidelines

Figure 8

STANDING ORDERS

Refer to Standing Order Sheet for full range of orders

VITALS:


- Continuous cardiac monitoring and SpO₂
- Maintain CVP 4-8 mm Hg
- Goal temp 36-38 degrees C (warming/cooling blanket, as needed)
- Q1 hour vitals and I/O documentation

MAINTENANCE IV FLUIDS: Rate run at urine output/hour +50 ml/hr

- 0.9% Sodium Chloride (NSS)
- 0.45% Sodium Chloride (1/2 NSS)
- 0.225% Sodium Chloride (1/4 NSS)
- 5% Dextrose and 0.45% Sodium Chloride(D5W 1/2NSS)
- 5% Dextrose and 0.225% Sodium Chloride (D5W 1/4 NSS)
- 5% Dextrose and Sterile Water (D5W)
- Add 20 meq of Potassium Chloride to each liter of IVF (to consider K⁺ less than 4)
- Albumin 5% 250ml q _____hr x _____dose(s)

MEDICATIONS

- Dopamine 400 mg/250 ml D5W (Max dose 20mcg/kg/min)
- Phenylephrine 50 mg/250 ml D5W (Max dose 200mcg/min)
- Norepinephrine 4 mg/250ml D5W



LEVOTHYROXINE (T4) PROTOCOL

- Levothyroxine 20 mcg IV X 1 dose
- Levothyroxine infusion: 200 mcg/500 ml NSS (0.4 mcg/ml)
Start at 20 mcg/hr (Max dose of 40 mcg/hr)
- Methylprednisolone 2 grams IV x 1 dose
- Dextrose 50% 50 ml IV x 1 dose
- Regular Human Insulin 20 units IV x 1 dose
- Vasopressin 1 unit IV x 1 dose

ANTIBIOTICS

- Cefazolin (Ancef®) 1 gram IV Q 8 hours
- Ceftazidime (Fortaz®) 1 gram IV Q 12 hours (for potential lung donors)
- Discontinue all previous antibiotic orders

DIABETES INSIPIDUS MANAGEMENT: (Indicated by serum osmolality > 300 mmol/kg or urine output >= 500 ml/hrx2hrs)

- Desmopressin Acetate (DDAVP) _____mcg IV Q 4 hr pm
- Vasopressin 100 units/250 ml (0.4 units/ml) Start at 1 unit/hr and titrate for goal urine output <= 300 ml/hr. (Max dose 4 units/hr)
- Electrolyte replacement – Refer to electrolyte protocol

VENT SETTINGS: Maximize for ABGs & lung recruitment

O₂ CHALLENGE: Draw baseline ABG, place patient on FiO₂ 100% and PEEP 5 cmH₂O for 20 min, repeat ABG, return to previous vent settings - Q4 hours and pm per Gift of Life

BRONCHODILATOR THERAPY: Albuterol MDI 4-8 puffs Q4 hrs, may repeat 4 additional puffs for wheezing

Organ donor management standing orders. This list of standing orders mirror the order set available in our electronic medical record



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