

INTERNATIONAL SOCIETY FOR HEART AND LUNG
TRANSPLANTATION
(ISHLT)

**HEART & LUNG TRANSPLANT AND MCS
CORE COMPETENCY CURRICULUM
DOCUMENT**

Nursing, Health Sciences and Allied Health (NNSAH)
Scientific Council
(ISHLT NNSAH CCC)

Second Edition/December 2017

Co-Chairs of the ISHLT NNSAH Scientific Council

Sarah Schettle, Caron Burch, Trish Leisfield

Contact

Schettle.sarah@mayo.edu

Tele: (507) 255-7065

Fax: (507) 255-7378

ISHLT NHSAH SCIENTIFIC COUNCIL

LEAD AUTHORS

Sarah Schettle, PA-C

Chair, ISHLT NHSAH CCC

Division of Cardiovascular Surgery, Assistant Professor of Surgery

Mayo Clinic College of Medicine

200 First Street SW

Rochester, MN 55905

United States of America

(507) 255-7065 (Phone)

(507) 255-7378 (Fax)

schettle.sarah@mayo.edu

Caron Burch, MSN, FNP, CCTC

Chair, ISHLT NHSAH CCC

Pediatric Heart Failure and Heart Transplant, Manager

UCSF Benioff Children's Hospital

550 16th Street

Box# 5754

San Francisco, CA 94143

(415) 476-2671 (Phone)

Caron.Burch@ucsf.edu

Trish Leisfield, RN

Chair, ISHLT NHSAH CCC

Queensland Lung Transplant Service

The Prince Charles Hospital

Rode Road, Chermside 4032

Queensland, Australia

61 7 31395561 (Phone)

61 7 3139 5696 (Fax)

trish.leisfield@health.qld.gov.au

AUTHORS

Connie White-Williams PhD, RN, NE-BC, FAAN

UAB Hospital, Nursing Services

Jefferson Tower 1056

619 19th ST S

Birmingham, AL 35249

United States of America

(205) 975-8611 (Phone)

(205) 996-7410 (Fax)

cwwilli@uabmc.edu

Michael Petty, PhD, RN, APRN-CNS

Department of Cardiothoracic Surgery

University of Minnesota Medical Center

516 Delaware St SE

Minneapolis, MN 55455

United States of America

(612) 273-5607 (Phone)

Mpetty1@fairview.org

Kevin C. Carney, MSN, CRNP, CCTC

Temple University Hospital

Department of Pulmonary Medicine and Thoracic Surgery

3401 North Broad Street

Philadelphia, PA, 19140

United States of America

(267) 536-9365 (Phone)

Kevin.Carney@tuhs.temple.edu

**NURSING, HEALTH SCIENCES AND ALLIED HEALTH
HEART & LUNG
TRANSPLANT AND MCS CORE CURRICULUM**

LIST OF CONTENTS

- 1. Role of the Transplant and MCS Coordinator: Evolution and Current Practice**
(Lead Author: S Schettle)
- 2. Evaluation and Management of the Advanced Thoracic Organ Failure Patient**
(Lead Author: C Burch)
- 3. Caring for the Listed patient**
(Lead Author: C Burch)
- 4. Transplant Management**
(Lead Author: T Leisfield)
- 5. MCS Management**
(Lead Author: S Schettle)
- 6. Immediate Post Transplant Care**
(Lead Author: C Burch)
- 7. Care of the Patient With Special Needs**
(Lead Author: T Leisfield)
- 8. Long Term Follow Up**
(Lead Author: T Leisfield)
- 9. Quality**
(Lead Author: S Schettle)
- 10. Caring for Ourselves and Others**
(Lead Author: S Schettle)

**NURSING, HEALTH SCIENCES AND ALLIED HEALTH
HEART & LUNG
TRANSPLANT AND MCS CORE CURRICULUM**

INTRODUCTION

1. The field of heart and lung transplantation and mechanical circulatory support is a dynamic field that continues to advance and evolve to meet the needs of this complex patient population. To that end, we seek to update providers in the nursing, health sciences, and allied health fields that care for this patient population with the most up-to-date information available after a thorough literature review. It is critically important to remain abreast of best practices internationally to ensure that the needs of these patients are met and that providers feel comfortable and competent in offering the necessary care.
2. Many advances and changes in patient management and best practices have occurred since the 2014 version of the core curriculum for heart and lung transplant and mechanical circulatory support. There is a current need for a core curriculum document update in this subject area for ISHLT to remain the leader in dissemination of knowledge in the field of heart and lung transplantation and mechanical circulatory support to the nursing, health sciences, and allied health providers that provide care for this challenging patient population.
3. The authors of this core curriculum estimate that another update will be necessary in 4 years to the nursing, health sciences, and allied health heart and lung transplant and mechanical circulatory support core curriculum. However, should significant advances or changes that should be disseminated to providers occur in the interim, an update could be required sooner than this estimation.

Section 1: Role of the Transplant and MCS Coordinator: Evolution and Current Practice

Learning Objectives for Section 1:

- 1) To establish context and historical background of the Coordinator role.
- 2) To appreciate role differences and variations pending educational backgrounds and training of the provider
- 3) To understand how different roles are integrated in the multidisciplinary team
- 4) To learn international role variations
- 5) To understand opportunities and challenges the role poses

1. Evolution of the Heart & Lung Transplant and MCS Coordinator role

- a. RNs and NP/PA/CNS providers
- b. Combined transplant/MCS role and separate roles
- c. Integration and role within the transplant and MCS team
- d. Opportunities, challenges, and limitations of the role

2. Global role variations

References:

- Coleman, B, et al. (2015). Adult cardiothoracic transplant nursing: an ISHLT consensus document on the current adult nursing practice in heart and lung transplantation. *J Heart Lung Transplant, 34*(2): 139-48.
- Cupples S, Ohler L. (2014). Online Education for Transplant Professionals. *Progress in Transplantation, 24*, 218-9.
- Filipponi F, De Simone P, Mosca F. (2005) Appraisal of the coordinator-based transplant organizational model. *Transplant Proceedings, 37*, 2421-2.
- Lopez-Navidad A. Domingo P. Viedma MA. (1997) Professional characteristics of the transplant coordinator. *Transplant Proceedings, 29*, 1607-13.
- Matesanz R., Miranda B. (1995) Profile of the Spanish transplant coordinator. *Transplant Proceedings, 27*, 2389-90.
- McNatt GE. (2008) Nursing and transplant coordination: a call for clarity

Section 2: Evaluation and Management of the Advanced Thoracic Organ Failure Patient

Learning Objectives for Section 2:

- 1) To understand when a provider should consider referring patients for advanced therapy
- 2) To establish elements for evaluation for heart and lung transplant candidates and mechanical circulatory support device candidates
- 3) To understand the various tests and imaging required as a part of the evaluation process
- 4) To learn the role of the coordinator throughout the evaluation of the patient
- 5) To understand components of a psychosocial evaluation prior to consideration for advanced therapy
- 6) To describe new metrics in the evaluation process and to appreciate recent changes in evaluation and management

1. When to refer...and do they meet criteria?:

Referral and indications/contraindications for heart and lung transplantation and MCS placement

- a. Referral methods, timing, evaluation, and evaluation efficiencies
- b. Contraindications for MCS and differences with VAD and TAH
- c. Shared Care

2. Evaluation and management

- a. Heart transplant candidacy
 - i. Elements of evaluation
 1. Tests
 2. Imaging
 3. Transplant coordinator role
 - ii. Decision-making
- b. Lung transplant candidacy
 - i. Elements of evaluation
 1. Tests
 2. Imaging
 3. Transplant coordinator role
 - ii. Decision-making
- c. MCS (LVAD and/or TAH) candidacy
 - i. Elements of evaluation
 1. Tests
 2. Imaging
 3. Transplant coordinator role
 - ii. Decision-making for BTT vs DT

3. Psychosocial issues pre-transplant and pre-MCS

- a. Substance abuse
- b. Support systems and identification of caregivers
- c. Patient and family education
- d. Postop management

4. Hot topics in evaluation

- a. Frailty
- b. Financial assessment and coverage
- c. Upcoming changes to UNOS listings
- d. New programs – how to share knowledge between

References:

Mehra MR, et al. (2016) The 2016 ISHLT listing criteria for heart transplantation: A 10-year update. *J Heart Lung Transplant*, 35 (1): 1-23.

Jha SR, Hannu MK, Chang S, et al. (2016) The Prevalence and Prognostic Significance of Frailty in Patients with Advanced Heart Failure Referred for Heart Transplantation. *Transplantation*, 100 (2): 429-36.

Chung CJ, Wu C, Jones M, et al. (2014) Reduced handgrip strength as a marker of frailty predicts clinical outcomes in patients with heart failure undergoing ventricular assist device placement. *Journal of cardiac Failure*, 20(5): 310-5.

Jha SR, Hannu MK, Newton, PJ et al. (2017) Reversibility of Frailty After bridge to Transplant Ventricular Assist Device Implantation of Heart Transplantation. *Transplant Direct*, 3(7); 167.

Banner, N. R., Bonser, R. S., Clark, A. L., Clark, S., Cowburn, P. J., Gardner, R. S., . . . Williams, S. G. (2011). UK guidelines for referral and assessment of adults for heart transplantation. *Heart*, 97(18), 1520-1527.

Blumenthal, N.P., Petty, M.G., McCorkle, R. (2017) Missing domains of lung transplant patient selection. *Progress in Transplantation*, 27(1): 90-7.

Canter, C. E., Shaddy, R. E., Bernstein, D., Hsu, D. T., Chrisant, M. R., Kirklin, J. K., . . . Quality of Care and Outcomes Research Interdisciplinary Working,Group. (2007). Indications for heart transplantation in pediatric heart disease: A scientific statement from the american heart association council on cardiovascular disease in the young; the councils on clinical cardiology, cardiovascular nursing, and cardiovascular surgery and anesthesia; and the quality of care and outcomes research interdisciplinary working group. *Circulation*, 115(5), 658-676.

Kreider, M., & Kotloff, R. M. (2009). Selection of candidates for lung transplantation. *Proceedings of the American Thoracic Society*, 6(1), 20-27.

Lynch, J. P.,3rd, Saggar, R., Weigt, S. S., Ross, D. J., & Belperio, J. A. (2006). Overview of lung transplantation and criteria for selection of candidates. *Seminars in Respiratory & Critical Care Medicine*, 27(5), 441-469.

- Mehra, M. R., Jessup, M., Gronda, E., & Costanzo, M. R. (2006). Rationale and process: International society for heart and lung transplantation guidelines for the care of cardiac transplant candidates--2006. *Journal of Heart & Lung Transplantation, 25*(9), 1001-1002.
- Orens, J. B. (2007). Lung transplantation for pulmonary hypertension. *International Journal of Clinical Practice, Supplement*(158), 4-9.
- Shah, P. D., & Orens, J. B. (2012). Guidelines for the selection of lung-transplant candidates. *Current Opinion in Organ Transplantation, 17*(5), 467-473.
- Weill, D., Benden, C., Corris, P.A., et al. (2015) A consensus document for the selection of lung transplant candidates: 2014—An update from the Pulmonary Transplantation Council of the International Society for Heart and Lung Transplantation. *Journal of Heart & Lung Transplantation, 34*(1), 1-15.

Section 3: Caring for the listed patient

Learning Objectives for Section 3:

- 1) To understand the process of organ allocation and patient listing
- 2) To increase knowledge about transplant immunology and key components of the immune system that influence transplantation
- 3) To establish risk factors of sensitization and mechanisms for desensitization
- 4) To learn appropriate monitoring strategies of antibodies pre and post-transplant
- 5) To understand specific transplant challenges through case scenarios

1. **Listing and collaboration: Transplant/MCS Coordinators and patients**
 - a. Listing criteria
 - b. Changes to heart allocation
 - c. Change to listing for MCS patients
 - d. LAS
 - e. Global heart/lung allocation schema
 - f. Living while waiting
2. **Immunology 101**
 - a. The concept of self and non-self
 - b. The key components of the immune system
 - c. What parts of this are important in transplantation?
3. **Managing patients with anti HLA antibodies and desensitization therapies**
 - a. Risk factors for development of anti -HLA Ab
 - b. Mechanism of action of desensitization strategies
 - c. Monitoring of anti-HLA Ab pre-transplant
 - d. Assessing for donor-specific Ab post-transplant
4. **Audience interactive session**

Panelists to propose case scenarios:

 - a. Donor is CDC high risk, how does your selection and care of recipient differ from SCD
 - b. Listed heart transplant candidate with MCS discloses to MCS coordinator ambivalence about transplant
 - c. Listed MCS patient with high antibody titers
 - d. Patients from states where cannabis is legal who are presenting for evaluation at a center where usage is illegal
 - e. Young ill patient with a BMI of 40 who is chronically hemodynamically unstable but with a VO₂ that does not meet CMS criteria

Recommended reading

Collaboration between Heart Transplant and MCS Coordinators c Patients on MCS Devices

Buda, T.M., Kendall, K. (2001) Nursing and psychosocial issues of patients on mechanical support. *Journal of Cardiac Surgery*, 16 (3), pp. 209-221.

Helman, D.N., Oz, M.C. (2001) Developing a comprehensive mechanical support program. *Journal of Cardiac Surgery*, 16 (3), pp. 203-208

Kinkhabwala, M. P., & Mancini, D. (2013). Patient selection for cardiac transplant in 2012. *Expert Review of Cardiovascular Therapy*, 11(2), 179-191.

Lingard, L. , Mcdougall, A. , Levstik, M. , Chandok, N. , Spafford, M.M. , Schryer, C. (2012) Representing complexity well: A story about teamwork, with implications for how we teach collaboration *Medical Education*, 46 (9), pp. 869-877.

Mehra MR, et al. (2016) The 2016 ISHLT listing criteria for heart transplantation: A 10-year update. *J Heart Lung Transplant*, 35 (1): 1-23.

Managing patients with anti HLA antibodies and desensitization therapies

Anand, J., & R. Mallidi, H. (2013). The state of the art in heart transplantation. *Seminars in Thoracic and Cardiovascular Surgery*, 25(1), 64-69.

Asante-Korang, A., Jacobs, J. P., Ringewald, J., Carapellucci, J., Rosenberg, K., McKenna, D., . . . Sleasman, J. (2011). Management of children undergoing cardiac transplantation with high panel reactive antibodies. *Cardiology in the Young*, 21(SUPPL. 2), 124-132.

Crew, R. J., & Ratner, L. E. (2007). Transplanting the sensitized patient. *Current Opinion in Organ Transplantation*, 12(4), 415-419.

Jordan, S. C., Vo, A., Lai, C. -, & Reinsmoen, N. (2013). Defining the benefits of desensitization therapy. *Transplantation*, 95(6), e31-e32.

Kinkhabwala, M. P., & Mancini, D. (2013). Patient selection for cardiac transplant in 2012. *Expert Review of Cardiovascular Therapy*, 11(2), 179-191

Lobashevsky, A. L., Higgins, N. G., Rosner, K. M., Mujtaba, M. A., Goggins, W. C., & Taber, T. E. (2013). Analysis of anti-HLA antibodies in sensitized kidney transplant candidates subjected to desensitization with intravenous immunoglobulin and rituximab. *Transplantation*, 96(2), 182-190.

Reed, E. F., Rao, P., Zhang, Z., Gebel, H., Bray, R. A., Guleria, I., . . . Gjertson, D. (2013). Comprehensive assessment and standardization of solid phase multiplex-bead arrays for the detection of antibodies to HLA. *American Journal of Transplantation*, 13(7), 1859-1870.

Sarkar, R. S., Philip, J., & Yadav, P. (2013). Transfusion medicine and solid organ transplant - update and review of some current issues. *Medical Journal Armed Forces India*, 69(2), 162-167.

Vo, A. A., Petrozzino, J., Yeung, K., Sinha, A., Kahwaji, J., Peng, A., . . . Jordan, S. C. (2013). Efficacy, outcomes, and cost-effectiveness of desensitization using ivig and rituximab. *Transplantation*, 95(6), 852-858.

Additional recommended reading

Kobashigawa, J et al. (2014) Report from a consensus conference on primary graft dysfunction after cardiac transplantation. *J Heart Lung Transplant*, 33:327-340.

Murphy K. (2012) *Janeway's Immunobiology*, 8th edition. New York: Garland Science

Costanzo MR, Hunt SA, Taylor DO, Kirklin JK. (2012) *ISHLT Monograph Series Volume 6: ISHLT Guidelines for the Care of Heart Transplant Recipients*. Philadelphia, PA: Elsevier.

Costanzo MR. Dipchand A. Starling R. Anderson A. Chan M. Desai S. Fedson S. Fisher P. Gonzales-Stawinski G. Martinelli L. McGiffin D. Smith J. Taylor D. Meiser B. Webber S. Baran D. Carboni M. Dengler T. Feldman D. Frigerio M. Kfoury A. Kim D. Kobashigawa J. Shullo M. Stehlik J. Teuteberg J. Uber P. Zuckermann A. Hunt S. Burch M. Bhat G. Canter C. Chinnock R. Crespo-Leiro M. Delgado R. Dobbels F. Grady K. Kao W. Lamour J. Parry G. Patel J. Pini D. Towbin J. Wolfel G. Delgado D. Eisen H. Goldberg L. Hosenpud J. Johnson M. Keogh A. Lewis C. O'Connell J. Rogers J. Ross H. Russell S. Vanhaecke J. (2010) The International Society of Heart and Lung Transplantation Guidelines for the care of heart transplant recipients. *Journal of Heart & Lung Transplantation*. 29(8):914-56.

Heeger PS, Dinavahi R. (2012) Transplant immunology for non-immunologist. *Mount Sinai Journal of Medicine*. 79(3): 376-87.

Bryant, S. B., & Reams, C. (1998). How to assess a patient's support system and personal abilities prior to liver transplantation. *Hepato-Gastroenterology*, 45(23), 1395-1397.

Byram, E. K. (2012). Upstream palliative care for the patient with a left ventricular assist device as destination therapy. *Dimensions of Critical Care Nursing*, 31(1), 18-24.

Charpentier, K. P., & Mavanur, A. (2008). Removing patients from the liver transplant wait list: A survey of US liver transplant programs. *Liver Transplantation*, 14(3), 303-307.

Colman, R. E., Curtis, J. R., Nelson, J. E., Efferen, L., Hadjiliadis, D., Levine, D. J., . . . Singer, L. G. (2013). Barriers to optimal palliative care of lung transplant candidates. *Chest*, 143(3), 736-743.

Evon, D. M., Burker, E. J., Sedway, J. A., Cicale, R., Davis, K., & Egan, T. (2005). Tobacco and alcohol use in lung transplant candidates and recipients. *Clinical Transplantation*, 19(2), 207-214.

- Lefaiver, C. A., Keough, V. A., Letizia, M., & Lanuza, D. M. (2009). Quality of life in caregivers providing care for lung transplant candidates. *Progress in Transplantation*, 19(2), 142-152.
- Lewis, E. F. (2011). End of life care in advanced heart failure. *Current Treatment Options in Cardiovascular Medicine*, 13(1), 79-89.
- Mullan, B., Snyder, M., Lindgren, B., Finkelstein, S. M., & Hertz, M. I. (2003). Home monitoring for lung transplant candidates. *Progress in Transplantation*, 13(3), 176-182.
- Neil, J. A., & Corley, M. C. (2000). Hostility toward caregivers as a selection criterion for transplantation. *Progress in Transplantation*, 10(3), 177-181.
- Ohler, L. (1998). In sickness and in health: Testing the vow after transplantation. *Journal of Transplant Coordination*, 8(4), 198.
- Paris, W., Cooper, D. K. C., Samara, S., Carpenter, W., Crockett, S., Calhoun-Wilson, G., . . . Zuhdi, N. (1995). A comparison of organ transplant patient and professional staff attitudes. *International Journal of Rehabilitation and Health*, 1(3), 167-178.
- Russell, C. L. (2005). Medication noncompliance: Perceptions of transplant healthcare providers. *Dialysis and Transplantation*, 34(5), 301-313+346.
- Russell, C. L., & Freiburghaus, M. (2003). Heart transplant patient teaching documentation. *Clinical Nurse Specialist CNS*, 17(5), 249-257; quiz 258.
- Trask, P. C., Paterson, A., Riba, M., Brines, B., Griffith, K., Parker, P., . . . Ferrara, J. (2002). Assessment of psychological distress in prospective bone marrow transplant patients. *Bone Marrow Transplantation*, 29(11), 917-925.
- Patel, J. K., & Kobashigawa, J. A. (2011). Heart Transplantation. *Circulation*, 124(4), E132-E134.
- Kirklin, J., Young, J., & McGiffin, D. (2002). Heart Transplantation.

Section 4: Transplant Management

Learning Objectives for Section 4:

- 1) Describe the role of the coordinator in donor evaluation and management and procurement of cardiothoracic organs
- 2) To understand contraindications for organ procurement
- 4) To explore the use of OCS and EVLP in organ procurement
- 3) To learn about induction and maintenance in immunosuppression
- 4) To establish common side effects associated with immunosuppression
- 5) To gain an awareness of different transplant management strategies between programs

1. The heart and lung donor

- a. **Multiple priorities of the procurement transplant coordinator**
- b. **Determining suitability of thoracic organs for transplantation**
- c. **Factors that determine donor-recipient matching**
- d. **How assessment and coordination of SCD and DCD donors differ**
- e. **Contraindications for heart transplant**
- f. **Contraindications for lung transplant**
- g. **Use of OCS and ex vivo lung perfusion**

2. Immunosuppression: Induction and Maintenance

- a. **Induction - what is it and why are there differences between sites?**
- b. **Which drugs are used to maintain the graft?**
- c. **Common side-effects and what to do if your patient has them**

References:

- Hyanga, J.W.A. (2017) Ex vivo lung perfusion: The makings of a game changer. *The Journal of Heart and Lung Transplantation* 36:7, 720-721.
- Manyalich, M. (2013) Transplant Procurement Management - Donation and Transplantation Institute (TPM - DTI): A new formula to success in Organ donation *Transplant Nurses Journal*, 22 (1), pp. 13-18.
- Dominguez-Gil, B., Delmonico, F., Shaheen, F.A.M. (2011) The critical pathway for deceased donation: Reportable uniformity in the approach to deceased donation *Transplant International*, 24 (4), pp. 373-378.
- Ormrod, J.A., Ryder, T., Chadwick, R.J., Bonner, S.M. (2005) Experiences of families when a relative is diagnosed brain stem dead: Understanding of death, observation of brain stem death testing and attitudes to organ donation *Anaesthesia*, 60 (10), pp. 1002-1008.
- Rivers, E.P., Buse, S.M., Bivins, B.A., Horst, H.M. (1990) Organ and tissue procurement in the acute care setting: Principles and practice - part 2. *Annals of Emergency Medicine*, 19 (2), pp. 193-200.

Westphal, G.A., Caldeira Filho, M., Fiorelli, A., Vieira, K.D., Zacliffevis, V., Bartz, M., Wanzuita, R., Teixeira, C., Franke, C., Machado, F.O., Friedman, G., Andrade, J., Matos, J.D., Lamgaro, D.M., Silva, E., Costa, G., Coelho, M.E., Oliveira, M.C., Youssef, N.C., Akamine, N., Duarte, P., Lisboa, R., Mazzali, M., Ferraz Neto, B.H., Task Force of the Brazilian Association, Intensive Medicine, Brazilian Association, Organs Transplantation, Transplantation Center Santa Catarina (2012) Guidelines for maintenance of adult patients with brain death and potential for multiple organ donations *Transplantation proceedings*, 44 (8), pp. 2260-2267.

Kobashigawa, J et al. (2014) Report from a consensus conference on primary graft dysfunction after cardiac transplantation. *J Heart Lung Transplant*, 33:327-340.

Murphy K. (2012) *Janeway's Immunobiology*, 8th edition. New York: Garland Science

Costanzo MR, Hunt SA, Taylor DO, Kirklin JK. (2012) *ISHLT Monograph Series Volume 6: ISHLT Guidelines for the Care of Heart Transplant Recipients*. Philadelphia, PA: Elsevier.

Costanzo MR. Dipchand A. Starling R. Anderson A. Chan M. Desai S. Fedson S. Fisher P. Gonzales-Stawinski G. Martinelli L. McGiffin D. Smith J. Taylor D. Meiser B. Webber S. Baran D. Carboni M. Dengler T. Feldman D. Frigerio M. Kfoury A. Kim D. Kobashigawa J. Shullo M. Stehlik J. Teuteberg J. Uber P. Zuckermann A. Hunt S. Burch M. Bhat G. Canter C. Chinnock R. Crespo-Leiro M. Delgado R. Dobbels F. Grady K. Kao W. Lamour J. Parry G. Patel J. Pini D. Towbin J. Wolfel G. Delgado D. Eisen H. Goldberg L. Hosenpud J. Johnson M. Keogh A. Lewis C. O'Connell J. Rogers J. Ross H. Russell S. Vanhaecke J. (2010) The International Society of Heart and Lung Transplantation Guidelines for the care of heart transplant recipients. *Journal of Heart & Lung Transplantation*. 29(8):914-56.

Heeger PS, Dinavahi R. (2012) Transplant immunology for non-immunologist. *Mount Sinai Journal of Medicine*. 79(3): 376-87.

Section 5: MCS Management

Learning Objectives for Section 5:

- 1) To establish the different types of mechanical circulatory support options presently available
- 2) To appreciate the differences between long-term and short-term mechanical circulatory support
- 3) To understand complications that can result from mechanical circulatory support
- 4) To learn how to identify and address common complications resulting from mechanical circulatory support

1. Devices
 - a. LVADs (HeartWare, HeartMate II, HeartMate III, others)
 - b. TAHs
 - c. Centrimags, IABP, impella, others
 - d. ECMO
2. Complications overview
 - a. Bleeding
 - b. Clotting
 - c. Infection
 - d. Right heart failure

References:

- Husain, S., Sole, A., Alexander, B.D., et al. (2016) The 2015 international Heart and Lung transplantation guidelines for the management of fungal infections in mechanical circulatory support and cardiothoracic organ transplant recipients: Executive Summary. *J Heart Lung Transplant*, 35(3): 261-82.
- Hoopes CW, Kukreja J, Golden J, et al.(2013) Extracorporeal membrane oxygenation as a bridge to pulmonary transplantation. *J Thorac Cardiovasc Surg.*, 145:862-867.
- MacIver, J., & Ross, H. J. (2012). Quality of Life and Left Ventricular Assist Device Support. *Circulation*, 126(7), 866–874.
- Rodriguez L.E., Suarez E.E., Loebe M., Bruckner B.A. (2013) Ventricular assist devices (VAD) therapy: new technology, new hope? *Methodist Debaquey Cardiovasc J*: 32–37.
- Goldstein DJ, Oz MC, Rose EA.(1998) Implantable left ventricular assist devices. *N Engl J Med*. 339(21):1522–33.
- Farrar DJ, Bourque K, Dague CP, Cotter CJ, Poirier VL.(2007) Design features developmental status, and experimental results with the Heartmate III centrifugal left ventricular assist system with a magnetically levitated rotor. *ASAIO J*, 53(3):310–5.

- Nguyen DQ, Thourani VH. (2010) Third-generation continuous flow left ventricular assist devices. *Innovations*, 5(4):250–8.
- Hoshi H, Shinshi T, Takatani S. (2006) Third-generation blood pumps with mechanical noncontact magnetic bearings. *Artif Organs*, 30(5):324–38.
- Timms D. (2011) A review of clinical ventricular assist devices. *Med Eng Phys*, 33(9):1041–7.
- Kirklin JK, Naftel DC, Pagani FD, Kormos RL, Stevenson LW, et al. (2015) Seventh INTERMACS annual report: 15,000 patients and counting. *J Heart Lung Transplant*, 34(12):1495–504
- Kirklin JK, Naftel DC, Pagani, F.D. *et al.* Pump thrombosis in the Thoratec HeartMate II device: an update analysis of the INTERMACS registry. *J Heart Lung Transplant*, 34(12): 1515-26.

Section 6: Immediate Post Transplant Care

Learning Objectives for Section 6:

- 1) To understand Primary Graft Dysfunction: characteristics and treatment modalities
- 2) To describe the difference between acute cellular rejection and antibody mediated rejection and respective management strategies
- 3) To explore teaching strategies to promote patient and caregiver learning
- 4) To understand follow-up care after transplantation

1. PGD: definitions and treatment

- a. ICU management
- b. Surgical and Medical Complications
- c. Prophylactic Regimen
- d. Immunosuppression therapy (covered in previous section)

2. Management of Acute Cellular Rejection and Antibody Mediated Rejection

- a. Definitions of acute cellular rejection and antibody mediated rejection
- b. Management strategies of acute cellular rejection
- c. Management strategies of antibody mediated rejection

3. Post-Transplant Heart and Lung Recipient and Caregiver Education

- a. Medication teaching
- b. Signs and symptoms of infection and rejection
 - o Heart
 - o Lung
- c. Monitoring for infection, rejection and changes in medical status
- d. Follow up care post discharge

References:

Immediate Post Transplant Care

George EL, Guttendorf J. (2011) Lung Transplant. *Critical Care Nursing Clinics of North America*, 23: 481-503.

Dilling DF, Glanville AR. (2011) Advances in lung transplantation: the year in review. *The Journal of Heart and Lung Transplantation*, 30: 247-251.

Lee JC, Christie JD, Puchalski J, Lee HJ, Sterman DH. (2011) Primary Graft Dysfunction. *Clinics in Chest Medicine*, 32: 279-293.

Falk JF, Oh S, Lee CJ, Reddy H, Chaux GE, Lewis MI. (2010) Intermediate and Late Complications of Lung Transplantation. *Medical Management of the Thoracic Surgery Patient*, 335-351.

Tomás EA, Quero Ríos MI, Robles Arista JC, Algar Algar FJ, Wolf JI, Alvarez Kindelan A, Cerezo Madueño F, Baamonde Laborda C, Guerrero Pabon R, Salvatierra Velazquez A. (2012) Postoperative Complications in the Intensive Care Unit Following Lung Transplantation in Adults: Results in University Hospital Reina Sofia. *Transplantation Proceedings*, 44: 2663-2665.

Midthun DE, McDougall JC, Peters SG, Scott JP. (1997) Medical Management and Complications in the Lung Transplant Recipient. *Mayo Clinic Proceedings*, 72: 175-184.

Puchalski J, Lee HJ, Serman DH. (2011) Airway Complications Following Lung Transplantation. *Clinics in Chest Medicine*, 32: 357-366.

Vigneswaran WT, Sakiyalak P, Bhorade S, Bakhos M. (2002) Airway complications after isolated lung transplantation. *Transplantation Reviews*, 16: 87-94.

Allan JS. (2004) Immunosuppression for lung transplantation. *Seminars in Thoracic and Cardiovascular Surgery*, 16: 333-341.

DiNella JV, Bowman J. (2011) Heart Transplantation. *Critical Care Nursing Clinics of North America*, 23: 471-479.

Klein DG. (2007) Current Trends in Cardiac Transplantation. *Critical Care Nursing Clinics of North America*, 19: 445-460.

Shah KB, Parameshwar J. (2011) Advances in heart transplantation: The year in review. *The Journal of Heart and Lung Transplantation*, 30: 241-246.

Management of Acute Cellular Rejection and Antibody Mediated Rejection

Witt CA, Gaut JP, Yusen RD, Byers DE, Iuppa JA, Bain KB, Patterson A, Mohanakumar T, Trulock EP, Hachem RR. (2013) Acute antibody-mediated rejection after lung transplantation. *The Journal of Heart and Lung Transplantation*, 32: 1034-1040.

Levine, D.J., Glanville, A.R., Aboyoun, C., et al. (2016) Antibody mediated rejection of the lung: a consensus report from the international Society of Heart and Lung Transplant. *J Heart Lung Transplant*, 35: 397-406

Morrell MR, Patterson GA, Trulock EP, Hachem RR. (2009) Acute Antibody-mediated Rejection After Lung Transplantation. *The Journal of Heart and Lung Transplantation*, 28: 96-100.

Martinu T, Pavlisko EN, Chen DF, Palmer SM. (2011) Acute Allograft Rejection: Cellular and Humoral Processes. *Clinics in Chest Medicine*, 32: 295-310.

Glanville AR. (2010) Antibody-mediated rejection in lung transplantation: Myth or reality? *The Journal of Heart and Lung Transplantation*, 29: 395-400.

Chakinala MM, Trulock EP. (2003) Acute allograft rejection after lung transplantation: diagnosis and therapy. *Chest Surgery Clinics of North America*, 13: 525-542.

Whelan TPM, Hertz MI. (2005) Allograft rejection after lung transplantation. *Clinics in Chest Medicine*, 26: 599-612.

Reed EF, Demetris AJ, Hammond E, Itescu S, Kobashigawa JA, Reinsmoen NL, Rodriguez ER, Rose M, Stewart S, Suciu-Foca N, Zeevi A, Fishbein MC, The International Society for Heart and Lung Transplantation. (2006) Acute Antibody-mediated Rejection of Cardiac Transplants. *The Journal of Heart and Lung Transplantation*, 25: 153-159.

Pham MX, Lee J. (2013) Chapter 49 - Cardiac Transplant Rejection. *Genomic and Personalized Medicine (Second Edition)*, Volume 2: 557-571.

Mehra M, Crespo-Leiro MG, Dipchand A, Ensminger SM, Hiemann NE, Kobashigawa JA, Madsen J, Parameshwar J, Starling RC, Uber PA. (2010) International Society for Heart and Lung Transplantation working formulation of a standardized nomenclature for cardiac allograft vasculopathy—2010. *The Journal of Heart and Lung Transplantation*, 29: 717-727.

Kobashigawa J, Crespo-Leiro MG, Ensminger SM, Reichenspurner H, Angelini A, Berry G, Burke M, Czer L, Hiemann N, Kfoury AG, Mancini D, Mohacsi P, Patel J, Pereira N, Platt JL, Reed EF, Reinsmoen N, Rodriguez ER, Rose ML, Russell SD, et al. (2011) Report from a consensus conference on antibody-mediated rejection in heart transplantation. *The Journal of Heart and Lung Transplantation*, 30: 252-269.

Post operative Patient Education

Williams TJ, Westall G, Snell GI. (2008) Chapter 21 – Lung Transplantation. *Pediatric Respiratory Medicine (Second Edition)*: 283-294.

George EL, Guttendorf J. (2011) Lung Transplant. *Critical Care Nursing Clinics of North America*, 23: 481-503.

DiNella JV, Bowman J. (2011) Heart Transplantation. *Critical Care Nursing Clinics of North America*, 23: 471-479.

Klein DG. (2007) Current Trends in Cardiac Transplantation. *Critical Care Nursing Clinics of North America*, 19: 445-460.

- Witt CA, Meyers BF, Hachem RR. (2012) Pulmonary Infections Following Lung Transplantation *Thoracic Surgery Clinics, Volume 22, Issue 3, August 2012, Pages 403-412*
Chad A. Witt, Bryan F. Meyers, Ramsey R. Hachem
- Costanzo MR, Dipchand A, Starling R, Anderson A, Chan M, Desai S, Fedson S, Fisher P, Gonzales-Stawinski G, Martinelli L, McGiffin D, Parisi F, Smith J, Taylor D, Meiser B, Webber S, Baran D, Carboni M, Dengler T, et al. (2010) The International Society of Heart and Lung Transplantation Guidelines for the care of heart transplant recipients. *The Journal of Heart and Lung Transplantation, 29:* 914-956.
- Cupples SA. (2011) Transplant Infectious Disease: Implications for Critical Care Nurses. *Critical Care Nursing Clinics of North America, 23:* 519-537.
- Snydman DR, Limaye AP, Potena L, Zamora MR. (2011) Update and Review: State-of-the-Art Management of Cytomegalovirus Infection and Disease Following Thoracic Organ Transplantation. *Transplantation Proceedings, 43 (Supplement):* S1-S17.
- Baas LS, Bell B, Giesting R, McGuire N, Wagoner LE. (2003) Infections in the heart transplant recipient. *Critical Care Nursing Clinics of North America, 15:* 97-108.
- Labarrere CA, Jaeger BR. (2012) Biomarkers of heart transplant rejection: the good, the bad, and the ugly! *Translational Research, 159:* 238-251.

Section 7: Care of the Patient with Special Needs

Learning Objectives for Section 7:

- 1) To understand the relevance of social support and socioeconomic status in patient care
- 2) To be able to determine health literacy and track patient adherence
- 3) To appreciate challenges resulting from low health literacy
- 4) To describe specific considerations in the management of the different age groups of transplant recipients
- 5) To learn about care of the older aged patient
- 6) To understand opportunities and challenges the role poses

1. **Poor social support and low socioeconomic status**
 - a. **Importance of social support**
 - b. **Why is socioeconomic status important?**
 - c. **Key principles in caring for these patients**
2. **Low health literacy and adherence**
 - a. **Overview of health literacy and why it's important**
 - b. **How to determine level of health literacy**
 - c. **Strategies to improve and track adherence**
3. **Care of the Very Young, School Age and Adolescent**
 - a. **What's different about the 3 age groups?**
 - b. **What are some key concepts in managing each group?**
 - c. **A short discussion about transitions**
4. **Care of the older aged patient**
 - a. **What defines older age?**
 - b. **Outcomes in the elderly, comorbidities, and impact on care**
 - c. **Long-term issues, death of caregiver, increasing medical needs**

References:

Poor Social Support and Low Socioeconomic Status

Mehra MR, et al. (2016) The 2016 ISHLT listing criteria for heart transplantation: A 10-year update. *J Heart Lung Transplant*, 35 (1): 1-23.

Cupples S. Dew MA. Grady KL. De Geest S. Dobbels F. Lanuza D. Paris W. (2006) Report of the Psychosocial Outcomes Workgroup of the Nursing and Social Sciences Council of the International Society for Heart and Lung Transplantation: present status of research on psychosocial outcomes in cardiothoracic transplantation: review and recommendations for the field. *Journal of Heart & Lung Transplantation*. 25(6):716-25.

Low Health Literacy and Adherence

McDermott R. (2008) Medical decision making: lessons from psychology. *Urologic Oncology*. 26(6):665-8.

Kahneman D. (2011) *Thinking Fast and Slow*. London: Allen Lane.

Cupples S. Dew MA. Grady KL. De Geest S. Dobbels F. Lanuza D. Paris W. (2006) Report of the Psychosocial Outcomes Workgroup of the Nursing and Social Sciences Council of the International Society for Heart and Lung Transplantation: present status of research on psychosocial outcomes in cardiothoracic transplantation: review and recommendations for the field. *Journal of Heart & Lung Transplantation*. 25(6):716-25.

Care of the Very Young, School Age and Adolescent

Canter CE. Shaddy RE. Bernstein D. Hsu DT. Chrisant MR. Kirklin JK. Kanter KR. Higgins RS. Blume ED. Rosenthal DN. Boucek MM. Uzark KC. Friedman AH. Young JK. American Heart Association Council on Cardiovascular Disease in the Young. American Heart Association Council on Clinical Cardiology. American Heart Association Council on Cardiovascular Nursing. American Heart Association Council on Cardiovascular Surgery and Anesthesia. Quality of Care and Outcomes Research Interdisciplinary Working Group. (2007) Indications for heart transplantation in pediatric heart disease: a scientific statement from the American Heart Association Council on Cardiovascular Disease in the Young; the Councils on Clinical Cardiology, Cardiovascular Nursing, and Cardiovascular Surgery and Anesthesia; and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation*, 115(5):658-76.

Care of the Older Aged Patient

Kniepeiss D, Wagner D, Pienaar S., Thaler HW, Porubsky C, Tscheliessnigg KH, Roller RE. (2012) Solid organ transplantation: technical progress meets human dignity: a review of the literature considering elderly patients' health related quality of life following transplantation. *Ageing Research Reviews*. 11(1):181-7.

Kilic A. Weiss ES. Yuh DD. Shah AS. Conte JV. (2012) Factors associated with 5-year survival in older heart transplant recipients. *Journal of Thoracic & Cardiovascular Surgery*. 143(2):468-74.

Afilalo J, Karunanathan S, Eisenberg MJ, Alexander KP, Bergman H. (2009) Role of frailty in patients with cardiovascular disease. *American Journal of Cardiology*. 103(11):1616-21.

Section 8: Long Term Follow Up

Learning Objectives for Section 8:

- 1) To establish recommendations for surveillance of the post transplant patient
- 2) To identify strategies to allow for return to work and school
- 3) To learn how to help patient achieve an acceptable quality of life
- 4) To learn common infections and malignancies as well as their treatment and prevention
- 5) To understand chronic rejection: symptoms and treatment, symptoms of rejection, and treatment

- 1. Follow up surveillance program (include common complications)**
 - a. Current recommendations**
 - b. Role of the surveillance biopsy**
 - c. Non-transplant complications, frequencies, and treatment strategies**
- 2. Return to work, school and quality of life**
 - a. Barriers to return to normal activities**
 - b. Strategies to facilitate successful reintegration into the community**
 - c. Return to school issues**
 - d. Achieving acceptable quality of life**
- 3. Infection and malignancy**
 - a. Common infections and their timing in the post-transplant period and in MCS D patients supported for long term**
 - b. Prevention and treatment of infections**
 - c. Malignancy Risk**
 - d. Prevention and treatment of malignancy**
- 4. Chronic rejection: BOS and CAV**
 - a. Signs and symptoms**
 - b. Current treatment strategies**
 - c. Re-transplantation**

References:

Work Status after Transplant

- De Baere C, Delva D, Kloeck A, et. al. (2010) Return to work and social participation: does type of organ transplantation matter? *Clinical Transplantation* 2010, 20:1-7.
- White-Williams C, Jalowiec A, Grady K. (2005) Who returns to work after heart transplantation? *J Heart Lung Transplant*, 24(12):2255-2261.
- White-Williams C, Wang E Rybarczyk B, Grady K. (2011) Factors associated with work 5 to 10 years after heart transplantation. *Clinical Transplantation*., 25(6):E599-605.
- Cicutto L, Braidy C, Moloney S et. al. (2004) Factors affecting attainment of paid employment after lung transplantation. *J Heart Lung Transplant*, 23(4):481-6.

Kristen AV, Ammon K, Kock A, et al. (2009) Return to work after heart transplantation: discrepancy with subjective work ability transplantation. *Transplantation*, 87(7):1001-1005.

Sahota A, Zaghla H, Adkin R, et. al. (2006) Predictors of employment after liver transplantation. *Clinical Transplantation*; 20:490-5.

Return to School after Transplant

Boonen H & Petry K. (2012) How do children with a chronic or long-term illness perceive their school re-entry after a period of homebound instruction? *Child: Care, Health and Development*, 38(4): 490-6.

Grieve AJ, Tluczek A, Rachine-Gilles C, Laxova A, Albers CA, & Farrell PM. (2011) Associations between academic achievement and psychosocial variables in adolescents with cystic fibrosis. *Journal of School Health*, 81(11): 713-720.

Gurney JG, Krull KR, Kadan-Lottick K et. al. (2009) Social outcomes in the childhood cancer survivor study cohort. *J Clinical Oncology*, 27(14): 2390-2395.

Kliebenstein MA & Broome ME. (2000) School re-entry for the child with chronic illness: Parent and school personnel perceptions. *Pediatric Nursing*, 26 (6): 579-584.

Weil CM, Rodgers S, & Rubovits S. (2006) School re-entry of the pediatric heart transplant recipient. *Pediatric Transplantation*, 10: 928-933.

Wray J, Long T, Radley-Smith R, Yacoub, M. (2001) Returning to school after heart or heart-lung transplantation: How well do children adjust? *Transplantation*, 72(1):100-106.

Transition Models

Naylor, M., D., Aiken, L., H., Kurtzman, E., T., Olds, D., M., & Hirschman, K., B. (2011). The importance of transitional care in achieving health reform. *Health Affairs*, 30(4), 746-754.

Nosbusch, J., M., Weiss, M., E., & Bobay, K., L. (2011). An integrated review of the literature on challenges confronting the acute care staff nurse in discharge planning. *Journal of Clinical Nursing*, 20(5), 754-774.

Wakefield, B. J., Boren, S. A., Groves, P. S., & Conn, V. S. (2013). Heart failure care management programs: A review of study interventions and meta-analysis of outcomes. *The Journal of Cardiovascular Nursing*, 28(1), 8-19.

Transition for Pediatric to Adult

LaRosa, C., Giah, G., Baturarte, J., & Meyers, K. (2011). "Solid-organ transplantation in childhood: transitioning to adult health care". *Pediatrics*, 127(4), p.742-753.

Bell, L. & Sawyer, S. (2010). "Transition of care to adult services for pediatric solid-organ transplant recipients". *The Pediatric Clinics of North America*, 57(2), p.593-610.

Lerret, Stacey Marie (2012). "Essential components of transition to adult transplant services: the transplant coordinators' perspective". *Progress in Transplantation*, 22(3), p.252-258.

Annunziato, R., & Shemesh., E.(2010). "Tackling the spectrum of transition: what can be done in pediatric settings?". *Pediatric Transplantation*, 14(7): 820-2.

Bell LE, Bartosh SM, Davis CL, Dobbels F, Al-Uzri A, Lotstein D, Reiss J, Dharnidharka VR. (2008) Adolescent transition to adult care in solid organ transplantation: a consensus conference report. *Am J Transplant*, 8(11):2230-42.

Infection and Malignancy

Mooney ML, Hannan MM, Husain S, Kirklin JK., Eds. (2011) *Diagnosis and Management of Infectious Diseases in Cardiothoracic Transplantation and Mechanical Circulatory Support* (ISHLT Monograph Series). Philadelphia: Elsevier. published 2011

Costanzo MR, Hunt SA, Taylor DA, Kirklin JK., Eds. (2012) *ISHLT Guidelines for the Care of Heart Transplant Recipients* (ISHLT Monograph Series). Philadelphia: Elsevier.

Sigurdardottir V, Bjortuft O, Eiskjaer H, Ekmehag B, Gude E, Gustafsson F, Hagerman I, Halme M, Lommi J, Mared L, Riise GC, Simonsen S. (2012) Long-term follow-up of lung and heart transplant recipients with pre-transplant malignancies. *Journal of Heart & Lung Transplantation*. 31(12) :1276-80.

Corbett C, Armstrong MJ, Neuberger J. (2012) Tobacco smoking and solid organ transplantation. *Transplantation*, 94(10): 979-87.

Sampaio MS, Cho YW, Qazi Y, Bunnapradist S, Hutchinson IV, Shah T. (2012) Posttransplant malignancies in solid organ adult recipients: an analysis of the U.S. National Transplant Database. *Transplantation*, 94(10): 990-8.

BOS

Meyer, K.C., Raghu, G., Verleden, G.M., Corris, P.A., Aurora, P., Wilson, K.C., Brozek, J., Glanville, A.R., and the 4 ISHLT/ATS/ERS BOS Task Force Committee (2014) An international ISHLT/ATS/ERS clinical practice guideline: diagnosis and management of bronchiolitis obliterans syndrome. *European Respiratory Journal*, 44(6): 1479-503.

Hayes, D.,Jr. (2011). A review of bronchiolitis obliterans syndrome and therapeutic strategies. *Journal of Cardiothoracic Surgery*, 6, 92.

- Kastelijjn, E. A., van Moorsel, C. H., Ruven, H. J., Lammers, J. W., & Grutters, J. C. (2012). Genetic polymorphisms and bronchiolitis obliterans syndrome after lung transplantation: Promising results and recommendations for the future. *Transplantation*, *93*(2), 127-135.
- Kennedy, V. E., Todd, J. L., & Palmer, S. M. (2013). Bronchoalveolar lavage as a tool to predict, diagnose and understand bronchiolitis obliterans syndrome. *American Journal of Transplantation*, *13*(3), 552-561.
- Khan, M. A., & Nicolls, M. R. (2013). Complement-mediated microvascular injury leads to chronic rejection. *Advances in Experimental Medicine & Biology*, *735*, 233-246.
- Todd, J. L., & Palmer, S. M. (2011). Bronchiolitis obliterans syndrome: The final frontier for lung transplantation. *Chest*, *140*(2), 502-508.
- Verleden, G. M., Vos, R., De Vleeschauwer, S. I., Willems-Widyastuti, A., Verleden, S. E., Dupont, L. J., . . . Vanaudenaerde, B. M. (2009). Obliterative bronchiolitis following lung transplantation: From old to new concepts? *Transplant International*, *22*(8), 771-779.
- Zamora, M. R. (2012). Updates in lung transplantation. *Clinical Transplants*, 185-192.

CAV

- Braga, J. R., Santos, I. S., McDonald, M., Shah, P. S., & Ross, H. J. (2012). Factors associated with the development of cardiac allograft vasculopathy--a systematic review of observational studies. *Clinical Transplantation*, *26*(2), E111-24.
- Colvin-Adams, M., & Agnihotri, A. (2011). Cardiac allograft vasculopathy: Current knowledge and future direction. *Clinical Transplantation*, *25*(2), 175-184.
- Crespo-Leiro, M. G., Marzoa-Rivas, R., Barge-Caballero, E., & Paniagua-Martin, M. J. (2012). Prevention and treatment of coronary artery vasculopathy. *Current Opinion in Organ Transplantation*, *17*(5), 546-550.
- Dandel, M., & Hetzer, R. (2010). Impact of immunosuppressive drugs on the development of cardiac allograft vasculopathy. *Current Vascular Pharmacology*, *8*(5), 706-719.
- Jeewa, A., Dreyer, W. J., Kearney, D. L., & Denfield, S. W. (2012). The presentation and diagnosis of coronary allograft vasculopathy in pediatric heart transplant recipients. *Congenital Heart Disease*, *7*(4), 302-311.
- Kindel, S. J., & Pahl, E. (2012). Current therapies for cardiac allograft vasculopathy in children. *Congenital Heart Disease*, *7*(4), 324-335.
- Millington, T. M., & Madsen, J. C. (2009). Innate immunity in heart transplantation. *Current Opinion in Organ Transplantation*, *14*(5), 571-576.

Suzuki, J., Isobe, M., Morishita, R., & Nagai, R. (2010). Characteristics of chronic rejection in heart transplantation: Important elements of pathogenesis and future treatments. *Circulation Journal*, 74(2), 233-239.

Suzuki, J., Ogawa, M., Hirata, Y., Nagai, R., & Isobe, M. (2012). Effects of immunoglobulin to prevent coronary allograft vasculopathy in heart transplantation. *Expert Opinion on Therapeutic Targets*, 16(8), 783-789.

Section 9: Quality

Learning Objectives for Section 9:

- 1) To learn about the variety of regulatory agencies to assess hospital practices
- 2) To establish performance improvement recommendations
- 3) To identify program metrics to consider evaluating and how to plan for improvement
- 4) To understand the importance of readmissions and their impact on a program
- 5) To be able to identify a multidisciplinary approach to patient care

1. Quality assurance and interprofessional collaborative practice

- a. **Regulatory agencies (Intermacs, Joint Commission, DNV, UNOS, CMS, etc)**
- b. **Performance improvement and collaborative practice**
- c. **Evaluating outcomes and developing plan for improvement**
- d. **Rewards identified by caregivers for performing the role**

2. Readmissions

- a. **Tracking trends at your institution and benchmark against national trends**
- b. **How to strategically say “no” and role of delegation and education for others**
- c. **Engagement of consulting services and multidisciplinary approach**
- d. **Develop plan for improvement**

References:

- Center for Medicare & Medicaid Services (CMS), HHS. (2016) Medicare Program: Transplant Outcome Measures and Documentation Requirements. *Fed Regist.* 81 (219): 79562-892.
- Kirklin JK, Naftel DC, Pagani FD, Kormos RL, Stevenson LW, et al. (2015) Seventh INTERMACS annual report: 15,000 patients and counting. *J Heart Lung Transplant.*, 34(12):1495–504
- Kirklin JK, Naftel DC, Kormos RL, et al. (2015) INTERMACS analysis of pump thrombosis in the HeartMate II left ventricular assist device. *J Heart Lung Transplant*, 33: 12-22
- Tsao CI, Chou NK, Chi NH, Yu HY, Chen YS, Wang CH, et al. (2010) Unplanned readmission within 1 year after heart transplantation in Taiwan. *Transplant Proceed.*42(3): 946–947.
- Bachmann, J. M., Shah, A. S., Duncan, M. S., Greevy, R. A., Jr, Graves, A. J., Ni, S., ... Freiberg, M. S. (2017). Cardiac rehabilitation and readmissions after heart transplantation. *The Journal of Heart and Lung Transplantation*.
- Zomak, R., Whiteman, S., Keddie, L., Meyer, K., Feinberg, A., Speicher, F., DeVito Dabbs, A. (2013). Pattern and predictors of hospital readmission after lung transplantation. *The Journal of Heart and Lung Transplantation*, 32(4): S44.

Berg, A., Hawthorne, S., & Hauser, A. (2011). 488 Utilization of checklists to maintain transplant quality and compliance. *The Journal of Heart and Lung Transplantation, 30(4)*: S166.

Weiner, B. J., Alexander, J. A., Shortell, S. M., Baker, L. C., Becker, M., & Geppert, J. J. (2006). Quality improvement implementation and hospital performance on quality indicators. *Health Services Research, 41(2)*: 307–334.

Section 10: Caring for Ourselves and Others

Learning Objectives for Section 10:

- 1) To establish strategies to provide support for caregivers of patients
- 2) To appreciate ethical challenges and role of palliative care at the end of life
- 3) To understand strategies for career development
- 4) To identify work-life balance strategies and time management techniques
- 5) To learn about the importance of networking

1. Care for the caregivers

- e. **Demographics of those who provide care for MCS and transplant patients**
- f. **The caregiver experience pre-transplant and post-transplant**
- g. **Interventions for struggling caregivers**
- h. **Rewards identified by caregivers for performing the role**

2. Caring at the end of life

- a. **Involvement of palliative care providers for transplant and MCS**
- b. **Ethical and practical challenges of offering hope while also helping patients and families to prepare for end of life**
- c. **Specific palliative interventions that can be of benefit to thoracic transplant patients.**

3. Career development strategies for MCS and transplant professionals

- a. **Outline steps along a potential career path for a transplant professional**
- b. **Describe strategies to prepare for a career in transplantation**
- c. **How do we stimulate interest in others for a transplant career to provide for controlled succession planning?**
- d. **Growing the network – helping others to become active in transplant organizations like ISHLT, ICCAC, NHA, etc.**

4. Work-life balance for the MCS and transplant professional – making it all work

- e. **Strategies to define work-life balance for the individual**
- f. **How to strategically say “no” and role of delegation and education for others**
- g. **Time management**
- h. **Stress relief**

References:

Care for the Caregivers

Egerod I. Overgaard D. (2012) Taking a back seat: support and self-preservation in close relatives of patients with left ventricular assist device. *European Journal of Cardiovascular Nursing.* 11: 380-7.

Myaskovsky L. Posluszny DM. Schulz R. DiMartini AF. Switzer GE. DeVito Dabbs A. McNulty ML. Kormos RL. Toyoda Y. Dew MA. (2012) Predictors and outcomes of health-

related quality of life in caregivers of cardiothoracic transplant recipients. *American Journal of Transplantation.* 12: 3387-97.

Ozbaran B. Kose S. Yagdi T. Engin C. Erermis S. Yazici KU. Noyan A. Ozbaran M. (2012) Depression and anxiety levels of the mothers of children and adolescents with left ventricular assist devices. *Pediatric Transplantation.* 16: 766-70.

Rosenberger EM. Dew MA. DiMartini AF. DeVito Dabbs AJ. Yusen RD. (2012) Psychosocial issues facing lung transplant candidates, recipients and family caregivers. *Thoracic Surgery Clinics.* 22: 517-29.

Sadala ML. Stolf NG. Bocchi EA. Bicudo MA. (2013) Caring for heart transplant recipients: The lived experience of primary caregivers. *Heart & Lung.* 42: 120-5

Xu J. Adeboyejo O. Wagley E. Aubrecht J. Song MK. Thiry L. Dabbs AD. (2012) Daily burdens of recipients and family caregivers after lung transplant. *Progress in Transplantation.* 22: 41-7.

Young LE. Molzahn A. Starzomski R. Budz B. (2010) Families and heart transplantation: reversing the trajectory of end stage heart disease. *Canadian Journal of Cardiovascular Nursing.* 20: 6-17.

End of Life in Transplantation

Dipchand, A. (2012) Decision-making in the face of end-stage organ failure: high-risk transplantation and end-of-life care". *Current opinion in organ transplantation.*, 17(5); 520-524.

Tanner CE, Fromme EK, Goodlin SJ. (2011) Ethics in the treatment of advanced heart failure: palliative care and end-of-life issues. *Congestive Heart Failure,* 17(5): 235-40.

MacIver J, Rao V, Delgado DH, Desai N, Ivanov J, Abbey S, Ross HJ. (2008) Choices: a study of preferences for end-of-life treatments in patients with advanced heart failure. *Journal of Heart & Lung Transplantation,* 27(9): 1002-7.

Career Development

Benner, P. (2011) Formation in professional education: An examination of the relationship between theories of meaning and theories of the self. *Journal of Medicine and Philosophy,* 36: 342-353.

Benner, P., Sutphen, M., Leonard-Kahn, V., Day, L. (2008) Formation and everyday ethical comportment *American Journal of Critical Care,* 17: 473-476.

- Goodloe, L. R., Sampson, R. C., Munjas, B., Whitworth, T. R., Lantz, C. D., Tangle, E., & Miller, W. (1996). Clinical ladder to professional advancement program: An evolutionary process. *Journal of Nursing Administration*, 26: 58-64.
- Hadidi, N. N., Lindquist, R., & Buckwalter, K. (2013). Lighting the fire with mentoring relationships. *Nurse Educator*, 38: 157-163.
- Hess, C. (2013). Health care educators: New directions in leadership development. *Journal of Leadership Studies*, 6: 72-76.
- Hickey, N., Sumsion, J., & Harrison, L. (2013). Why nursing? applying a socio-ecological framework to study career choices of double degree nursing students and graduates. *Journal of Advanced Nursing*, 69: 1714-1724.
- Pancheri, K., Fowler, D. L., Wiggs, C. M., Schultz, R., Lewis, P., & Nurse, R. (2013). Fostering completion of the doctor of philosophy degree through scholarly collegial support. *Journal of Continuing Education in Nursing*, 44: 309-312.
- Rice, E.M., Rady, M.Y., Hamrick, A., Verheijde, J.L., Pendergast, D.K. (2008) Determinants of moral distress in medical and surgical nurses at an adult acute tertiary care hospital *Journal of Nursing Management*, 16: 360-373.
- Russell, C. L., & Van Gelder, F. (2008). An international perspective: Job satisfaction among transplant nurses. *Progress in Transplantation*, 18: 32-40.
- Toh, S.G , Ang, E, Kamala Devi, M. (2012) Systematic review on the relationship between the nursing shortage and job satisfaction, stress and burnout levels among nurses in oncology/haematology settings *International Journal of Evidence-Based Healthcare*, 10: 126-141.
- Tummers, L. G., Groeneveld, S. M., & Lankhaar, M. (2013). Why do nurses intend to leave their organization? A large-scale analysis in long-term care. *Journal of Advanced Nursing*, 69 (12): 2826-38.

Work Life Balance

- Buettner L. Shattell M. Reber M. (2011) Working hard to relax: improving engagement in leisure time activities for a healthier work-life balance. *Issues in Mental Health Nursing*. 32: 269-70.
- Carter MR. Tourangeau AE. (2012) Staying in nursing: what factors determine whether nurses intend to remain employed? *Journal of Advanced Nursing*. 68: 1589-600.

Lehmann-Willenbrock N. Lei Z. Kauffeld S. (2012) Appreciating age diversity and German nurse well-being and commitment: co-worker trust as the mediator. *Nursing & Health Sciences. 14*: 213-20.

Munir F. Nielsen K. Garde AH. Albertsen K. Carneiro IG. (2012) Mediating the effects of work-life conflict between transformational leadership and health-care workers' job satisfaction and psychological wellbeing. *Journal of Nursing Management. 20*: 512-21.