

ISHLT CONSENSUS

Adult cardiothoracic transplant nursing: An ISHLT consensus document on the current adult nursing practice in heart and lung transplantation



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KEYWORDS:

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BACKGROUND: The role of nurses in cardiothoracic transplantation has evolved over the last 25 years. Transplant nurses work in a variety of roles in collaboration with multidisciplinary teams to manage complex pre- and post-transplantation issues. There is lack of clarity and consistency regarding required qualifications to practice transplant nursing, delineation of roles and adequate levels of staffing.

METHODS: A consensus conference with workgroup sessions, consisting of 77 nurse participants with clinical experience in cardiothoracic transplantation, was arranged. This was followed by subsequent discussion with the ISHLT Nursing, Health Science and Allied Health Council. Evidence and expert opinions regarding key issues were reviewed. A modified nominal group technique was used to reach consensus.

RESULTS: Consensus reached included: (1) a minimum of 2 years nursing experience is required for transplant coordinators, nurse managers or advanced practice nurses; (2) a baccalaureate in nursing is the minimum education level required for a transplant coordinator; (3) transplant coordinator-specific certification is recommended; (4) nurse practitioners, clinical nurse specialists and nurse managers should hold at least a master's degree; and (5) strategies to retain transplant nurses include engaging donor call teams, mentoring programs, having flexible hours and offering career advancement support. Future research should focus on the relationships between staffing levels, nurse education and patient outcomes.

CONCLUSIONS: Delineation of roles and guidelines for education, certification, licensure and staffing levels of transplant nurses are needed to support all nurses working at the fullest extent of their education and licensure. This consensus document provides such recommendations and draws attention to areas for future research.

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The role of cardiothoracic transplant nursing has evolved with advances in research and clinical sophistication of heart and lung transplantation over the last 25 years. What began

as a simple enlistment of resources, such as transplant nurse coordinators assisting in procurement, program organization and teaching patients, evolved into the addition of advanced practice nurses (nurse practitioners and clinical nurse specialists) working in collaboration with multidisciplinary team members managing complex patients. It is clear that this specialty has established itself as a transplant nursing mainstay. Success in terms of team performance and patient outcomes now hinges in part on a more formal explanation of the roles and responsibilities of the various members of the transplant nursing team. In particular, the role of the transplant coordinator needs to be formally defined.

On April 12, 2011, an unprecedented global transplant nursing conference was convened in San Diego, California, to formally establish a dialog related to crucial issues impacting cardiothoracic transplant nursing. The specific aims of the Nursing Consensus Conference were to define minimal recommendations for transplant nursing education and role responsibilities, and describe retention strategies and models of care. The 77 invited conference participants consisted of nurse coordinators (72%), nurse practitioners (15%), nurse managers (4%) and nurse researchers (6%), representing 12 countries (Australia, Austria, Belgium, Canada, Germany, Italy, Japan, New Zealand, Norway, Spain, the UK and the USA) from 4 different continents. A transplant cardiologist and cardiothoracic transplant surgeon, both with extensive experience in the field, served as advisors to the conference. Representatives were chosen from small to large transplant centers, as defined by the United Network of Organ Sharing (UNOS). The meeting included background presentations by experts in the field, followed by breakout workgroup sessions and, finally, a consensus discussion.

Methodology

To reach consensus regarding recommendations for governance/structure, workforce and research imperatives, a modified nominal group technique¹ was used. Samples of 70 senior transplant nurses with >5 years of experience were selected. Sample selection was representative of International Society for Heart and Lung Transplantation (ISHLT)-defined transplant center sizes, with small defined as 0 to 10/cases per year, medium 10 to 20 cases/year and large >20 cases per year.²

Before the conference, experts were invited to complete a survey based on their experience and their in expertise in cardiothoracic transplant nursing. Standardized questions were developed based on literature and common issues. Questions addressed focused on minimum core competencies, level of education, roles and responsibilities, recommended staffing levels and areas of future research. Each breakout group considered the questions independently, then responded aloud for documenting on a flipchart. Breakout group members discussed, ranked and voted to identify the most important issues to take to the larger group discussion. The participants re-assembled and each group reported its discussion points. The entire group voted to reach consensus on the questions discussed in small groups.^{3,4} Strengths of

the nominal group technique include the expediency of reaching consensus due to preparation and having experts inform the issue for discussion. In addition, the opinion of each member was collated for ranking by peers, resulting in the most relevant issues prevailing.

Overview of key cardiothoracic transplant issues

The following sections provide an overview of the current status, expert opinions, available evidence and recommendations concerning the key cardiothoracic transplant issues raised. Each issue was discussed during breakout workgroup sessions at the conference and further discussed in consultation with the ISHLT Nursing, Health Science and Allied Health Council Standards & Guidelines Workforce. Consensus statements were then drafted based on these discussions and subsequently reviewed and approved by the Council, producing this consensus document.

Education, licensure and certification: Setting standards for transplant nursing

In 2009, the American Nurses Association and International Transplant Nurses Society published statements regarding the scope of nursing practice in the field of transplantation⁵ and defined transplant nursing practice as: "Specialized nursing care focused on the protection, promotion, and optimization of the health and abilities of both the transplant recipient and the living donor across the life span. The depth and breadth in which individual registered nurses engage in the total scope of nursing practice is dependent upon education, experience, role, and the population served." However, there are no consensus guidelines on required education, licensure or certification for the specialty of transplant nursing.

Education. Education among transplant nursing professionals varies depending on their country of origin (Table 1). Most staff nurses in direct patient care in the USA who work in an intensive care or transplant step-down unit, or who work as a transplant coordinator, have a

Table 1 Nursing Degrees Worldwide

	USA	Europe	Australia	Canada	Asia
Licensed practical nurse	LPN			LPN	
Associate degree	ADN				
Baccalaureate	BSN	BA/BSc	BSN	BSN, BScN	BSN
Master of science	MSN	MSc	MSN	MSN, MScN	MAN
Doctorate	PhD, DNP	PhD	PhD	PhD	PhD

ADN, associate degree in nursing; BA, bachelor of arts; BSc, bachelor of science; BSN or BScN, bachelor of science in nursing; DNP, doctor of nursing practice; LPN, licensed practical nurse; MAN, master's of arts in nursing; MSc, master of science; MSN or MScN, master of science in nursing; PhD, doctor of philosophy.

baccalaureate or associate degree in nursing; indeed, most hospitals are moving toward employing nurses with a baccalaureate degree to improve patient outcomes⁶ to achieve Magnet status.⁷ Similarly, the baccalaureate degree, or its equivalent, is required for entry into practice for nurses in Europe, Canada, Asia and Australia.

On the other hand, advanced practice nurses (APNs), such as nurse practitioners or clinical nurse specialists, have at least a master's level education. According to the National Organization for Transplant Professionals (NATCO), the Organization for Transplant Professionals and the International Transplant Nurses Society (ITNS), most nurses working in transplantation hold a baccalaureate degree (53.6% and 48%, respectively). A smaller but significant percentage have a master's degree (21.7%).⁵ In the USA, the American Association of Colleges of Nursing (AACN) has recommended that the doctor of nursing practice (DNP) doctorate degree be required for advanced nursing practice positions such as nurse practitioner or clinical nurse specialist, with a proposed transition date of 2015.⁸

Licensure. Licensure and transplant nursing practice is quite different across the world (Table 2). The majority of transplant coordinators are registered nurses. The scope of nursing practice in transplant nursing is governed by individual countries and states within those countries. For example, a transplant coordinator in England holds a Band 7 level of nursing and an APN may be called a nurse consultant, but may not have an advanced degree. In the USA, the scope of practice may differ by state for a registered nurse practicing. For nurses with the job title of transplant coordinator, a usual prerequisite is 3 to 5 years of nursing experience and a baccalaureate degree, although a master's degree is often preferred. In recent years, especially in the USA, nurse practitioners have been incorporated into the traditionally non-APN transplant coordinator role.^{9,10}

Certification. In the USA, national certification is currently not required for transplant nurses or coordinators. However, many transplant programs require transplant coordinators become certified within 1 or 2 years of employment. Use of the certification credentials attests to the transplant community and the public that the individual

has met a standard of competency and possesses the necessary knowledge and skills needed to provide quality care for transplant donors and recipients. The American Board for Transplant Certification (ABTC)¹¹ offers certification examinations for transplant nurses, transplant coordinators and procurement coordinators, but not for APNs. Approximately, 1,100 transplant coordinators are transplant certified. However, many transplant nurses hold other certifications, such as certified clinical nurse specialist (CCNS)¹²⁻¹⁴ or a nurse practitioner certification (ACNP-BC).¹⁵

Blurred boundaries and defining nursing roles on the transplant team: The USA perspective

Within the structure of the cardiothoracic transplant team, the transplant coordinator, APNs, such as the nurse practitioner and clinical nurse specialist, carry out multiple nursing roles to ensure safe care of patients, families and donors based on their individual required licensing state-mandated scope of practice. Nurse practitioners (NPs) are licensed to independently evaluate, diagnose and manage patients in most states. Therefore, NPs commonly order and interpret diagnostic tests and prescribe medications, including narcotics, within the scope of their licensure. Historically, clinical nurse specialists (CNSs) have provided leadership, consultations and education to staff nurses with the goal of improving complex patient outcomes. However, recently, many states in the USA have expanded the role of CNSs to include treating and managing health-care problems, such as granting prescriptive authority.¹⁴

In the USA, transplant coordinators are usually educationally prepared as registered nurses (RNs) with clinical experience and specialized training in an area related to transplantation. These nurses subsequently acquire organ-specific education and training in the coordinator role. Roles and responsibilities of transplant coordinators vary widely within the USA, depending on program and population needs. Blurred boundaries may develop when the scope of practice granted by individual states is expanded within the

Table 2 Transplant Nursing Licensure Similarities and Differences Worldwide

	USA	Europe	Australia	Canada	Asia
Registered nurse	X	X Grades: Band 4 to Grade 8	X Division 1	X	X
Nurse practitioner	X FNP, ANP, PNP, ACNP	X Band 4-8	X Master of nursing practice	X ACNP, PHCNP, RN (EC)	X
Physician's assistant	X	X Slowly being introduced	X Slowly being introduced	X Slowly being introduced	
Advanced practice nurse	X APN	X Nurse consultant/APN		X CNS/NP	X APN, CNS, varies among countries

ACNP, acute care nurse practitioner; ANP, adult nurse practitioner; APN, advanced practice nurse; CNS, clinical nurse specialist; FNP, family nurse practitioner; PNP, pediatric nurse practitioner; PHCNP, primary health care nurse practitioner; RN (EC), registered nurse in the extended class.

actual or expected tasks and roles of individual transplant team members. Blurred boundaries are driven by multiple internal and external forces. Expectations of other team members or the institution may also lead to a confusing confluence of expectations, particularly when programs expand. For example, as clinical responsibilities for transplant programs increase, nurses may feel compelled to address urgent patient issues.

Any nurse or transplant coordinator may feel protected by the physician or an established protocol; however, if a nurse is practicing outside of their scope of nursing practice, this is problematic. Whatever the cause, it is imperative that all nursing members of the transplant team be mindful of the practice governing nursing licensure in their individual state. As roles and responsibilities of nursing members of the transplant team develop, there must be appropriate support by legislation governing their practice. Individuals currently functioning in these roles must continually assess their actual practice and evaluate its congruence with existing regulations.

Challenges in transplantation—international perspectives: Situations nurses face in different European countries

Nursing in Europe is challenged by an increasing nursing shortage in the practice setting and the rationing of nursing care.^{16–18} To date, literature describing the situation of transplant nurses is scant,^{19,20} especially within European countries.²¹ Although recent standards for the scope of nursing practice in the field of transplantation have been published in the USA,⁵ no such standards exist to guide European transplant nurse professionals.

There is scant literature on the scope of cardiothoracic transplant nursing practice in Europe. Thus, before the nursing consensus conference, a pilot study (personal communication with Christiane Kugler, PhD) was conducted to investigate nursing roles, responsibilities and blurred nursing practice boundaries in five European countries (Belgium, Germany, Italy, The Netherlands and the UK). Ten cardiothoracic transplant nurses gave written consent to participate in semi-structured telephone interviews that lasted 23 minutes on average (range 20 to 44 minutes). Participants averaged 9.25 years of transplant nursing experience (range 2 to 18 years); 7 were female and employed at academic transplant centers. Clinical job titles included clinical nurse specialist, transplant recipient coordinators, clinical nurses, NPs and APNs, with a majority holding a master's degree ($n = 6$). The remaining nurses held a bachelor's degree or equivalent. Nurses from Belgium, Germany and The Netherlands were responsible for inpatient and as well as outpatient clinical care services. In comparison, nurses from Italy and the UK worked exclusively in inpatient settings. In another section of the pilot study, nurse participants were asked about their practice responsibilities in relation to patient care nurse consultation, patient education across the continuum, and research. One APN described herself as being “the spider in

the net” as her role connected everything and everybody for the best interest of patients. Fifty percent of participants ($n = 5$) reported they had taken on more responsibility due to changes in their roles and positions. Five nurses (50%) reported that their role crossed boundaries of their scope of practice into medical practice. Nurses also reported having to take on responsibilities that could have been completed by other members of the transplant team (e.g., secretarial duties). All nurses participating in the interviews had observed changes with respect to their working conditions due to increased complexity of managing transplant patients, increased patient needs, and managing more multiple comorbidities and, increasingly, older age cardiothoracic transplant patients. Nurses reported an increasing level of perceived exhaustion, burnout and stress.

Changes observed within the European transplant nursing community may be related to decreased hospital staffing, decreased days of hospital admissions and/or increased outpatient clinic visits. Indeed, the coordinating component of the role can be burdensome. Within Europe, transplant nurses' roles seem to differ between countries and are associated with individual and system factors. To date, there is no European consensus on licensure or educational preparation for the different roles and responsibilities that transplant nurses perform. In this small study, it became clear that European transplant nurses are confronted with decisions that cross their nursing scope boundaries, increasing workloads and the need for ancillary support. All these concerns impact the recruitment and retention of an increasingly scarce nursing workforce.

Recruitment and retention strategies for the maintenance of a quality nursing staff

Recruitment and retention of cardiothoracic transplant coordinators and NPs is critical to the viability of transplant programs and quality outcomes of patients and families. Transplant coordinators are an integral part of transplant programs, and their presence on the transplant team is mandated by the U.S. Centers for Medicare and Medicaid Services.²² Cardiothoracic transplant coordinators have a specialized skill set. They manage the pre-transplant evaluation process, listing of candidates for transplant, and provide care to patients on the waiting list. They coordinate organ retrieval and peri-operative care and subsequently manage care of the transplant recipient in both the inpatient and outpatient settings. Patient and family education are also important parts of the role of cardiothoracic transplant coordinators. In addition, in some centers, transplant coordinators provide staff education and participate in quality improvement and clinical research.

However, as nurses, cardiothoracic transplant coordinators may be faced with factors similar to those identified by staff nurses that adversely affect recruitment and retention to the position. Nurses in hospitals are frequently dissatisfied with escalating patient volumes, staff shortages, high staff turnover, long work hours, increased interruptions and demands on their time, inadequate administrative support

and inadequate remuneration.^{6,23} These “dissatisfiers” have been shown to result in job dissatisfaction and burnout.⁶ A summary of 94 observational studies of nurse staffing and relationship to outcomes by the U.S. Agency for Healthcare Research and Quality (AHRQ) demonstrated that hospital commitment to high-quality care, combined with effective nurse retention strategies, leads to better patient outcomes, patient satisfaction with nursing care and nurse satisfaction with the job and care provided.²² Furthermore, AHRQ and European investigators have reported that nurse job satisfaction and autonomy were associated with a significant reduction in risk of patient death and that increased nurse-to-patient ratios and total nurse hours per patient per day were associated with improved patient outcomes, including decreased hospital mortality and decreased hospital length of stay; this was after adjusting for patient and provider characteristics.^{22,24} A retrospective analysis of data from nine European transplant centers also found that decreasing nurse-to-patient ratio was associated with greater inpatient mortality; specifically, an increase in a nurses' workload by just 1 patient increased the likelihood of an inpatient dying within 30 days of admission by 7%.²⁵ The importance of such findings cannot be overstated and should be heeded by transplantation team members.

Unfortunately, no research was found describing job dissatisfiers of cardiothoracic transplant coordinators or the relationship between nursing care provided by transplant coordinators and patient outcomes. Transplant nursing care models may impact patient outcomes such as morbidity, mortality, quality of life, adherence to the transplant regimen, safe transition from pediatric to adult transplant care and caregiver burden. In addition, transplant nursing care models may influence resource utilization (i.e., hospital length of stay and rates of hospital readmission) and processes of care; for example, the safe transition from inpatient to outpatient settings where medication reconciliation, facilitation of clinic and other appointments, and provision of team contact information are critical to a successful transition. The unique and important contributions of cardiothoracic transplant coordinators to the care of heart and lung transplant candidates, recipients and their families compels our need to better understand how we can improve nurse recruitment and retention and thereby support transplant patient-centered care. With the current emphasis on positive outcomes, reduced cost and increased patient satisfaction, it also becomes apparent that attention to ensuring job satisfaction for transplant nursing professionals is necessary. Given the specialized role of transplant coordinators and the evidence regarding the influence of hospital nurse satisfaction and models of care on outcomes, the potential impact of cardiothoracic transplant coordinator nursing care on pre- and post-transplant outcomes warrants investigation.

Staffing benchmark: What is the optimal composition of a transplant program?

There has been a growing interest in evaluating staffing levels of transplant programs. Most current data on

transplant program staffing exist within the confines of general inpatient nurse-to-patient ratios.²⁶ Attempts have been made to measure the care required for patients in ambulatory care, but most existing models are based on the inpatient measurement systems. Most tools to measure staffing in ambulatory care settings were developed before diagnostic-related groups (DRGs) and managed care, and were adapted from inpatient classification systems.²⁷ Transplant patient characteristics and needs differ in ambulatory care just as they do in the inpatient environment.

Patients and families awaiting transplantation with mechanical assist devices require more focused attention to technical and educational needs compared with patients and families 2 years post-transplant. Patient acuity in the ambulatory setting will impact nurse ratios. Acuity levels differ between various organs systems and within pre- and post-transplant patient status. But, how is this measured? To date, there are no tools to measure the multifactorial variables of ambulatory care acuity or nurse patient ratios. Continued focus on managing complex patient outcomes challenges us to also gain evidence to inform prudent staffing ratios to ensure the highest quality of care.

Two groups currently provide staffing benchmarks specific to transplantation: the University Health System Consortium (UHC) and UNOS. Both organizations conduct an annual transplant administrators' staffing survey and thus provide comparative data on clinical operations specific to staffing in transplant programs; however, extracting and interpreting data considered as valid can be problematic. In this survey, definitions are provided for each practitioner and staff member. However, the actual function of each practitioner may vary considerably from center to center. For instance, a pre-transplant coordinator may have 25% of duties focused on-call, 50% pre-transplant evaluations and 25% in patient care. It is unclear whether these percentages reflect the non-USA perspective, as there are no relevant data from outside the USA. In the future, a transplant-specific tool to accurately assess staffing ratios in ambulatory care clinics may be useful (see Summary of Consensus Statements).

Models of Care at Selected Transplant Centers

Staff of seven transplant centers presented their structure for providing nursing care to cardiothoracic transplant patients (Tiffany Buda, Cleveland Clinic, Cleveland, Ohio, USA; Ramona Spill, Deutsches Herzzentrum, Berlin, Germany; Angela Velleca, Cedars-Sinai Medical Center, Los Angeles, California, USA; Hwajoo Haynes, University of South Carolina, Charleston, South Carolina, USA; Bronwyn Levvey, Alfred Hospital, Melbourne, Australia; Dora Rossi, Columbia University, New York, New York, USA; and Celia Hyde, Papworth Hospital, UK). A summary of examples of models of care in each of the aforementioned hospitals is shown in [Table 3](#). These models served as useful practical examples of how care is currently organized at different centers across the world, and as useful areas for subsequent discussion. Nevertheless, the optimal model of care is yet to be determined.

Table 3 Models of Care at 7 Heart Transplant Centers Worldwide

Institution	CNS responsibilities	NP responsibilities	Pre-Tx coordinator responsibilities	Post-Tx coordinator responsibilities	VAD coordinator responsibilities	Administrative assistant responsibilities
Cleveland Clinic	NA	<ul style="list-style-type: none"> In-hospital coverage Discharge education Address any issues until first post-Tx visit 	<ul style="list-style-type: none"> Pre-Tx referrals and evaluations Patient education and consent for Tx evaluation and Tx process Arrange Tx committee agenda/meeting Donor call Procurement coordination Waitlist management 	<ul style="list-style-type: none"> Post-Tx patient management long term Post-Tx OPD 	<ul style="list-style-type: none"> Nurse practitioner/ PA inpatient care and management Nurse practitioner/PA in LVAD OPD clinic Communication from NP/PA to Tx coordinators On call for device-related issues both inpatient and outpatient Consults for VAD evaluation VAD education/study consent/ INTERMACS Arrange OR Device equipment and management Work with insurance companies 	<ul style="list-style-type: none"> Procedure / appointment scheduling Financial authorizations (insurance verification) Secretarial support to Tx coordinators, NP/PA, VAD team
Cedars-Sinai Heart Institute		<ul style="list-style-type: none"> Rotate between inpatient Tx service and VAD service / VAD clinic Round with team, examine patients, write orders, dictate notes, teach house staff, discharge patients See VAD clinic patients with VAD team 	<ul style="list-style-type: none"> Pre-Tx referrals and evaluations: UNOS listing, status changes, and waitlist management TCR forms Input and update all pre-Tx information in the hospital electronic Tx database All pre-Tx patient education Preparation for selection committee 	<p>Inpatient post-Tx coordinators:</p> <ul style="list-style-type: none"> Round with team Coordinate consults Patient/family post-Tx education Ensure entire team aware of plan of care Liaison to other departments Coordinate discharge and transition to outpatient program UNOS TRR forms <p>Outpatient post-Tx coordinators:</p> <ul style="list-style-type: none"> Outpatient clinic 3 days/week: average 20–30 patients per clinic Prepare lab review 3 days/week with Tx physician Patient calls from lab review Office calls: patients, departments, outside physicians Liaison for consults, test/procedure schedules Manage pharmacy refills <p>UNOS Tiedi forms</p>		
Deutsches Herzzentrum Berlin (Germany)	In Germany, the responsibility is with the physicians. They coordinate pre-/post-Tx patients and manage VAD recipients	<ul style="list-style-type: none"> We have a Tx coordinator, who manages all logistic aspects of Tx The nursing focuses on the care of patients during hospitalization and outpatient department 				
Medical University of South Carolina		<ul style="list-style-type: none"> Inpatient coverage (Post-Tx education) Outpatient Tx clinic VAD (BT and DT) coordination Heart failure/outreach clinics Pediatric inpatient coverage and outpatient clinic Review community labs/tests results 	<ul style="list-style-type: none"> Pre-Tx and VAD evaluations Pre-Tx patient and family education Complete UNet Tiedi forms Manage selection committee minutes 		<ul style="list-style-type: none"> Arrange device implantation and maintain equipment inventory Patient management—inpatient coverage and outpatient clinic Education: patient and family, EMS and ED staff INTERMACS management 	<ul style="list-style-type: none"> Appointment/procedure scheduling Taking phone calls Secretarial support to Tx NPs/RNs

<p>The Alfred Tx Program (Australia)</p> <ul style="list-style-type: none"> • Pre- and post-Tx patient clinics (Heart or Lung) • Patient phone call triage service • Pre- and post-Tx patient education • Protocol development • Part-time Tx coordination/administration / data management 	<ul style="list-style-type: none"> • Complete CTRD, PHTS and INTERMACS forms • Develop and revise teaching materials, protocols, etc. • Manage IRB requirements 	<ul style="list-style-type: none"> • Pre-Tx assessment / evaluations (heart or lung) • Recipient coordination (on-call service) • Administration and data management 		<ul style="list-style-type: none"> • In- and outpatient management post-VAD insertion • Patient and family education regarding VAD management • Pre-Tx assessment / evaluation • Discharge planning 	
<p>Columbia University</p>	<ul style="list-style-type: none"> • Participate out-patient visit and management • In-hospital coverage • VAD coordination 	<ul style="list-style-type: none"> • Pre-Tx evaluations • Pre-Tx education • Procurement coordination • Donor call 	<ul style="list-style-type: none"> • Post-Tx patient management • Patient education (at discharge) 	<ul style="list-style-type: none"> • Participate in inpatient/outpatient management • Participate in research 	<ul style="list-style-type: none"> • Procedure / appointment scheduling • Financial authorizations (insurance verification) • Secretarial support to Tx coordinator or NP
<p>Papworth Hospital (UK)</p>	<p>In our practice, the junior sister nurse is the Tx coordinator. Her roles include:</p> <ul style="list-style-type: none"> • Coordinating Tx clinic • Assisting physicians with pre- and post-Tx management of patients • Supervision of junior staff • Coordination of Tx retrieval process • Reports to the matron/senior sister, who oversees the department 	<p>Tx practitioner (Band 6) nurse acts as a mix of pre-/post-Tx and VAD coordinator:</p> <ul style="list-style-type: none"> • Donor call/retrieval • Coordinates outpatient care • Coordinates heart failure service • Assisting physicians with pre- and post-Tx management of patients • Coordinates assessment potential of heart failure/VAD patients <p>The Band 5 nurse assists the Band 6 nurse in all activities above, including organ procurement</p>			

These models are intended to serve as practical examples of how care is currently organized at different centers across the world, rather than a statement of the optimal model. BT, bridge to transplant; CNS, clinical nurse specialist; CTRD, Cardiac Transplant Research Database; DT, destination therapy; ED, emergency department; EMS, emergency medical services; INTERMACS, Interagency Registry for Mechanically Assisted Circulatory Support; IRB, institutional review board; LVAD, left ventricular assist device; NP, nurse practitioner; OPD, outpatient department; PA, physician assistant; PHTS, Pediatric Heart Transplant Study; UNOS, United Network for Organ Sharing; TCR, transplant candidate registration; TRR, transplant recipient registration; Tx, transplant; UNet/Tiedi, name of the UNOS database application into which data is entered; VAD, ventricular assist device.

Discussion and Recommendations

During the consensus conference, participants engaged in dialog regarding these key cardiothoracic nursing topics in workgroup sessions. After this conference, further discussions occurred with members of the ISHLT Nursing, Health Science and Allied Health Council. The following statements/recommendations for cardiothoracic transplant nursing are a product of these discussions, and are approved by the ISHLT Nursing, Health Science and Allied Health Council Standards & Guidelines Workforce.

Minimal specialty experience and education qualifications

In some countries, such as Canada and Australia, the experience/qualifications required for certain roles are already well defined. However, where it is not well defined, we recommend the following: a minimum of 2 years of general nursing experience should be required for entry into the role of transplant coordinator, clinical nurse specialist or NP. Previous critical care experience is preferred but not required. In terms of educational qualifications, it was generally agreed that a baccalaureate in nursing is the minimum entry level required for the transplant coordinator role with at least a master's in nursing for an APN role. In the USA specifically, a transition to the DNP degree as a minimum requirement for the APN role is planned by 2015. Given the complexities of managing transplant patients, non-RN transplant coordinators were not appropriate for the transplant coordinator role. In addition, it was highly recommended that coordinators seek specialty certification. Currently, the CCTC qualification or international equivalent is the standard. In the future, the increasing complexities of these patients may require coordinators to obtain master's of science nursing degrees. For nursing managers, a desirable combination of previous transplant experience and an advanced degree was highly recommended. Finally, further study is needed to explore the appropriate nursing educational level and core competencies needed relative to scope of practice by state requirements for RNs and APNs caring for complex cardiothoracic patients. By consensus, these recommendations were also considered appropriate for international transplant nursing.

Staffing roles and levels

Standard staffing recommendations were proposed, with staffing ratios of each role dependent on both inpatient and outpatient load (Table 4). The consensus suggested that a clearer standardized definition of the duties of transplant coordinator, nurse practitioner and clinical nurse specialist was needed, as these roles vary from center to center. In addition, the development of a transplant-specific tool to accurately assess staffing ratios in ambulatory care clinics was proposed. This would realistically measure time spent on each task required by specific staff members related to patient care, and hence would provide a more accurate view of workload for comparison between programs. The working group was committed to provide a standard against which staffing levels could be benchmarked.

Strategies to improve transplant nursing retention

Given the intensity of the training, expertise and workload of transplant nurses, proposals were made to improve their retention. In particular, the use of donor call teams to decrease call expectations for transplant coordinators was a common proposal. In addition, proposals were made with the aim of enriching transplant nurses professionally and intellectually. This may involve the establishment of mentoring programs for transplant nurses; flexible hours (e.g., four 10-hour days) to support work and life balance; support for tuition to achieve advanced nursing degrees; encouraging nurses to participate in research; and the existence of supportive leadership (both nurse and physician) open to suggestions to improve processes that have an impact on role performance of transplant coordinator/nurses.

Future research and education

It was agreed that more research is needed in the evolving field of transplant nursing. Studies investigating the impact of transplant nurse staffing ratio, level of education and qualifications on patient outcomes (e.g., survival, adverse events and re-hospitalization) were proposed. In addition, it was believed that there is a need to investigate the impact of an advanced degree on nurse satisfaction, patient self-management and adherence and post-operative cost. Toward this end, it was agreed that hospital and academic partnerships should be established in

Table 4 Consensus of Required Staffing for Heart Transplant Coordinators^a

Number of patients evaluated	Optimal number of RNs per patients evaluated	Number of heart transplant inpatients	Number of Tx coordinators covering heart inpatient heart Tx	Number of post-heart Tx outpatients followed	Number of post-heart Tx coordinators following outpatients
1–10	1	1–15	1	1 to 90	1
11–20	2	16–30	2	For every 90 outpatients add a nurse coordinator	For every 90 outpatients add 1 nurse coordinator
21 ⁺	3	30 ⁺	3		

RN, registered nurse; Tx, transplant.

^aParticipants suggested that for lung transplant programs the ratio should be 1 transplant coordinator to 55 outpatients.

nursing research, education and clinical practice, with the aim of improving patients' outcomes and reducing resource utilization. With regard to future certifications, it was strongly believed that the ISHLT, although not a credentialing organization itself, should aid in the development and administration of a transplant nursing certification that would be applicable both nationally and internationally. Such certification could center upon nursing management of heart transplantation, heart failure, mechanical circulatory support and lung transplant patients.

Summary of Consensus Statements

1. All transplant coordinators should possess a baccalaureate nursing degree, a minimum of 2 years of nursing experience and clinical certification.
2. An international standard of certification for transplant coordinators should be developed.
3. A master's degree in nursing should be required for transplant nurse managers, nurse practitioners and clinical nurse specialists, noting that a doctorate nursing degree is a future requirement for APN roles in the USA.
4. Staffing ratios, with regard to numbers and mix of roles, depend on inpatient/outpatient case loads (consensus-recommended staffing levels indicated in [Table 4](#)).
5. Tool development is needed to evaluate acuity of patients in the ambulatory setting to inform adequate nurse-to-patient ratios.
6. Clearer standardized delineation are needed of the roles of the transplant coordinator, nurse practitioner and clinical nurse specialist.
7. Steps should be taken to retain transplant nursing staff, through separate donor call teams, mentorship, support for advanced degree attainment, engagement in research, flexible hours, and adequate support from leadership and administration.
8. Research is needed to investigate the relationship between nursing ratios/education levels and nursing satisfaction with patient outcomes.

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Appendix A. Consensus Conference attendees

Sherrie Adams, RN, Vanderbilt; Nerea Arnaiz, Puerta de Hierro University Hospital (Spain); Sharon Augustine, NP, University of Maryland; Sharon Beer, RN, MSc, University Hospital (UK); Shirley Belleville, RN, BSN, University of Utah; Paula Blanco-Canosa, Unidad de Insuficiencia Cardiaca (Spain); Nancy Blumenthal, RN, University of Pennsylvania Medical Center; Tiffany Buda, RN, Cleveland Clinic Foundation; Caron Burch, RN, FNP, MSN, CCTC, University of California, Los Angeles; Deb Carter, MS, CRNP, CCTC,

Johns Hopkins Hospital; Margie Chartrand, RN, BSN, University of Nebraska; Susan Chernenko, RN, MN, NP, Toronto General Hospital; Bernice Coleman, PhD, ACNP, Cedars-Sinai Heart Institute; Belinda Conner, RN, CCTC, University of Kentucky; Judy Currey, RN, PhD, Deakin University and The Alfred, Melbourne (Australia); Annette Dabbs, PhD, RN, University of Pittsburgh; John Dark, MD, Freeman Hospital (UK); Anne Davison, RN, Freeman Hospital (UK); Fabienne Dobbels, PhD, University of Leuven (Belgium); Joan Doody, MS, RN, ANP-BC, Tufts Medical Center; Barbara Elias, RN, The Methodist Hospital; Mary Francois, RN, MS, CCTC, University of Wisconsin; Anne Fukano, RN, BSN, MBA, University of California, San Francisco; Helen C. Gibbs, RN, Greenlane Clinical Centre (New Zealand); Kathy Grady, PhD, Northwestern Memorial; Kimmarrie Hammond, ANP-C, Mount Sinai Medical Center; Christine Hartley, RN, MS, Stanford University; Hwajoo Haynes, RN, Medical University of South Carolina; Yumiko Hori, RN, National Cardiovascular Center (Japan); Celia Hyde, RN, Papworth Hospital (UK); Nichol Jones, RN, MSN, CNS, Seton Heart & Specialty Transplant Center; Annemarie Kaan, MCN, RN, St. Paul's Hospital (Canada); Patricia Kaiser, RN, CNS, CCTC, University of Texas Southwestern; Diane Kasper, RN, CCTC, Mayo Clinic; Peggy Kearney-Hoffman, RN, BSN, CCTC, Sutter Medical Center; Sally Keck, RN, Massachusetts General Hospital; Karin Keller, MS, RN, CS-FNP, University of Colorado; Jon Kobashigawa, MD, Cedars-Sinai Heart Institute; Stella Kozuszko, RN, BScN, Toronto General Hospital; Christiane Kugler, PhD, Hannover Medical School (Germany); Bronwyn Levvey, RN, Grad Dip Clin Ep, The Alfred Hospital Melbourne (Australia); Patricia Manning, BS, RN, Integris Baptist Medical Center; Vicki McCalmont, NP, Sharp Memorial; Bridgette McDevitt BA, RN, CCRN, Washington Hospital Center; Katie McMahan, RN, BSN, University of North Carolina; Tara Miller, FNP-BC, MSN, CCTC, Duke University Medical Center; Susan Moore, RN, MHA, University of Washington; Margaret Moses, MSN, FNP-BC Intermountain Medical Center; Sue Mullarkey, RN, University of Arizona; Cathy Murks, PhD, APN-NP, University of Chicago Medicine; Rhonda Newman, RN, CCRN, Medical City Dallas; Linda Ohler, MSN, VCU/Pauley Heart Center; Deborah Page, APRN-BC, Brigham & Women's Hospital; Debra Penk, RN, BSN, CCTC, Oregon Health & Science University; Michael Petty, RN, University of Minnesota Medical Center; Suzanne Reed, RN, CCTC, University of California, San Diego; Eva Reich, Medical University of Vienna (Austria); Ann Marie Richardson, RN, BSN, CCTC, University of Michigan; Mikel Rodgers, RN, BSN, Drexel University; Federica Roncon, University of Padova Medical School (Italy); Dora Rossi, NP, Columbia University; Elaine Russell, RN, CTC, University of Kansas; Michelle Sarcol, RN, Kaiser Southern California; Felicia Schenkel, RN, University of Southern California; DeeAnne Seeger, RN, BSN, CCTC, Allegheny General Hospital; Anne T. Shipp, Royal Children's Hospital (Australia); Kristin Simard, BScN, RN, University of Alberta; Lisa Smith, ARNP, University of Iowa; Gro Sørensen, RN, Rikshospitalet University Hospital (Norway); Ramona Spill, Deutsches Herzzentrum Berlin;

Kathy St. Clair, MSN, APRN, BC, St. Luke's Hospital; Tatiana Valderrama, NP, Newark Beth Israel Medical; Angela Velleca, BSN, CCTC, Cedars-Sinai Heart Institute; Connie W. Williams, PhD, RN, University of Alabama at Birmingham; and Heidi Wright, RN, North Cascade Cardiology.

Appendix B. ISHLT Nursing, Health Science and Allied Health Council: Standards & Guidelines Workforce

Annemarie Kaan (Leader), MCN, RN, University of British Columbia, Vancouver, Canada; Holli Blazey, CNP, Cleveland Clinic Foundation, Cleveland, Ohio; Peggy Blood, MSN, University of Alabama Medical Center, Birmingham, Alabama; Hilde Bollen, RN, University of Leuven, Leuven, Belgium; Pamela Combs, PhD, RN, Seton Hall University, South Orange, New Jersey; Jennifer Franzwa, RN, BSN, CCTC, University of Iowa, Iowa City, Iowa; Monica Horn, RN, CCRN, CCTC, University of Southern California, Los Angeles, California; Meloneysa Hubbard, MSN, CRNP, CCTC, University of Alabama Medical Center, Birmingham, Alabama; Katherine Idrissi, RN, MSN, Columbia University Medical Center, New York, New York; Tina Kao, RN, CCTC, Cedars-Sinai Heart Institute, Los Angeles, California; Mary Theresa Massey, RN, Norton Healthcare, Louisville, Kentucky; Masina Scavuzzo, BSN, CCTC, Barnes-Jewish Hospital, St. Louis, Missouri; Connie White-Williams, PhD, RN, FAAN, University of Alabama Medical Center, Birmingham, Alabama; and Quincy Young, PhD, University of British Columbia, Vancouver, Canada.

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