

# Practice pattern and professional issues of nurse practitioners in mechanical circulatory support programs in the United States: a survey report

**Context**—Few data-based reports about the role and work environment of advanced practice nurses, specifically nurse practitioners in mechanical circulatory support programs, have been published.

**Objective**—To describe the practice pattern and professional issues confronted by nurse practitioners in the rapidly evolving and expanding mechanical circulatory support programs in the United States.

**Design**—A descriptive research design was employed using the data from the 2010 mechanical circulatory support nurses survey. Quantitative and qualitative data that pertained to the demographic and practice profiles as well as barriers and overall issues faced by the nurse practitioners in their clinical practice were analyzed.

**Participants**—Nonrandom sample of 48 nurse practitioners from 95 mechanical circulatory support programs nationwide.

**Results**—The practice pattern of nurse practitioners in mechanical circulatory support programs is similar to the practice pattern reported for nurse practitioners in acute and critical care settings. However, only 44% and 10% of nurse practitioners in mechanical circulatory support programs are authorized to admit and transfer patients into and out of the hospital, respectively. High workload, lack of institutional support, knowledge deficit, role ambiguity, lack of professional recognition, and burnout were the common issues faced by the participants in their clinical practice.

**Conclusion**—The results provide preliminary evidence on the practice pattern, restrictions, and work environment issues that may threaten the viability of an mechanical circulatory support program in which nurse practitioners play a crucial role. Implications for clinical practice, research, and policy development are discussed. (*Progress in Transplantation*. 2012;22:229-236)

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During the past 2 decades, great strides have been made in technological advancements of mechanical circulatory support (MCS) including the left-ventricular assist device (LVAD). Current types of LVADs offer a range of patients with advanced/end-stage heart failure the opportunity to live longer and attain an optimal quality of life. In this situation, the LVAD is implanted as a bridge to heart transplant and/or for myocardial recovery, or as a permanent alternative to transplant known as destination therapy.<sup>1-3</sup>

Key to maintaining the normal functioning of the LVAD system and the overall health of the patient is the constant surveillance of the device and the recipient by an MCS advanced practice nurse (APN; ie, a clinical nurse specialist or nurse practitioner) or registered nurse. Since the first out-of-hospital use of long-term LVADs in the early 1990s, these specialized and highly skilled nurses have been at the forefront in helping patients and families manage the complex home care regimen for an LVAD.<sup>4</sup> Through the ongoing

educative and supportive role of MCS nurses, patients and caregivers can successfully manage and cope with new ways of living that are unique to a mechanical heart recipient.<sup>5</sup> However, in spite of the rapidly changing technology and expanding use of LVADs across the life span, very limited data have been published about MCS nurses, specifically the APNs.

The first study of the role and function of MCS nurses<sup>4</sup> was conducted in 2010 involving 4 clinical nurse specialists, 45 nurse practitioners, and 57 registered nurses from 95 MCS programs across the country. The authors reported that these nurses, commonly referred to as LVAD coordinators, have similarities, differences, and some overlap in job function. Both APNs and registered nurses have direct patient care responsibilities, but they differ in their roles in patient care coordination, education, and consultation. Distinct to the APN is the legal title to practice independently within the scope of practice defined by state laws. However, the nurse practitioners have a broader role in diagnosing and managing patients as well as performing advanced procedures (eg, chest tube insertions) than their clinical nurse specialist and registered nurse counterparts.<sup>4</sup>

Moreover, nurse practitioner respondents extended their services beyond the MCS program, which included the management of patients with heart failure and/or a heart transplant. Aside from providing direct patient care, the majority of the nurse practitioners and clinical nurse specialists were expected to conduct research and quality improvement projects while a minority reported having leadership and/or administrative duties. Although the workload distributions among the survey participants were not clear, it appeared that the multifaceted roles of APNs may have resulted in a higher workload than that of the registered nurses. In order to support the effectiveness of APNs in MCS outcomes, specifically the nurse practitioners, this situation must be explored and addressed. Yet because of the large amount of data derived from the 2010 MCS nurses study,<sup>4</sup> a significant portion of data specific to nurse practitioners was not published.

Therefore, the purpose of this article is to report the data derived from a section of the MCS nurses study<sup>4</sup> that pertained to the context and extent to which MCS nurse practitioners practice independently. Specific aims of the present study were to identify and describe the demographic characteristics, practice pattern, and professional issues faced by nurse practitioners in the rapidly evolving and expanding MCS programs nationwide. Study limitations and implications for clinical practice, research, and policy development are discussed.

## Method

A descriptive research design was employed using the data obtained from 45 nurse practitioners who

participated in the MCS nurses study.<sup>4</sup> Included in the present study was analyses of survey items specific for the demographic and clinical practice profiles of the MCS nurse practitioners. In the practice pattern section, we asked nurse practitioner participants to select which specific tasks, procedures, and type of medications they frequently performed and prescribed, independently, or collaboratively (with a physician's input or approval). Two open-ended questions solicited the nurse practitioners' description of the barriers and issues they have encountered in their current practice setting. The nurse practitioners' responses to the open-ended questions varied from 1 to 25 lines of phrases or sentences. It is worth noting that after the first publication of the MCS nurses study,<sup>4</sup> 3 additional surveys were received, yielding a total of 48 nurse practitioners who provided usable data for the present study. Approval was obtained from the institutional review board at Wayne State University before implementation of the parent study.<sup>4</sup>

The survey data for MCS nurse practitioners were analyzed with SPSS version 19.0 (IBM SPSS). Frequency distribution, mean, and standard deviation for demographics and practice profiles were computed. Responses to the open-ended questions were transcribed verbatim and saved in a Microsoft Word document. Next, repeated readings of the transcripts were implemented to determine recurring ideas. Qualitative research software (Nvivo 8.0, QRS International) was used to cluster ideas into similar topics, which were subsequently categorized in themes. Finally, the data were reduced into groups of descriptive responses reflective of the barriers and professional practice issues encountered by the MCS nurse practitioners.

## Results

### Demographic Profile

Table 1 summarizes the demographic profile of the 48 MCS nurse practitioners. Most respondents were from the Northeast (42%) and Midwest (31%) regions of the United States. Eighty-five percent were female with a mean age of 44.0 years (SD, 9.9), and most of the nurse practitioners were white and married. Ninety-six percent of the nurse practitioners had a master's degree and 4% held a clinical doctorate. The participants had a mean of 5.2 (SD, 4.6) years of experience in an MCS setting and a majority reported the job title of ventricular assist device (VAD) nurse practitioner. Critical care or cardiac surgery was the type of specialty certification held by the majority of the participants rather than transplant certification. Typically, nurse practitioners were employed full-time (96%) in a university or university-affiliated hospital located in an urban area and reported directly to a physician (67%). However, the department listing the staff membership of these nurse practitioners varied from cardiothoracic surgery to general patient care services of a hospital.

Table 1 Demographic profile of 48 responding nurse practitioners in mechanical circulatory support programs

Characteristic	%	Characteristic	%
Sex		Place of employment	
Female	85.0	Northeast	42.0
Male	15.0	Midwest	31.0
Ethnic background		Southeast	13.0
White	94.0	West	8.0
Asian/Pacific Islander	4.0	Southwest	6.0
Native American	2.0	Type of hospital where employed	
Marital status <sup>a</sup>		University/university-affiliated	67.0
Married	65.0	Tertiary/teaching	29.0
Single	15.0	Community	4.0
Divorced	8.0	Hospital location	
Domestic partner	6.0	Urban/downtown	67.0
Job title		Suburban	33.0
VAD nurse practitioner	45.0	Hospital department where employed	
MCS/VAD coordinator	30.0	Cardiothoracic surgery	42.0
VAD/heart transplant coordinator	25.0	Heart failure/transplant	39.0
Specialty certification <sup>a</sup>		Patient care services/private group practice	19.0
Critical care	40.0	Immediate supervisor	
Cardiac surgery	27.0	Collaborating physician	67.0
Transplant coordinator	13.0	Nursing supervisor	21.0
		Service line manager	12.0

Abbreviations: MCS, mechanical circulatory support; VAD, ventricular assist device.

<sup>a</sup> Not all percentages total 100 because of items left blank.

### Practice Pattern

Most of the responding MCS nurse practitioners reported working with a collaborating physician, primarily a cardiologist (52%) or a cardiac surgeon (48%). Their hospital employers generally provided malpractice insurance, but 69% of the nurse practitioners preferred having their own additional insurance. Although 90% of the nurse practitioners were authorized to prescribe medications and procedures, only 64% were allowed to bill for services they provided and discharge patients from the hospital. Moreover, only 44% of the nurse practitioners had hospital admitting privileges, and 10% had the authority to transfer patients directly from the hospital to a long-term care facility.

Table 2 offers an example of activities illustrating the extent of the nurse practitioners' role as independent clinicians in a typical MCS program in the United States. The table summarizes the nature of patient care-related tasks customarily performed by the nurse practitioners. Assessment and diagnosis occurred with the highest frequency, whereas nonspecific LVAD and out-of-hospital patient care activities were performed at the lowest frequency on a daily basis. Table 3 lists the types of medications and procedures commonly prescribed by the nurse practitioners independently within the domain of MCS patient care management. Notably, antihistamines, electrolyte replacements, and gastrointestinal medications were prescribed at the highest frequency, whereas neuromuscular blocking

agents, inhaled nitric oxide, and chemotherapeutics were rated the lowest frequency in terms of prescribing practices without a physician cosignature.

### Professional Issues

Six major themes emerged from our analysis of responses to the open-ended questions pertaining to the barriers and professional issues encountered by MCS nurse practitioners: (1) high work intensity, (2) lack of institutional support, (3) knowledge deficit, (4) role ambiguity, (5) lack of professional recognition, and (6) burnout. An overwhelming 96% of the nurse practitioners described the nature of their job as "stressful" because of the high intensity of their work. Their roles as health care provider, consultant, educator, researcher, and to some degree administrator placed an enormous challenge in managing their time at work. Additionally, most indicated that they had to carry out case management tasks and nonclinical duties, including routine biomedical equipment checks and maintaining an inventory of supplies.

Lack of institutional support or poor organizational infrastructure was another common issue faced by the nurse practitioners. Because of the rapid expansion of MCS programs, nurse practitioner respondents felt inundated and powerless at times. Inadequate staffing or lack of personnel seemed to be the critical need in their clinical practice. As one respondent described it:

Table 2 Tasks *independently* performed by the 48 responding nurse practitioners in mechanical circulatory support programs

Patient care activity	%
Interprets results of laboratory tests and other diagnostic procedures	98
Prepares patient preoperatively	98
Orders laboratory tests and other diagnostic procedures	92
Conducts daily rounds	90
Writes progress notes	90
Assesses patients' readiness for discharge	88
Performs physical assessment	88
Performs specialty services referral	79
Conducts health history	79
Assesses and manages common health problems	79
Implements VAD patient protocol	77
Screens and evaluates patients for VADs	75
Develops standard of care/protocols for MCS/VAD	73
Writes consultation notes	73
Admits and discharges patients into and out of the hospital	67
Decides when the patient should be discharged	67
Initiates medical diagnosis and differential diagnosis	65
Orders VAD settings and parameters	63
Initiates patient transfer from the intensive care unit to step-down unit	63
Initiates patient transfer to subacute or long-term facility	60
Writes admission orders	58
Writes preoperative and postoperative orders	58
Writes discharge summaries	56
Obtains surgical consent	53
Decides patients' clearance for surgery	40
Conducts psychosocial counseling	40
Conducts sexual counseling	33
Lists patients for transplant	25
Conducts home visits	17

Abbreviations: MCS, mechanical circulatory support; VAD, ventricular assist device.

[We] need more APNs dedicated exclusively to VAD care since our VAD population has grown exponentially in the past 2 years from 5 to greater than 20 per year . . . growth is happening but not enough help.

A third common issue, although we were not able to identify the exact proportion of nurse practitioners in new MCS programs, was that many expressed that deficits in scientific knowledge were undermining their practice. Many MCS nurse practitioner pioneers

felt that they were poorly equipped with knowledge on evidence-based practices or best-practice guidelines for VAD patients and their caregivers. One nurse practitioner pointed out that her dilemma involved "not knowing the clinical guidelines tailored to improving outcomes of pediatric patients with heart failure and VADs." Participants perceived that this issue is linked with the formative stage of the MCS program in the United States and the lack of funds allocated for continuing education.

Two more recurrent issues occurring in newly created MCS programs pertained to role ambiguity and lack of professional recognition of nurse practitioners. In the MCS context, the nurse practitioner's role is not well defined as illustrated by a participant's comment: "often other health care professionals call us VAD nurses when we are NPs [nurse practitioners]." Moreover, one participant described the critical problem that appears to be commonly arising in the MCS programs as "no standardization of clinical practices with great variations from center to center." Because of the novelty of their roles, some nurse practitioners felt that their clinical skills and contributions to patient and organizational outcomes are not well recognized by clinical staff and physician colleagues, resulting to some degree in "physician mistrust." This conflict is elaborated further by a participant as "surgeons refuse to let APN manage the LVAD..."; she went on to describe her experience:

I was very well accepted because I was a cardiac surgery NP [nurse practitioner] here for 7 years before becoming VAD NP, [however, a] new NP started 6 months ago, [I] see a lot of resistance and lack of trust [from surgeons] because she is new with less experience in cardiac surgery.

Adding to this type of multidisciplinary conflict is that some nurse practitioners felt that they were constantly struggling to educate pharmacists and health insurance providers about their scope of practice and their prescriptive and billing privileges in an MCS program.

A sixth recurring theme related to burnout also emerged from the analysis of the transcripts. For example, a participant described the issue as "early burnout [can occur] related to the taxing nature of the role." This description was echoed by another participant's perception of burnout as the outcome of internalizing the high intensity of the job and complexity of care required for an LVAD recipient: "[I'm] consumed with patient psychosocial issues; tendency to ignore self-care and [my] own family, and friend relationships." On the contrary, only 2 out of 48 nurse practitioners expressed satisfaction with their roles despite the many challenges intrinsic to the job and the dynamics of the

Table 3 Examples of medications and procedures independently prescribed by the 48 responding nurse practitioners in mechanical circulatory support programs

Medication/procedure	%	Medication/procedure	%
Antihistamines/decongestants	88	Enteral/parenteral nutrition	44
Electrolyte replacements	88	Insulin preparations	44
Gastrointestinal medications	88	Muscle relaxants	44
Anticoagulants	79	Vasodilators	44
Expectorants	79	Blood and blood products	42
Anti-inflammatory agents	73	Vasoactive drugs	33
Analgesics	71	Inotropic agents	33
Cardiovascular agents	71	Pulmonary vasodilators	33
Antihypertensives	67	Sedatives	33
Oxygen	67	Defibrillation	33
Bronchodilators	60	Psychoactive drugs	29
Coagulants	58	Cardioversion	28
Colloids	58	Antiretroviral agents	23
Crystalloids	58	Hypnotic agents	23
Narcotic analgesics	56	Neuromuscular blocking agents	17
Oral hypoglycemics	54	Inhaled nitric oxide	10
Antimicrobial agents	46	Chemotherapeutic agents	8

work environment. One of the satisfied respondents described her job satisfaction as follows: "I am employed by my hospital and pretty well supported . . . I am primarily with a cardiac surgeon whose medical management varies with CHF [congestive heart failure] cardiologists."

## Discussion

Findings of the present study add to the emerging data about the role of nurses in the MCS programs in the United States.<sup>4</sup> Specifically, the findings are the springboard for advancing the knowledge underpinning the scope of practice among nurse practitioners in specialty services, particularly in the acute and critical care settings.<sup>6-9</sup> New data from the present study that add to the existing information on nurse practitioners in acute and critical care settings include demographic shifts, practice pattern, restrictions in the scope of practice, and overall professional and organizational issues. Collectively, this new knowledge serves as the beginning evidence to gain the attention of persons with a stake in MCS programs, encouraging them to pay close attention to not only the practice pattern but the working conditions of nurse practitioners in this expanding field. This knowledge also provides the groundwork for more research that is a catalyst for development of health care policy.

Notably, a remarkable 15.0% of the participants in the present study self-reported as male, doubling

the number of male nurse practitioners (6.5%) in a sample of previously published studies on acute care practitioners (ACNPs) in the United States.<sup>10-12</sup> The demographic shift is reflective of the current increase in the influx of men into the nursing profession, as shown by the 11.4% of males enrolled in nursing master's degree programs in 2010.<sup>13</sup> Also, in the present study, 67% of the nurse practitioners were employed in academic medical centers with diverse hospital departments to which they reported; the data suggest the formative and evolving stage of MCS programs nationwide. Such a departmental variation may be driven by the territorial shift affecting which department houses an MCS program. In recent years, MCS patients are shared by cardiac surgery and cardiology services, illustrated in a report showing that cardiologists are learning how to manage MCS patients.<sup>14</sup> The notion that more patients are eligible for destination therapy in community hospitals than in academic medical centers and the availability of MCS in non-heart transplant hospitals<sup>15</sup> are trends worth exploring to validate and further understand the shifting demographics among nurse practitioners employed in specialized services.

Aside from the knowledge and skill-set unique to MCS nurse practitioners shown in Table 2, the present study findings are consistent with the published literature on the role, function, context, and extent of independence of ACNPs in the United States.<sup>6-12,16</sup> Of

particular importance, the ACNPs participating in those studies shared a similar practice pattern (eg, tasks, procedures, and prescriptive practices) with the MCS nurse practitioners. This observation is further elaborated by the present data that 67% of the nurse practitioners have specialty certifications in critical care or cardiac surgery. Thus, one can assume that a significant proportion of MCS nurse practitioners are primarily ACNPs, warranting further explorations. The data also support that clinical experience in critical care and/or cardiac surgery is an important job qualification for hiring a nurse practitioner for an MCS program.<sup>4</sup>

A key finding that has important implications for health care delivery is the low proportion of MCS nurse practitioners authorized to admit and discharge patients to and from the hospital as well as transfer patients from the hospital to a long-term care facility. Ideally, all nurse practitioners with direct patient care responsibilities should be authorized to admit and/or discharge and transfer patients to expedite care and promote continuity and quality of care in the complex and vulnerable MCS population. Meeting the patients' needs across the health care continuum and reducing costs are paramount, and that goal should be the underlying premise for removing practice restrictions on nurse practitioners. Perpetuating such a restriction in the nurse practitioner's scope of practice can cause further delay in care delivered to MCS patients. Nurse practitioners are well qualified to make independent judgments and decisions in determining (1) whether or not the patient or caregiver can execute the prescribed LVAD home care regimen, and (2) readiness for discharge. The delay in home discharge or transfer to a long-term care facility predisposes patients for hospital-acquired infections, resulting in longer hospitalization, high cost, and dissatisfaction of care, all well understood phenomena in clinical practice and in health sciences literature.

The ultimate goal for LVAD therapy is the attainment of an optimal quality of life of the recipient.<sup>17</sup> However, meeting this goal is multifactorial in nature and therefore takes time to accomplish, requiring constant surveillance from the nurse practitioner, who is usually available 24 hours a day, 7 days a week for the patient and/or family caregiver.<sup>18</sup> In view of the advancements in MCS technology, nearly 50% of patients with LVADs still require hospital readmissions within 6 months after the LVAD is implanted, primarily because of complications such as stroke, infection, and device malfunction.<sup>19,20</sup> Not to allow the nurse practitioner to implement appropriate intervention to help correct a problem that would potentially require immediate readmission of the patient to the acute or critical care unit can potentially cause more harm to the LVAD system and/or the recipient.

Although this explanation emanated from anecdotal evidence, it is critical to examine how the MCS nurse practitioner is used and further explore the underlying factors that restrict nurse practitioners from functioning to their fullest extent. This assertion is timely and congruent with several recommendations of the Institute of Medicine reported in the Future of Nursing Initiatives, in which nurses are charged to lead and transform healthcare in the United States. For example, the Institute of Medicine recommends that barriers in the scope of APN practice should be removed. Allowing nurse practitioners to practice at their fullest capacity based on their education and training contributes to the improvement of the quality of care delivered to all Americans.<sup>21</sup>

Several practice-related issues faced by the nurse practitioners that also warrant close attention are the high level of work intensity, knowledge deficit, role ambiguity, lack of institutional support or infrastructure and professional recognition, and burnout. Together, these issues may be by-products of the constantly and rapidly changing dynamics in MCS programs nationwide. The research literature in health sciences, business, psychology, and sociology is replete with evidence that these types of work-related issues faced by the nurse practitioners not only can affect the individual employee's quality of work life (eg, working conditions) but also his/her performance, ultimately resulting in a poor organizational outcomes.<sup>22</sup>

With the growing body of knowledge on correlations among the individual perceptions of their work environment, organizational culture and performance,<sup>22-25</sup> hospital administrators must be cognizant in addressing these issues that may threaten the viability of a particular MCS program. Although no comparative study has been done yet, the present findings suggest that the nature of the MCS nurse practitioner's role and the work environment may have been unfavorable to the participants at the time the survey was conducted, requiring prompt resolution and monitoring from nurse practitioners' supervisors (eg, physicians).

Hospital administrators can learn from the adverse outcomes that have been associated with poor working conditions of staff nurses. For example, studies have shown that high workload, lack of support and recognition, and burnout have been linked with high staff turnover (low staff retention), job dissatisfaction, poor quality of care, and lower satisfaction among patients, resulting in ineffective organizational performance and increases in human resources cost.<sup>22-24</sup> With the push for improvement in quality of care and reimbursement of quality versus quantity of care from the Centers for Medicare and Medicaid Services,<sup>26</sup> hospital employers, administrators, supervisors, and other persons with a stake in the process are encouraged to thoughtfully create and implement strategies tailored

to reducing the prevalence of the aforementioned issues, particularly those involved in the planning, development, and/or implementation phase of new MCS programs within the United States.

### Limitations and Implications

The nonprobability sampling and the lack of items that comprehensively measure the extent to which the MCS nurse practitioners practice independently are major limitations of the study. Therefore, the data are to be interpreted within the context of the research purpose, specific aims and design, and the findings should be considered preliminary. Nevertheless, the sample of the study is a good representation of nurse practitioners, as the participants were drawn from the list of hospitals registered in an MCS national database.<sup>19</sup> Despite the limitations, important practice and research implications are generated from the findings.

At the individual level, prospective MCS nurse practitioner applicants should be aware that there are trade-offs, professional and personal, in pursuing employment in this specialty. Applicants can be guided by the data during the hiring process through exploration of the nature and barriers in scope of practice, and nurse practitioners should consciously engage in the process of reflective practice to positively and successfully manage the impact of the job on their quality of work life and personal life. At the organizational level, hospital employers and administrators should evaluate their practices on how MCS nurse practitioners are used and implement strategies tailored to promoting a healthy work environment by preventing occurrences of the organizational issues confronted by most of the APNs in the present study.

Replication of the present study may not be necessary. However, future studies should focus on advancing the science about MCS nurse practitioners forward from its formative state to a well-circumscribed stage of knowledge. First, investigators should use a comprehensive survey instrument that measures different domains and competencies of nurse practitioners.<sup>27</sup> Second, explore the correlations among the following variables: (1) demographics, (2) practice pattern, (3) professional issues (eg, work intensity, role ambiguity, burnout), and (4) types of hospitals (eg, academic vs nonacademic) and MCS programs (new versus old and heart transplant versus non-heart transplant) nationwide. Third, a research design aimed at identifying the linkages between the role of MCS nurse practitioners and patient care (eg, hospital readmission rates) and organizational outcomes (eg, cost and care satisfaction) is critically important. Consequently, the knowledge generated from the proposed studies is fundamental to developing and implementing benchmarking strategies and policies relevant to education, training, and scope of practice of MCS nurse practitioners.

### Conclusion

The context and extent of MCS nurse practitioners' practice are consistent with the current shifts in demographics, nursing professional, and health policy issues in the United States. This report provides beginning evidence on practice pattern, restrictions, and work environment and organizational issues that may threaten the viability of an MCS program. Individual nurse practitioners and hospital employers should be proactive and deliberate in addressing the nature of the APN practice, workload, and institutional support and recognition. These strategies will prevent burnout and can promote a healthy work environment vital to the quality of the work life of nurse practitioners and the overall viability of an MCS program. It is important to note that, to this date, nurse practitioners play a major role in helping MCS patients (and caregivers) achieve an optimal quality of life crucial to meeting the mission of MCS programs. Although the findings are preliminary in nature, the present data expanded the existing information of this very important group of nurse practitioners, providing a roadmap for future research and policy development relevant to MCS programs in the United States.

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| Financial Coordinators    | Preservationist                         |

**Plenary Sessions**

- Impact of the Push & Pull on the Donation & Transplantation Community
- Infectious Disease Transmission
- Overview of Living Donation & Alternatives for Incompatible Pairs
- When No Becomes Yes: Increasing the Donor Pool
- Hot Topics in Donation & Transplantation
- Heart & Lung: Heading to the Future of "Making Organs"

Procurement-Focused Workshops	Transplant-Focused Workshops
Organ Preservation Symposium Donor Management Workshop	Kidney Paired Donation Training Pharmacology/Transplant Nutrition

Full conference agenda and online registration now available! Visit [www.natco1.org](http://www.natco1.org) for more information.



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