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MISSING DOMAINS OF LUNG TRANSPLANT PATIENT SELECTION

Submitted to the Faculty
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In Partial Fulfillment
of the Requirements for the Degree
Doctor of Nursing Practice

Nancy P. Blumenthal

May 18, 2015

The capstone is accepted in partial fulfillment of the requirements for the degree Doctor of Nursing Practice.

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May 18, 2015

Abstract

The goal of consistent, predictable, improved outcomes has continued to elude the scientific community in the thirty years since lung transplantation became the procedure of choice for patients with terminal, non-malignant lung disease. **Background:** Though there is a consensus regarding disease-specific indications for a lung transplant, ambiguity remains regarding how patient-specific attributes should influence lung transplant candidacy. This project had three aims: 1) to establish the missing domains of the interdisciplinary assessment of the lung transplant candidate, 2) to have these domains validated by an international panel of lung transplant experts, and 3) to recommend the next step for inclusion of these domains into the lung transplant candidate selection process. **Methods:** Three levels of evidence were reviewed. A search for standards and guidelines, a systematic literature review and a validation of domains by experts were conducted. **Results:** Seven domains of patient attributes were identified as relevant to lung transplant patient selection: cognitive performance, frailty, psychological factors, self-efficacy, social support, quality of life, and sociodemographic factors. Within each domain, several elements to be incorporated in the process of patient assessment were identified. **Conclusions:** Assessment of the missing domains and elements should be incorporated into the interdisciplinary lung transplant evaluation process. Standardized recognition and reporting of the patient-specific attributes will inform the work of individual transplant programs and the international transplant community. Further study is needed to better understand how nurses assess lung transplant candidates, how they communicate their findings within interdisciplinary settings, and how those findings relate to transplant outcomes.

Keywords: lung transplant, interdisciplinary, transplant nursing, transplant evaluation, patient selection

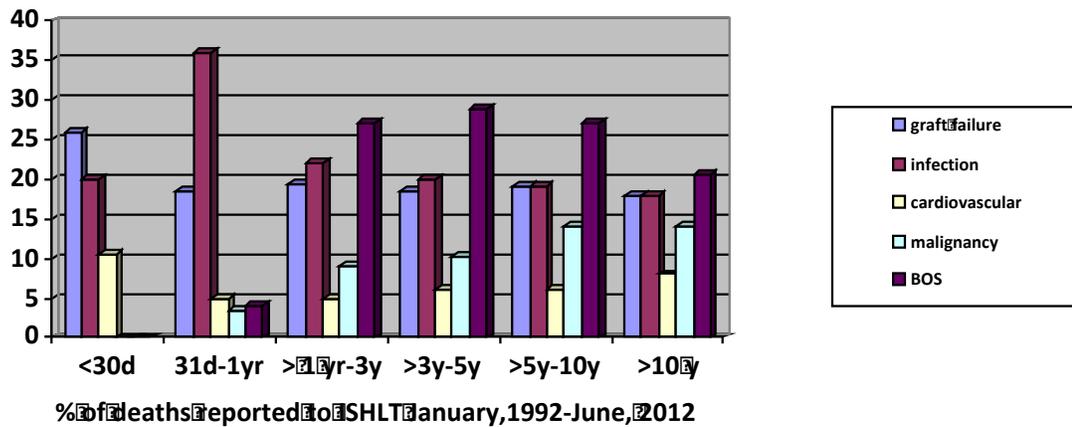
In the thirty years since lung transplantation became the procedure of choice for patients with terminal, non-malignant lung disease, the goal of consistent, predictable, improved outcomes has

continued to elude the scientific community. The state of the art has been realized through collaboration among interdisciplinary clinical teams, scientists, bioethicists, and lawmakers. Consensus about selection criteria has been derived from both rigorous science and judicious empiricism. Unfortunately, the advancement of the science has not resulted in meaningful improvements in survival.

When comparing outcomes by era (Figure 1), the International Society for Heart and Lung Transplantation (ISHLT) estimates that for adult patients transplanted between 1990-1997, the median survival time was 4.1 years; for patients transplanted 1998-2004, the median survival time was 5.7 years and for patients transplanted between 2005-2012 median survival time was 6.1 years.¹

Despite major advances in the science of immunomodulation, infectious disease and surgical techniques, patients are not surviving significantly longer than they did in the early days of lung transplantation. It must, therefore, be considered that there are recipient attributes that are under appreciated or poorly managed in the process of candidate selection and care.

Figure 1. Most frequent causes of death by time interval following adult lung transplant reported to ISHLT



(data from JHLT. 2014 Oct; 33(10): 1009-1024)

Lung Transplant Patient Selection Criteria

“The appropriate selection of lung transplant recipients is an important determinant of outcomes.”² So begins the most recent consensus statement on the selection of lung transplant candidates from ISHLT. The 14 members of the international writing committee were physicians and surgeons from ISHLT’s Pulmonary Council. Advancing from consensus reports published in 1998 and 2006^{3,4}, the seminal document provides advice regarding the timing of referral and the selection and listing of candidates for lung transplantation.

The paper provides detail regarding the disease-specific physiologic metrics of lung transplant evaluation. After establishing which medical and psychosocial attributes should be considered in determining lung transplant candidacy, recommendations for absolute and relative contraindications to lung transplant are presented based on available studies and the committee’s expert opinion. (Table 1).

Table 1. Absolute and Relative Contraindication to Adult Lung Transplantation (Adapted from 2014 ISHLT Consensus Statement)

Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none"> • Recent malignancy (2-5 years) except for non-melanoma skin cancer • Advanced dysfunction of an extrapulmonary vital organ (e.g., heart, kidney, liver, brain) that is refractory to treatment • Significant untreatable ischemic vascular disease • Acute critical illness (e.g., sepsis, organ failure) 	<ul style="list-style-type: none"> • Advanced age (i.e., > 65-75 years) in combination with other risk factors • Class I Obesity characterized by BMI= 30-34.9 • Significant or worsening malnutrition • Debilitating osteoporosis • History of thoracic surgery that would impede explantation of lung • Dependence on extracorporeal life support (i.e., mechanical ventilation or

<ul style="list-style-type: none"> • Incurable bleeding disorders • Chronic, active infections with highly virulent or resistant organisms • Significant restrictive thoracic skeletal deformity • Class II or III Obesity characterized by BMI >35 • Current or historic medical non-adherence perceived to increase risk of non-adherence post-transplant • Psychopathology that interferes with ability to work with transplant team or follow complex self-care regimen • Inadequate or unreliable social support • Severe debilitation with minimal potential for rehabilitation • Dependence on or abuse of alcohol, tobacco or recreational drugs within the past 6 months 	<p>extracorporeal membrane oxygenation)</p> <ul style="list-style-type: none"> • Colonization or infection with highly virulent or resistant organisms including extrapulmonary foci • Controlled and stable hepatitis B or C infection without evidence of cirrhosis or portal hypertension • HIV infection without detectable HIV-RNA and with no complications of immunodeficiency • Significant atherosclerotic disease that increases post-operative risk of ischemic injury of end-organs • Co-morbidities requiring medical optimization to avoid end-organ damage (e.g., diabetes mellitus, systemic hypertension, gastroesophageal reflux, epilepsy, peptic ulcer disease)
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Importantly, five of the fourteen absolute contraindications to lung transplantation require subjective or qualitative assessment. While the rationale for listing these conditions is based on extensive global experience, it is not further explored and the contraindications themselves are not clearly defined. Medical non-adherence, disruptive psychopathology, inadequate social support, severe functional debility, and substance abuse are each identified as a significant threat to successful long-term outcomes.

Yet, the consensus statement offers limited direction to the assessment of these factors. The reference list included in the document reflects that the identification of these contraindications was derived empirically rather than from a review of the literature. This ambiguity detracts from the utility of the consensus document in its practical application for interdisciplinary use.

Lung transplantation commits a patient to enduring risks and a demanding self-care regimen. Evaluation of the individual's potential to manage post-transplant rigors and routines is essential, and yet has not been specifically identified in the current ISHLT consensus document as a consideration in patient selection.

The absence of such an assessment represents a gap that has not been addressed in the literature or in current practice. This project addresses this deficiency by identifying and validating the domains that are missing from the standard interdisciplinary lung transplant candidate evaluation.

Purpose

This project had three aims.

- To establish the domains that are missing from the standard interdisciplinary assessment of the lung transplant candidate based on evidence.
- To have a panel of clinical content experts validate these domains.
- To recommend the next step for dissemination and inclusion of these domains into the lung transplant candidate selection process.

Methodology

In order to establish the domains that are missing from the evaluation of the lung transplant patient, three levels of evidence were reviewed. Sources of information were collected from existing databases, published literature, clinical guidelines, and interviews. The first endeavor was a search for standards and guidelines. Then, a systematic review of the literature was conducted and findings were organized into categories, referred to as domains. Several elements emerged within each domain. The

domains and their integral elements were judged for content validity, relevance and importance by two international panels of clinical lung transplant experts using a standardized rating scale. Domains and elements validated as relevant and important were recommended for inclusion in the lung transplant patient selection process. Approval by the Internal Review Board for Use of Human Subjects was not required.

Levels of Evidence

Clinical guidelines and pathways specific to the assessment of the lung transplant candidate were sought. Voluntary and confidential conversations with interdisciplinary colleagues from several lung transplant programs took place throughout the discovery phase of the project. Tools used for the documentation of the non-physiologic aspects of lung transplant evaluation were sought by verbal and written request to members of 20 active lung transplant programs in North America. While most respondents noted that subjective and qualitative patient-specific attributes are discussed and often debated during the patient selection meetings, none identified tools or pathways employed in the documentation or communication of those findings.

In order to identify the missing domains of the lung transplant evaluation, the second level of inquiry entailed a comprehensive and systematic literature search via Ovid, current Medline, Scopus, PubMed, Cochrane Library and CINAHL. Medical librarians at Yale University and the University of Pennsylvania provided support. Specific attention was given to publications and websites associated with professional organizations dedicated to transplantation, to management of chronic illness, and to palliative care. Literature written in English and pertaining to solid organ transplant, bone marrow transplant and resource-limited procedures were included. No date restrictions were applied. Since the focus of this work was adult lung transplant, literature pertaining to pediatric transplantation was excluded. Given the added level of complexity and potentially confounding nature of multi-organ transplantation, studies involving heart-lung and lung-liver transplant were also excluded.

The following terms were searched for consideration: “transplant candidate assessment,” “transplant assessment,” “transplant evaluation,” “patient assessment,” “transplant nursing,” “nursing assessment,” “transplant nursing assessment,” “transplant psychosocial assessment,” “transplant psychiatry,” “transplant psychology,” “transplant substance abuse,” “transplant substance dependence,” “transplant functional status,” “transplant debilitation,” “transplant fitness,” “transplant rehabilitation,” “transplant non-adherence,” “transplant non-compliance,” “transplant self,” “transplant quality of life,” “interdisciplinary assessment,” “multidisciplinary assessment,” “transplant patient selection,” “transplant criteria,” “transplant transitions,” “palliative care assessment,” “transplant caregiver,” “transplant social support,” “transplant outcome predictors,” and “successful transplant.” Specific attention was given to ensure that evidence related to the non-physiologic criteria for lung transplant patient selection identified within the ISHLT consensus statement would be discovered.

The initial search returned several thousand articles. Combined keyword and medical subject heading (MeSH) term searches were instrumental in honing the query to identify 558 articles of interest. To further refine the review, the titles of these articles were then searched for key words and phrases. For example, titles that reflected pre-transplant care planning, transplant patient selection, transplant listing, interdisciplinary decision-making, and transplant outcomes were included. Titles reflecting donor selection were excluded, as were titles that reflected content unrelated to transplant recipient selection. Abstracts were reviewed and evaluated for inclusion. A reviewer with subject matter expertise independently evaluated the evidence for consideration for inclusion in a table of evidence. Ultimately, 103 articles were included, organized and presented in a table that described year, author, author’s country, journal, purpose of study, findings and recommendations of study and level of evidence. The themes of the evidence were then categorized and grouped into seven domains, each comprised of several elements.

The third level of inquiry required a panel of experts to validate content and to recommend additional elements of the domains found in the literature. In the interest of mirroring the constituency of

lung transplant teams, an initial panel of five experts was engaged and included a pulmonologist, a surgeon, a nurse, a psychologist and a social scientist. To reflect the international community driving the advancement of lung transplantation, care was taken to select experts from both American and international programs. Experts were selected based on prominence in the literature and extensive practical experience. However, after review by the representative panel, several questions identified by the experts reflected a knowledge gap specific to terms unique to nursing science. Because many of these terms were associated with patient selection criteria noted in the ISHLT guidelines, a second group of experts with subspecialized knowledge in nursing were independently engaged.

The nurse from the initial panel was retained and four new experts were identified. The nurse experts were chosen for their expertise, history of interdisciplinary leadership, prominence in the literature, and stature within the international lung transplant professional community. The nursing expert panel's answers were used not only to provide content validation, but also to discern the constructs of the nurses' assessment of lung transplant candidates. This was accomplished by comparing the results of the second panel's rating scale with those of the combined group. Table 2 identifies the nine experts who served as raters.

Table 2. Expert Panelists' Brief Biographies

Interdisciplinary Panel
R. Duane Davis, Jr., MD, MBA is Professor of Surgery, Director Transplantation in the Division of Cardiothoracic Surgery at Duke University Medical Center in Durham, North Carolina. His research interests have focused on increasing organ availability and preventing lung allograft injury. Increasingly, his clinical research focus has been on the impact of advanced age on transplant and patient related outcomes.
Annette Devito Dabbs, PhD, RN, ACNS-BC, FAAN has over 35 years of clinical experience in the management of patients with chronic cardiopulmonary conditions. She has led an interdisciplinary team to develop technology-based interventions to promote patient engagement, self-management and health outcome in lung transplant and has parlayed this into widely referenced RCTs that are fully funded by the National Institute of Nursing Research. Dr Dabbs is a tenured Professor & Chair of the Acute & Tertiary Care in the School of Nursing at the University of Pittsburgh where she also hold an appointment in the Center for Bioethics and Health Law.
Mary Amanda Dew, PhD Professor of Psychiatry, Psychology, Epidemiology and Clinical and Translational Science, University of Pittsburgh; Director of Quality of Life Studies, Artificial Heart Program, Adult Cardiothoracic Transplantation, University of Pittsburgh Medical Center, Director of Clinical Epidemiology Program, Western Psychiatric Institute and Clinic. The themes of Dr. Dew's work

encompass mental health, quality of life, and behavioral (including medical adherence) outcomes in transplant candidates and recipients. Her work has focused on factors involved in the selection of transplant candidates and well as the evaluation of outcomes post-transplant
Fabienne Dobbels, MSc, PhD is a psychologist and psychotherapist whose doctoral and post-doctoral work has focused on pre-transplant psychosocial screening, adherence and long-term post-transplant outcomes. Appointed as full-time assistant professor, she is currently a senior researcher within the Center for Health Services and Nursing Research, Department of Public Health and Primary Care of the University of Leuven, Belgium.
Robert M. Kotloff, MD was a founding member of the Lung Transplant Program at the University of Pennsylvania and served on the faculty in the Pulmonary, Allergy, and Critical Care Division for 23 years. He is currently Chairman of the Pulmonary Department at the Cleveland Clinic. Dr. Kotloff has authored over 100 articles and edited 3 monographs related to his clinical focus in advanced lung disease and lung transplantation.
Nurse-Only Panel
Susan Chernenko, RN, MN, NP is the Clinical Practice Leader/Program Development for the Toronto Lung Transplant Program. In recognition of her expertise, she has been appointed to regional, national and international efforts to represent nursing concerns and promote interdisciplinary collaboration within the field of lung transplantation.
Annette Devito Dabbs, PhD, RN, ACNS-BC,FAAN (see above)
Christiane Kugler, PhD, RN is a professor at the Hanover Medical School and has a joint appointment with the Cardiothoracic Transplant Program of Witten University, Faculty of Health, Germany. Her work is dedicated to research, teaching and clinical care of chronically ill patients and their families with an emphasis on lung transplant and ventricular assist device patients. She is widely published and internationally recognized for her research on rehabilitative interventions to improve long-term outcomes in terms of health-related quality of life after heart and lung transplantation.
Masina Scavuzzo, RN, BSN, CCTC has been a lung transplant nurse coordinator since 1988. She cares for patients and families throughout all phases of transplantation. She describes that she has developed expertise in identifying and addressing the problems that result from deficiencies in the patient selection process.
Michael Petty, PhD, RN, CNS has held a variety of positions related to lung transplantation at the University of Minnesota since the inception of their program in 1986. He has been staff nurse, nurse manager, transplant coordinator and clinical nurse specialist. He has participated in the interdisciplinary patient selection committee and has led quality improvement projects aimed at improving lung transplant outcomes. His work is increasingly concerned with non-medical barriers to improved patient outcomes.

A binary rating tool was developed to judge each domain, and the elements within each domain, for relevance and importance to lung transplant candidate selection. Following verbal agreement to participate in the project, an introductory letter with instructions was sent via e-mail to the expert reviewers. They were asked to rate each domain's relevance and importance to lung transplant candidate selection. Next, the reviewers were asked to identify the relevance and importance of each element within each of the domains to lung transplant candidate selection. Space was provided for suggestions

pertaining to each domain and element. All experts returned their completed rating scale within two weeks. Percent of agreement between the experts' ratings of the domains and elements were calculated. The domains and elements with greater than 78% agreement were deemed valid as evidence-based criteria.⁵

Results

The systematic review identified seven valid domains: (1) cognitive performance, (2) frailty, (3) psychological factors, (4) self-efficacy, (5) social support, (6) quality of life, and (7) sociodemographic factors. A comparison of the rating of the domains and constituent elements by the two panels of experts is presented in Table 3.

Table 3. Comparison of Two Expert Panels' Rating of Domains and Elements Missing from Lung Transplant Patient Selection

	Interdisciplinary Panel of Experts	Interdisciplinary Panel of Experts	Nurse-only Panel of Experts	Nurse-only Panel of Experts
Domains and Elements*	Is the category relevant?	Is the category important?	Is the category relevant?	Is the category important?
	% agree	% agree	% agree	% agree
I. Cognitive Performance	100	100	100	100
a. Health literacy	100	60	100	100
b. Health numeracy	60	40	80	60
c. Ability to write	20	0	80	60
d. Ability to follow directions by telephone	100	60	100	100
e. Ability to independently acquire and process health information	60	0	80	60
II. Frailty	80	60	100	100
a. Nutritional status	80	60	100	100
b. Functional status	80	60	100	100
c. Sarcopenia	80	60	80	60
d. Mobility	60	60	100	80
e. Energy	20	20	20	20
f. Independence with activities of daily	60	40	20	20

living				
g. Health resource utilization	0	0	40	20
h. Comorbidity	100	100	100	100
i. History of falls	100	80	80	80
j. Age	80	40	100	60
k. Frequent hospitalizations	20	20	40	40
l. Chronic pain	100	60	100	100
III. Psychological Factors	80	80	100	100
a. Personality traits	40	20	80	80
b. Locus of control	20	20	60	40
c. Ambivalence about transplant	100	100	100	100
d. Coping	60	60	100	100
e. Spirituality	0	0	40	0
f. Current substance abuse	100	100	100	100
g. Former substance abuse	100	100	100	100
h. Psychiatric pathology	100	100	100	100
IV. Self-Efficacy	60	60	100	100
a. Ability to describe medical condition	40	40	80	80
b. Ability to get to transplant center on short notice	80	80	100	80
c. Ability to self-administer medications	100	40	100	100
d. Ability to self-monitor	100	80	100	100
e. Role function	20	20	80	80
f. Adherence with medical advice	100	100	100	100
g. Adherence with medications	100	100	100	100
h. Adherence with medical appointments	100	100	100	100
i. Adherence with communicating health changes to medical team	100	100	100	100
V. Social Support	100	80	100	80
a. Engaged primary caregiver	100	100	100	100
b. Resides with primary caregiver	40	20	60	20
c. Relationship with primary caregiver	80	60	80	80
d. Engaged secondary caregiver	40	0	80	40
e. Supportive community	20	0	60	20
VI. Quality of life	80	60	100	80
a. Perception of general health	40	20	100	100
b. Perception of activity limitation	40	20	100	100
c. Perception of emotional health	60	20	100	100
VII. Sociodemographic Factors	60	60	60	60
a. Insurance	60	80	80	80
b. Education	40	20	80	60
c. Fluent in language of healthcare team	40	40	40	40
d. Residential distance from transplant center (minutes)	60	40	60	60
e. Financial status (i.e., ability to meet out of pocket expenses)	100	80	80	80
f. Employment status	40	20	80	80

*Percent agreement is calculated as the number of experts who answered “yes” or “high” divided by the number of experts who responded. This is equivalent to the Item Content Validity Index (I-CVI) for which the recommended standard is 0.78⁵.

While the interdisciplinary panel rated all domains except for self-efficacy and sociodemographic factors to be relevant, they rated only cognitive performance, psychological factors and social support as important. On the contrary, the nurse-only panel rated with 100% agreement the relevance and importance of every domain except sociodemographic factors. Comments made by members of both panels throughout the survey noted the interdependence of the domains.

Members of both panels unanimously rated the domain of cognitive performance as relevant and important. Health literacy and the ability to follow directions by telephone were rated as relevant by both panels. However, the interdisciplinary panel rated none of the elements as important to patient selection. The nurse-only panel regarded every element as relevant, but rated only health literacy and the ability to follow instructions by telephone as important. Notes by the experts reflected that deficiencies in any of the cognitive performance elements could be compensated for by adequate social support. Other comments entailed recommendations to include screening for dementia, memory, and concentration for their potential impact on the domain of self-efficacy.

The domain of frailty was rated as relevant, but did not achieve threshold of agreement for importance by the interdisciplinary panel. Despite rating several of the elements as relevant, this group validated only comorbidity and history of falls as important. With similar findings for relevance, the nurse-only panel validated the importance of nutritional status, functional status, mobility, comorbidity, history of falls and chronic pain in the assessment of the lung transplant candidate. In their comments, members of both panels distinguished between physiologic age and chronologic age while others cautioned against including sarcopenia because the evidence associated its impact on transplant outcomes as preliminary. One expert suggested understanding root cause of frequent hospitalizations to better identify risk factors and preventive measures. Energy, independence with activities of daily living, health

resource utilization, and frequent hospitalization did not achieve acceptable percentage of agreement as relevant or important with either panel and, therefore, are not recommended for inclusion.

Both panels validated the relevance and importance of psychological factors as a domain. Both panels achieved threshold of agreement to validate the relevance and importance of ambivalence about transplant, current substance abuse, former substance abuse, and psychiatric pathology. The nurse-only panel additionally validated the relevance and importance of personality traits and coping. Several experts within the nurse-only panel further suggested screening for depression, post-traumatic stress disorder and suicidal ideations as meaningful in the evaluation and care of lung transplant candidates. Neither group validated locus of control or spirituality as relevant or important. Several experts noted the association of psychological factors with adherence.

The nurse-only panel validated the domain of self-efficacy and every one of the constituent elements as relevant and important. Though the interdisciplinary panel did not achieve the percentage of agreement to validate the domain, many of the elements within the domain were rated as relevant and important. Of note, several non-nurse experts noted lack of familiarity with some terms used within this domain.

Both panels rated the domain of social support as relevant and important. All experts rated the presence of an engaged primary caregiver as relevant and important. Both panels rated the relationship with the primary caregiver as relevant, but only the nurse-only panel rated this element as important.

The most significant distinction between the results of rating by the two panels was seen in the domain of quality of life. Although the interdisciplinary panel rated the domain to be relevant, it did not rate it to be important. The nurse-only panel unanimously rated the domain and every element therein to be relevant and important for inclusion in the assessment of individuals considering lung transplant.

Although the domain of sociodemographic factors did not achieve threshold for validation among either panel, elements within the domain did. Both groups rated financial status (i.e., the ability to meet

out of pocket expenses) to be relevant and important. The nurses-only panel also rated insurance and employment status as relevant and important. Comments from experts on both panels distinguished between insurance for health care and access to health care, noting the differences in payment sources internationally. Several experts on both panels commented that where concerns exist regarding a candidate's sociodemographic factors, compensatory measures should be taken.

Based on these results, final recommendations for the patient attributes that should be considered in the evaluation of lung transplant candidates were identified. A summary of the validated domains and elements is listed in Table 4.

Table 4. Comparison of the Domains and Elements Recommended by Two Panels of Experts for Inclusion in the Assessment of Adult Lung Transplant Candidates

Domains and Elements Validated by Expert Panels as Important to Adult Lung Transplant Patient Selection	Interdisciplinary Panel	Nurse-only Panel
I. Cognitive Performance	X	X
a. Health literacy		X
b. Ability to follow directions by telephone		X
II. Frailty		X
a. Nutritional status		X
b. Functional status		X
c. Mobility		X
d. Comorbidity	X	X
e. History of falls	X	X
f. Chronic pain		X
III. Psychological Factors	X	X
a. Personality traits		X
b. Ambivalence about transplant	X	X
c. Coping		X
d. Current substance abuse	X	X
e. Former substance abuse	X	X
f. Psychiatric pathology	X	X
IV. Self-Efficacy		X
a. Ability to describe medical condition		X
b. Ability to get to transplant center on short notice	X	X
c. Ability to self-administer medications		X
d. Ability to self-monitor	X	X
e. Role function		X
f. Adherence with medical advice	X	X
g. Adherence with medications	X	X

h. Adherence with medical appointments	X	X
i. Adherence with communicating health changes to medical team	X	X
V. Social Support	X	X
a. Engaged primary caregiver	X	X
b. Relationship with primary caregiver		X
VI. Quality of life		X
a. Perception of general health		X
b. Perception of activity limitation		X
c. Perception of emotional health		X
VII. Sociodemographic Factors		
a. Insurance	X	X
b. Financial status (i.e., ability to meet out of pocket expenses)	X	X
c. Employment status		X

Discussion

The high percentage of agreement among the nurse experts as compared to the experts from different disciplines suggests that nurses regard a lung transplant patient's candidacy differently than other disciplines do. Every domain and element that was rated as relevant and important by the interdisciplinary team was also rated as relevant and important by the nurse-only panel. However, there were several additional domains and elements that the nurse-only panel validated as important and relevant. This is highly suggestive of the existence of distinct nursing assessment criteria for lung transplant candidates.

The difference in percentages of agreement between the two groups indicates that members of each panel may be prioritizing different benefits, risks, or outcome measures associated with lung transplant. It follows that nursing, the discipline grounded on attention to human responses to illness and treatment⁶⁻⁷, would place significance on metrics of self-efficacy and quality of life. It may also be that the nurse gathers assessment data differently than other disciplines do based on the type, intensity, and frequency of encounters during the evaluation phase of transplant. Further study is needed to better understand how nurses assess lung transplant candidates and how they communicate their findings within

the interdisciplinary setting. Achieving wider acceptance and inclusion of the missing domains and elements of lung transplant candidate assessment is imperative if international guidelines for patient selection criteria are to be influenced.

There were limitations to this project. The sample size of experts was small and, though efforts were made to include representatives of the many disciplines that work within lung transplant teams, the perspectives of those in physical therapy, social work, nutrition, and pharmacy are notably absent. It was not until feedback was received from the interdisciplinary panel that the need for a definition of terms was recognized. Several terms used to label domains and elements are unique to the lexicon of nursing and, while the concepts are not proprietary to the discipline, this limitation created an obstacle to the rating of certain elements by non-nurse panelists. Future work related to nursing's contribution must include ongoing dialogue about the domains and elements and their definitions so mutual understanding is established among members of the interdisciplinary team.

Conclusion

The findings of this project support the ISHLT-recommended patient selection guidelines by elucidating the qualitative and subjective elements of the lung transplant candidate selection. It is intended that the validated domains and elements will provide language and structure to help in the interdisciplinary work of candidate selection for adult lung transplantation. This work is foundational for further study and broader application in solid organ transplantation and other medical interventions associated with major lifestyle implications. Further study is needed to establish the relationship between assessment findings and lung transplant outcomes.

Fortifying evaluations with an evidence-based nursing assessment has the potential to inform the lung transplant selection process in order to greatly improve transplant care and outcomes. Assessment of the identified domains and elements will help to recognize those patients who will benefit from

augmented pre-transplant care and determine and mitigate risk factors of those patients deemed less likely to thrive following transplantation.

In the setting of the persisting critical donor organ shortage⁸, the significant financial costs associated with transplant⁹, and the low rates of long term survival¹, clinical transplant teams have a responsibility to society and to individual patients to recommend lung transplant only for those likely to endure following the procedure. Embedding the missing domains and elements into the standard lung transplant patient selection process is necessary in order to better understand how patient attributes influence transplant outcomes. This endeavor is critical to achieving more consistent, predictable, and improved results from lung transplantation.

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