**Table S5** Survey 3 (final Delphi survey) and results

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| --- | --- | --- |
| **Q#** | **Question** | **Score** |
| **EVLP General** | | |
| Goals for EVLP | | |
| 2 | Expanding the number of lungs available for transplant is an important reason to use EVLP. | 4.83 ± 0.50 (Consensus For) |
| 3 | Expanding the number of lungs available for transplant is the most important reason to use EVLP. | 4.22 ± 1.03 (Consensus For) |
| 4 | Improving logistical flexibility for lung transplants is an important reason to use EVLP. | 1.67 ± 1.63 (No Consensus) |
| 5 | Improving logistical flexibility for lung transplants is the most important reason to use EVLP. | −2.44 ± 2.50 (No Consensus) |
| 6 | Use of EVLP as a research tool is an important reason to use EVLP. | 3.72 ± 1.04 (Consensus For) |
| 7 | Use of EVLP as a research tool is the most important reason to use EVLP. | −1.67 ± 2.03 (No Consensus) |
| 8 | Improving lung function and quality in marginal lung allografts is an important reason to use EVLP. | 3.50 ± 1.30 (Consensus For) |
| 9 | Improving lung function and quality in marginal lung allografts is the most important reason to use EVLP. | 1.83 ± 2.03 (No Consensus) |
| EVLP and Standard-Criteria Lungs | | |
| 10 | EVLP sometimes worsens the quality of standard-criteria lungs. | −0.56 ± 3.10 (No Consensus) |
| 11 | I never put lungs that meet standard criteria on EVLP. | −0.94 ± 3.14 (No Consensus) |
| 12 | I sometimes put lungs that meet standard criteria on EVLP when required by logistical considerations. | 1.61 ± 2.71 (No Consensus) |
| 13 | I sometimes put lungs that meet standard criteria on EVLP to improve lung quality. | −2.00 ± 2.54 (No Consensus) |
| 14 | I sometimes put lungs that meet standard criteria on EVLP for other reasons. | 0.11 ± 2.49 (No Consensus) |
| Data Gaps and Unmet Needs in EVLP | | |
| 15 | Panelists mentioned several data gaps for EVLP in Survey 1. We have consolidated them into the following major themes. Please rank the themes in the order of their importance to you (1 = most important, 5 = least important). If our consolidation missed any key points, please mention them in the “Other” section. | Rankings for: Improved techniques and perfusion solutions to lengthen EVLP duration  1: 3 |
| 2: 4 |
| 3: 5 |
| 4: 6 |
| 5: 0 |
| Rankings for: Improved lung selection and assessment  1: 5 |
| 2: 7 |
| 3: 5 |
| 4: 1 |
| 5: 0 |
| Rankings for: Treatment to improve lung quality and function on EVLP  1: 10 |
| 2: 7 |
| 3: 1 |
| 4: 0 |
| 5: 0 |
| Rankings for: Reduce cost and resource requirements  1: 0 |
| 2: 0 |
| 3: 7 |
| 4: 10 |
| 5: 1 |
| Rankings for: Other  1: 0 |
| 2: 0 |
| 3: 0 |
| 4: 1 |
| 5: 17 |
| 16 | Would you like to add any comments on EVLP in general? Also, if you have any “Other” data gaps in mind, please describe them.  0 | No: 14 |
| Yes: 4 (Please add any comments.) - Gaps in customizing antimicrobial treatments for known pathogens while on EVLP  - Presently limited therapeutics need to focus on this gap as a future direction  - Use of lungs discarded for transplantation for research purposes using the EVLP platform. - I think the logistics piece and EVLP ( for standard lungs) is an evolving field. Strong data is coming that up to 24hs of preservation EVLP is not needed if you preserve lungs at 10C. If we are starting to think longer than 24hs I think EVLP will have an important logistics role still. |
| **Decision Criteria for EVLP vs Straight to Transplant** | | |
| Putting Lungs on EVLP – Framework | | |
|  | This survey assumes a general framework for decisions about placing lungs on EVLP: • Donor lungs that meet standard criteria go straight to transplant, unless logistical issues require EVLP • Lungs that have marginal or unclear quality are placed on EVLP for further evaluation • Lungs that have unacceptably poor quality are rejected outright  The questions in this part of the survey are intended to identify specific parameters and criteria used in these decisions. | |
| 17 | The framework described above is a reasonable high-level summary of my decision-making process for deciding whether to take lungs straight to transplant, put them on EVLP, or reject them outright. | 3.50 ± 1.89 (Consensus For) |
| 18 | If one lung does not meet standard criteria for transplant and the original intended recipient is a double-lung recipient, I typically:  0  0  0 | Put both lungs on EVLP: 7 |
| Reject the nonstandard criteria lung and find a standard criteria recipient for the good lung: 3 |
| Put both lungs on EVLP if the injured lung is potentially recoverable; otherwise find a single-lung recipient for the good lung: 7 |
| Other: 1 (please describe) - If one is infected, I place the other with a SL recipient. If one had low P/F or some other similar issue, I would likely try EVLP with both and have a backup SL recipient. |
| Putting Lungs on EVLP – Logistical Issues | | |
| 19 | I place lungs on EVLP to extend their preservation time if required by logistics issues, such as site issues (eg, the transplant surgeon or operating room is not available), recipient issues (eg, recipient has extended travel time or is not prepared), or donor issues (eg, delays or prolonged transport time from the donation center). | 1.94 ± 2.86 (No Consensus) |
| 20 | I place lungs recovered by an unfamiliar surgeon on EVLP for assessment. | 1.94 ± 1.68 (No Consensus) |
| 21 | I always place lungs recovered by third-party organizations on EVLP for assessment. | −1.22 ± 3.03 (No Consensus) |
| 22 | I place lungs recovered by third-party organizations on EVLP for assessment if information from the third party is inconsistent, incomplete, or otherwise concerning. | 3.39 ± 2.09 (Consensus For) N/A: 1 |
| 23 | In an en bloc lung procurement, if one lung appears unusable and a recipient is available for a single lung or other partial transplant, I use en bloc EVLP to evaluate the potentially usable lung. | −0.17 ± 2.06 (No Consensus) |
| 24 | I place lungs rejected by another program on EVLP for assessment. | 0.94 ± 2.50 (No Consensus) |
| Putting Lungs on EVLP – Lung Quality in the Donor | | |
|  | For this section, please think of three broad categories for parameters that might be considered in deciding whether to take a lung straight to transplant, put it on EVLP, or reject it outright: • Essential first-line parameters that you always consider • Second-line parameters that you only consider in specific situations • Parameters that you never consider Questions later in the survey ask about specific thresholds and criteria for these parameters. If these categories are unclear or inappropriate, please say so in the comments. | |
| 25 | In which category do you put each parameter for decisions about putting lungs on EVLP? (Always/First-line, Sometimes/Second-line, Never)?0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 | P/F ratio  Always: 16 |
| Sometimes: 2 |
| Never: 0 |
| Edema on imaging  Always: 11 |
| Sometimes: 7 |
| Never: 0 |
| Other radiographic findings  Always: 3 |
| Sometimes: 15 |
| Never: 0 |
| Edema on palpation  Always: 7 |
| Sometimes: 11 |
| Never: 0 |
| Peak inspiratory pressure (PIP)  Always: 13 |
| Sometimes: 4 |
| Never: 1 |
| Compliance and deflation  Always: 17 |
| Sometimes: 1 |
| Never: 0 |
| Bronchoscopy  Always: 11 |
| Sometimes: 7 |
| Never: 0 |
| Type of lung injury (eg, contusion vs aspiration vs other)  Always: 7 |
| Sometimes: 11 |
| Never: 0 |
| The possibility of pulmonary emboli  Always: 1 |
| Sometimes: 16 |
| Never: 1 |
| The possibility of aspiration  Always: 2 |
| Sometimes: 15 |
| Never: 1 |
| Donor type (DBD vs DCD)  Always: 2 |
| Sometimes: 14 |
| Never: 2 |
| Cold ischemia time before EVLP (CIT1)  Always: 1 |
| Sometimes: 10 |
| Never: 7 |
| Recipient characteristics   Always: 1 |
| Sometimes: 15 |
| Never: 2 |
| 26 | I primarily consider the “Sometimes” parameters when the “Always” parameters are borderline or marginal. | 2.61 ± 1.30 (Consensus For) |
| 27 | I always consider the "Sometimes" parameters but give them less weight than the "Always" parameters. | 2.11 ± 1.91 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – P/F Ratio | | |
| 28 | I place lungs with P/F <350 on EVLP. | −0.78 ± 2.39 (No Consensus) |
| 29 | I place lungs with P/F <300 on EVLP. | 2.44 ± 1.64 (Near Consensus) |
| 30 | I place lungs with P/F <250 on EVLP. | 3.67 ± 1.25 (Consensus For) |
| Criteria and Thresholds for Putting Lungs on EVLP – Edema on Imaging | | |
| 31 | Mild edema on imaging is a concern that favors EVLP. | −0.22 ± 1.55 (No Consensus) |
| 32 | Moderate edema on imaging is a concern that favors EVLP. | 1.89 ± 1.20 (No Consensus) |
| 33 | Severe edema on imaging is a concern that favors EVLP. | 3.83 ± 1.07 (Consensus For) |
| Criteria and Thresholds for Putting Lungs on EVLP – Other Radiographic Findings | | |
| 34 | Infiltrates not attributable to edema are a concern that favors EVLP. | 1.67 ± 1.60 (No Consensus) |
| 35 | Focal infiltrates are a concern that favors EVLP. | 0.50 ± 2.29 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Palpation (Edema or Consolidation) | | |
| 36 | I take lungs with mild or no edema on palpation straight to transplant unless there are other concerning parameters. | 3.72 ± 1.59 (Consensus For) |
| 37 | Mild edema on palpation is a concern that favors EVLP. | −1.00 ± 2.00 (No Consensus) |
| 38 | Moderate edema on palpation is a concern that favors EVLP. | 2.28 ± 1.33 (Near Consensus) |
| 39 | Severe edema on palpation is a concern that favors EVLP. | 3.78 ± 1.27 (Consensus For) |
| Criteria and Thresholds for Putting Lungs on EVLP – Edema on Imaging | | |
| 40 | Mild consolidation on palpation is a concern that favors EVLP. | 0.67 ± 1.80 (No Consensus) |
| 41 | Moderate consolidation on palpation is a concern that favors EVLP. | 1.44 ± 1.83 (No Consensus) |
| 42 | Severe consolidation on palpation is a concern that favors EVLP. | 0.44 ± 3.06 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Peak Inspiratory Pressure | | |
| 43 | High PIP is a concern that favors EVLP. | 2.33 ± 1.76 (Near Consensus) |
| 44 | Do you have a threshold for PIP where you would reject lungs without putting them on EVLP?  0 | No: 14 |
| Yes: 4 (What is the threshold? Please add any comments.) - >25 - I am the pulmonologist and so do not decide exactly... but I would suggest that maybe over 40 mmHg is too high to consider EVLP - 30 - >27-28 |
| Criteria and Thresholds for Putting Lungs on EVLP – Compliance and Deflation | | |
| 45 | I primarily consider static compliance. | 1.06 ± 1.31 (No Consensus) |
| 46 | I primarily consider dynamic compliance. | 1.61 ± 1.57 (No Consensus) |
| 47 | I consider static and dynamic compliance equally. | 2.22 ± 1.72 (No Consensus) |
| 48 | Deflation captures regional differences better than compliance. | 2.72 ± 1.69 (Consensus For) |
| 49 | I take lungs with acceptable compliance and deflation straight to transplant unless there are other concerning parameters. | 3.61 ± 1.57 (Consensus For) |
| 50 | Compliance ≤120 mL/cm H₂O is a concern that favors EVLP. | −0.11 ± 2.08 (No Consensus) |
| 51 | Peak inspiratory pressure (PIP) can be a useful surrogate for compliance. | 1.11 ± 2.08 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Bronchoscopy | | |
| 52 | I take lungs that are clear on bronchoscopy straight to transplant unless there are other concerning parameters. | 3.78 ± 1.90 (Consensus For) |
| 53 | I take lungs that have thick, easily removed, nonpurulent secretions on bronchoscopy straight to transplant unless there are other concerning parameters. | 3.50 ± 1.57 (Consensus For) |
| 54 | Thin secretions are a concern that favors EVLP. | −1.00 ± 2.49 (No Consensus) |
| 55 | Difficult-to-clear secretions are a concern that favors EVLP. | 1.83 ± 2.54 (No Consensus) |
| 56 | Purulent secretions are a concern that favors EVLP. | −0.44 ± 2.83 (No Consensus) |
| 57 | Frothy secretions are a concern that favors EVLP. | 2.94 ± 1.54 (Consensus For) |
| 58 | Secretions that reaccumulate are a concern that favors EVLP. | 0.72 ± 2.53 (No Consensus) |
| 59 | Signs of aspiration or inflammation are concerns that favor EVLP. | 1.56 ± 2.50 (No Consensus) |
| 60 | I reject lungs with frankly purulent, reaccumulating secretions. | 3.83 ± 1.07 (Consensus For) |
| Criteria and Thresholds for Putting Lungs on EVLP - Mechanism of Injury | | |
| 61 | EVLP allows reassessment of the injured lung(s) in cases of doubt. | 3.94 ± 1.27 (Consensus For) |
| 62 | I place lungs with traumatic injuries on EVLP. | −1.61 ± 2.50 (No Consensus) |
| 63 | I place lungs injured due to drowning on EVLP. | 1.00 ± 2.45 (No Consensus) |
| 64 | I place lungs injured due to hanging on EVLP. | 1.00 ± 2.36 (No Consensus) |
| 65 | I reject lungs with severe injury due to trauma, drowning, or hanging. | −0.78 ± 3.10 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Pulmonary Emboli and/or Infarction | | |
| 66 | I place lungs on EVLP if there are blood clots in the pre-EVLP retrograde flush at procurement or if other signs of pulmonary embolism are present. | 0.00 ± 2.69 (No Consensus) |
| 67 | I use EVLP to clear emboli (eg, with thrombolytics or vascular angioextraction). | 0.39 ± 3.02 (No Consensus) |
| 68 | How do the size and quantity of emboli affect your decision? | - The number of potential segments involved and the total extent of clot. - Multiple PEs or large size infarcts will likely result in rejecting the lungs esp if selective venous sampling poor  - The greater the quantity, the more EVLP is considered - angioscopy if unable to clear emboli would reject esp if multiple emboli even if small size  - large burden (large clot or many clots) will rule out EVLP or transplant for donor lungs - minimal only accept - It doesn’t. I routinely take massive PE and remove acute and even chronic clots from the pulmonary arteries on the backtable. If the donor organ doesn’t have PH and the other parameters of oxygenation and compliance are ok, the lungs will be fine - If multiple or large emboli - more likely to use EVLP with thrombolytic therapy. - Only if effects gas exchange or PVR - Significant emboli more prone to EVLP, mild clots with adequate function more prone to straight to transplant.  - Large clots and multiple (>2) favor EVLP - Small to moderate amount of clot (emboli or in situ clot) are common. Use EVLP for significant amount of clot and/or nonhomogenous perfusion when flushed or infarction - Emboli that occlude a lobar branch by visual estimate - larger and more numerous clots means we are more likely to use EVLP and tPA - large PE would favor EVLP - Emboli large enough to cause large infarcts will prevent me from taking lungs straight to transplant.  - Direct vision - if donor dies of PE I always put on EVLP. Incidental PE usually don’t go on EVLP if otherwise good |
| 69 | I reject lungs with large pulmonary infarction. | 1.33 ± 2.92 (No Consensus) |
| 70 | Do you have a threshold for pulmonary infarction where you would reject lungs without putting them on EVLP?  0 | No: 6 |
| Yes: 12 (What is the threshold? Please add any comments.) - 50% of lobar infarction in lower lobes or upper lobes. Less concerned with RML infarction. - when paO2 <250 and infarct is present on plain chest film  - if >15% of lung lobe is infarcted  - if it is more than 1/3 of either lung then reject and no EVLP or transplant - >1/3 lungs - Large area - Depends on lung function and ability to remove clots  - Large infarct involving more than 1/2 of a lobe or large infarcts in more than 1 lobe.  - size assessment as to whether the area can be resected - more than 1/2 lobe, with dense consolidation - > 10% lobe or non resectable - If is a lobar infarct I would reject, unless I can do lobar transplant. Then I would put lungs on EVLP prior to it. |
| Criteria and Thresholds for Putting Lungs on EVLP – Aspiration | | |
| 71 | I place lungs on EVLP if any signs suggestive of aspiration are observed. | 1.06 ± 2.37 (No Consensus) |
| 72 | I reject lungs if there is severe aspiration. | 3.22 ± 1.81 (Consensus For) |
| Criteria and Thresholds for Putting Lungs on EVLP – Donor Parameters | | |
| 73 | I take DBD lungs straight to transplant unless there are other concerning parameters. | 4.06 ± 2.20 (Consensus For) |
| 74 | I take DCD lungs that meet standard criteria straight to transplant. | 2.89 ± 2.31 (Consensus For) |
| 75 | I put DCD lungs with excessive WIT/agonal time on EVLP. | 3.44 ± 1.86 (Consensus For) |
| 76 | I put DCD lungs that were recovered in conjunction with a heart device on EVLP. | 1.78 ± 1.87 (No Consensus) N/A: 3 |
| 77 | I put most DCD lungs on EVLP. | 1.06 ± 2.53 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Normothermic Regional Perfusion (NRP) | | |
|  | Note: Survey 2 had one question related to NRP, on which did not achieve consensus. To gain more information about your management of NRP lungs, that question has been replaced by several. For this set of questions, please consider DCD lungs procured when NRP is used. If you have no experience with transplant of NRP lungs, please select N/A. | |
|  | Original question from survey 2 (for background information) I put DCD lungs that used normothermic regional perfusion (NRP) on EVLP. | |
| 78 | If NRP DCD lungs appear to meet standard criteria, I will consider taking them straight to transplant. | 1.50 ± 2.41 (No Consensus) N/A: 5 |
| 79 | I put all NRP DCD lungs on EVLP for assessment unless they are clearly unusable. | −0.22 ± 2.70 (No Consensus) N/A: 6 |
|  | How do you handle NRP DCD lungs that develop the following characteristics during or after NRP? |  |
| 80 | Mild edema or other mildly concerning factors.  0  0  0 | Reject: 0 |
| Assess on EVLP: 7 |
| Go straight to transplant: 6 |
| N/A: 5 |
| 81 | Moderate edema or other moderately concerning factors.  0  0  0 | Reject: 1 |
| Assess on EVLP: 12 |
| Go straight to transplant: 1 |
| N/A: 4 |
| 82 | Severe edema or other severely concerning factors.  0  0  0 | Reject: 9 |
| Assess on EVLP: 5 |
| Go straight to transplant: 0 |
| N/A: 4 |
| 83 | Please add any additional comments on your management of NRP lungs. | - We have not had good luck with NRP lungs on EVLP so we have stopped pumping them if they don't appear usable. Moderate edema after NRP often is manageable without intervention if other parameters are acceptable. - N/A  - We have not used NRP lungs to date, but imagine EVLP could be very helpful in this space - with severe edema may reject lungs  - No further comment - vented lungs always - Our experience with NRP is that the lungs often manifest more edema than even standard DCD, so our practice has been frequently to assess with EVLP. I think a lot of it comes down to how the NRP is done with regard to left atrial decompression, etc - Limited experience with NRP donor lungs. Ones that I have seen have been injured by NRP process and rendered non usable. So an area of concern. - Depends if/what venting strategy was used - Very little experience so far - The technique used and time on NRP are important considerations to accept, EVLP or reject lungs - I reassess after NRP. If look OK, go straight to transplant. If not, EVLP. - I have no experience with NRP lungs - no experience - I assume we are meaning TA-NRP - For NRP lungs, I always have EVLP backup prepared - none - We don’t have NRP heart in Canada, so cant comment yet. But based on current data I would put those on EVLP |
| Criteria and Thresholds for Putting Lungs on EVLP – Cold Ischemia Time Before EVLP (CIT1) | | |
|  | For the following questions, please consider lungs that are managed with standard procurement and storage practices and have no issues other than CIT | |
| 84 | Lungs with CIT ≤7 hours can go straight to transplant. | 3.56 ± 2.29 (Consensus For) |
| 85 | Lungs with CIT 8-9 hours can go straight to transplant. | 2.56 ± 2.69 (No Consensus) |
| 86 | Lungs with CIT 10-11 hours can go straight to transplant | 0.94 ± 3.19 (No Consensus) |
| 87 | Lungs with CIT ≥12 hours can go straight to transplant. | −1.39 ± 2.85 (No Consensus) |
| 88 | Lungs with CIT ≥12 hours may be acceptable for straight to transplant if they are stored at 10°C. | 1.61 ± 2.98 (No Consensus) N/A: 1 |
|  | What is the longest CIT1 duration using standard procurement and storage practices you would accept for placing a lung on EVLP? |  |
| 89 | Lungs with projected CIT1 ≤6 hours should be placed on EVLP. | −0.89 ± 3.83 (No Consensus) |
| 90 | Lungs with projected CIT1 7-8 hours should be placed on EVLP. | −0.22 ± 3.54 (No Consensus) |
| 91 | Lungs with projected CIT1 9-10 hours should be placed on EVLP. | 0.94 ± 3.26 (No Consensus) |
| 92 | Lungs with projected CIT1 11-12 hours should be placed on EVLP. | 1.22 ± 3.54 (No Consensus) |
| 93 | Lungs with projected CIT1 13-16 hours should be placed on EVLP. | 2.28 ± 2.72 (Near Consensus) |
| 94 | Lungs with projected CIT1 >16 hours should be placed on EVLP. | 2.17 ± 3.37 (No Consensus) |
| 95 | The quality of the donor lung affects the duration of CIT1 I will accept. | 2.22 ± 1.99 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – Recipient Characteristics | | |
| 96 | The recipient’s illness and general health. | 1.67 ± 1.97 (No Consensus) |
| 97 | The urgency of the recipient’s transplant. | 2.11 ± 2.18 (No Consensus) |
| 98 | The recipient’s panel reactive antibody score. | 0.33 ± 2.40 (No Consensus) |
| 99 | The recipient’s time on the waiting list. | −0.22 ± 2.27 (No Consensus) |
| 100 | The probability of finding an appropriate matched donor. | 1.89 ± 2.05 (No Consensus) |
| 101 | The possibility of a single-lung or lobar transplant. | 0.61 ± 1.98 (No Consensus) |
| 102 | Recipient factors do not influence this decision. | −2.11 ± 2.47 (No Consensus) |
| Criteria and Thresholds for Putting Lungs on EVLP – General | | |
| 103 | Would you like to add any comments on decision criteria for EVLP vs straight to transplant?  0 | No: 15 |
| Yes: 3 (Please add any comments.) - The impact of 10°C storage on EVLP CIT1 & CIT2 is not yet understood. It would be clarified that Questions 84-88 do not include the 10°C storage practices because the answers would be different if 10°C becomes SOC - If I am not sure of the quality of a donor lung or am thinking of declining the lung, then I perform EVLP to be sure - DCD donors who take a long time to die after withdrawal of support (? 2 hours) |
| **Decision Criteria for Transplant of EVLP Lungs** | | |
| Transplant of EVLP Lungs – Framework | | |
| 104 | EVLP lungs that are good on all relevant parameters are appropriate for transplant. (Note: Later questions will probe which parameters are relevant and what constitutes good quality.) | 4.39 ± 1.16 (Consensus For) |
| 105 | EVLP lungs that are borderline on some parameters may be appropriate for transplant depending on clinical judgment and the specific clinical scenario. | 3.67 ± 1.33 (Consensus For) |
| 106 | Bilateral EVLP lungs where parameters are borderline for one lung may be appropriate for bilateral transplant depending on clinical judgment and the specific clinical scenario. | 3.61 ± 1.42 (Consensus For) |
| 107 | Bilateral EVLP lungs where parameters are borderline for one lung may be appropriate for single-lung or other partial lung transplant depending on clinical judgment and the specific clinical scenario. | 4.17 ± 1.30 (Consensus For) |
| 108 | EVLP lungs with any unacceptable parameters are not transplanted. | −1.00 ± 2.24 (No Consensus) |
| Quality of EVLP Lungs Compared With Standard–Criteria Lungs | | |
| 109 | Lungs that are acceptable after EVLP are equivalent to standard criteria lungs. | 3.44 ± 1.38 (Consensus For) |
| 110 | I use EVLP lungs in high-risk recipients. | 3.44 ± 1.61 (Consensus For) |
| 111 | I sometimes manage recipients of EVLP lungs differently than recipients of standard criteria lungs. | 0.17 ± 2.32 (No Consensus) |
| 112 | I manage recipients of lungs that are marginal after EVLP differently from recipients of lungs that are marginal but go straight to transplant. | −0.83 ± 2.69 (No Consensus) |
| 113 | My decisions about intraoperative and/or postoperative management are based on patient and lung status rather than EVLP history. | 2.33 ± 2.16 (Near Consensus) |
| Acceptability of EVLP Lungs for Transplant – Specific Parameters | | |
|  | For this section, please think of 3 broad categories for parameters that might be considered in deciding whether a lung is acceptable for transplant: • Essential first-line parameters that you always consider • Second-line parameters that you only consider in specific situations • Parameters that you never consider Questions later in the survey ask about specific thresholds and criteria for these parameters. If these categories are unclear or inappropriate, please say so in the comments. | |
| 114 | In which category do you put each parameter? | Radiography  Always: 17 |
| Sometimes: 1 |
| Never: 0 |
| Deflation  Always: 18 |
| Sometimes: 0 |
| Never: 0 |
| LA PaO₂ at the completion of EVLP   Always: 7 |
| Sometimes: 5 |
| Never: 6 |
| Delta PO₂ at the completion of EVLP   Always: 15 |
| Sometimes: 3 |
| Never: 0 |
| Bronchoscopy   Always: 12 |
| Sometimes: 6 |
| Never: 0 |
| Palpation   Always: 11 |
| Sometimes: 7 |
| Never: 0 |
| Peak airway pressure   Always: 13 |
| Sometimes: 4 |
| Never: 1 |
| Pulmonary vascular resistance (PVR)   Always: 9 |
| Sometimes: 9 |
| Never: 0 |
| STEEN Solution™ loss   Always: 13 |
| Sometimes: 5 |
| Never: 0 |
| Compliance   Always: 18 |
| Sometimes: 0 |
| Never: 0 |
| Weight gain   Always: 9 |
| Sometimes: 7 |
| Never: 2 |
| Overall movement   Always: 14 |
| Sometimes: 4 |
| Never: 0 |
| Glucose and lactate   Always: 2 |
| Sometimes: 15 |
| Never: 1 |
| Estimated cold ischemic time from EVLP to reperfusion (CIT2)   Always: 2 |
| Sometimes: 9 |
| Never: 7 |
| 115 | I primarily consider the “Sometimes” parameters when the “Always” parameters are borderline or marginal. | 2.56 ± 1.42 (Consensus For) |
| 116 | I always consider the “Sometimes” parameters but give them less weight than the “Always” parameters. | 2.67 ± 1.70 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Radiography | | |
| 117 | Lungs with improved or stable radiography findings and no new or significant edema are ready for transplant unless other parameters cause concern. | 3.56 ± 1.61 (Consensus For) |
| 118 | Diffuse abnormalities are a cause for concern. | 3.28 ± 1.28 (Consensus For) |
| 119 | Focal consolidations are a cause for concern. | 1.44 ± 1.71 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Deflation | | |
| 120 | Lungs that completely deflate at a normal or near normal rate are ready for transplant unless other parameters cause concern. | 4.06 ± 1.35 (Consensus For) |
| 121 | Regional incomplete deflation impacts my decisions about suitability for transplant if all other parameters are OK. | 1.28 ± 1.56 (No Consensus) |
| 122 | Regional incomplete deflation impacts my decisions about suitability for transplant if there are abnormal synchronous regional, physiologic, or imaging parameters. | 2.89 ± 1.41 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Arterial Blood Gases | | |
| 123 | EVLP lungs with PaO₂ that is stable or improving and >300 mmHg are ready for transplant unless other parameters cause concern. | 2.17 ± 1.74 (No Consensus) |
| 124 | EVLP lungs with PaO₂ that is stable or improving and >350 mmHg are ready for transplant unless other parameters cause concern. | 3.72 ± 1.28 (Consensus For) |
| 125 | EVLP lungs with delta PO₂ that is stable or improving and >250 mmHg are ready for transplant unless other parameters cause concern. | −0.28 ± 2.42 (No Consensus) |
| 126 | EVLP lungs with delta PO₂ that is stable or improving and >300 mmHg are ready for transplant unless other parameters cause concern. | 2.33 ± 1.94 (Near Consensus) |
| 127 | EVLP lungs with delta PO₂ that is stable or improving and >350 mmHg are ready for transplant unless other parameters cause concern. | 4.00 ± 1.29 (Consensus For) |
| 128 | EVLP lungs with a declining trend in blood gases are usually ready for transplant. | −2.56 ± 1.38 (Consensus Against) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Selective/Differential Venous Gases | | |
| 129 | I consider selective/differential venous gases when I have concerns about regional dysfunction. | 3.67 ± 1.37 (Consensus For) |
| 130 | I consider selective/differential venous gases when I am evaluating an en bloc EVLP lung for a single-lung or lobar transplant. | 3.67 ± 1.29 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Bronchoscopy | | |
| 131 | Lungs that are clear with no significant persistent or reaccumulating edema are ready for transplant unless other parameters cause concern. | 4.11 ± 1.41 (Consensus For) |
| 132 | Lungs with frothy secretions are usually acceptable for transplant. | 0.28 ± 2.18 (No Consensus) |
| 133 | Lungs with bloody secretions are usually acceptable for transplant. | 0.11 ± 1.73 (No Consensus) |
| 134 | Lungs with abundant thin secretions are usually acceptable for transplant. | −0.17 ± 2.03 (No Consensus) |
| 135 | Lungs with nonrecurrent purulent secretions are usually acceptable for transplant. | 2.33 ± 1.25 (Near Consensus) |
| 136 | Lungs with diffuse secretions isolated to one lobe are usually acceptable for transplant. | 0.44 ± 1.57 (No Consensus) |
| 137 | Lungs with bilateral diffuse secretions are usually acceptable for transplant. | −1.89 ± 2.23 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Palpation | | |
| 138 | Lungs with no significant edema are ready for transplant unless other parameters cause concern. | 4.06 ± 1.35 (Consensus For) |
| 139 | Lungs that are not excessively heavy or boggy are ready for transplant unless other parameters cause concern. | 3.22 ± 1.58 (Consensus For) |
| 140 | Lungs with heavy lower lobes are common and acceptable if other parameters are good. | 1.06 ± 1.72 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Peak Airway Pressure | | |
| 141 | Lungs with acceptable peak airway pressure that is stable or improving are ready for transplant unless other parameters cause concern. | 3.89 ± 1.41 (Consensus For) |
| 142 | I define acceptable peak airway pressure as <15 mmHg. | 1.33 ± 2.38 (No Consensus) N/A: 1 |
| 143 | I define acceptable peak airway pressure as <20 mmHg. | 1.56 ± 2.09 (No Consensus) N/A: 1 |
| 144 | I define acceptable peak airway pressure as <25 mmHg. | 0.11 ± 2.26 (No Consensus) N/A: 1 |
| 145 | I define acceptable peak airway pressure as <30 mmHg. | −2.17 ± 1.57 (No Consensus) N/A: 1 |
| 146 | I define stability as a <15% increase in peak airway pressure. | 2.11 ± 1.49 (No Consensus) N/A: 1 |
| 147 | A high peak airway pressure may be acceptable if there is a trend toward improvement. | 0.22 ± 1.47 (No Consensus) N/A: 1 |
| Criteria and Thresholds for Transplant of EVLP Lungs – Pulmonary Vascular Resistance (PVR) | | |
| 148 | Lungs with acceptable PVR and a stable or improving trend in PVR are ready for transplant unless other parameters cause concern. | 3.94 ± 1.31 (Consensus For) |
| 149 | I define acceptable PVR as <200 dyn·s/cm5. | 1.78 ±- 1.08 (No Consensus) N/A: 1 |
| 150 | I define stability as a <15% increase in PVR. | 3.06 ± 1.22 (Consensus For) |
| 151 | A high PVR may be acceptable if there is a trend toward improvement. | 0.89 ± 2.00 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – STEEN Solution™ Loss | | |
| 152 | Lungs with acceptable STEEN Solution™ loss that is not worsening over time are ready for transplant unless other parameters cause concern. | 3.78 ± 1.40 (Consensus For) |
| 153 | I define acceptable STEEN Solution™ loss as 150-200 cc/hour. | 0.83 ± 2.24 (No Consensus) |
| 154 | STEEN Solution™ loss of >200 cc in the first hour is acceptable if the loss slows or stops subsequently at the following hour assessment. | 2.83 ± 1.61 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Compliance | | |
| 155 | I primarily consider static compliance. | 1.22 ± 1.40 (No Consensus) |
| 156 | I primarily consider dynamic compliance. | 1.28 ± 1.41 (No Consensus) |
| 157 | I consider both static and dynamic compliance. | 3.44 ± 1.50 (Consensus For) |
| 158 | Lungs with acceptable compliance and a stable or improving trend in compliance are ready for transplant unless other parameters cause concern. | 4.00 ± 1.25 (Consensus For) |
| 159 | I define acceptable compliance as dynamic compliance of >60. | 2.11 ± 1.37 (No Consensus) N/A: 2 |
| 160 | I define stability as a <15% deterioration in compliance. | 3.33 ± 1.53 (Consensus For) |
| 161 | Poor compliance may be acceptable if there is a trend toward improvement. | 0.39 ± 1.83 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Weight Gain | | |
| 162 | Lungs with no more than marginal weight gain are ready for transplant unless other parameters cause concern. | 2.94 ± 1.81 (Consensus For) N/A: 2 |
| 163 | I define marginal weight gain as a <10% increase from baseline. | 1.56 ± 1.38 (No Consensus) N/A: 5 |
| 164 | I define marginal weight gain as a <200 g increase from baseline. | 0.50 ± 1.34 (No Consensus) N/A: 6 |
| 165 | I define marginal weight gain as a <500 g increase from baseline. | −0.17±1.01 (No Consensus) N/A: 6 |
| Criteria and Thresholds for Transplant of EVLP Lungs – Overall Movement | | |
| 166 | Lungs with good movement in most lobes are ready for transplant unless other parameters cause concern. | 3.72 ± 1.45 (Consensus For) |
| 167 | Lungs with poor movement in a few segments can be considered for transplant. | 2.56 ± 1.26 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Glucose and Lactate Levels | | |
| 168 | Very high or rapidly increasing lactate levels are a cause for concern. | 2.56 ± 1.98 (Consensus For) |
| Criteria and Thresholds for Transplant of EVLP Lungs – Cold Ischemic Time From EVLP to Reperfusion (CIT2) | | |
|  | Note: Survey 2 had one question on CIT2, which did not achieve consensus. To gain more information about the role of CIT2 in your management of EVLP lungs, that question has been replaced by several. | |
| 169 | The maximum acceptable cold ischemic time for EVLP to reperfusion of the transplanted lungs is <6 hours. | −1.17 ± 3.06 (No Consensus) |
| 170 | The maximum acceptable cold ischemic time for EVLP to reperfusion of the transplanted lungs is 6 to <8 hours. | −0.39 ± 3.13 (No Consensus) |
| 171 | The maximum acceptable cold ischemic time for EVLP to reperfusion of the transplanted lungs is 8 to <10 hours. | −0.17 ± 2.97 (No Consensus) |
| 172 | The maximum acceptable cold ischemic time for EVLP to reperfusion of the transplanted lungs is 10 to <12 hours. | −0.06 ± 2.66 (No Consensus) |
| 173 | The maximum acceptable cold ischemic time for EVLP to reperfusion of the transplanted lungs can be ≥12 hours for appropriate lungs. | 0.61 ± 2.93 (No Consensus) |
| Criteria and Thresholds for Transplant of EVLP Lungs – General | | |
| 174 | Would you like to add any comments on decision criteria for transplant of EVLP lungs?  0 | No: 16 |
| Yes: 2 (Please add any comments) - A reference is made above to “arterial blood gases” - there are no “arterial blood gases” on EVLP - I put NA for weight gain questions since we don’t use that. We use rather perfusate loss |

This list contains verbatim questions and scores from the final Delphi survey (Survey 3). Three questions have been omitted: one asking for the panelist’s name and two asking for comments on content to be included in the manuscript. Some minor typographical errors have been corrected. Green shading indicates a Likert-scale question that reached consensus; yellow indicates near consensus; white indicates no consensus; and red indicates consensus against. CIT, cold ischemia time; DBD, donation after brain death; DCD, donation after cardiocirculatory death; EVLP, ex vivo lung perfusion; h, hour; LA, left atrial; NA, not applicable; N/A, not applicable; NRP, normothermic regional perfusion; P/F, PaO2/fraction of inspired oxygen; PE, pulmonary embolism; PVR, pulmonary vascular resistance; RML, right middle lobe; SL, single-lung; SOC, standard of care; TA-NRP, thoraco-abdominal normothermic regional perfusion; tPA, tissue plasminogen activator; WIT, warm ischemia time.