How to Define Success of a Liver Transplant

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Duke University Health System
How to Define Success for a Liver Transplant Candidate
How to Define Success for a Patient with ESLD
Disclosure

Nothing to disclose.
Learning Objectives

1. Review commonly utilized measures of liver transplant success
2. Review longer term outcomes of liver transplantation
   a. Graft or patient survival
   b. Health care related quality of life
3. Recognize deficiencies in patient centered contributions to defining success of liver transplantation
Do we really have any consensus regarding the definition of transplant success?
Definitions of success

• From a systematic/regulatory perspective

• Patient perspective
  – Quality of life
  – Employment
  – Physical functioning

• Cost/benefit analysis-value based thinking
Simplest binary definition

• Are we alive or dead?
Figure C6. Adult (18+) 3-year graft failure HR program comparison

Estimated Hazard Ratio (HR)

Better

Worse

Program Volume

Transplants Performed 01/01/2014 - 06/30/2016

High performing center

Low performing center

No transplant
For liver transplant candidates, this measure has the **largest impact on survival after listing** among these three measures. 1 year liver survival includes only candidates who received a transplant.
Regulatory oversight and definition of success

- CMS Conditions of Participation
- UNOS MPSC oversight
- SRTR Public reporting
- Focus has been on 1 year survival
What about longer term survival/success?

2018 SRTR Annual report

Figure LI 67. Graft failure among adult deceased donor liver transplant recipients. All adult recipients of deceased donor livers, including multi-organ transplants. Patients are followed until the earliest of retransplant, death, or December 31, 2018.
How good is good enough?

Figure LI 86. Patient survival among adult deceased donor liver transplant recipients, 2011-2013, by age. Patient survival estimated using unadjusted Kaplan-Meier methods. For recipients of more than one transplant during the period, only the first is considered.
Long term “success”: ELTR

Adam R, et al., J Hepatol 2012; 57:675-688

Fig. 7. Patient survival according to year of LT.
Long term “success”: US

Success compared to what?

Aberg F, et al., Hepatology 2015;61:668-677
If we have survived, what is the expected QOL that defines success?
The focus of success after transplantation is moving toward achieving ‘normality’ posttransplant.

Curr Opin Organ Transplant 2014;19:480-485
“Successful” outcome: 

In the Eye of the Beholder

• Majority of cancer patients more concerned about QOL than longevity
• More than 50% of patients consider a severe stroke worse than death
• Physician perception of QOL often at odds with patient perception

Owens DK. Hepatology 1998;27:292-293
Mean Karnofsky scores following LT

QOL after liver transplant

Bravata DM, et al.,
Liver Transpl Surg 1999;
5:318-331

Figure 3. Summary results of the sign test. The number of positive studies (■) and nonpositive studies (□) for each QOL domain are shown.

General QOL (p<0.02)
Daily Activities (p<0.02)
Sexual Functioning (p<0.008)
Physical Health (p<0.0004)
Social Functioning (p<0.05)
Psychological Health (p<0.08)
SF-LDQOL before/after LT

McLean KA, et al., Transplant International 2019;32:808-819
UCLA long-term “success”: QOL

<table>
<thead>
<tr>
<th>Category</th>
<th>20-yr Survivors (n = 68)</th>
<th>US Population (n = 2474)</th>
<th>P</th>
<th>Chronic Liver Disease (n = 210)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical functioning</td>
<td>79 ± 26</td>
<td>84 ± 23</td>
<td>0.038</td>
<td>51 ± 29</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Role–physical</td>
<td>67 ± 42</td>
<td>81 ± 34</td>
<td>&lt;0.001</td>
<td>38 ± 31</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>72 ± 28</td>
<td>75 ± 24</td>
<td>0.315</td>
<td>50 ± 32</td>
<td>&lt;0.001</td>
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<tr>
<td>General health</td>
<td>62 ± 23</td>
<td>72 ± 20</td>
<td>&lt;0.001</td>
<td>54 ± 27</td>
<td>0.033</td>
</tr>
<tr>
<td>Vitality</td>
<td>63 ± 22</td>
<td>61 ± 21</td>
<td>0.329</td>
<td>52 ± 28</td>
<td>0.002</td>
</tr>
<tr>
<td>Social functioning</td>
<td>77 ± 26</td>
<td>83 ± 23</td>
<td>0.026</td>
<td>33 ± 21</td>
<td>&lt;0.001</td>
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<tr>
<td>Role–emotional</td>
<td>75 ± 39</td>
<td>81 ± 33</td>
<td>0.098</td>
<td>58 ± 20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mental health</td>
<td>80 ± 20</td>
<td>74 ± 18</td>
<td>0.029</td>
<td>34 ± 22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physical component summary</td>
<td>46 ± 12</td>
<td>50 ± 10</td>
<td>&lt;0.001</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mental component summary</td>
<td>52 ± 11</td>
<td>50 ± 10</td>
<td>0.124</td>
<td>—</td>
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</tr>
</tbody>
</table>

UMinn long term “success”: QOL

20 year survivors

Sullivan KM, et al.
Liver Transplantation 2014; 20:649-654

<table>
<thead>
<tr>
<th></th>
<th>Adult Recipients (n = 12)</th>
<th>Pediatric Recipients (n = 24)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS</td>
<td>39.3 ± 14.7</td>
<td>49.2 ± 12.0</td>
<td>0.04</td>
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<tr>
<td>MCS</td>
<td>54.6 ± 9.4</td>
<td>48.6 ± 11.0</td>
<td>0.12</td>
</tr>
</tbody>
</table>

NOTE: The values were standard-normalized to the US population with a mean of 50 and a standard deviation of 10. P values are based on the Mann-Whitney U test. Thirty-six of the 53 liver transplant recipients alive at the time of follow-up responded to an SF-12 Health Survey.
“It would be ideal if a measure of HRQOL were included in transplant databases or clinical care. These data could be monitored over time and might enable therapeutic interventions or provide a better understanding of the challenges that remain for OLT”

Summary

- Definition of success has largely been driven by regulatory bodies
- Success has been focused on short term end-point
- Success is more than being alive
- There is abundant opportunity to make liver transplantation more successful