Impact of Regional Organ Sharing and Allocation in the UK Northern Liver Alliance (NLA) on Waiting Time to Liver Transplantation and Waitlist survival

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Background

- Deceased-donor liver grafts (DDL) have been allocated in a centre-based system until recently

- A supra-regional organ allocation system (NLA) was established in 2006 to improve access to DDLs for the sickest patients awaiting liver transplantation
  - 3 Northern centres (Edinburgh, Newcastle and Leeds)
    - Patients with UKELD ≥62* listed on 'top-band'
    - Prioritisation by UKELD score
    - Organs shared between centres
    - Organ 'payback' scheme

- Scheme mirrors "Share-35" system in US
  - Implemented from 2013

- We aimed to investigate the impact on waiting list outcomes

**MELD ≥25 until 2013*

Massie AB, Am J Transplant, 2015

Methods

- Data retrospectively extracted from UK transplant registry (NHSBT)
  - Apr 2013 to Dec 2016
  - NLA centres compared with two non-NLA centres (King's and Cambridge liver transplant units)
  - Changes in UKELD captured by sequential data
- Adult patients registered for first DDL transplant included in analysis
- Once patients are registered into top-band, they are not removed
- Periods of suspension from WL not included in WT

Methods, cont.

- Kaplan-Meier method used to estimate WL survival and WT to transplantation
- WL survival – patients who were suspended, removed from WL (non-transplant reason), or transplanted were censored
- WT – patients removed/suspended or died on WL were censored
- Log-rank test used for comparisons
  - Bonferroni correction for multiple testing
- Cox proportional hazards model used to ascertain impact of WT on post-transplant survival
  - All 7 liver transplant units included
  - Adjusted with risk factors for post-transplant mortality

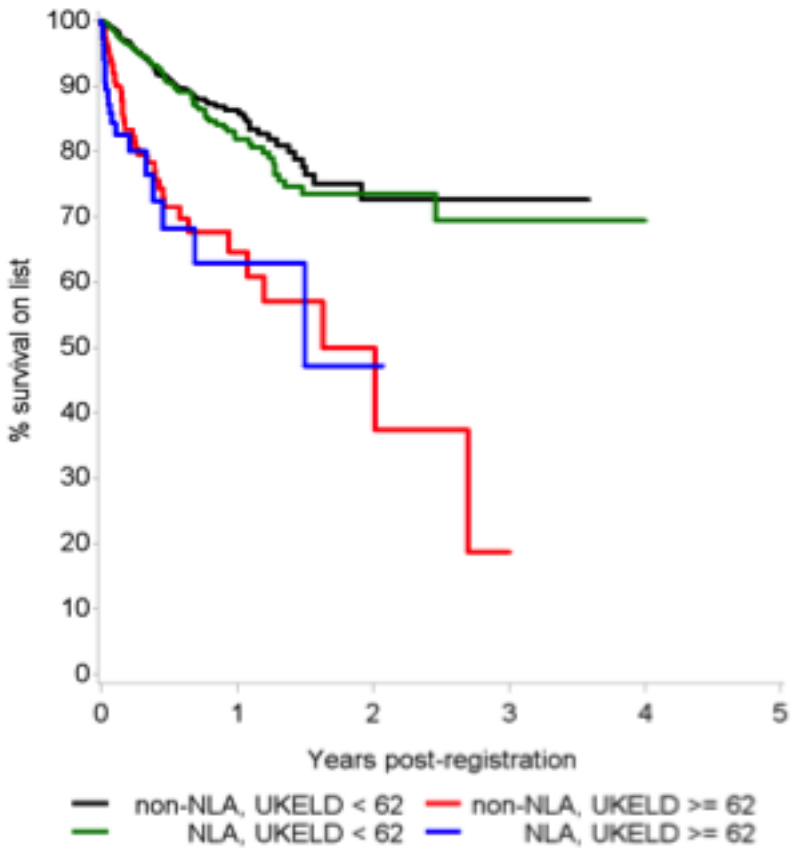
NHSBT, Annual report on liver transplantation, 2015/2016

Results

Transplant centre	Non-top-band	Top-band	Total
NLA centres	**880**	**159**	**1039**
Newcastle	129	32	161
Edinburgh	319	62	381
Leeds	432	65	497
Non-NLA centres	**923**	**200**	**1123**
Cambridge	322	65	387
King's	601	135	736
Total	**1803**	**359**	**2162**

WL survival

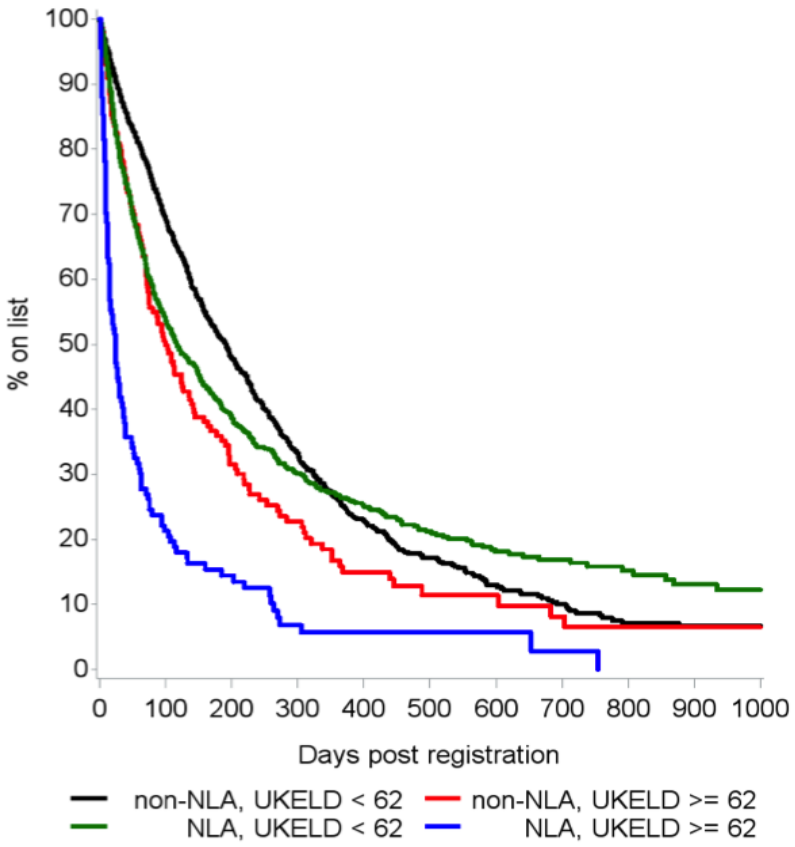
- NLA top-band vs non-NLA top-band p=0.9999
  - 62.9 vs. 64.6%
- NLA top-band vs NLA non-top-band p<0.0001
  - 62.9 vs. 81.9%
- No difference between NLA non-top-band and non-NLA non-top-band
  - 81.9 vs. 86.4%



Significantly different amongst 4 groups (p<0.0001)

WT to transplantation

- Median WT NLA top-band shorter compared to non-NLA top-band
  - 23 vs. 99 days
  - p<0.0001
- Median WT non-top-band no different between NLA and non-NLA
  - 117 vs. 192 days
  - p=0.2288



Significantly different among 4 groups (p<0.0001)

Impact of WT on post-transplant survival in top-band patients

- 315 top-band transplants from Apr 2013 to Dec 2016
  - 273 included in analysis
  - 42 excluded from analysis due to missing survival/risk factor data, or auxiliary transplant

- **WT has no significant impact on 3-year risk-adjusted post-transplant survival (p=0.712)**
  - *1-month increase in WT is associated with 4.6% increase in risk of death*
  - *HR 1.046 (95% CI 0.825-1.327*)

Discussion

- NLA significantly shortened WT for top-band patients
- No improvement in WL survival
  - *No adverse impact upon non-top-band patients either*
- WT did not impact long-term survival in top-band patients
- Results can be seen as an ethically positive outcome
  - Sicker patients warrant special priority, irrespective of potentially lower ‘benefit’/utility
  - Mirrors US organ allocation policy and ‘final rule’

Discussion, cont.

- Survival benefit may not have been detected as each centre ensures timely transplantation of sickest patients
  - Patients censored at transplantation – *type 2 error*
- Initial analysis of Share-35 reported **30% reduction in WL mortality** in patients with MELD ≥35
  - Patients with MELD <35 not adversely affected
  - **Analyses limited through historical controls**
- Under Share-35, WL patients reprioritised were not disadvantaged by losing allocation
  - Similar analysis into NLA not possible retrospectively

Chow EK, Am J Transplant, 2017

Conclusions

- **NLA achieved its aim of improving DDL transplantation access to those most in need**
- Prioritisation of sickest patients did not improve WL survival
  - **Did not disadvantage less sick patients**
- Similar experience to US
- NLA will be absorbed into UK national allocation scheme based on transplant benefit score
  - Similar analysis into outcomes of patients UKELD ≥62 after national allocation warranted once long-term follow-up data sufficiently available

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