### 2014 Top 20 Liver Transplant Centers by Volume

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>2014 Tx Volume</th>
<th>2013 Tx Volume</th>
<th>2012 Tx Volume</th>
<th>1-yr patient survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LAOF-TX1 Ochsner Foundation Hospital</td>
<td>196</td>
<td>175</td>
<td>174</td>
<td>Statistically Higher</td>
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<tr>
<td>2</td>
<td>CAUC-TX1 UCLA Medical Center</td>
<td>168</td>
<td>173</td>
<td>169</td>
<td>As Expected</td>
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<tr>
<td>3</td>
<td>FLSL-TX1 Mayo Clinic Florida</td>
<td>157</td>
<td>146</td>
<td>165</td>
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<tr>
<td>3</td>
<td>CASF-TX1 Univ of CA San Francisco Med Ctr</td>
<td>157</td>
<td>146</td>
<td>159</td>
<td>As Expected</td>
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<tr>
<td>4</td>
<td>GEM-TX1 Emory University Hospital</td>
<td>134</td>
<td>127</td>
<td>111</td>
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</tr>
<tr>
<td>5</td>
<td>TWU-TX1 Vanderbilt Univ Med Ctr</td>
<td>132</td>
<td>119</td>
<td>98</td>
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<tr>
<td>6</td>
<td>NYPC-TX1 New York-Presbyterian/Columbia</td>
<td>142</td>
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<tr>
<td>7</td>
<td>BM-91X1 Indiana University Health</td>
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<td>114</td>
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<tr>
<td>8</td>
<td>OHSCC-TX1 Cleveland Clinic Foundation</td>
<td>132</td>
<td>128</td>
<td>143</td>
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<tr>
<td>9</td>
<td>FL-JM-TX1 Jackson Memorial Hospital</td>
<td>122</td>
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<td>115</td>
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<tr>
<td>10</td>
<td>WHUP-TX1 The Hosp of the Univ of PA</td>
<td>117</td>
<td>127</td>
<td>125</td>
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<tr>
<td>11</td>
<td>MCCC-TX1 Wake Forest University Hospital</td>
<td>115</td>
<td>115</td>
<td>117</td>
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<tr>
<td>12</td>
<td>SSM-TX1 Northwestern Memorial Hospital</td>
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<td>113</td>
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<td>As Expected</td>
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<tr>
<td>13</td>
<td>NYMS-TX1 Mount Sinai Med Center</td>
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<td>93</td>
<td>108</td>
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<tr>
<td>14</td>
<td>MDUK-TX1 University of Kansas Hospital</td>
<td>106</td>
<td>114</td>
<td>77</td>
<td>As Expected</td>
</tr>
<tr>
<td>15</td>
<td>DCQ-TX1 George Washington Univ Med Ctr</td>
<td>102</td>
<td>91</td>
<td>116</td>
<td>As Expected</td>
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<tr>
<td>16</td>
<td>BAIU-TX1 Kaiser Hospital of USC</td>
<td>101</td>
<td>80</td>
<td>94</td>
<td>Statistically Higher</td>
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<tr>
<td>17</td>
<td>ALUK-TX1 Univ. of Alabama Hospital</td>
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<td>95</td>
<td>110</td>
<td>As Expected</td>
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<tr>
<td>18</td>
<td>MMAG-TX1 Rochester Methodist Hosps-Mayo Clinic</td>
<td>96</td>
<td>92</td>
<td>95</td>
<td>As Expected</td>
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<tr>
<td>19</td>
<td>NEJU-TX1 The Northeast Medical Center</td>
<td>84</td>
<td>111</td>
<td>86</td>
<td>As Expected</td>
</tr>
<tr>
<td>20</td>
<td>NORTX-TX1 Barnes-Jewish Hospital</td>
<td>93</td>
<td>99</td>
<td>97</td>
<td>As Expected</td>
</tr>
</tbody>
</table>

Source: OPTN/UNOS & Scientific Registry for Transplant Recipients
Issues Facing the Liver Transplant Program at Ochsner Clinic in 2016

The changing face of Hepatitis C and ESLD
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The changing face of Obesity and ESLD

Transplanting patients with ESLD and multiple co-morbidities
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The changing organ allocation schemes
Nigel Girgrah, MD, PhD

The Hepatitis C Opportunity is Now

- Leading cause of ESLD and HCC
- #1 indication for liver transplant
- Deaths from HCV surpassed deaths from HIV in 2007
- Economic burden of managing HCV in US >$6.5B

The Hepatitis C Opportunity is Now

Strategies for screening and treating HCV rapidly changing

1 time birth cohort screening

Advent of highly effective antiviral therapies
Hep C Treatment Impact
The Changing Burden of Hepatitis C Virus Infection in the United States: Model-Based Predictions
Milena Robit, MS; Alison B. Hazzard, MD; Mark S. Roberts, MD; Andrew J. Scharf, PhD; and Jack C. Tu, MD

HCV predicted to become rare by 2036

Hepatitis C Becomes a Rare Disease over Next 20 yrs

1. Highly Effective Treatment Strategies
2. Screening guidelines (1 time birth cohort vs. universal)
3. Capacity to treat
Decompensated Liver Disease and HCC Related to Hepatitis C peaks by 2020

Base Case

2019
↓ 124,200 cases of DC
↓ 78,800 cases of HCC
↓ 126,500 LRD
↓ 9900 LTx

2016
↓ 260,000 cases of DC
↓ 174,100 cases of HCC
↓ 288,000 LRD
↓ 23,800 LTx
Liver Transplantation: HCV when to treat?

- Pre-transplant
  - In cirrhosis, two potential goals of treatment:
    - Slow or even reverse decompensation to eliminate the need for transplantation
    - Prevent disease recurrence following transplantation
  - Interferon/RBV therapy poorly tolerated, with low success rates in cirrhosis and high rates of early discontinuation
  - Interferon-free regimen ideal in patients listed for transplant

HCV trials for compensated cirrhosis
LDV/SOF in Cirrhotic G1 Patients Who Previously Failed Therapy (Sirius Study)

- 97% of previously treatment-experienced Cirrhotic achieved SVR
- 2 AE headache, fatigue

HCV trials for decompensated cirrhosis
**LDV/SOF + RBV in Patients with Decompensated Cirrhosis Who Previously Failed Therapy (Solar 2 Study)**

- LDV/SOF + RBV for 12 weeks SVR 85% in CHILD B & C
- Extending treatment to 24 weeks not increase response rate

**ALLY-1 Study: SVR 12 by Child-Pugh Class and by Albumin Level**

Adapted from Poordad F, et al. Presented at EASL 2015; Oral presentation #L08.
Summary of DAA in pre tx

- LDV/SOF + RBV 12 weeks for compensated G1 cirrhotics
- DCV/SOF + RBV for 12 weeks 85% for G3
- High SVR12 (85-90%) in Child-Pugh class A, B
- Lower in Child C cirrhosis (50-60%),
- LDV/SOF + RBV or DCV/SOF + RBV for 12 weeks is safe and well tolerated in decompensated cirrhosis

Treatment strategies Post LT

Treat patients post-LT who have progressive or severe disease with the aim of achieving a sustained virologic response (SVR).
- To prevent liver related complications
- To improve patient and graft survival
- To reduce the need for re-LT for recurrent HCV
HCV Eradication Improved Survival Following Liver Transplantation

$\text{SVR}$

$p < 0.001$

NR

Tanaka et al., 2013

SOF+RBV for Established Recurrent HCV Post-Liver Transplant

N=40

SOF 400 mg + RBV 400–1200 mg

SVR 12

- No TAC or CsA toxicities or drug interactions were observed

LDV/SOF+RBV for 12 or 24 Weeks in Post-Liver Transplant HCV

Lower SVR rate in Child C

Manns, EASL, 2015, G02

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Average weight of a US citizen

http://stateofobesity.org/

Obesity rates: 9/21/15

- 3 states (AR, MS, WV) now have >35% of population with BMI >30
- 5 states, including MN, increased in 2014
- 17% of children are obese

http://stateofobesity.org/adult-obesity/
Impact of obesity on incidence of NASH

- 2/3 of obese people have steatosis (108 million US).

- Of these, 2/3 remain with bland steatosis, 1/3 progress to steatohepatitis (30 million

- 5-15% progress to cirrhosis (3 million US)

NEJM, 346: 16;1221-1231. 2002
Fatty Liver in Olmstead County

- Autopsy data in decedents of non-natural causes of death
- 465 cases (1981-2010)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (Yrs)</td>
<td>37.2</td>
<td>37.3</td>
<td>37.3</td>
</tr>
<tr>
<td>Male</td>
<td>71%</td>
<td>74%</td>
<td>75%</td>
</tr>
<tr>
<td>Mean BMI</td>
<td>23.9</td>
<td>26.5</td>
<td>27.8</td>
</tr>
<tr>
<td>Obesity</td>
<td>11%</td>
<td>26%</td>
<td>29%</td>
</tr>
<tr>
<td>Fatty liver</td>
<td>15.0%</td>
<td>33.2%</td>
<td>44.3%</td>
</tr>
<tr>
<td>NASH</td>
<td>1.6%</td>
<td>2.9%</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Charlton et al Gastro 2011;141;1241-53.
Indication for listing for liver transplantation


• N=1294, UCLA experience
• NASH=136
• Second most common indication for transplant

Annals of surgery, 2012:
Impact of obesity on outcome:

- SRTR data 1987-2007
- 68,172 BMI 18.5-40, 1827 <18.5, and 1,447 >40.
- Outcome worse high and low BMI patients (similar to previous report Nair et al)
- No correction for ascites, small number of patients in each of the “extreme” groups


Impact of Obesity on Outcome

- SRTR 2004-2011
- N=38,194
- Compared <18.5, 18.5-45, >45.
- BMI <18.5 associated worse survival
- No difference in outcomes for obese patients

Orci Transpnt Int. 2012: 26;170-6.
Long term outcomes: NASH

SRTR data analysis of transplant for NASH 1997-2010


Summary Impact of obesity on LT

- NASH emerging as the 2nd leading indication for LTx and will likely become the #1 indication by 2025
- Post-transplant outcomes for obese patients appear to be acceptable, based on data of selected patients who have undergone transplantation
- Hospital stay, ICU stay, and complication rates may be higher
- Concern for post LT NASH
- Long term mortality post LT is impacted by obesity related complications: diabetes, heart disease, cancer, renal disease
Bariatric surgery in Decompensated Cirrhosis

- Before transplant: not an option for patients with Child's B/C,
- After transplant
- Concurrent with transplantation
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Liver Transplantation for the Morbidly Obese. The Ochsner Experience

Laura Harper, Ari Cohen, M.D., Adam Kressel, Humberto Bohorquez, M.D., David Bruce, M.D., Thomas Brechner, M.D., Ph.D., Ian Carmody, M.D., Ph.D., Nigel Girgrah, M.D., Ph.D., Shobha Joshi, M.D., Natalie Bzowej, M.D., Ph.D., George Loss, M.D., Ph.D., George Therapondos, M.D., Ochsner Medical Center, New Orleans, LA

Patient Survival

Graft Survival

0 12 24 36 48 60 72 84 96

40% 50% 60% 70% 80% 90% 100%

BMI >40 BMI <30

BMI >40 BMI <30

40% 50% 60% 70% 80% 90% 100%

0 12 24 36 48 60 72 84 96

BMI >40 BMI <30

BMI >40 BMI <30
What is TransCatheter Aortic Valve Replacement?

TAVR

TAVR in the Setting of ESLD
The Ochsner Experience (2012-14)

• 9 pts with ESLD (MELD >12) and significant AS evaluated for TAVR
• 1/9 denied TAVR
  – Successfully underwent AVR/CABG followed by liver-kidney transplant
• 8/9 undergo TAVR
  – 1 undergoes OLTx 1 month post-TAVR
  – 4 pts currently awaiting liver transplant at OMC
  – 1 pt undergoes redo liver/kidney transplant at OMC
  – 1 pt “recompensates” and does not need LTx
  – 1 pt elects to not proceed with transplant evaluation
Nigel Girgrah, MD, PhD

Excellnt Outcomes after Liver Retransplantation for Recurrent HCV: a Single Centre Experience

George Theraponodos, A Kressel, Humberto Bohorquez, Brian Borg, David Bruce, Ian Carmody, Ali Cohen, Nigel Girgrah, Shobah Joshi, Trevor Rechman, and George E Loss

- Small sample size (n=30 vs 589)
- Higher % LKtx (29% vs 17%)
- Intraoperative dialysis
- Lower CIT, WIT

Issues Facing the Liver Transplant Program at Ochsner Clinic in 2016

- The changing face of Hepatitis C and ESLD
- The changing face of Obesity and ESLD
- Transplanting patients with ESLD and multiple co-morbidities
- The changing organ allocation schemes
What is the Imperative?

- Death on the list
- 2011 nearly 25% of our listed patients died while waiting

- 50% with MELD <21, 50% >21
What Drives Aggressive Utilization? Below Depicts the Chance that a Donor will Result in a Liver Transplant by OPO. O/E Ratio Shown.

CAOP 0.84  NYFL 0.96  CASD 0.97  UTOP 0.95

What Drives Aggressive Utilization?

FLUF 1.15  GALL 1.11  ALOB 1.07  LOPA 1.13
Aggressive Centers Use Livers from Donors with the Following Characteristics

- HBV core
- DCD
- CDC
- LFT >500
- HCV
- BMI >40
- Age >65
- Import

Organs Used: Importing Over 50%, but only 10% for MELD >35
• Fracking, or hydraulic fracturing, is the process of extracting natural gas from shale rock layers deep within the earth. Fracking makes it possible to extract resources that were once unreachable with conventional technologies.

Frackable Livers

HBV core
DCD
CDC
LFT >500
HCV
BMI >40
Age >65
Import
iPhone Screen Shots

Smartphone cameras can be used to take pictures through the eyepiece and ocular lens. Takes about 90 seconds to teach a surgeon how to do this.

We do not believe a written report if we are not forced to. We always try to look at the slides ourselves.

Fat content is most often overcalled.

We Don’t Use Bad Livers; We Use Good Livers with Bad Stories

Graft survival significantly better than expected
Patient survival is significantly better than expected
Adult Primary Non-function (PNF) rate 0.1% (national rate still reported as 2-7%)
Transplant rate is significantly higher than expected (2.10 vs expected of 0.66)
Wait time is short (median 2.1 months vs national 15.6)
Mortality rate while on waitlist (0.15 vs expected of 0.19)
Over 100 consecutive DCD liver transplants performed without a graft loss from ischemic cholangiopathy in absence of late HAT.
Organ Donors by State 2006

Organ Donors by State 2011
Strategies

Collaborate (50% imports)

Use Geography to Your Advantage/Build distant relationships

Export Nothing—liver sluts—“if Ochsner won’t use it why should we?”—Stingiest OPO in our region

Culture/Teamwork-Strive to continuously improve and find an edge

Purpose/Mission- remember why we do this
Liver Transplant SRTR

Transplant Rate

Death on List

1 Yr Patient Survival

Ochsner MD Team

Hepatologists
- Nigel Girgrah
- George Therapondos
- Natalie Bzowej
- Shoba Joshi
- Gia Tyson

Surgeons
- Ari Cohen
- David Bruce
- Ian Carmody
- Humberto Bohoroquez
- Trevor Reichman
- Emily Ahmed
- John Seal
- Narendra Battula (fellow)
Thank You