International Intestinal Transplant Registry: 2023 Update

Rob Venick
On Behalf of the IRTA Scientific Committee
IITR Mission

• The International Intestinal Transplant Registry (ITR) collects data on worldwide activity & results of intestinal transplantation (ITx)

• IITR Mission: to provide data on ITx outcomes to the international community in order to help improve patient care, and optimize decision making.
IITR Database Description

• Data collection started in 1985 (Dr. David Grant)

• Data collection & analyses are performed by Eric Pahl, under the direction of the Scientific Committee of the IRTA

• A simple core data set is collected to promote reporting

• Additional data is collected for specific projects
IITR Website

- Data is entered via RedCap
- Center data is confidential and accessible in real time
- Aggregate outcomes are reported in the overall IITR report

Intestinal Transplant Registry “How To” Guide

1. Access the ITR Log-in page at https://intestinalregistry.org/redcap
2. Sign into the Intestinal Transplant Registry with your REDCap username and password
Definitions and Analyses

- **Definitions:**

<table>
<thead>
<tr>
<th>Transplant Type</th>
<th>Intestine</th>
<th>Liver</th>
<th>Stomach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Bowel (SBT)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver/SBT</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Modified MVT</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MVT</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- Pediatric cases defined as < 18 years.
2022-2023 IITR Updates

- August 2022 SRTR data import was performed: 456 new transplant baseline records were added into ITR
- Fall 2022-June 2023: 85 new transplants were added into ITR
- IITR data was accessed June 2023 for this report
Global Intestinal Tx Experience

January 1985 - June 2023

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITx (n=)</td>
<td>4,709</td>
<td>2,350</td>
<td>2,359</td>
</tr>
<tr>
<td>Reporting Centers</td>
<td>98</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>Active Centers</td>
<td>50</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Actively Followed</td>
<td>2,121 (45%)</td>
<td>1,001 (43%)</td>
<td>1,120 (47%)</td>
</tr>
</tbody>
</table>
Intestinal Transplants Performed

(All recipients transplanted between Jan 1985 - June 2023)
Global Trends In Clinical Activity

![Global Trends In Clinical Activity Chart]

- AstaAustralia
- LatinAmerica
- Europe
- NorthAmerica

## Graft Type

<table>
<thead>
<tr>
<th>Type of Transplant</th>
<th>Pediatric (n=2,350)</th>
<th>Adult (n=2,359)</th>
<th>Overall Peds+ Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBT</td>
<td>35%</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Liver/SBT</td>
<td><strong>45%</strong></td>
<td>13%</td>
<td>29%</td>
</tr>
<tr>
<td>Modified MVT</td>
<td>2%</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>MVT</td>
<td><strong>18%</strong></td>
<td>24%</td>
<td>21%</td>
</tr>
</tbody>
</table>

The type of transplants have remained proportionally relatively constant over time.
The type of transplants have remained proportionally relatively constant over time.
## Demographics of ITx

<table>
<thead>
<tr>
<th></th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median Age at ITx</strong></td>
<td>2.8 y/o (1.2, 6.9)</td>
<td>41 y/o (30, 52)</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>43%</td>
<td>51%</td>
</tr>
</tbody>
</table>
Age at Time of ITx

<table>
<thead>
<tr>
<th></th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
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<td>2.8 y/o (1.2, 6.9)</td>
<td>41 y/o (30, 52)</td>
</tr>
</tbody>
</table>

Number of Transplants by Year of Transplant (2000-2022)

- Red: Age < 1
- Blue: Age < 18

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Indications for ITx

Pediatric ITx

Leading causes of peds SBS:
- Gastrochisis
- Volvulus
- NEC
- Intestinal atresia

Adult ITx

Leading causes of adult SBS:
- Ischemia
- Crohn’s disease
- Volvulus
- Trauma
Indications for Transplant Over Time

Proportion

Year Group


Motility Disorder, Mucosal Defect, Retransplant, Short Gut, Tumor

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Trends In Graft Type
Transplant Type Over Time

**Pediatric**, n=2350

**Adults**, n=2359

- Red: No Liver
- Blue: Liver Component
Colon Inclusion Over Time
Functional Status of Transplant Recipients by Era
Initial Hospitalization
# Length of Stay

<table>
<thead>
<tr>
<th></th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Initial LOS (days)</td>
<td>53 (34, 92)</td>
<td>41 (25, 73)</td>
</tr>
</tbody>
</table>
Induction Immunosuppression

Pediatric induction immunosuppression changes over time

Adult induction immunosuppression changes over time

- Daclizumab, Zenapax basiliximab, Simulect
- Anti-lymphocyte product ATG or ALG
- Alemtuzumab CamPath
- Other
- Rituximab
# Rejection During Initial Hospitalization

<table>
<thead>
<tr>
<th>Category</th>
<th>No Rejection</th>
<th>Mild ACR</th>
<th>Mod-Severe ACR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric</td>
<td>65%</td>
<td>22%</td>
<td>13%</td>
</tr>
<tr>
<td>Adult</td>
<td>79%</td>
<td>15%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Long-Term Follow-Up
### At Last Follow-Up

#### Immunosuppression

<table>
<thead>
<tr>
<th></th>
<th>Tac</th>
<th>CSa</th>
<th>MMF</th>
<th>Aza</th>
<th>Siro</th>
<th>Pred</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ped+ Adults</td>
<td>91%</td>
<td>3%</td>
<td>12%</td>
<td>6%</td>
<td>16%</td>
<td>55%</td>
<td>4%</td>
</tr>
</tbody>
</table>

#### Complications

- Insulin/Anti-glycemic
- Anti-HTNsive
- CRRT
- PTLD

[Bar chart showing the distribution of complications for Peds and Adults.]
Trends in Graft & Patient Survival
Overall Graft & Patient Survival (1985-2022)

<table>
<thead>
<tr>
<th>Survival</th>
<th>1- year</th>
<th>5-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graft</td>
<td>67%</td>
<td>50%</td>
</tr>
<tr>
<td>Patient</td>
<td>74%</td>
<td>59%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survival</th>
<th>1- year</th>
<th>5-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graft</td>
<td>69%</td>
<td>44%</td>
</tr>
<tr>
<td>Patient</td>
<td>76%</td>
<td>50%</td>
</tr>
</tbody>
</table>
1-Year Graft Survival Over Time

Survival (%)

Transplant Year

- Adult
- Pediatric
5-Year Graft Survival Over Time

![Graph showing 5-year graft survival over time for adult and pediatric patients. The graph indicates an increasing trend in survival rate over the years.]
5-Year Conditional Graft Survival Over Time

Five-Year Conditional Graft Survival, Given Survival to One Year

Survival (%)

Transplant Year

2000
2010
2020

Adult
Pediatric
Pediatric Graft Survival By Transplant Type (2009-2022)

**Graph Description:**
- The graph shows the survival rates for different types of transplant recipients over a period from 2009 to 2022.
- The x-axis represents the years post-transplantation, ranging from 0 to 20.
- The y-axis represents the graft survival percentage, ranging from 0% to 100%.
- There are four types of transplant recipients represented:
  - **SBT** (red line)
  - **MVT** (green line)
  - **MMVT** (blue line)
  - **SB+Liv** (purple line)

**Statistical Information:**
- The graph highlights a statistical significance of **p = 0.0039**.

**Key takeaway:**
The survival rates vary significantly across different transplant types, with some showing higher survival rates than others.
Adult Graft Survival By Transplant Type (2009-2022)

Graft Survival

Years

p = 0.017
Pediatric Patient Survival by Transplant Era

- 1985-1995
- 1996-2000
- 2001-2005
- 2006-2010
- 2011-2015
- 2016-2020
- 2021-2022

\[ p < 0.0001 \]
Adult Patient Survival by Transplant Era

- 1985-1995
- 1996-2000
- 2001-2005
- 2006-2010
- 2011-2015
- 2016-2020
- 2021-2022

Patient Survival

Years

p < 0.0001
Causes of Death
(1985-2023)

- Sepsis, 54%
- Graft Failure, 16%
- MSOF, 14%
- Other, 10%
- PTLD, 6%
## Multivariate Predictors of Graft Survival

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Called in from home for ITx</td>
<td>0.74</td>
<td>0.008</td>
</tr>
<tr>
<td>Liver-inclusive graft</td>
<td>0.67</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Primary Transplant</td>
<td>0.66</td>
<td>0.030</td>
</tr>
<tr>
<td>Rapamycin maintenance therapy</td>
<td>0.83</td>
<td>0.057</td>
</tr>
</tbody>
</table>
## Multivariate Predictors of Patient Survival

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Called in from home for ITx</td>
<td>0.63</td>
<td>0.003</td>
</tr>
<tr>
<td>Pediatric Age</td>
<td>0.98</td>
<td>.06</td>
</tr>
</tbody>
</table>
Challenges, Benefits & The Future of IITR
IITR Challenges

• Barriers to Data Entry:
  – IRB & DUA Challenges
  – Limited resources (unfunded registry)
  – Time to enter data

• Unpopulated Data Fields:
IITR Publications

• Publications:

  – Ceulemans L et al. Outcome after intestinal transplantation from living versus deceased donors: a propensity-matched cohort analysis of the IITR. *Annals of Surgery* 2023

  – Raghu V et al. Analysis of the intestinal transplant registry *Pediatric Transplantation* 2019

Individual Center Reports for IRTA Members

Data Summary

152 Total Transplants

<table>
<thead>
<tr>
<th>Number of Transplants by Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Transplants</td>
</tr>
<tr>
<td>Pediatric (≤ 18)</td>
</tr>
<tr>
<td>Adult (18+)</td>
</tr>
<tr>
<td>Unknown (NA)</td>
</tr>
<tr>
<td>352</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>53</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Value for benchmarking and QI
Future IITR Opportunities

• Streamline IRB & DUA process
• Explore linkage between existing registries & the ITR
  i.e.- UK NHS Bowel Transplant Registry, Eurotransplant, Argentina, IRTA Chapters
• Encourage continuous data entry
• Promote the use of center dashboards (QI)
Future of the IITR

• Utilize the IITR to address specific, targeted, contemporary knowledge deficits
  i.e. - DSA, PTLD, Long-term complications, Re-ITx

• IITR: Longitudinal follow-up of IFR patients who require ITx
Thank you