Care of the Elderly Transplant Patient

Laura Roldan, RN, MSN, CCTC
October 18, 2013

Transplant Center
Care of the Elderly Transplant Patient

Objectives

• Define elderly
• Define what are top causes of death in U.S.
• What leading causes of death in elderly
• Describe the changes the body goes through with age
• List the risks associated with transplanting the elderly
• Understand how the immune system changes with age
• Describe how to safely medicate the elderly
• Describe ways to safely care for an elderly transplant recipient
World Health Organization definition of elderly
• 65 years or older
Care of the Elderly Transplant Patient

CDC

2000 – 2010 life expectancy increased
• 2.1 years males (75.7)
• 1.7 years females (80.8)
• Average life expectancy is 78.3 years
• A male who is alive at 65 years is expected to live another 17.2 years
• A female who alive at 65 years is expected to live another 19.9 years
Care of the Elderly Transplant Patient

Increase in elderly recipients

- More listed at advanced age
- Younger transplant recipients reaching older age
- Higher donor age
- Older population rapidly growing
## Care of the Elderly Transplant Patient

### Transplants in the U.S. by Recipient Age


Based on OPTN data as of August 9, 2013

<table>
<thead>
<tr>
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<tbody>
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<td>2,503</td>
<td>6,386</td>
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<td>6,892</td>
<td>6,965</td>
<td>7,460</td>
<td>7,744</td>
<td>7,805</td>
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<td>7,730</td>
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<td>4,017</td>
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<td>3,432</td>
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<td>2,413</td>
<td>2,169</td>
<td>1,872</td>
<td>1,821</td>
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**Barnes Jewish Hospital**

**Washington University in St. Louis Physicians**

National Leaders in Medicine
### Care of the Elderly Transplant Patient

**Characteristics of patients on the liver transplant waiting list on December 31, 2001 & December 31, 2011**

<table>
<thead>
<tr>
<th>AGE Level</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
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<tr>
<td>18-34</td>
<td>844</td>
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<td>35-49</td>
<td>5,574</td>
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<td>50-64</td>
<td>8,489</td>
<td>51.3</td>
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<tr>
<td>65+</td>
<td>1,637</td>
<td>9.9</td>
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**Characteristics of liver transplant recipients, 2001 & 2011**

<table>
<thead>
<tr>
<th>AGE Level</th>
<th>2001</th>
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<tr>
<td></td>
<td>N</td>
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<tr>
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<tr>
<td>65+</td>
<td>339</td>
<td>7.4</td>
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Distribution of patients waiting for a liver transplant

- 65+
- 50-64
- 35-49
- 18-34

Care of the Elderly Transplant Patient
Care of the Elderly Transplant Patient

Adult Liver Transplants

- 50-64
- 35-49
- 18-34
- 65+
- 1998-2010
## Characteristics of patients on the heart transplant waiting list on December 31, 2001 & December 31, 2011

<table>
<thead>
<tr>
<th>AGE</th>
<th>2001</th>
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<td></td>
<td>N</td>
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<tr>
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<td>270</td>
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<tr>
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<td>23.7</td>
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<tr>
<td>65+</td>
<td>421</td>
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## Characteristics of heart transplant recipients, 2001 & 2011

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<td></td>
<td>N</td>
<td>%</td>
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<td>457</td>
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<td>1,070</td>
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<tr>
<td>65+</td>
<td>208</td>
<td>10.8</td>
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## Characteristics of patients on the lung transplant waiting list on December 31, 2001 & December 31, 2011

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<tr>
<td></td>
<td>N</td>
<td>%</td>
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<tr>
<td>18-34</td>
<td>613</td>
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<tr>
<td>35-49</td>
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<td>30.2</td>
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<td>1,665</td>
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<tr>
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## Characteristics of lung transplant recipients, 2001 & 2011

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<tr>
<td></td>
<td>N</td>
<td>%</td>
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<tr>
<td>18-34</td>
<td>133</td>
<td>12.7</td>
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<tr>
<td>35-49</td>
<td>237</td>
<td>22.7</td>
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<tr>
<td>50-64</td>
<td>614</td>
<td>58.8</td>
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<tr>
<td>65+</td>
<td>36</td>
<td>3.4</td>
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</table>
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Distribution of patients waiting for a heart transplant

Distribution of patients waiting for a lung transplant

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Adult heart transplants

Adult lung transplants

Transplants per 100 wait-list years
## Characteristics of patients on the kidney transplant waiting list on December 31, 2001 & December 31, 2011

<table>
<thead>
<tr>
<th>AGE</th>
<th>Level</th>
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<th></th>
<th>2011</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
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<td>18-34</td>
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<td>466</td>
<td>1.0</td>
<td>1868</td>
<td>2.2</td>
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## Characteristics of kidney transplant recipients, 2011

<table>
<thead>
<tr>
<th>AGE</th>
<th>Level</th>
<th>2001</th>
<th></th>
<th>2011</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>18-34</td>
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<td>2685</td>
<td>19.8</td>
<td>1246</td>
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<td>4665</td>
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<td>33.6</td>
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<tr>
<td>65-74</td>
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<td>4913</td>
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<td>39.3</td>
</tr>
<tr>
<td>75+</td>
<td></td>
<td>1287</td>
<td>9.5</td>
<td>903</td>
<td>11.4</td>
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</tbody>
</table>
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Distribution of patients waiting for a kidney transplant

- Age
  - 75+
  - 65-74
  - 50-64
  - 35-49
  - 18-34

- Percent

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Care of the Elderly Transplant Patient

CDC – 2013

• 2 out of 3 older Americans have multiple, chronic conditions

• Accounts for 66% of healthcare budget

• 1 of every 5 adults is older

• Cost for providing healthcare to person aged 65 or older is 3-5 times higher than someone younger
 APA

• Primary source of income for 65 and older is social security
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Risks of Transplantation in the elderly

- Increased risk of infection
- Increased risk of neoplasm
- Increased bone disease
- Increased risk of interactions/reactions with drugs
- Death with graft function
Older Donors

- Age graft less robust and ability to recover from damage decreases with age.
- Older donors are more immunogenic
- Organ quality decreases with age
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2008 USA Today
“More Elderly Having Transplants”
• Pushing age limits
• Increased elderly patient survival
• Older patients imperfect organs
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Changes in Transplant
• Increased age of recipients
• Increased age of donors
• Increased use of marginal donors
• Increased co-morbidities among recipients
• Increased cost of transplantation
• Aging population – we are getting older; prevalence of end-stage organ failure
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Matching donor age to recipient age
  • Moral, ethical issues
  • Increase in recipients on waitlist
  • Donor shortage
  • Shorter wait time better for older recipients

Use of young donors in elderly
  • Procedure cost effective in relation to alternative
  • Life years saved
Changes in body with age

- Hypertension
- Dyslipidemia
- Cognitive Impairment
- Prostatic Hypertrophy
- Decreased hearing
- Change in long-term memory
- Changes in vision
- Increased gastric pH
- Decreased C.O.
- Decreased GFR
- Decreased lean body mass
- Decreased physical activity
- Difficulty sleeping

- Life expectancy rose 0.2/year from 78.5 years to 78.7 years
- 15 leading causes of death

1. Heart disease
2. Neoplasm
3. Chronic lower respiratory diseases
4. CVA
5. Accidents (unintentional injuries)
6. Alzheimer’s
7. Diabetes
8. Nephritis
9. Influenza/pneumonia
10. Suicide (intentional self-harm)
11. Septicemia
12. Chronic liver disease
13. HTN and hypertensive renal disease
14. Parkinson’s
15. Pneumonitis

Taken from the US Census Bureau
Received as of April 2010
1991-2010
Care of the Elderly Transplant Patient

Top 5 causes of death in elderly

1. Heart disease
2. Cancer
3. CVA
4. Pneumonia / flu
5. COPD
Shift to Aging Population

Aging – changes in transcription of genes
  – Change in replicative senescence
  – Failure of mitotic competence
  – Loss of telomeric function
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Immune System in Elderly
• Change related to age itself
• Immunosenescence – decreased potency
  – Helper T cell less functional
• Increased susceptibility to neoplasms/cancer due to over immunosuppression
Immune System in Elderly

- Decrease in bone marrow hematopoetic tissue
- Decrease in naive T cell production
- Increased senescent T cells
- Decrease in frequency of CD$_4$ T cells producing IL-2
- Change in humoral immunity
- Smaller number of B cells leaving marrow
- Natural killer cells increased
- Decreased macrophage activity
- Decrease in phagocytic ability of neutrophils
Immune System in Elderly

- Decreased ability to mount inflammatory cytokine response
- Decreased clearance of apoptotic cells by macrophages (decreased macrophage activity)
- Neutrophils remain the same but their phagocytic ability decreases
Immune System in Elderly

- Thymic Involution – Thymus gland decreases activity with age
  - Decrease of naïve T cells
    - Decreased ability to mount a response against new antigens
  - Decreased CD$_4$ T cells, Increased CD$_8$
  - Inability to proliferate and secrete IL-2
  - T cells stimulate B cells
    - Decreased AB production
  - Decreased T regulator function after age 50
    - Number of B cells decreases
    - AB function decreases with infections/vaccines
Immune System in Elderly

Thymic Involution
- Decrease of naïve T cells
- Increased memory cells associated with increase in cytokine production
- Decrease in T cell receptor diversity
- Increased levels pro-inflammatory cytokines (TNF, Interferon gamma)
Immunotherapy in the elderly – 90% of older Americans 65 years take at least one medication, most take 2 or more

- Increased risk of diabetes
- Increased risk of adverse effects
- Increased risk of drug interactions
- Increased nephrotoxicity

1995 Mayo Clinic Proceedings 70;685-693
Immunotherapy in the elderly
Related to
- Altered absorption
- Altered distribution
- Altered hepatic metabolic function (20-30% decreased mass; 40-45% blood flow)
- Altered renal function (40% decrease in blood flow)
- Diminished gastric emptying
- Decreased bowel motor activity
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Immunotherapy in the elderly
Related to
• Reduced intestinal epithelium surface area (40% decreased blood flow)
• Decrease in drug clearance
• Decreased gastric acid secretion
• GFR deterioration
• Decreased total body water
• Decreased plasma albumin

1995 Mayo Clinic Proceedings 70;685-693
Immunotherapy in the elderly

Thus

- Lower doses of drugs
- Begin low and slow
- Be careful about over the counter meds
- Simplify medication schedules
- Adjust medications due to age (already immunosuppressed due to age alone)
- Adequate nutrition – optimizing immune function
- BEERS Criteria
## Care of the Elderly Transplant Patient

### Heart-Lung Transplant
Unadjusted Graft and Patient Survival*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>3 Months (Tx 2009-2010)</th>
<th>1 Year (Tx 2009-2010)</th>
<th>5 Years (Tx 2005-2010)</th>
<th>10 Years (Tx 2000-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-34 Years</td>
<td>87.00%</td>
<td>87.00%</td>
<td>87.00%</td>
<td>87.00%</td>
</tr>
<tr>
<td>35-49 Years</td>
<td>76.20%</td>
<td>76.20%</td>
<td>71.10%</td>
<td>71.40%</td>
</tr>
<tr>
<td>50-64 Years</td>
<td>94.70%</td>
<td>94.70%</td>
<td>78.20%</td>
<td>78.90%</td>
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</table>
### Heart Transplant

**Unadjusted Graft and Patient Survival**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>3 Months (Tx 2009-2010)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Graft Survival</td>
<td>Pt. Survival</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Graft Survival</td>
<td>Pt. Survival</td>
</tr>
<tr>
<td>18-34 Years</td>
<td>97.10%</td>
<td>97.60%</td>
<td>93.50%</td>
<td>94.80%</td>
</tr>
<tr>
<td>35-49 Years</td>
<td>95.00%</td>
<td>95.10%</td>
<td>92.20%</td>
<td>92.20%</td>
</tr>
<tr>
<td>50-64 Years</td>
<td>93.30%</td>
<td>93.60%</td>
<td>89.40%</td>
<td>89.70%</td>
</tr>
<tr>
<td>65+ Years</td>
<td>91.10%</td>
<td>91.50%</td>
<td>86.80%</td>
<td>87.10%</td>
</tr>
</tbody>
</table>

*Care of the Elderly Transplant Patient*
## Liver - Living Donor

*Unadjusted Graft and Patient Survival*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>3 Months (Tx 2009-2010)</th>
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<tbody>
<tr>
<td>18-34 Years</td>
<td>93.80%</td>
<td>95.60%</td>
<td>89.60%</td>
<td>93.30%</td>
</tr>
<tr>
<td>35-49 Years</td>
<td>91.80%</td>
<td>94.40%</td>
<td>87.70%</td>
<td>93.10%</td>
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<tr>
<td>50-64 Years</td>
<td>93.50%</td>
<td>96.70%</td>
<td>86.10%</td>
<td>91.00%</td>
</tr>
<tr>
<td>65+ Years</td>
<td>88.90%</td>
<td>88.60%</td>
<td>82.20%</td>
<td>81.80%</td>
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</table>
Liver- Deceased Donor
Unadjusted Graft and Patient Survival*

<table>
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<tr>
<th>Age Group</th>
<th>3 Months (Tx 2009-2010)</th>
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<tbody>
<tr>
<td>18-34 Years</td>
<td>92.40%</td>
<td>95.10%</td>
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<td>91.60%</td>
</tr>
<tr>
<td>35-49 Years</td>
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<td>95.20%</td>
<td>87.20%</td>
<td>91.50%</td>
</tr>
<tr>
<td>50-64 Years</td>
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<td>86.70%</td>
<td>89.60%</td>
</tr>
<tr>
<td>65+ Years</td>
<td>89.60%</td>
<td>92.30%</td>
<td>81.40%</td>
<td>84.30%</td>
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### Care of the Elderly Transplant Patient

#### Kidney - Deceased Donor

Unadjusted Graft and Patient Survival*

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<td>96.60%</td>
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*Transplant Center*
## Kidney- Living Donor

Unadjusted Graft and Patient Survival*

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<td>96.50%</td>
<td>99.40%</td>
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<td>96.90%</td>
<td>63.50%</td>
<td>90.20%</td>
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<td>97.20%</td>
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<td>87.20%</td>
<td>95.10%</td>
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<td>84.00%</td>
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<td>99.10%</td>
<td>95.10%</td>
<td>96.90%</td>
<td>77.90%</td>
<td>81.50%</td>
<td>44.00%</td>
<td>47.50%</td>
</tr>
</tbody>
</table>

*Data includes all transplant years from 2000 to 2010*
## Care of the Elderly Transplant Patient

### Lung- Deceased Donor

Unadjusted Graft and Patient Survival*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>3 Months (Tx 2009-2010)</th>
<th>1 Year (Tx 2009-2010)</th>
<th>5 Years (Tx 2005-2010)</th>
<th>10 Years (Tx 2000-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-34 Years</td>
<td>93.10%</td>
<td>95.30%</td>
<td>85.30%</td>
<td>87.80%</td>
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<tr>
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<td></td>
<td>46.90%</td>
<td>53.00%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>30.70%</td>
<td>36.80%</td>
</tr>
<tr>
<td>35-49 Years</td>
<td>93.30%</td>
<td>93.60%</td>
<td>87.20%</td>
<td>88.80%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>57.90%</td>
<td>62.40%</td>
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<td></td>
<td></td>
<td>35.90%</td>
<td>39.70%</td>
</tr>
<tr>
<td>50-64 Years</td>
<td>91.90%</td>
<td>92.80%</td>
<td>84.20%</td>
<td>85.20%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>54.20%</td>
<td>56.60%</td>
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<td></td>
<td></td>
<td></td>
<td>24.50%</td>
<td>26.50%</td>
</tr>
<tr>
<td>65+ Years</td>
<td>92.30%</td>
<td>93.30%</td>
<td>80.70%</td>
<td>82.10%</td>
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<td></td>
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<td>43.60%</td>
<td>44.60%</td>
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<td></td>
<td></td>
<td>17.20%</td>
<td>18.20%</td>
</tr>
</tbody>
</table>

*Transplant Center at Barnes-Jewish Hospital and Washington University in St. Louis*
Care of the elderly transplant recipient

Thus

• Regular exercise
  – 2 hours 30 minutes of moderate intensity aerobic weekly
  – Muscles strengthening 2 or more days or 1 hour 15 minutes weekly

• Supplements (Vitamin D, B₁₂)

• Vaccinations (higher doses)
  – Influenza
  – Tetanus/diphtheria/pertussis every 10 years
  – Varicella – 2 doses
  – Pneumococcal

• Colorectal screening
Care of the elderly transplant recipient

- Screening for Bone Health
- Screening for Nutritional Alterations
- Assess for any Sensory Impairment
- Assess Mental Health
- Screening of recipients—will procedure improve QOL
- Avoid Poly-pharmacy
- Medicate low and slow
- Assess for sleep disorders
Care of the Elderly Transplant Patient

Summary

- Elderly can have successful course after transplant
- Are we widening the gap? Ethical issues
- More research regarding care of elderly after transplant regarding QOL
- Does Cost outweigh benefit?
- Age is not a direct contraindication with immunosuppressive medications.
- Geriatric Assessment Pre-Transplant