Cardiovascular Risk Reduction in Kidney Transplant Recipients

Istvan Mucsi

University Health Network, Toronto, Ontario, Canada and
Semmelweis University Budapest, Hungary
Conflict of interest: none
Lots to talk about....

• Risk assessment, risk prediction
• Early/peri-op risk – pre-tx screening

• CVD and CV risk factors in Tx
• Hypertension
• DM
• Lipids
• Obesity
• Bone – FGF23
• Psycho-social factors - depression
• Prediction, assessment, follow-up
• How to manage...
Cardiovascular mortality in kidney transplant recipients


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Association of pre-transplant dialysis duration with outcome in kidney transplant recipients: a prevalent cohort study

Adam Remport · Andras Keszei · Eszter Panna Vamos · Marta Novak · Jeno Jaray · Laszlo Rosivall · Istvan Muesi · Miklos Zsolt Molnar

Figure 1 Prevalence of cardiovascular disease in patients with renal disease

Cause of mortality; UK Renal Registry – courtesy Dr. D Goldsmith
Majority of transplant recipients have kidney function equivalent to stage 3 CKD or worse (UK data)

19,074 adult patients with a functioning kidney transplant at the end of 2005
Assessing CV risk
Framingham Risk Score and Novel Cardiovascular Risk Factors Underpredict Major Adverse Cardiac Events in Kidney Transplant Recipients

Samuel A. Silver, Michael Huang, Michelle M. Nash, and G. V. Ramesh Prasad

Transplantation 2011;92: 183–189
The External Validation of the Cardiovascular Risk Equation for Renal Transplant Recipients: Applications to BENEFIT and BENEFIT-EXT Trials

Inga Soveri, Jon Snyder, Hallvard Holdaas, Ingar Holme, Alan G. Jardine, Gilbert J. L’Italien, and Bengt Fellström

- age,
- Previous coronary heart disease
- Smoking
- serum creatinine,
- diabetes mellitus,
- LDL-cholesterol (for MACE only),
- total time on renal replacement therapy (for MACE only),
- number of transplants

(Transplantation 2012;94: 57Y62)
Risk prediction

- Framingham Risk Score
- Age
- LDL/total cholesterol
- HDL-cholesterol
- Blood pressure
- Presence of diabetes
- Smoker status

- Lisbon conference (2007)
  - age 60 years
  - dyslipidemia
  - hypertension,
  - diabetes mellitus,
  - smoking,
  - prior cardiovascular disease,
  - years on dialysis,
  - left ventricular hypertrophy
Cardiovascular morbidity and mortality after kidney transplantation

Sokratis Stoumpos,¹ Alan G. Jardine¹,² and Patrick B. Mark¹,²

Pre transplant factors

DONOR FACTORS
- Age, Graft quality, Brain-death injury, Vascular disease

RECIPIENT FACTORS
- Age, Smoking, BMI, Preexisting vascular disease, Preexisting diabetes, Dialysis vintage

IMMUNOLOGIC FACTORS
- Episodes of acute rejection

NONIMMUNOLOGIC FACTORS
- Chronic toxic effects of CNI or steroids

Post transplant factors

REDUCED eGFR

LVH  HYPERTENSION  PTDM  DYSLIPIDAEMIA

ARRHYTHMIA  CHF  CAD  VALVULAR HEART DISEASE

CV DEATH

Management of cardiovascular disease in patients with kidney disease

Mark R. Kahn, Michael J. Robbins, Michael C. Kim and Valentin Fuster

**Chronic kidney disease**
- LDL-cholesterol level <100 mg/dl
- Statins recommended
- Antiplatelet therapy; consider ticagrelor or prasugrel when dual antiplatelet therapy needed in high-risk patients

**End-stage renal disease**
- LDL-cholesterol level <100 mg/dl
- No compelling evidence for statin use, but might be beneficial in patients with diabetes mellitus
- Antiplatelet therapy; consider ticagrelor or prasugrel when dual antiplatelet therapy needed in high-risk patients
- Revascularization with percutaneous coronary intervention or CABG surgery according to current guidelines

**Coronary artery disease**

**Congestive heart failure**
- β-Blockers recommended
- ACE inhibitors or ARBs recommended
- MRAs can be considered
- Use digoxin with caution and adjust dose

**Valvular disease**
- Valve replacement according to current guidelines

**Atrial fibrillation**
- Use apixaban, dabigatran, rivaroxaban, or warfarin for stroke prevention

**β-Blockers recommended**
- ACE inhibitors or ARBs recommended
- Use MRAs with caution; requires close monitoring of potassium level
- Avoid digoxin except in selected patients with congestive heart failure or atrial fibrillation

**Yearly echocardiography in moderate aortic stenosis**
- Consider aortic valve replacement in asymptomatic severe aortic stenosis
- The choice between mechanical and bioprosthetic valves must be individualized

**Use only warfarin for stroke prevention**
### Table 4. Traditional and nontraditional risk factors for CVD in renal transplant recipients

<table>
<thead>
<tr>
<th>Traditional Risk Factors</th>
<th>Nontraditional Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older age</td>
<td>Decreased kidney function</td>
</tr>
<tr>
<td>Male gender</td>
<td>CNI</td>
</tr>
<tr>
<td>Family history of CVD</td>
<td>Proteinuria</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Anemia</td>
</tr>
<tr>
<td>Hypertension</td>
<td>C-reactive protein</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Oxidative stress</td>
</tr>
<tr>
<td>- low HDL</td>
<td>Advanced glycation end products</td>
</tr>
<tr>
<td>- high LDL</td>
<td>Inflammation</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>Homocysteine</td>
</tr>
<tr>
<td>Left ventricular hypertrophy</td>
<td></td>
</tr>
<tr>
<td>Menopause</td>
<td>Uric acid</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>Hyperparathyroidism</td>
</tr>
<tr>
<td></td>
<td>Obesity</td>
</tr>
<tr>
<td></td>
<td>Thrombogenic factors</td>
</tr>
</tbody>
</table>

CAD treatment gap in the community

Provider awareness does not equal successful implementation

NCEP = National Cholesterol Education Program

The world would be a better place if we kept six of the ten commandments. Any six.
Hypertension
Blood Pressure One Year after Kidney Transplantation and Graft Outcome

BP, Cardiovascular Disease, and Death in the Folic Acid for Vascular Outcome Reduction in Transplantation Trial

Myra A. Carpenter,* Alin John,† Matthew R. Weir,‡ Stephen R. Smith,§
Lawrence Hunsicker,‖ Bertram L. Kasiske,‖ John W. Kusek,** Andrew Bostom,‖‖
Anastasia Ivanova,‖ Andrew S. Levey,§ Scott Solomon,‖ Todd Pesavento,‖‖ and
Daniel E. Weiner§

A

![Graph showing hazard ratio vs. systolic blood pressure groups (mm Hg)]

B

![Graph showing hazard ratio vs. diastolic blood pressure groups (mm Hg)]
hypertensive persons aged 60 years or older to a BP goal of less than 150/90mmHg and hypertensive persons 30 through 59 years of age to a diastolic goal of less than 90mmHg;

there is insufficient evidence in hypertensive persons younger than 60 years for a systolic goal, or in those younger than 30 years for a diastolic goal, so the panel recommends a BP of less than 140/90mmHg for those groups (expert opinion).

The same thresholds and goals are recommended for hypertensive adults with diabetes or nondiabetic chronic kidney disease (CKD) as for the general hypertensive population < 60 years.

MODERATE: initiating drug treatment with an ACEI, ARB, calcium channel blocker, or thiazide-type diuretic in the nonblack hypertensive population, including those with diabetes.

In the black hypertensive population, including those with diabetes, a calcium channel blocker or thiazide-type diuretic is recommended as initial therapy.

There is moderate evidence to support initial or add-on ACEI/ARB in persons with CKD to improve kidney outcomes.
Observational Modeling of Strict vs Conventiona Pressure Control in Patients With Chronic Kidney
Figure 3. Kaplan-Meier Survival Curves of Patients With Follow-up Systolic Blood Pressure (SBP) Less Than 120 vs 120 to 139 mm Hg

A) Overall cohort

B) Propensity score-matched cohort
Figure 4. Propensity Score-Adjusted Hazard Ratios of All-Cause Mortality Associated With Systolic Blood Pressure Less Than 120 vs 120 to 139 mm Hg in Various Subgroups of Patients in the Overall Cohort.
Cardiovascular Death in Kidney Recipients Treated With Renin–Angiotensin System Blockers

Gerhard Opelz and Bernd Döhler

A

Deceased donor

ACEi/ARB  n=10,946
Other AHY  n=17,674

P = 0.27

B

Living donor

ACEi/ARB  n=4,304
Other AHY  n=6,327

P = 0.88

Transplantation 2014;97: 310Y315
Angiotensin-Converting Enzyme Inhibitor, Angiotensin Receptor Blocker Use, and Mortality in Patients With Chronic Kidney Disease

Miklos Z. Molnar, MD, PhD,‡‡ Kamyar Kalantar-Zadeh, MD, MPH, PhD,*† Evan H. Lott,§ Jun Ling Lu, MD,∥ Sandra M. Malakauskas, MD, PhD,¶# Jennie Z. Ma, PhD,# Darryl L. Quarles, MD,∥ Csaba P. Kovesdy, MD∥∥

Figure 1
Kaplan-Meier Survival Curves of 20,247 Patients Treated With ACEIs/ARBs and 20,247 Untreated Patients Matched by Propensity Scores
Angiotensin-Converting Enzyme Inhibitor, Angiotensin Receptor Blocker Use, and Mortality in Patients With Chronic Kidney Disease

Miklos Z. Molnar, MD, PrfD,|| Kamyar Kalantar-Zadeh, MD, MPH, PrfD,|| Evan H. Lott,§
Jun Ling Lu, MD,∥ Sandra M. Malakauskas, MD, PrfD,¶ Jennie Z. Ma, PrfD,¶
Darryl L. Quarles, MD,∥ Csaba P. Kovesdy, MD||

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Hazard Ratio of Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt;70 years</td>
<td></td>
</tr>
<tr>
<td>Age &gt;=70 years</td>
<td></td>
</tr>
<tr>
<td>Whites</td>
<td></td>
</tr>
<tr>
<td>Blacks</td>
<td></td>
</tr>
<tr>
<td>Absence of diabetes</td>
<td></td>
</tr>
<tr>
<td>Presence of diabetes</td>
<td></td>
</tr>
<tr>
<td>Absence of CHF</td>
<td></td>
</tr>
<tr>
<td>Presence of CHF</td>
<td></td>
</tr>
<tr>
<td>eGFR&gt;= 90 ml/min</td>
<td></td>
</tr>
<tr>
<td>eGFR: 60-&lt;90 ml/min</td>
<td></td>
</tr>
<tr>
<td>eGFR: 45-&lt;60 ml/min</td>
<td></td>
</tr>
<tr>
<td>eGFR: 30-&lt;45 ml/min</td>
<td></td>
</tr>
<tr>
<td>eGFR: 15-&lt;30 ml/min</td>
<td></td>
</tr>
<tr>
<td>eGFR:&lt;15 ml/min</td>
<td></td>
</tr>
<tr>
<td>Serum potassium &lt;=4.5 mmol/l</td>
<td></td>
</tr>
<tr>
<td>Serum potassium &gt;4.5 mmol/l</td>
<td></td>
</tr>
<tr>
<td>Blood hemoglobin &lt;=11 g/dL</td>
<td></td>
</tr>
<tr>
<td>Blood hemoglobin &gt;11 g/dL</td>
<td></td>
</tr>
<tr>
<td>Systolic BP &lt;=&lt;130 mmHg</td>
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</tr>
<tr>
<td>Systolic BP &gt;130 mmHg</td>
<td></td>
</tr>
<tr>
<td>Diastolic BP &lt;=&lt;80 mmHg</td>
<td></td>
</tr>
<tr>
<td>Diastolic BP &gt;80 mmHg</td>
<td></td>
</tr>
<tr>
<td>Serum albumin &lt;=&lt;4 g/dL</td>
<td></td>
</tr>
<tr>
<td>Serum albumin &gt;4 g/dL</td>
<td></td>
</tr>
<tr>
<td>ACR &lt;=20</td>
<td></td>
</tr>
<tr>
<td>ACR &gt;20</td>
<td></td>
</tr>
</tbody>
</table>

Hazard Ratios (95% CIs) of All-Cause Mortality Associated With ACEI/ARB Administration in Various Subgroups of 40,494 Propensity Score-Matched Patients With Nondialysis-Dependent CKD
Antiplatelet agents
Benefits for antiplatelet therapy among persons with CKD are uncertain and are potentially outweighed by bleeding hazards.
Dyslipidemia
### Table 2. Effect of immunosuppressive drugs on lipid parameters

<table>
<thead>
<tr>
<th>Drug</th>
<th>TC</th>
<th>LDL-C</th>
<th>HDL-C</th>
<th>TG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclosporine</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↓</td>
<td>↑↑</td>
</tr>
<tr>
<td>Tacrolimus</td>
<td>↑</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Sirolimus</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↓</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Everolimus</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↓</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Mycophenolate mofetil</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Azathioprine</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Prednisone</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Deflazacort</td>
<td>↑</td>
<td>↑</td>
<td>↑↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

HDL-C—high-density lipoprotein cholesterol; LDL-C—low-density lipoprotein cholesterol; TC—total cholesterol; TG—triglyceride.
Prevalence of Hyperlipidemia in Renal Transplant Patients Based on CKD Stage

Karthikeyan V, Am J Transplant 4:262-269, 2004

- Cholesterol > 200 mg/dl
- Triglycerides > 150 mg/dl
- Lipid Lowering Therapy

Bar chart showing the prevalence of hyperlipidemia based on CKD stage:

- Stage 1: 67%
- Stage 2: 44%
- Stage 3: 54%
- Stage 4: 59%
- Stage 5: 67%
Hypercholesterolemia: Relative Risk for Ischemic Heart Disease in Patients More Than One Year After Renal Transplantation

Relative Risk of IHD in Males From the Framingham Heart Study (FHS) or Transplant Patients

- Cholesterol (mg/dL)
  - ≥280: 2.25 (Transplant), 1.93 (FHS)
  - 240-279: 2.02 (Transplant), 1.66 (FHS)
  - 200-239: 2.39 (Transplant), 1.19 (FHS)
  - 160-199: 1.19 (Transplant), 1.00 (FHS)
  - <160: 1.00 (Transplant), 1.00 (FHS)

Effect of fluvastatin on cardiac outcomes in renal transplant recipients: a multicentre, randomised, placebo-controlled trial


ITT, intent-to-treat population.

Fluvastatin vs Placebo: 6.0% vs 1.0% incidence of cardiac mortality over 6 years, with a statistically significant difference (P=0.031).

Fluvastatin demonstrated a 38% reduction in cardiac mortality compared to placebo.

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Proportion of patients</th>
<th></th>
<th></th>
<th></th>
<th>Risk ratio (95% CI)</th>
<th>Incidence (number of events per 100 patient years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fluvastatin (n=1,050)</td>
<td>Placebo (n=1,052)</td>
<td>p*</td>
<td>Risk ratio (95% CI)</td>
<td>Fluvastatin (n=1,050)</td>
<td>Placebo (n=1,052)</td>
</tr>
<tr>
<td>Cardiac death, non-fatal MI, CABG, PCI</td>
<td>137 (13.0%)</td>
<td>174 (16.5%)</td>
<td>0.036</td>
<td>0.79 (0.63-0.99)</td>
<td>2.07</td>
<td>2.63</td>
</tr>
<tr>
<td>Cardiac death or non-fatal MI</td>
<td>95 (9.0%)</td>
<td>128 (12.2%)</td>
<td>0.014</td>
<td>0.71 (0.55-0.93)</td>
<td>1.39</td>
<td>1.89</td>
</tr>
<tr>
<td>CABG/PCI</td>
<td>59 (5.6%)</td>
<td>88 (8.4%)</td>
<td>0.019</td>
<td>0.67 (0.48-0.94)</td>
<td>0.88</td>
<td>1.31</td>
</tr>
<tr>
<td>Fatal or non-fatal cerebrovascular events†</td>
<td>93 (8.9%)</td>
<td>91 (8.7%)</td>
<td>0.952</td>
<td>1.01 (0.75-1.35)</td>
<td>1.38</td>
<td>1.34</td>
</tr>
<tr>
<td>Non-cardiovascular death</td>
<td>101 (9.6%)</td>
<td>90 (8.6%)</td>
<td>0.441</td>
<td>1.12 (0.84-1.49)</td>
<td>1.45</td>
<td>1.29</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>194 (18.5%)</td>
<td>189 (18.0%)</td>
<td>0.875</td>
<td>1.02 (0.83-1.24)</td>
<td>2.79</td>
<td>2.71</td>
</tr>
</tbody>
</table>
SHARP: Major Atherosclerotic Events

Risk ratio 0.83 (0.74 – 0.94)
Logrank 2P=0.0022

Proportion suffering event (%)

Years of follow-up

Placebo

Eze/simv
Effect of statins on cardiovascular events in patients with mild to moderate chronic kidney disease: a systematic review and meta-analysis of randomized clinical trials

Xiao Zhang, Chun Xiang, Yu-Hao Zhou, An Jiang, Ying-Yi Qin and Jia He

BMC Cardiovascular Disorders 2014, 14:19

Figure 3 Forest plot of the effect of statin on total mortality in patients with mild to moderate chronic kidney disease.
Algorithm for cholesterol-lowering treatment in persons with CKD. Boxes represent recommendations about whether to prescribe a statin regimen. Boxes with dark and medium green fill represent strong recommendations; lighter green and white boxes represent weak recommendations. Recommended statin regimens are shown in Table 1 and include statin monotherapy or statin/ezetimibe for those with CKD stage 3a to 5 and statin monotherapy for all other CKD populations. CKD = chronic kidney disease; HD = hemodialysis; PD = peritoneal dialysis.
Do patients with chronic kidney disease get optimal cardiovascular risk reduction?

Mark K. Elliott, Jennifer A. McCaughan, and Damian G. Fogarty

Relative risk (95% confidence interval)
### Analysis 1.1. Comparison | Statins versus placebo, Outcome | Cardiovascular mortality.

**Review:** HMG CoA reductase inhibitors (statins) for kidney transplant recipients

**Comparison:** 1 Statins versus placebo

**Outcome:** 1 Cardiovascular mortality

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Statins n/N</th>
<th>Placebo n/N</th>
<th>Risk Ratio IV, Random, 95% CI</th>
<th>Weight</th>
<th>Risk Ratio IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santos 2001</td>
<td>0/34</td>
<td>1/33</td>
<td></td>
<td>1.6 %</td>
<td>0.32 [0.01, 7.68]</td>
</tr>
<tr>
<td>Katzenelson 1996</td>
<td>0/24</td>
<td>1/24</td>
<td></td>
<td>1.6 %</td>
<td>0.33 [0.01, 7.80]</td>
</tr>
<tr>
<td>Kasiske 2001</td>
<td>2/53</td>
<td>0/52</td>
<td></td>
<td>1.8 %</td>
<td>4.91 [0.24, 99.82]</td>
</tr>
<tr>
<td>ALERT 2001</td>
<td>36/1050</td>
<td>54/1052</td>
<td></td>
<td>95.0 %</td>
<td>0.67 [0.44, 1.01]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1161</strong></td>
<td><strong>1161</strong></td>
<td></td>
<td><strong>100.0 %</strong></td>
<td><strong>0.68 [0.45, 1.01]</strong></td>
</tr>
</tbody>
</table>

Total events: 38 (Statins), 56 (Placebo)

Heterogeneity: Tau² = 0.0; Chi² = 2.07, df = 3 (P = 0.56); I² = 0.0%

Test for overall effect: Z = 1.90 (P = 0.057)

Test for subgroup differences: Not applicable
## Analysis 1.2. Comparison 1 Statins versus placebo, Outcome 2 All-cause mortality.

**Review:** HMG CoA reductase inhibitors (statins) for kidney transplant recipients

**Comparison:** 1 Statins versus placebo

**Outcome:** 2 All-cause mortality

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Statins n/N</th>
<th>Placebo n/N</th>
<th>Risk Ratio IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seron 2008</td>
<td>0/39</td>
<td>1/35</td>
<td></td>
</tr>
<tr>
<td>Santos 2001</td>
<td>0/34</td>
<td>1/33</td>
<td></td>
</tr>
<tr>
<td>Katznelson 1996</td>
<td>0/24</td>
<td>2/24</td>
<td></td>
</tr>
<tr>
<td>Kasiske 2001</td>
<td>4/53</td>
<td>0/52</td>
<td></td>
</tr>
<tr>
<td>SOLAR Study 2001</td>
<td>5/182</td>
<td>2/182</td>
<td></td>
</tr>
<tr>
<td>ALERT 2001</td>
<td>143/1050</td>
<td>138/1052</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1382</strong></td>
<td><strong>1378</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 152 (Statins), 144 (placebo)

Heterogeneity: Tau² = 0.08; Chi² = 5.49, df = 5 (P = 0.36); I² = 9%

Test for overall effect: Z = 0.28 (P = 0.78)

Test for subgroup differences: Not applicable
Statins may reduce cardiovascular events in kidney transplant recipients, although treatment effects are imprecise. Statin treatment has uncertain effects on overall mortality, stroke, kidney function, and toxicity outcomes in kidney transplant recipients.
Multidisciplinary care
How to improve outcome in kidney transplanted patients?

An important issue for long term patient outcomes is to reduce ISU toxicity and to manage CV disease.

- Before Tx:
  - Dialysis vintage
  - CV management
  - CV interventions

- After Tx: medical management
  - HTN
  - DM
  - Dyslipidaemia
  - Obesity
  - Smoking
  - Inflammation
  - Anemia
  - Bone
  - ...
cardiovascular disease management after renal transplantation
Steno 2: Intensive Therapy
NB: combined cardio/renal protection

- Multidisciplinary team (MD, nurse, dietician)
- Diet
- Exercise 30 minutes 3 – 5x/wk
- Smoking cessation courses
- ACEI/ARB independent of BP
- Vitamin – mineral supplement
- ASA
- Glycemic control
- BP control
- Lipid control

Gaede P et al. NEJM 2003; 348: 383-393
Steno 2: Outcomes

- Hazard ratio = 0.47 in favor of intensive group (.24 - .73, p=0.008)
- Absolute RR = 20%
- NNT 5 patients to prevent one CV event in 7.8 years

Gaede P et al. NEJM 2003; 348: 383-393
CAD treatment gap in the community

Provider awareness does not equal successful implementation

NCEP = National Cholesterol Education Program

We Cannot Do This Alone!
Multidisciplinary care

- Education program
- Protocollized clinic f/u
- Protocollized lab
- Regular audits/CQI
- Nephrologist
- Nurse practitioner
- Social worker/psychologist
- Dietician
- Pharmacist
- Physiotherapist
Un-managed

- Fee For Service
  - Inpatient focus
  - O/P clinic care
  - Low Reimbursement
  - Poor Access and Quality
  - Little oversight
- No organized networks
- Focus on paying claims
- Little Medical Management

Coordinated Care

- Organized care delivery
  - Aligned incentives
  - Linked by HIT
- Integrated Provider Networks
- Focus on cost avoidance and quality performance
  - PC Medical Home
  - Care management
  - Transparent Performance Management

Patient Centered

- Integrated Health
  - Patient Care Centered
    - Personalized Health Care
  - Productive and informed interactions between Patient and Provider
  - Cost and Quality Transparency
  - Accessible Health Care Choices
  - Aligned Incentives for wellness
  - Multiple integrated network and community resources
  - Aligned reimbursement/care management outcomes
  - Rapid deployment of best practices
  - Patient and provider interaction
    - Information focus
    - Aligned self care management
    - E-health capable

Paul McGann, MD. Acting CMO; CMS. 2/25/2011
Collaborative Care - 1

Systematic collaboration of primary care providers and mental health providers to improve care for depression and other common mental disorders

Over 40 RCTs for depression
  – Gilbody S. et al., Arch Int Medicine; Dec 2006

Several recent RCTs for anxiety disorders
  – CALM Study (Roy Byrne et al); PTSD (Zatzick et al)
IMPACT Doubles Effectiveness of Care for Depression

50% or greater improvement in depression at 12 months

Unützer et al., Psych Clin NA 2004
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AIMS CENTER | Advancing Integrated Mental Health Solutions
Collaborative Care for Patients with Depression and Chronic Illnesses

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As compared with controls, patients in the intervention group had greater overall 12-month improvement across glycated hemoglobin levels (difference, 0.58%), LDL cholesterol levels (difference, 6.9 mg per deciliter [0.2 mmol per liter]), systolic blood pressure (difference, 5.1 mm Hg), and SCL-20 depression scores (difference, 0.40 points) (P<0.001). Patients in the intervention group also were more likely to have one or more adjustments of insulin (P=0.006), antihypertensive medications (P<0.001), and antidepressant medications (P<0.001), and they had better quality of life (P<0.001) and greater satisfaction with care for diabetes, coronary heart disease, or both (P<0.001) and with care for depression (P<0.001).
Team Approach

Tx nephrologist → Patient

Care Manager

Consulting specialists
The world would be a better place if we kept six of the ten commandments. Any six.
Summary and conclusion

• Multiple traditional and novel/Tx specific risk factors are prevalent in KTx patients and are associated with increased mortality/CV events
• Assessing and treating BP, glucose and lipid metabolism and BP is likely beneficial
• Uncertainty about the targets and treatment choices still exists
• Lifestyle modifications and medications are likely to improve outcomes
Summary and conclusion

• Psycho-social factors contribute to increased CV risk and poor outcome

• Multidisciplinary “risk management clinics”,

providing complex bio-psycho-social care

• are necessary to target all the risk factors among kidney transplant recipients to improve patient outcomes
I put Redbull in my coffee this morning instead of water
and now I can see noises.