Dialysis outcomes: can we do better?

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Disclosures

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Current Status of dialysis outcomes in the United States

- Trends in both incident and prevalent based mortality
- The impact of three times per week hemodialysis on morbidity and mortality: impact of a long interdialytic interval
- Hospitalization and re-hospitalization
- Alternatives to three times per week HD in practice
  - Peritoneal dialysis
  - Frequent hemodialysis: 5+ days per week

USRDS 2011 ADR
Adjusted all-cause mortality rates (from day 90), by modality & year of treatment

Figure 5.1 (Volume 2)

Adjusted all-cause mortality rates in prevalent hemodialysis patients, by vintage

Figure 5.4 (Volume 2)

Adjusted hospital admission rates & days, by modality

Figure 3.2 (Volume 2)


USRDS 2011 ADR
Change in adjusted all-cause & cause-specific hospitalization rates, by modality

Figure 3.1 (Volume 2)

State of Dialysis in the United States

- Slow progress in overall Prevalent mortality (10% decline over 20+ years)
- Slightly better improvement in incident based death rates over the last 20 years (20-30% decline)
- Hospitalization rates are still very high for CVD, Infections and other causes
- Hemodialysis is the dominant dialysis therapy based on 3 times per week
Original Article

Long Interdialytic Interval and Mortality among Patients Receiving Hemodialysis

Robert N. Foley, M.B., David T. Gilbertson, Ph.D., Thomas Murray, M.S., and Allan J. Collins, M.D.

N Engl J Med
Volume 365(12):1099-1107
September 22, 2011
Annualized Mortality Rates on Different Days of the Dialysis Week.

CMS-CPM random HD sample
2004-2007 N=32,065
Annualized CVD Admission Rates on Different Days of the Dialysis Week.

CMS-CPM random HD sample
2004-2007 N=32,065

N Engl J Med
Volume 365(12):1099-1107
September 22, 2011
Mortality and Morbidity on three times per week hemodialysis

• The long interdialytic interval (two days off) is associated with substantial morbidity and mortality.

• Congestive Heart failure, Arrhythmias and Acute Myocardial Infarctions are the lead causes of hospitalization after the long interdialytic interval.

• This is only the tip of the iceberg!
  - Re-hospitalization within 30 days are substantial.
Cause-specific rehospitalization rates in the 30 days following live hospital discharge, by age, 2009

Figure 3.4 (cont.; Volume 2)

USRDS 2011ADR

Period prevalent hemodialysis patients age 20 & older, 2009; unadjusted. Includes live hospital discharges from January 1 to December 31, 2009.
Re-hospitalizations are a major problem

- Almost double the rate of the non-dialysis population in Medicare
- Cardiovascular disease and infections are the major source of re-hospitalization
- The rates have not changed over the last decade (data in 2011 ADR)

- How do the different therapies stack up on morbidity and mortality?
Adjusted five-year survival, by modality & primary diagnosis

Figure 6.7 (Volume 2)

Classic Cox outcome modeling does not address substantial selection bias between HD and PD

USRDS 2010 ADR
Propensity-Matched Mortality Comparison of Incident Hemodialysis and Peritoneal Dialysis Patients

Eric D. Weinhandl, Robert N. Foley, David T. Gilbertson, Thomas J. Arneson, Jon J. Snyder, and Allan J. Collins

Survival from Day 0
Intention-to-treat analysis

From Dialysis Initiation

HR = 0.92
95% CI: 0.86-1.00
p = 0.04

Survival Proportion

HD
PD

Months after Dialysis Initiation
Survival from Day 90
Intention-to-treat analysis

From 90 Days after Dialysis Initiation

Survival Proportion

HD
PD

HR = 1.05
95% CI: 0.96-1.16
p = 0.23

Months after Dialysis Initiation

USRDS 2011 ADR
Mortality Hazard Ratios (PD vs HD)
Follow-up from Day 0; subgroups by Age, CVD, and DM

USRDS 2011ADR
PD vs HD matched populations: outcomes in the USRDS 2011 ADR

USRDS Coordinating Center Staff
Unadjusted rates of hospitalization in 2006–2007 matched incident hemodialysis & peritoneal dialysis patients: all patients

Figure 3.8 (Volume 2)

Incident hemodialysis & peritoneal dialysis patients age 20 & older, 2006–2007; unadjusted. First-year rates show admissions from day 90 to one year after initiation; second-year rates include patients alive & uncensored at the end of the first year.
Comparative Mortality in NxStage System One Users and Matched Controls from the Thrice-Weekly In-center Hemodialysis Population

- Once again home hemodialysis populations are highly selected for the therapy
  - Lack of balance between controls and treatment groups such as in an RCT
  - Matching of populations or statistical matching with probability weighting
- Direct matching results

- Presented NKF Spring Clinical Meeting 2011.
All-cause Mortality

- Rates per 100 patient-years
  - Frame of reference: 205 deaths per 1000 pt-yr in ‘08 period-prevalent dialysis patients (USRDS)

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<td>AT</td>
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<td>137</td>
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ITT analysis

HR 0.87
95% CI (0.78, 0.97)

Survival at 1 year
DHHD 89.4%
IHD 87.4%

Survival at 2 years
DHHD 80.1%
IHD 77.8%

Survival at 3 years
DHHD 72.9%
IHD 69.8%
AT analysis

HR 0.82
95% CI (0.72, 0.94)

Survival at 1 year
DHHD 89.4%
IHD 87.3%

Survival at 2 years
DHHD 80.0%
IHD 76.7%

Survival at 3 years
DHHD 71.7%
IHD 67.6%
Summary

- It appears it is time for the traditional three times per week hemodialysis to be modified based on the high morbidity and mortality based on the intermittent nature of the therapy.
- PD therapy, in appropriate groups, is comparable as with HD.
- Frequent hemodialysis 5-6 days per week has been shown in clinical trials to have some advantages, yet good criteria are needed to advance this therapy in practice.
- One last thing to consider:
“Insanity: doing the same thing over and over again and expecting different results”.

Albert Einstein
Absolute standardized differences before & after hemodialysis patients are matched to peritoneal dialysis patients

Figure 1.2 (Volume 2)

Incident ESRD patients.