Differences in Medication Use among Daily Home Hemodialysis, Peritoneal Dialysis, and In-Center Hemodialysis Patients

Eric D. Weinhandl, MS,[1] David T. Gilbertson, PhD,[1] Allan J. Collins, MD[1,2]

[1]Chronic Disease Research Group, Minneapolis Medical Research Foundation, Minneapolis, MN, US; [2]Department of Medicine, University of Minnesota, Minneapolis, MN, US

Introduction

- Anemia, hyperphosphatemia, and hypertension are common complications of end-stage renal disease (ESRD).
- Anemia is typically treated with a combination of erythropoiesis-stimulating agents (ESAs) and intravenous iron agents.
- Hyperphosphatemia is treated with oral phosphate binders.
- Hypertension is treated with oral blood pressure-lowering medications, including alpha agonists, beta blockers, calcium channel blockers, renin-angiotensin system inhibitors, and vasodilators.
- These drugs are available in branded and generic forms and are collectively reimbursed under Medicare Parts B and D, but ultimately constitute a substantial percentage of dialysis patient costs.
- No national data compare medication use in daily home hemodialysis (DHHD), peritoneal dialysis (PD), and in-center hemodialysis (IHD) patients with similar characteristics.
- We aimed to compare use of medications indicated for the treatment of anemia, hyperphosphatemia, and hypertension in US patients undergoing DHHD, PD, or IHD.
  - We matched PD and IHD patients with DHHD patients to reduce the influence of confounding factors that might limit the validity of comparisons.

Methods

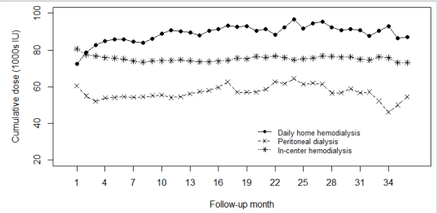
- NxStage Medical, Inc., records and United States Renal Data System (USRDS) standard analysis files were linked.
- From NxStage records, we identified patients who initiated DHHD between January 1, 2007, and June 30, 2010.
- From USRDS standard analysis files, we identified patients who initiated PD (for the first time) between October 1, 2006, and September 30, 2010.
- From USRDS standard analysis files, we also identified patients who were treated with IHD at any time between January 1, 2007, and June 30, 2010.
- We retained the subset of these patients with Medicare coverage for ≥3 months before home dialysis initiation.
- For each DHHD patient, we selected 1 matched PD patient and 5 matched IHD patients according to the date of DHHD initiation, 4 blocking factors, and propensity scores of DHHD initiation.
  - Blocking factors were duration of ESRD (≤6, >6 months), Medicare Part D enrollment, hospital before home dialysis initiation (0, ≥1 admission during 3 preceding months), and dialysis provider (DaVita, other).
- We followed patients until the earliest of home dialysis cessation (in DHHD and PD), home dialysis initiation (in IHD), kidney transplant, death, or December 31, 2010.

Results

- We identified 3560 DHHD, 3560 matched PD, and 17,800 matched IHD patients.
- Slightly more than 60% of patients in each group were enrolled in Medicare Part D.
- Among DHHD patients, mean ESA dose per month (among users) increased sharply during the first 3 months after home dialysis initiation and generally continued to increase for 18 months.
- After 1 year, mean ESA dose per month (among users) was highest among DHHD patients, intermediate among IHD patients, and lowest among PD patients.
- Among DHHD patients, the percentage using phosphate binder(s) decreased modestly during the first 3 months after home dialysis initiation and was stable thereafter.
- Among DHHD patients, the percentage using oral antihypertensive medications declined sharply during the first 4 months after home dialysis initiation and continued to decrease for 18 months, reaching a nadir of nearly 45%.
- Among both DHHD and PD patients, the mean number of antihypertensive classes dispensed (among users of ≥1 class) declined during the first 24 months after home dialysis initiation, although the rate of decline was more rapid with DHHD.
- Antihypertensive medication use (both percentage of users and mean number of classes per user) was significantly less (P <0.01) with DHHD versus IHD.

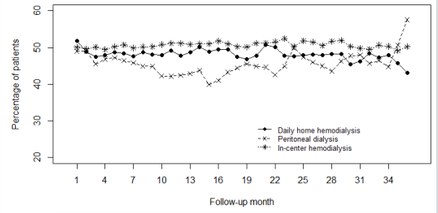
Mean cumulative ESA dose per month, among users, for DHHD, matched PD, and matched IHD patients

In epoetin alfa-equivalent IU

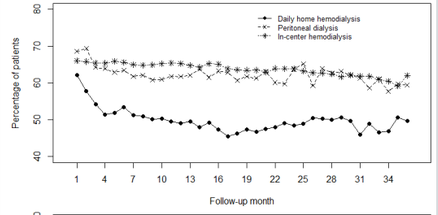


Percentage of patients using phosphate binder(s), for DHHD, matched PD, and matched IHD patients

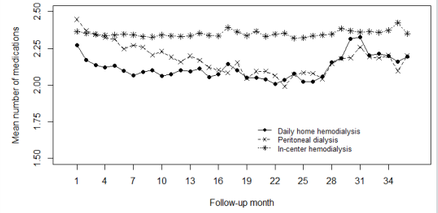
Binders included calcium acetate, sevelamer, and lanthanum



Percentage of patients using at least 1 oral antihypertensive medication, for DHHD, matched PD, and matched IHD patients



Mean number of antihypertensive medication classes per user, for DHHD, matched PD, and matched IHD patients



Conclusions

- DHHD initiation was followed by an increase in dosing of ESAs.
  - The reasons for this change are unclear and merit further study.
  - DHHD was associated with increased risk of hospitalization for sepsis, compared with both PD and IHD. ESA resistance secondary to infection-related inflammation may necessitate ESA dose titration.
  - Concurrent use of IV iron formulations among DHHD patients is unknown.
- DHHD initiation was associated with only a modest decrease in the prevalence of phosphate binder use.
  - However, this study did not consider prescribed doses or daily pill count.
  - More comprehensive analyses of hyperphosphatemia treatment and control are needed.
- Lower antihypertensive agent use with DHHD likely reflects improved fluid control attributable to shortening of inter-dialytic intervals.
  - These data corroborate the significant reduction in mean number of antihypertensive agents following 6 versus 3 hemodialysis sessions per week, as observed in the Frequent Hemodialysis Network (FHN) trial.

cdrg
CHRONIC DISEASE RESEARCH GROUP

funded by a grant from NxStage

www.cdrg.org