

Do all incident ESRD patients with diabetes share similar morbidity & mortality outcomes?

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Introduction

- Past USRDS reports showed that incident end-stage renal disease (ESRD) patients with diabetes mellitus (DM) have the highest first-year mortality rates and Medicare costs.
- To reduce adverse event rates, the American Diabetes Association (ADA) recommends that people with DM should have a hemoglobin A1c (HbA1c) test every three months, with a target value of $\leq 7\%$.
- Few data were available on HbA1c levels in incident patients or on those levels as an associated predictor of first-year morbidity in patients with DM as the primary cause of renal failure (ESRD-DM).
- In May, 2005, CMS added to the ESRD Medical Evidence 2728 (ME) form a question about the patient's HbA1c level at initiation, providing an opportunity to assess this factor for its association to early mortality.

Objective

- To assess the impact of glycemic control among incident ESRD patients with respect to morbidity and mortality outcomes.

Methods

- The study included incident ESRD-DM patients from 1/1/2005 to 6/30/2007 with the 2005 ME form.
- Patients were divided into six groups using comorbidity data and the HbA1c test result (Y/N) on the ME form. Patients in the first five groups had a reported HbA1c level.
 - G#1 - using oral DM medications,
 - G#2 - using insulin,
 - G#3 - using oral DM medications and insulin,
 - G#4 - didn't use DM medications,
 - G#5 - not in first 4 groups,
 - G#6 - didn't report an HbA1c value.
- Glycemic control was defined as an HbA1c test value $\leq 7\%$.
- Mortality rates (AHR) were calculated using the Cox regression model, adjusting for age, gender, race, and ethnicity.
- Hospital admission rates and costs were calculated only on patients with Medicare as their primary payer.
- Follow-up time was 6 months from the date of ESRD onset.

Results

- Among 104,766 incident ESRD-DM patients, we found (Table 1):
 - Only 26% had a reported HbA1c test value on the ME form.
 - Most patients were under 65 years of age (53.2%), male (53.4%), white (66.1%), and non-Hispanic (82.3%). DM groups had similar age, gender, race, and ethnicity distributions.
 - Hemodialysis (HD) patients made up 93.2% of the study cohort, 5.6% were on peritoneal dialysis (PD), and 1% had a preemptive transplant (TX).
 - G#4 was the only group which achieved glycemic control (6.92%), and G#3 had the worst HbA1c levels (8.11%).
- Compared to G#2 (ref), G#6 had the highest AHR (1.159, $p < .0001$) and G#1 had the lowest (Table 2).
- Among Medicare (primary) patients ($n=51,394$), G#6 had the highest unadjusted hospital admission rate (4.57) and Medicare expenditures (PPPM=\$8,852; Figures 1 & 2).
- G#6 had the highest AHR, admission rate, and costs; but reasons for the missing HbA1c values were unknown.

Table 1
 Patient characteristics by modality, age, gender, race, ethnicity, and HbA1c level

	G#1	G#2	G#3	G#4	G#5	G#6
All	5,472	16,600	655	1,625	2,937	77,477
Modality						
HD (%)	91.6	90.2	91.8	93.3	90.2	94.1
PD (%)	7.6	8.2	7.4	5.2	6.5	4.9
TX (%)	0.8	1.5	0.6	1.3	3.0	0.9
Unk. Dialysis (%)	0.0	0.1	0.0	0.2	0.3	0.1
HbA1c						
HD	7.23	7.83	8.19	6.92	7.45	-
PD	6.78	8.02	7.27	6.86	7.01	-
TX	7.96	8.28	7.88	7.02	7.81	-
Unk. Dialysis	6.10	7.97	-	5.80	7.53	-
Mean	7.20	7.85	8.11	6.92	7.44	-
Age (%)						
0-44	4.9	12.5	8.1	7.5	8.0	8.8
45-64	42.1	47.6	45.8	40.8	44.5	43.5
65-74	28.6	24.3	28.7	26.7	26.6	26.8
75+	24.4	15.7	17.4	25.0	20.8	20.9
Gender (%)						
Male	58.3	54.4	53.1	55.4	54.6	52.8
Female	41.7	45.6	46.9	44.6	45.4	47.2
Race (%)						
White	65.8	67.6	62.9	60.6	66.3	66.0
Black	23.6	25.2	24.1	27.9	25.1	28.0
Native American	2.2	1.9	5.2	4.7	1.6	1.4
Asian	7.8	4.7	7.2	6.4	6.5	4.1
Other/Unknown	0.7	0.7	0.6	0.4	0.5	0.4
Ethnicity (%)						
Hispanic	23.2	19.3	20.3	21.4	23.3	16.6
Non-Hispanic	76.8	80.7	79.7	78.6	76.7	83.4

Figure 1
 Hospital admission rates (unadjusted)

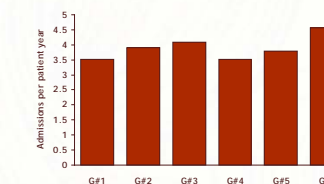
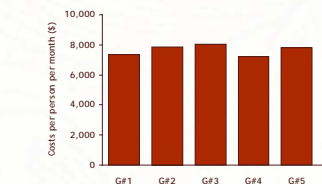


Table 2
 Hazard ratios adjusted for age, gender, race and ethnicity

Variable	Hazard Ratio	95% CI	p-value
Age 0-44	0.553	0.501 0.610	<.0001
Age 45-64	1		
Age 65-74	1.834	1.755 1.917	<.0001
Age 75+	3.306	3.170 3.448	<.0001
Male	1		
Female	0.944	0.913 0.976	0.0008
White	1		
Black	0.797	0.765 0.831	<.0001
Other Race	0.638	0.589 0.692	<.0001
Non-Hispanic	1		
Hispanic	0.742	0.705 0.780	<.0001
G#1	0.773	0.703 0.851	<.0001
G#2	1		
G#3	1.075	0.860 1.343	0.5249
G#4	0.951	0.821 1.103	0.5090
G#5	0.976	0.869 1.095	0.6733
G#6	1.159	1.103 1.217	<.0001

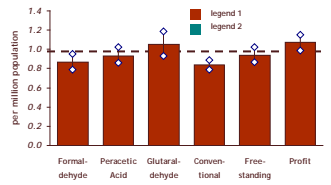
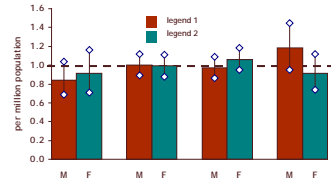
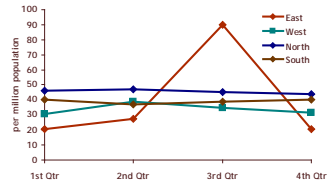
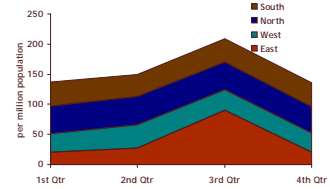
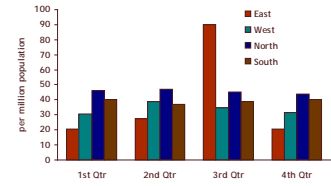
Figure 2
 Medicare expenditures per person per month (\$)



Discussion

- HbA1c level tracks with AHR, hospital admission rates, and costs. Higher HbA1c levels are associated with higher AHRs, admission rates, and costs.
- Attempts were made to gain insights on G#6 by re-introducing them back into G#1-G#5:
 - Patients were equally distributed, ranging from 71% to 77%, and there were no distinct geographic differences among networks and providers.
 - There were similar percentages of HbA1c Medicare claims among those with and without an HbA1c reported on the ME form (mean: 71% vs. 62%).
 - Cox regression showed consistent results with and without G#6 in the model, and G#1 was still the only group with significant AHR (0.773 vs. 0.777).

Conclusions



10 point

graphs with confidence intervals: the bars have to be colored by hand, and the x-axis labels (if long), line at 1.0, and legend have to be made outside of the graph

TABLES: Please do not use the space bar to align numbers in columns; the numbers will not print properly. If you aren't sure how to set the tabs to create columns, just ask Ed or Sue; we'll be happy to show you.

Group #	1	2	3	4	5	6
Race	white	white	white	white	white	white
Gender	male	male	male	male	male	male
Age	45-64	45-64	45-64	45-64	45-64	45-64
ESRD years	0	0	0	0	0	0
Diabetes	no	yes	yes	yes	yes	yes
Comorbidity	no	no	PVD	PVD	PVD	PVD
Hosp. days	0	0	0	11-20	11-20	11-20
Blood trans.	0	0	0	0	3+	3+
Vascular acc.	0	0	0	0	0	2
