

CBE 2979: Standardized Transfusion Ratio for Dialysis Facilities

5.4.4 Risk/Case-Mix Adjustment Modeling and/or Stratification Results

5.4.4 [If risk/case-mix factors are addressed by any method (5.4.1)] Risk/Case-Mix Adjustment Modeling and/or Stratification Results*

Describe the statistical results of the analyses used to test and select risk/case-mix factors for inclusion in or exclusion from the adjusted model and/or stratification, as applicable. Clearly indicate the risk/case-mix factors included in the final adjusted model and/or used in the final stratification approach.

Please see section 5.4.6 for a list of the final set of risk factors used in the model.

Parameter	Reference Group	Estimate	Standard Error	P-Value	Hazard Ratio
Age: 18-24 years old	Categorical (60-74 is ref)	0.410	0.038	<.0001	N/A**
Age: 25-44 years old	Categorical (60-74 is ref)	0.210	0.011	<.0001	N/A**
Age: 45-59 years old	Categorical (60-74 is ref)	0.038	0.008	<.0001	N/A**
Age: 75 or older	Categorical (60-74 is ref)	-0.110	0.008	<.0001	N/A**
Diabetes as cause of ESRD	Categorical (1 versus 0)	-0.138	0.024	<.0001	N/A**
Cause of ESRD Missing	Categorical (1 versus 0)	0.083	0.112	0.4612	1.09
Duration_of_ESRD (6 months-1 year)*Diabetes as cause of ESRD	Interaction (<6 months and 0 as ref)	0.111	0.029	0.0001	N/A**
Duration_of_ESRD 1-2 years)*Diabetes as cause of ESRD	Interaction (<6 months and 0 as ref)	0.119	0.027	<.0001	N/A**
Duration_of_ESRD (2-3 years) *Diabetes as cause of ESRD	Interaction (<6 months and 0 as ref)	0.149	0.027	<.0001	N/A**
Duration_of_ESRD (3-5 years) *Diabetes as cause of ESRD	Interaction (<6 months and 0 as ref)	0.113	0.026	<.0001	N/A**

Parameter	Reference Group	Estimate	Standard Error	P-Value	Hazard Ratio
Duration_of_ESRD (5+ years) *Diabetes as cause of ESRD	Interaction (<6 months and 0 as ref)	0.119	0.025	<.0001	N/A**
Age (18-24 years old) *Diabetes as cause of ESRD	Interaction (60-74 and 0 is ref)	0.820	0.162	<.0001	N/A**
Age (25-44 years old) *Diabetes as cause of ESRD	Interaction (60-74 and 0 is ref)	0.001	0.019	0.9593	N/A**
Age (45-59 years old) *Diabetes as cause of ESRD	Interaction (60-74 and 0 is ref)	-0.004	0.0131	0.7899	N/A**
Age (75 or older) *Diabetes as cause of ESRD	Interaction (60-74 and 0 is ref)	0.013	0.013	0.3213	N/A**
Patient in a Nursing Home <90 days in last 365 days	Categorical (1 versus 0)	0.277	0.007	<.0001	1.32
Patient in a Nursing Home 90 days or more in last 365 days	Categorical (1 versus 0)	0.117	0.010	<.0001	1.12
Underweight	Categorical (Normal as ref)	0.103	0.014	<.0001	1.11
Overweight	Categorical (Normal as ref)	-0.052	0.007	<.0001	0.95
Obese	Categorical (Normal as ref)	-0.160	0.006	<.0001	0.85
Incident Comorbidity: Atherosclerotic heart disease	Categorical (1 versus 0)	0.042	0.009	<.0001	1.04
Incident Comorbidity: Other cardiac disease	Categorical (1 versus 0)	0.028	0.007	0.0001	1.03
Incident Comorbidity: Congestive heart failure	Categorical (1 versus 0)	0.022	0.006	0.0008	1.02
Incident Comorbidity: Inability to ambulate	Categorical (1 versus 0)	0.057	0.015	0.0002	1.06

Parameter	Reference Group	Estimate	Standard Error	P-Value	Hazard Ratio
Incident Comorbidity: Chronic obstructive pulmonary disease	Categorical (1 versus 0)	0.150	0.010	<.0001	1.16
Incident Comorbidity: Inability to transfer	Categorical (1 versus 0)	0.063	0.021	0.0024	1.07
Incident Comorbidity: Malignant neoplasm, cancer	Categorical (1 versus 0)	0.028	0.011	0.0104	1.03
Incident Comorbidity: Diabetes (all types excluding cause of ESRD)	Categorical (1 versus 0)	0.005	0.009	0.5982	1.01
Incident Comorbidity: Peripheral vascular disease	Categorical (1 versus 0)	0.085	0.010	<.0001	1.09
Incident Comorbidity: Cerebrovascular disease, CVA, TIA	Categorical (1 versus 0)	-0.021	0.010	0.028	0.98
Incident Comorbidity: Tobacco use (current smoker)	Categorical (1 versus 0)	0.151	0.010	<.0001	1.16
Incident Comorbidity: Alcohol dependence	Categorical (1 versus 0)	0.142	0.020	<.0001	1.15
Incident Comorbidity: Drug dependence	Categorical (1 versus 0)	0.097	0.020	<.0001	1.10
Incident Comorbidity: At least one of the incident comorbidities listed	Categorical (1 versus 0)	0.043	0.009	<.0001	1.04
Incident Comorbidity: No Medical Evidence (CMS-2728) Form	Categorical (1 versus 0)	-0.192	0.117	0.0997	0.83
Medicare Advantage coverage	Categorical (1 versus 0)	-0.026	0.006	<.0001	N/A**
Prevalent Comorbidity*: Carcinoma in situ	Categorical (1 versus 0)	0.055	0.027	0.0387	1.06

Parameter	Reference Group	Estimate	Standard Error	P-Value	Hazard Ratio
Prevalent Comorbidity*: Coagulation disorders (not from dialysis claims)	Categorical (1 versus 0)	0.373	0.012	<.0001	N/A**
Prevalent Comorbidity*: Head and neck cancer	Categorical (1 versus 0)	0.124	0.033	0.0002	1.13
Prevalent Comorbidity*: Hemolytic and aplastic anemia	Categorical (1 versus 0)	0.747	0.00762	<.0001	2.11
Prevalent Comorbidity*: Leukemia	Categorical (1 versus 0)	0.392	0.020	<.0001	1.48
Prevalent Comorbidity*: Lymphoma	Categorical (1 versus 0)	0.124	0.030	<.0001	N/A**
Prevalent Comorbidity*: Metastatic cancer	Categorical (1 versus 0)	0.542	0.014	<.0001	1.72
Prevalent Comorbidity*: Multiple myeloma, myelodysplastic syndrome and Myelofibrosis	Categorical (1 versus 0)	0.592	0.010	<.0001	1.81
Prevalent Comorbidity*: Other cancers (connective tissue, skin, and others)	Categorical (1 versus 0)	0.247	0.024	<.0001	1.28
Prevalent Comorbidity*: Sickle cell anemia	Categorical (1 versus 0)	1.518	0.019	<.0001	4.56
Prevalent Comorbidity*: Solid organ cancer (breast, prostate, lung, digestive tract and	Categorical (1 versus 0)	0.202	0.008	<.0001	1.22

Parameter	Reference Group	Estimate	Standard Error	P-Value	Hazard Ratio
others)					
Prevalent Comorbidity*: Gastrointestinal (GI) bleeding	Categorical (1 versus 0)	0.853	0.006	<.0001	2.35
Indicator of Medicare FFS or Medicare Advantage for at least 6 months during the past 12 months	Categorical (1 versus 0)	-0.161	0.011	<.0001	0.85
Medicare Advantage coverage * Coagulation disorders (not from dialysis claims)	Interaction (0 and 0 as ref)	-0.075	0.016	<.0001	N/A**
Medicare Advantage coverage * Lymphoma	Interaction (0 and 0 as ref)	0.193	0.040	<.0001	N/A**

*Prevalent Comorbidities are indicators of comorbidities (claim sources: Part A/B/C) in past 365 days from the beginning of each patient period at risk.

** Hazard ratios are not calculated for interaction terms or main effects of variables that have interaction terms.

Hazard ratios are not shown for interaction terms or main effects of variables that area also included as interaction terms because caution is needed in interpreting these terms. For example, the coefficient for Age: 18-24 years old cannot be interpreted simply the difference in transfusion risk of Age: 18-24 years old compared to Age: 60-74 years old (reference). It is instead the difference in risk for non-diabetic Age: 18-24 years old and non-diabetic Age: 60-74 years old. The difference in risk for diabetic Age: 18-24 years old vs diabetic Age: 60-74 years old is larger as indicated by the positive coefficient for the diabetes by age interaction term.

The table below shows the parameter estimates for patient and area level SDS/SES variables tested based on a model that included these variables along with the original covariates.

Table SDS/SES 2023

Covariate	Estimates	P-value	Hazard Ratio
Sex: Female	0.083	<.0001	1.09
Race			
White	ref		
Black	-0.084	<.0001	0.92
Asian/Pacific Islander	-0.092	<.0001	0.91
Native American	0.010	0.6734	1.01
Other	0.021	0.6917	1.02
Hispanic	-0.129	<.0001	0.88
Employment status			
Employed	ref		
Unemployed	0.065	<.0001	1.07
Other	0.034	<.0001	1.04
Medicare coverage			
Medicare as primary w/o Medicaid	ref		
Medicare as primary with Medicaid	-0.050	<.0001	0.95
Other	-2.075	<.0001	0.13
Medicare Advantage	0.577	<.0001	1.78
ADI	0.002	<.0001	1.00

CBE 1463: Standardized Hospitalization Ratio for Dialysis Facilities (SHR)

5.4.4a Attach Risk/Case-mix Adjustment Modeling and/or Stratification Specifications

The risk adjustment is based on a Cox or relative risk model. The adjustment is made for the following variables:

- Patient age: Age (continuous); Age squared
- Sex
- Medicare Advantage coverage
- Diabetes as cause of ESRD
- Nursing home status in previous 365 days:
 - None (0 days) (reference)
 - Short term (0-89 days)
 - Long term (≥ 90 days)
- BMI at ESRD incidence
 - BMI < 18.5
 - $18.5 \leq \text{BMI} < 24.9$
 - $25 \leq \text{BMI} < 29.9$
 - BMI ≥ 30 (reference)
- Comorbidities at ESRD incidence
 - Atherosclerotic heart disease
 - Other cardiac disease
 - Diabetes that is not cause of ESRD (all types including diabetic retinopathy)
 - Congestive heart failure
 - Inability to ambulate
 - Chronic obstructive pulmonary disease
 - Inability to transfer
 - Malignant neoplasm, cancer
 - Peripheral vascular disease
 - Cerebrovascular disease, CVA, TIA
 - Tobacco use (current smoker)
 - Alcohol dependence
 - Drug dependence
 - No Medical Evidence (CMS-2728) Form
 - At least one of the comorbidities listed
- A set of prevalent comorbidities based on Medicare claims (individual comorbidities categorized into 91 groups – see below)
 - Includes an adjustment for less than 6 months of Medicare covered months in prior calendar year
- Beside main effects, two-way interaction terms between age, sex, and cause of ESRD are also included:
 - Diabetes as cause of ESRD*Sex
 - Diabetes as cause of ESRD*Age
 - Age*Sex