Medicare Home Health Care Patient Case-Mix Before and After the Balanced Budget Act: Effect on Dual Eligible Beneficiaries

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Questions

- How did the Medicare payment model affect the patient case-mix of Medicare home health care?
- Whether the changes in patient case-mix were different for the Medicare/Medicaid dually eligible beneficiaries than for the Medicare-only enrollees?

Background

Home Health Care (HHC)

- HHC refers to a broad range of medical and personal care services delivered at home, funded primarily by Medicare and Medicaid.
- HHC was the most rapidly growing medical service in the U.S. prior to the Balanced Budget Act (BBA) of 1997.
- The utilization of Medicare HHC dramatically decreased after the BBA was implemented.

Background

Dual Eligible Beneficiaries

- Dual eligibles are poorer, sicker, and cost Medicare 60% more than non-dual enrollees.
- About 17% (7 million) of the Medicare Beneficiaries are dually eligible.
- Prior studies have observed a negative and significant relationship in HHC spending between Medicare and Medicaid.

Background
The Balanced Budget Act of 1997

Pre-BBA
paid on a retrospective cost basis

October 1997

Interim Payment System (IPS)
introduced a lower per-visit and per-beneficiary limit

October 2000

Prospective Payment System (PPS)
introduced a predetermined rate schedule

Background

Case-Mix

- Refers to the overall intensity of conditions requiring medical intervention based on a composite of each patient's assessments.
- Patients with higher case-mix severity suggest that they are sicker, have more severe conditions, and are expected to receive more care and to have higher health care expenditures.

Background

The Effect of IPS on Case-Mix

- Prior studies were only based on limited information
  - ✓ percentage of skilled nursing visits increased
  - ✓ distribution of the primary or secondary diagnoses changed
  - ✓ percentage with ADL and IADL dependency increased
  - ✓ average number of diagnoses increased

Background

The Effect of PPS on Case-Mix

- Home Health Resource Group (HHRG)
  - ✓ patients are assigned to 1 of 80 HHRGs based on their clinical, functional, and services utilization characteristics
- Prior study observed a shift in the HHRG distribution toward more clinically complex and functionally dependent patients
  - ✓ HHRG measures could be directly influenced by PPS financial incentives

Hypotheses

1) Modifications in the Medicare HHC payment model led to changes in Medicare HHC patient case-mix.

2) Changes in patient case-mix were different for Medicare/Medicaid dually eligible beneficiaries than for the Medicare-only beneficiaries.

Data

- The Medical Expenditure Panel Survey (MEPS)
  - ✓nationally representative dataset for the U.S. non-institutionalized population
  - ✓include full year consolidated data file, home health event file, and medical conditions file
  - ✓Medicare beneficiaries aged 65 and older
  - ✓data categorized into
    - pre-BBA period
    - IPS period
    - PPS period

Methods

Dependent Variable – Case-Mix

- Centers for Medicare and Medicaid Services Hierarchical Condition Categories (CMS-HCC) Model
  - ✓ originally developed for risk-adjusting Medicare HMO capitation payments
  - ✓ estimate risk scores for community, institutional, and new enrollee settings
- Patient case-mix was defined as the CMS-HCC risk score associated with a Medicare home health event
  - ✓ only diagnoses associated with a Medicare home health event were included in the analysis

Methods

Independent Variables

- BBA status: categorized into pre-BBA period, IPS period and PPS periods.
- Medicaid status: indicated monthly eligibility for Medicaid when Medicare HHC services were received.
- Other variables: age, gender, race, education, marital status, living arrangement, residence location (rural/urban area), geographic region, private insurance status, and prior hospitalization.
- Personal income, health status and functional limitations were not included.

Methods

Sample Description and Bivariate Analysis

- Characteristics of the sample population were described.
- Variables were categorized and compared across BBA status using the chi-square test.
- The CMS-HCC risk score was compared by BBA status.

Methods

Multivariate Analysis

- A log-transformed ordinary least squares (OLS) regression model was used with a smearing estimator for better model fit.
- Standardized predictions of CMS-HCC risk scores were calculated to minimize the effect of socio-demographic differences.
- Confidence intervals and standard errors of the standardized predictions were estimated by using bootstrapping (with 200 iterations).

Methods

- Model Diagnostics
  - ✓ Linearity: semiparametric test
  - ✓ Multicollinearity: variance inflation factor
  - ✓ Model Specification: Pregibon's linktest
  - ✓ Autocorrelation and Heteroscedasticity: clustered by individual identifiers using Huber-White robust standard errors
- All analyses were adjusted by sampling weights
- The study was conducted using SAS for Windows version 9.1 and Stata for Unix version 8.2

Results

8,429 Medicare home health person months were identified: 3,107 in pre-BBA, 2,368 in IPS, and 2,954 in PPS

- 29% were dually eligible
- 79 years old
- 69% female
- 80% white
- 41% had at least high school degree
- 28% had spouse residing in the same home
- 64% lived in an urban area
- 37% had private insurance
- 48% followed a hospitalization

Results

- All socio-demographic variables were significantly different across each time period
- CMS-HCC risk score ranged from 0.307 to 4.081 (mean=0.790; standard deviation=0.350)

Results

CMS-HCC Risk Score by BBA Status

	CMS-HCC Risk Score (Standard Error)		
	Pre-BBA period	IPS period	PPS period
Total Medicare	0.767	0.785	0.841
	(0.016)	(0.016)	(0.025)
t statistics (p-value)	0.81 (0.415)		
		1.92 (0.055)	
Medicare-Only	0.789	0.799	0.828
	(0.020)	(0.019)	(0.027)
t statistics (p-value)	0.38 (0.703)		
		0.86 (0.391)	
Dual Eligible	0.695	0.733	0.907
	(0.018)	(0.034)	(0.044)
t statistics (p-value)	1.05 (0.295)		
		3.20 (0.001)	

Results

Multivariate log-transformed OLS Regression Model of CMS-HCC Risk Score

Variable	Coefficient	Standard Error	p-value
BBA status (reference: IPS period)			
Pre-BBA	-0.026	0.031	0.401
PPS	0.060	0.033	0.071
Dually eligible	-0.041	0.042	0.338
Interaction term (with dual eligible status)			
Pre-BBA	0.020	0.051	0.690
PPS	0.194	0.061	0.001

Multivariate log-transformed OLS Regression Model of CMS-HCC Risk Score (Continued)

Variable	Coefficient	Standard Error	p-value
Age (reference: 65<age<=75 group)			
75 < age <= 85	0.274	0.031	<0.001
Age > 85	0.478	0.032	<0.001
Gender			
Male	0.138	0.029	<0.001
Race			
White	0.013	0.029	0.642
Education			
Have high school degree	0.016	0.026	0.535
Spouse residing in the same home	0.030	0.030	0.322
Live in urban area	-0.017	0.027	0.525
Region (reference: Northeast)			
Midwest	-0.017	0.036	0.631
South	-0.003	0.031	0.922
West	-0.012	0.040	0.774
Have private insurance	-0.012	0.027	0.645
Following hospitalization	0.057	0.021	0.007
Constant	-0.661	0.057	<0.001

Note: Number of observation=7517; Number of clusters=1529; R-squared= 0.2154.

Results

Standardized Prediction of CMS-HCC Risk Score with Bootstrapped Confidence Interval

	CMS-HCC Risk Score (Standard Error)		
	Pre-BBA period	IPS period	PPS period
Total Medicare	0.757	0.774	0.857
	(0.021)	(0.022)	(0.028)
Confidence Interval	(0.721, 0.809)	(0.736, 0.821)	(0.808, 0.912)
Medicare-Only	0.761	0.781	0.829
	(0.025)	(0.026)	(0.031)
Confidence Interval	(0.721, 0.815)	(0.733, 0.834)	(0.779, 0.902)
Dual Eligible	0.745	0.750	0.967
	(0.030)	(0.043)	(0.059)
Confidence Interval	(0.682, 0.808)	(0.657, 0.839)	(0.877, 1.101)

Note: Confidence intervals were constructed at the 95% level.

Results

CMS-HCC Risk Score by Hospitalization and BBA Status

	CMS-HCC Risk Score (Standard Error)		
	Pre-BBA period	IPS period	PPS period
Following hospitalization	0.782 (0.021)	0.825 (0.024)	0.863 (0.029)
t statistics (p-value)	1.37 (0.171)		
		1.03 (0.303)	
Not following hospitalization	0.761 (0.021)	0.756 (0.020)	0.829 (0.033)
t statistics (p-value)	-0.16 (0.876)		
		1.90 (0.058)	

Conclusions

- Impact of BBA on Patient Case-Mix
  - ✓patient case-mix severity increased over time from the pre-BBA period through the IPS and then the PPS periods
  - ✓these results are consistent with other studies
  - ✓these results also reflected how the HHC agencies responded to the new financial incentives

Conclusions

- Differential Effect for Dual Eligible Beneficiaries
  - ✓changes in patient case-mix were different for Medicare/Medicaid dually eligible beneficiaries than for the Medicare-only beneficiaries
  - ✓no differential effect in patient case-mix during IPS

Discussion

- Questions Raised by the Findings
  - ✓did the provision of HHC shift to Medicaid-paid services?
  - ✓were the dual eligible beneficiaries more likely to have certain specific diagnoses or were in more profitable HHRGs?
  - ✓has this combination of increased case-mix severity and reduced utilization affected patient outcomes?

Discussion

BBA and Hospital/Other Post Acute Care Settings

- The BBA affected not only HHC but also hospital and post acute settings (such as SNF and IRF).
  - ✓tighter PPS rates for hospitals beginning in October 1997
  - ✓prospective payment systems for SNF and IRF

Strengths

- Comprehensive and independent measure to study the case-mix of Medicare HHC
- The first research to study the effect of the BBA on Medicare HHC patient case-mix of dual eligible beneficiaries

Limitations

- The CMS-HCC model was not developed for HHC
- Precision of the ICD-9 codes
- No provider characteristics
- Definition of the MEPS home health event

Home Health Care Financing and Service Intensity: Dual Eligibles Before and After BBA

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Presented at 慈濟大學
03/13/2008

Originally Presented at 2006 American Public Health Association Medical Care Section Student Paper Award

Questions

- How did the Medicare payment model affect the use of home health care (HHC) among dual eligibles?
  - ✓user population profile
  - ✓expenditures and financing distribution
  - ✓number of visits
  - ✓case-mix

Background
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Hypotheses

- The utilization of Medicare HHC decreased after IPS
- The number of visits of Medicare HHC decreased after PPS
- The case-mix of Medicare HHC changed after PPS
- Changes in Medicare HHC use affected the use of Medicaid HHC

Data

- The Medical Expenditure Panel Survey (MEPS)
  - ✓nationally representative dataset for the U.S. non-institutionalized population
  - ✓dual eligibles aged 65 and older
  - ✓data categorized into
    - pre-BBA period
    - IPS period
    - PPS period

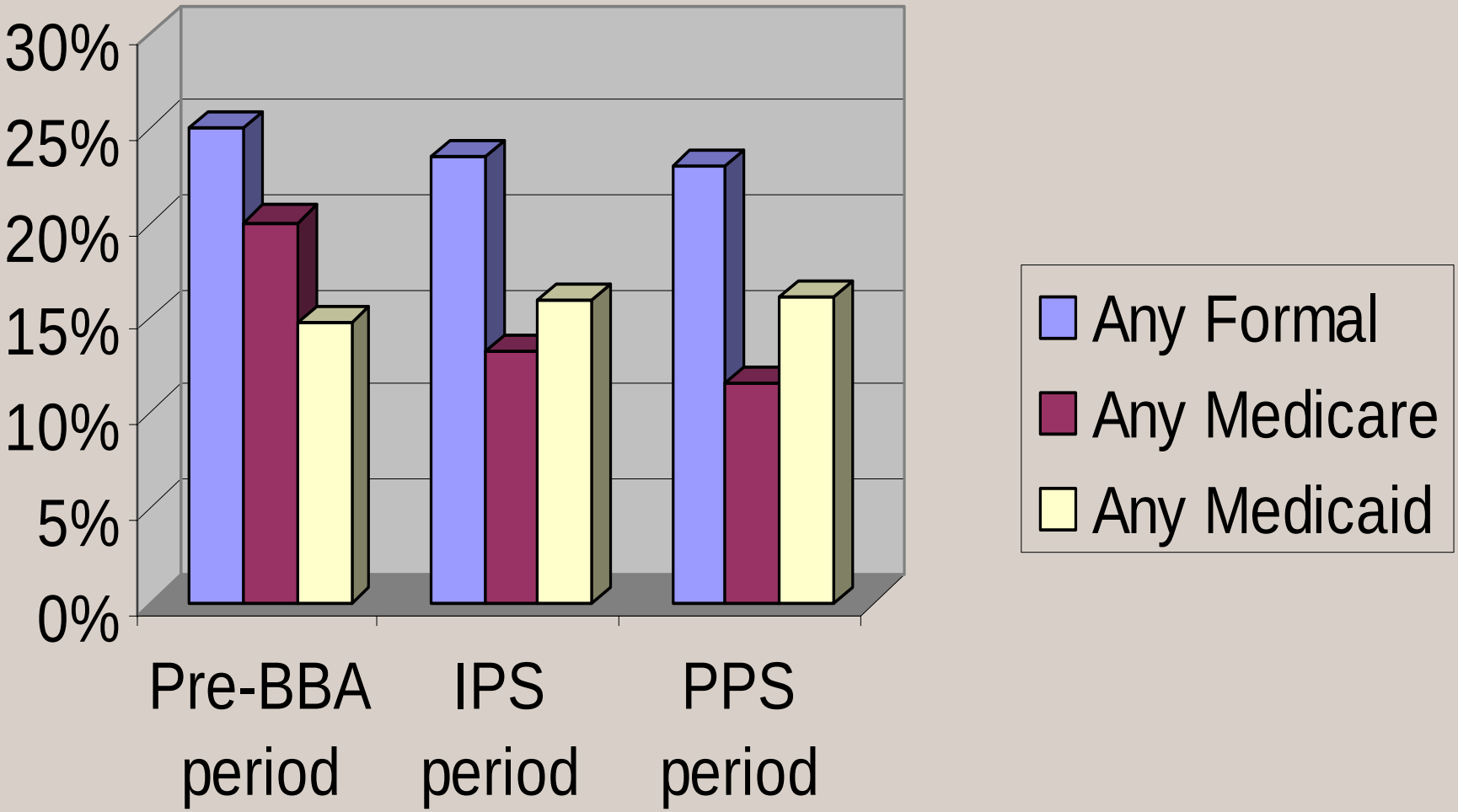
Methods

- Prorated average used to estimate population profile, expenditures and financing distribution
- Primary payment sources aggregated into: Medicare, Medicaid and other funding
- All expenditures in 2005 $ using the Bureau of Labor Statistics HHC Producer Price Index (PPI)

Methods

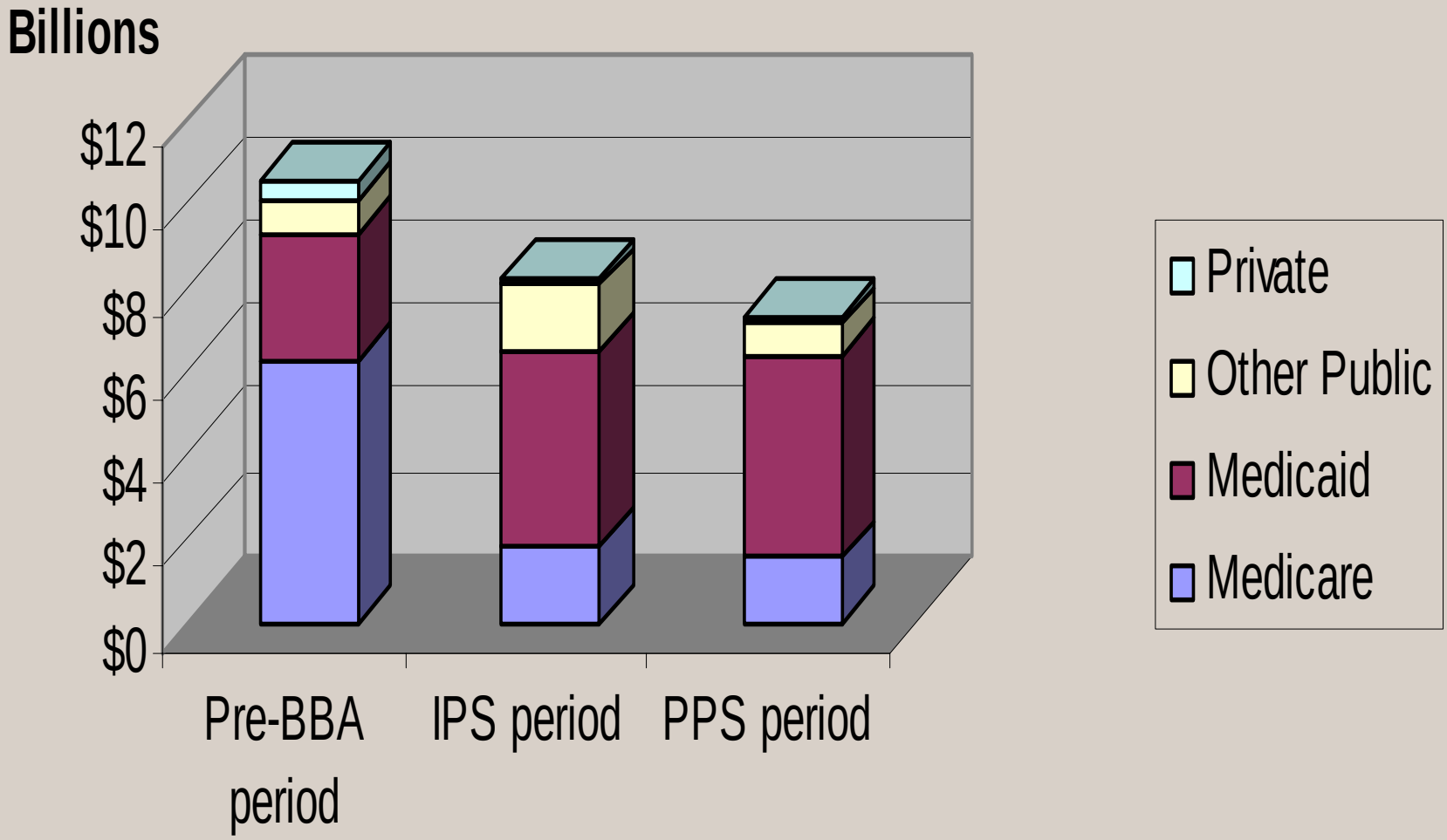
- Number of HHC Visits and Case-Mix
  - ✓ visits per month
  - ✓ risk score derived from the CMS-HCC model

Results
Home Health Care Utilization Profile



Results

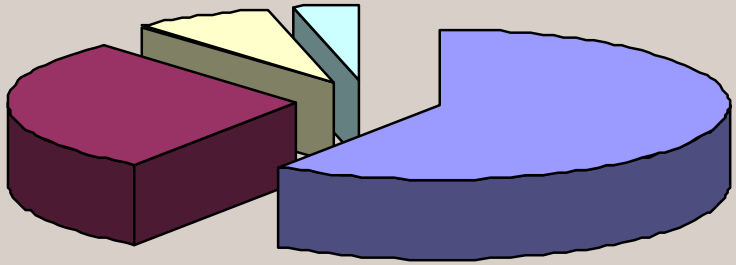
HHC Financing Distribution Among Dual Eligibles



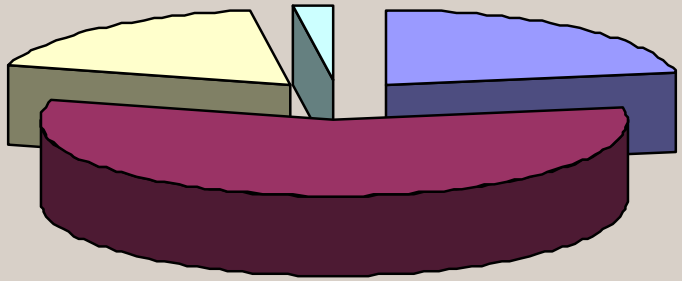
Results

HHC Financing Distribution

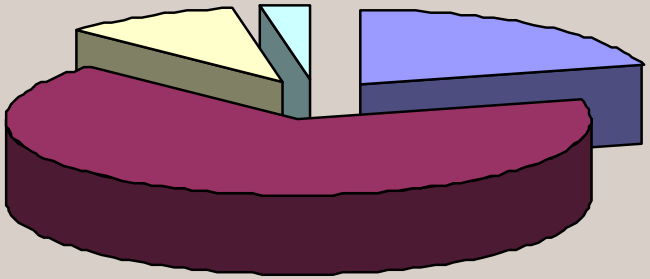
Pre-BBA



IPS



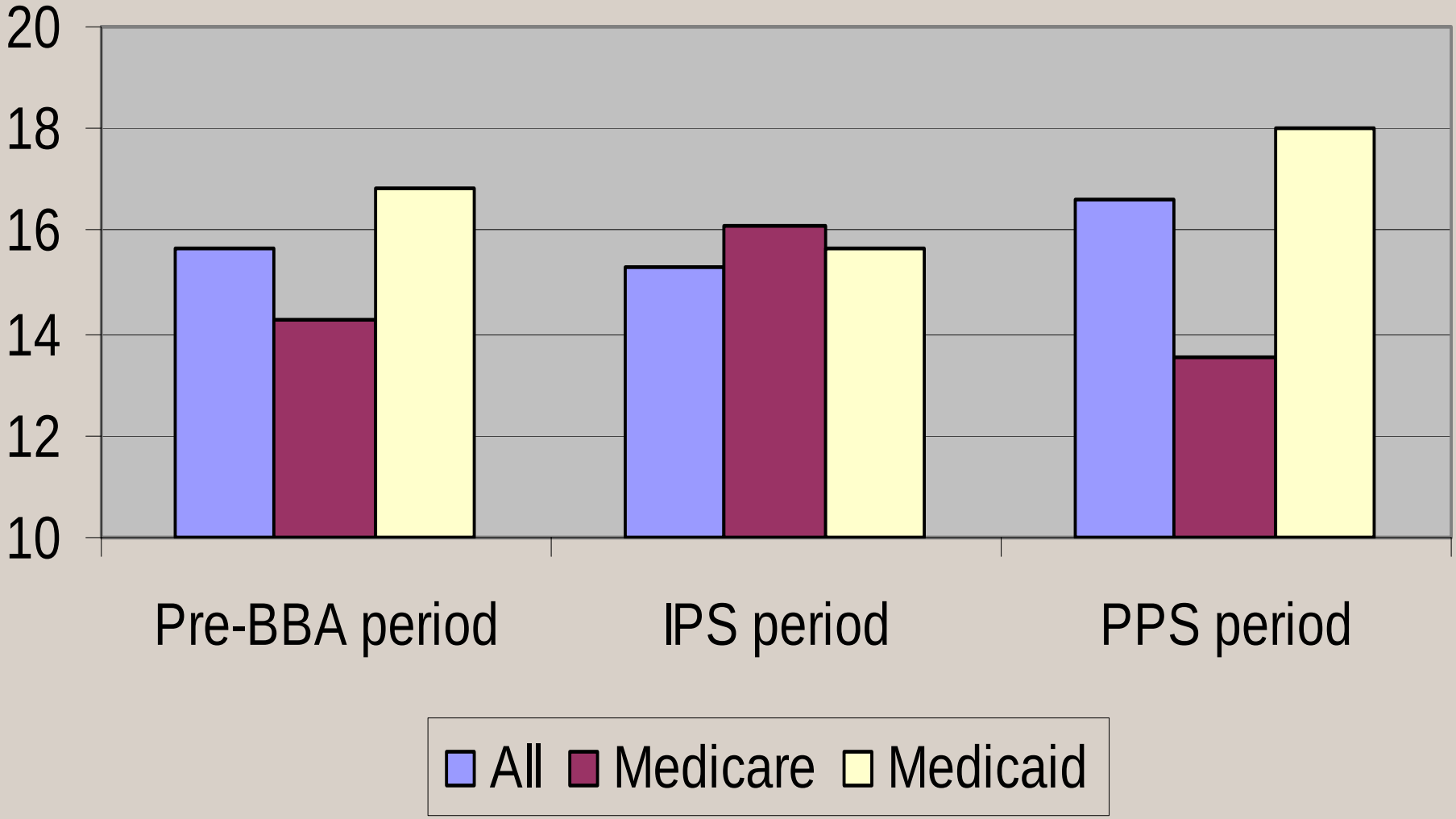
PPS



- Medicare
- Medicaid
- Other Public
- Private

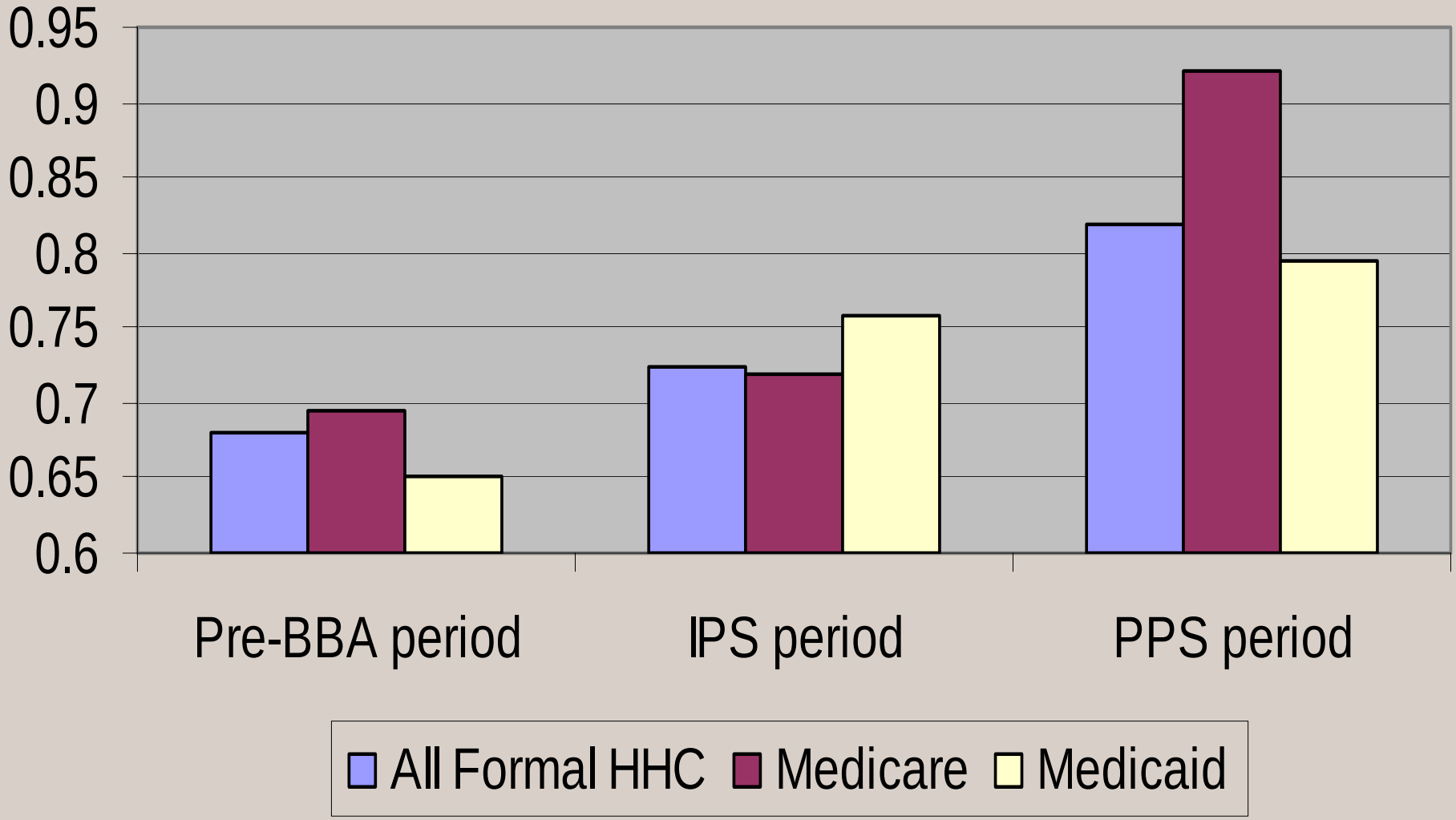
Results

HCC Visits Per Month by Primary Payment Source



Results

CMS-HCC Risk Score by Primary Payment Source



Conclusions

- Substantial shifts in financing distribution and case-mix
  - ✓decline in Medicare HHC and increase in Medicaid HHC after IPS
  - ✓significant increase in Medicare HHC case-mix severity after PPS

Conclusions

- Changes in the number of Medicare HHC visits
  - ✓accompanied by the changes in Medicaid HHC visits but in reversed direction
  - ✓financial incentive created by PPS and IPS

Conclusions

- Significant difference in case-mix between Medicare HHC and Medicaid HHC during the PPS period
- Overall increase in case-mix severity and other post-acute care settings

Questions and Comments

Thank You!