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Evaluating the Impact of Integrated Behavioral Health (IBH) Intervention

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Outline

- Summary
- Terms / Abbreviations
- Background
 - Integrated Behavioral Health (IBH) Intervention
- Methods
- Results
 - Trends
 - Regression results
- Discussion



Summary of findings

Utilization outcome

- Overall, analysis suggests positive effects of IBH intervention
- Analysis suggests:
 - reduction in office and emergency department (ED) visits
 - no effects on hospitalization
- Holds true for both IBH-1 and IBH-2

Cost outcomes

IBH-1

- Analysis suggests lower ED costs
 - Also, reduction in professional services cost and drugs cost

IBH-2

- Analysis suggests an increase in costs for professional services for IBH-2



Terms and Abbreviations

- IBH = Integrated Behavioral Health
- Intervention (or treatment) = the package of services offered
- Treatment (or treated) group = group that received the intervention
- Control (or comparison) group = group that did not receive the intervention
- Group = practices
- IBH-1 = cohort 1
- IBH-2 = cohort 2
- Baseline period = one-year time period before the start of intervention
- Intervention (or treatment) period = duration of when intervention occurred
- ED visits = Emergency Department visits
- Inpatient = hospitalization
- RCT = Randomized Control Trial
- APCD = All Payers Claims Database
- DiD = Difference-in-Differences
- PSM = Propensity Score Matching



IBH Background



IBH intervention: the elements

IBH was a targeted behavioral health intervention, and the elements of the intervention included the following:

Universal screening for depression, anxiety, SUD issues

Infrastructure within each practice for universal screening

Hire and provide workspace for 1 behavioral specialist

Care coordination for high need patients

Workflows including regular review of high risk patients

Meet with BH specialist every quarter to review results of screening

Financial incentive

Training & orientation, mentoring

IBH intervention

- It was a practice level intervention (i.e., practices were eligible/selected to receive the services).
- A total of 11 practices received the intervention.

Cohort	Practice Name
1	Associates in Primary Care
	East Bay Community Action Program (E. Providence)
	East Bay Community Action Program (Newport)
	Providence Community Health Centers – Chafee
	Tri-County Community Action
	Women’s Medicine Collaborative
2	Brown University – Governor Street
	Coastal Medical – Hillside Family Medicine
	Providence Community Health Centers – Capitol Hill
	Providence Community Health Centers – Prairie Avenue
	Wood River Health Services



IBH intervention: the timeline

Slightly different timeline for cohort 1 and cohort 2 practices

Cohort	Baseline period	Intervention period
1	Jan. 2015 – Dec. 2015	Jan. 2016 – Dec. 2017
2	Nov. 2016 – Oct. 2017	Nov.2016 – Oct. 2018



Methods



Data and Empirical Strategy

- Data
 - ❖ Intervention patient list submitted to Arcadia and Onpoint
 - ❖ De-identified claims in the All-Payers Claims Database (APCD)
 - ❖ Enrollment files, medical claims, prescription claims
 - ❖ 2015-2018
- Empirical strategy: matched difference-in-difference (DID)
 - ❖ Propensity-score-based individual-level matching to select controls
 - ❖ DID analysis: differences between intervened and (matched) control cohorts before and after the intervention

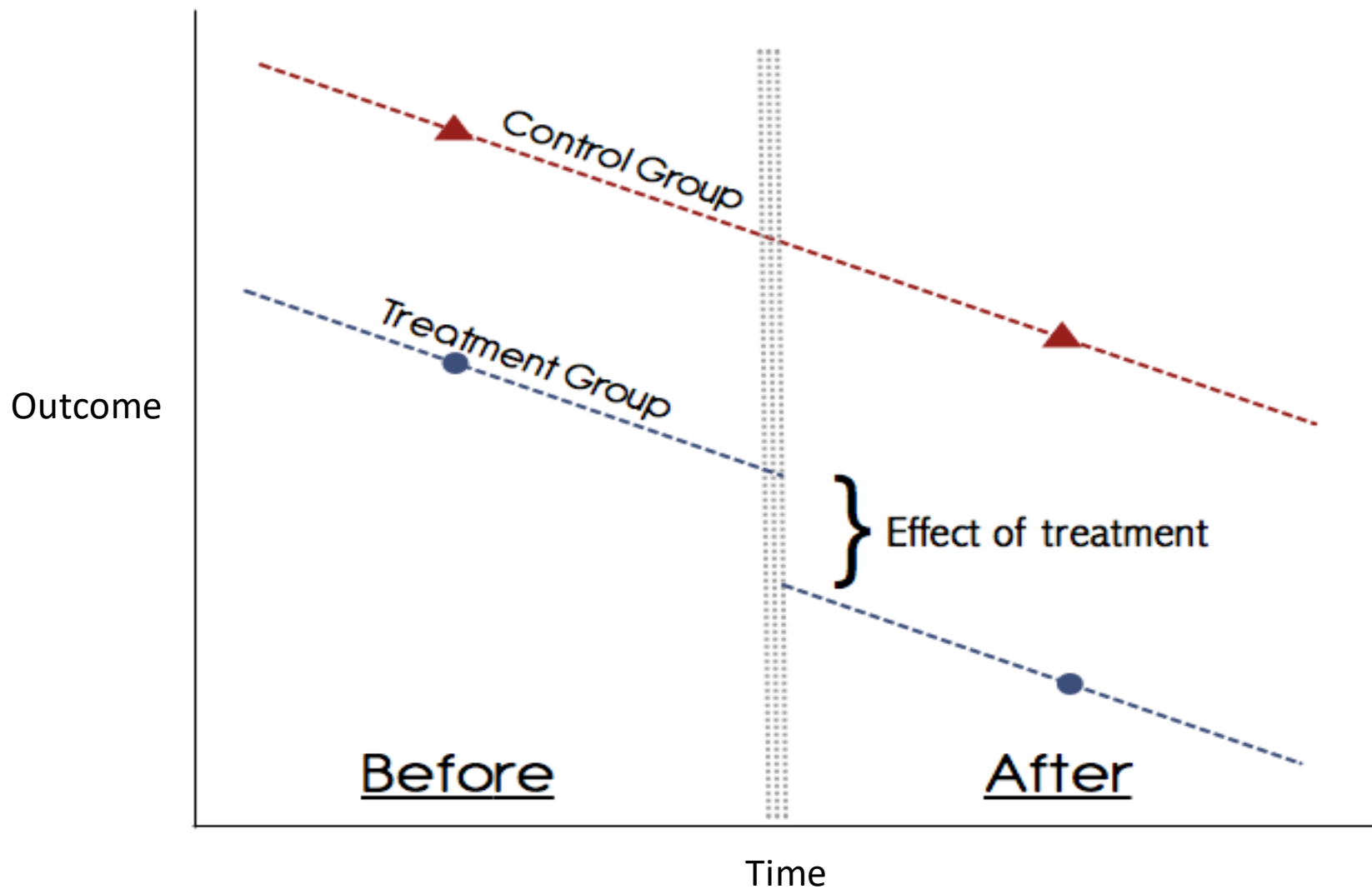


Propensity score matching

- Propensity score
 - ❖ A composite measure of how likely a person is to be in the intervention group (IBH cohort=“treatment”) vs. comparison (control) group
 - ❖ Based on observed factors that may affect a person’s probability of being in the intervention group
 - ❖ Demographic & eligibility factors: age, gender, Medicare status, Medicaid, dual eligibility...
 - ❖ Chronic conditions
 - ❖ Zip-code level poverty rate
 - ❖ Potential control population: anyone in the RI APCD who was continuously enrolled between 2015 and 2018 that was NOT in the treatment/intervened cohort
 - ❖ 1-to-many matching



Difference-in-Differences (DiD) in Brief



Characteristics of the matched population

(Standardized Means)

VARIABLE↓	IBH - Cohort 1			IBH - Chort 2		
	<i>Treated</i>	<i>Control</i>	<i>p>t</i>	<i>Treated</i>	<i>Control</i>	<i>p>t</i>
Age (in yrs.)	45.668	45.57	0.632	50.944	50.876	0.730
Female (%)	0.674	0.678	0.463	0.618	0.618	0.981
Dual status (%)	0.101	0.098	0.471	0.085	0.085	0.886
# of Comorbidities in 2015	1.223	1.206	0.332	1.077	1.066	0.419
Medicaid (%)	0.582	0.578	0.574	0.449	0.445	0.467
<i>Blind/Disabled</i>	0.123	0.126	0.527	0.084	0.086	0.595
<i>Parents/Caretakers</i>	0.179	0.182	0.559	0.150	0.151	0.787
<i>Children</i>	0.012	0.011	0.483	0.016	0.016	0.952
<i>Expansion adults</i>	0.194	0.194	0.952	0.134	0.134	0.944
<i>Not Applicable</i>	0.430	0.432	0.656	0.559	0.562	0.658
Medicare (%)	0.228	0.223	0.310	0.320	0.320	0.977
<i>Aged without ESRD</i>	0.129	0.128	0.895	0.257	0.259	0.699
<i>Disabled with ESRD</i>	0.000	0.000	0.581	0.001	0.000	0.077
<i>Disabled without ESRD</i>	0.098	0.094	0.260	0.061	0.061	0.760
<i>ESRD only</i>	0.000	0.000	.	0.000	0.000	.
<i>Not Applicable</i>	0.772	0.777	0.310	0.680	0.680	0.977
Poverty Rate	14.173	16.232	0.000	17.112	15.760	0.000
N	12,298	30,638		17,603	31,559	



Outcomes of interest

Utilization

❖ ED visit rates

- CPT Codes: 99281 – 99285, 99288, 99289
- Revenue center codes: 0451-0459
- Place of service: emergency room

❖ Office visit rates

❖ Hospitalization rates

- Based on unique discharge IDs

Cost of care

❖ Total cost of care

- ❖ Inpatient
- ❖ Professional services
- ❖ Drugs
- ❖ Outpatient
 - ❖ Emergency

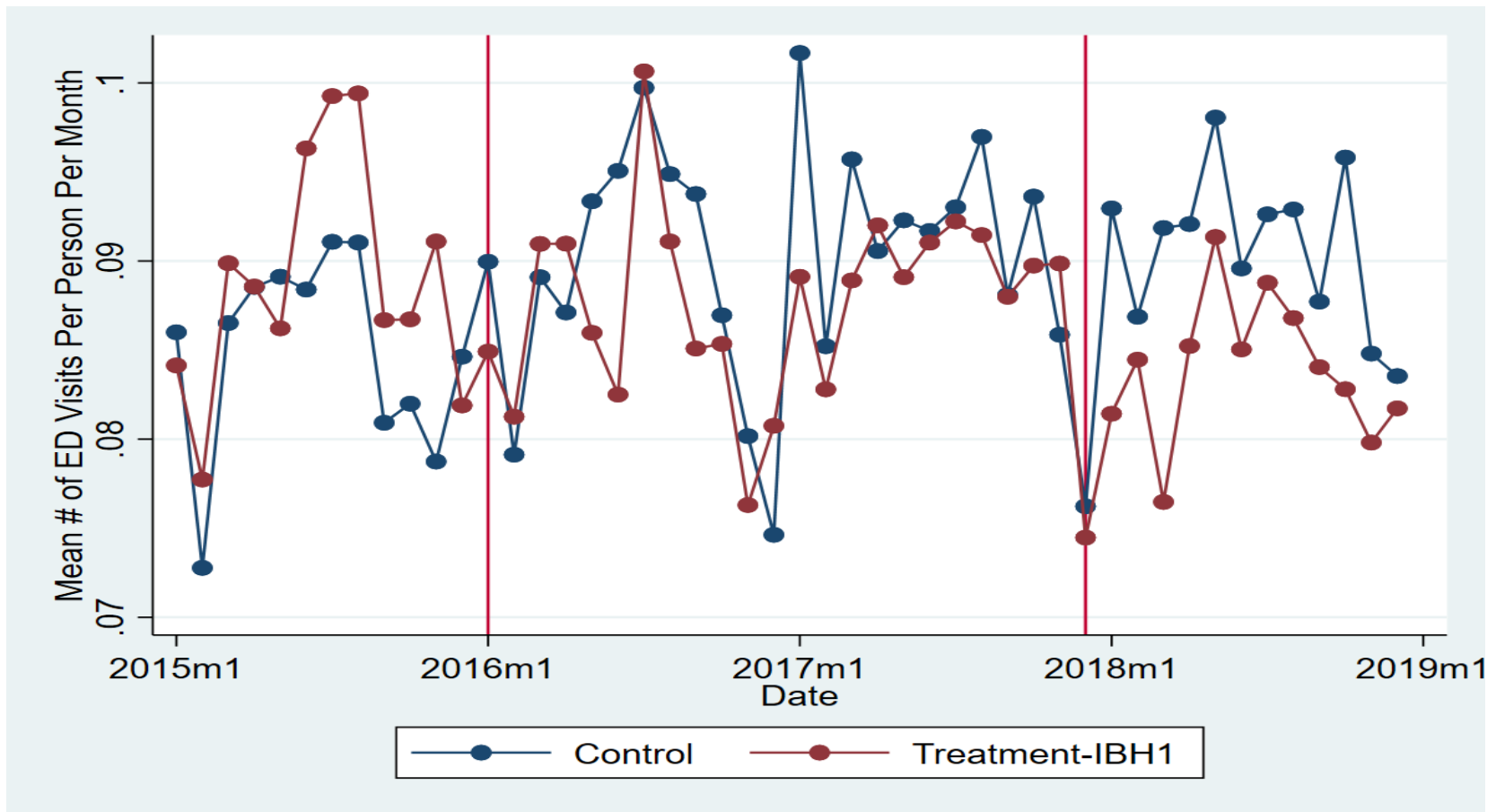


RESULTS: Unadjusted trends

(sample)



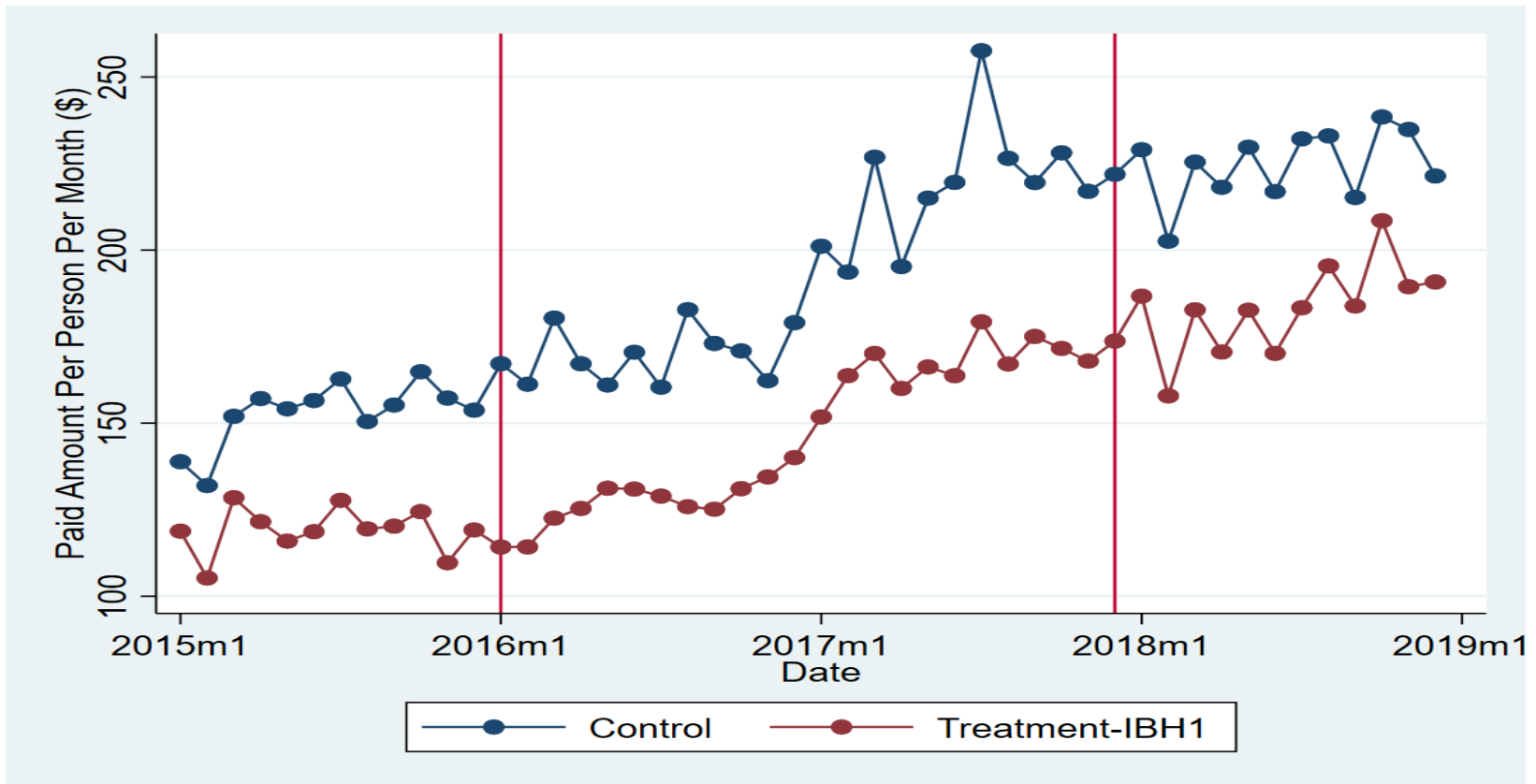
ED Visits (unadjusted) – IBH1



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



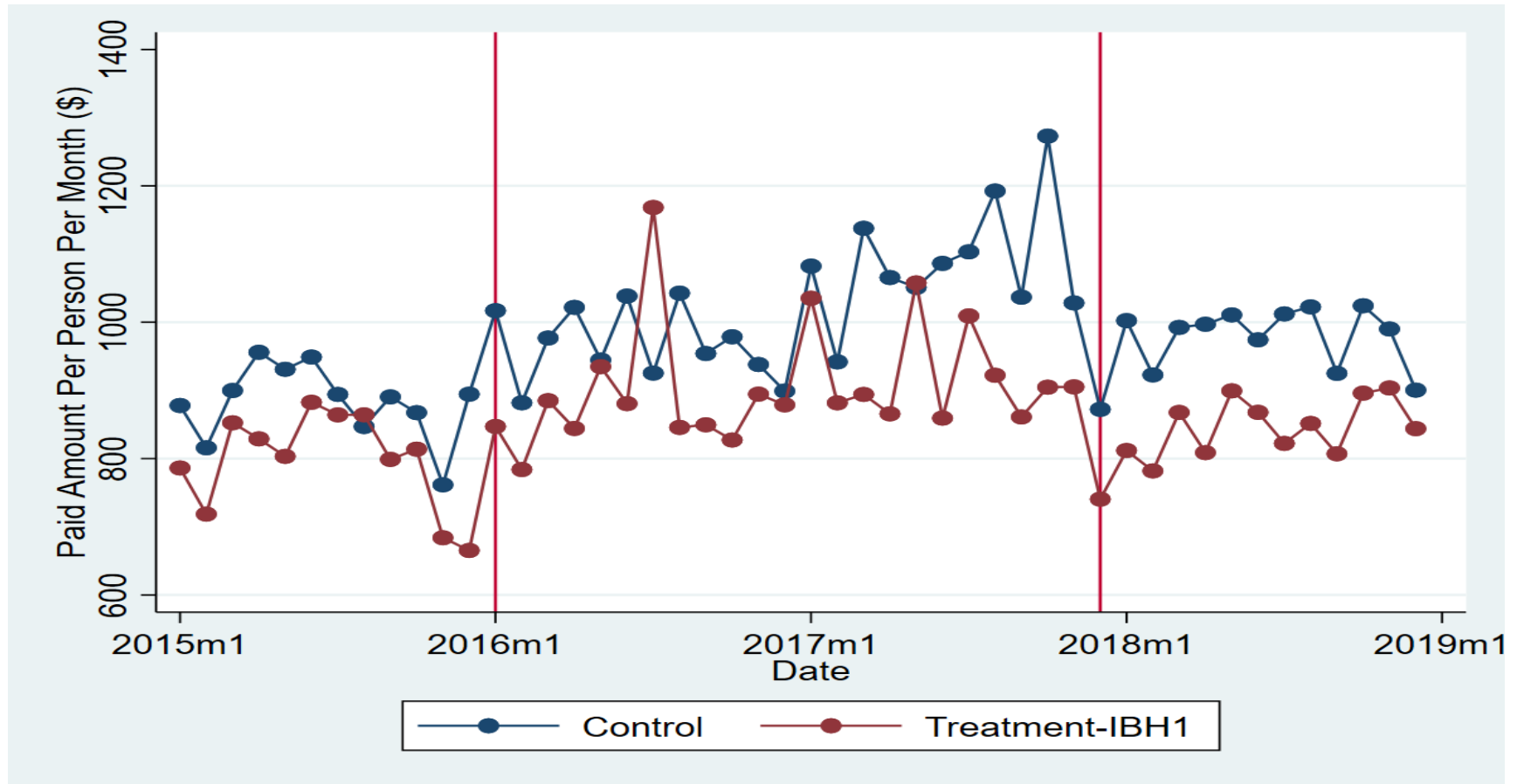
Prescription drugs cost (unadjusted) – IBH1



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



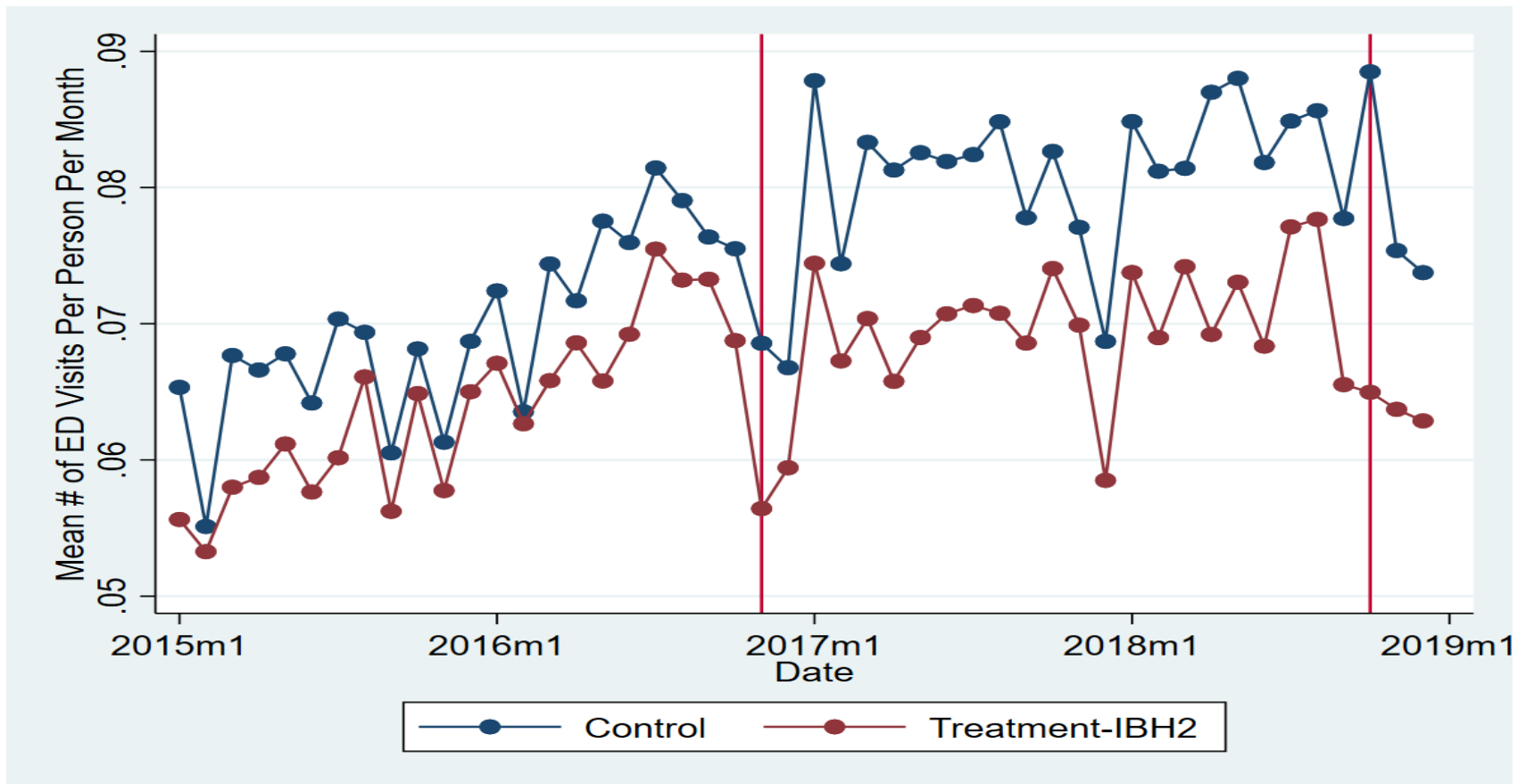
Total costs (unadjusted) – IBH1



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



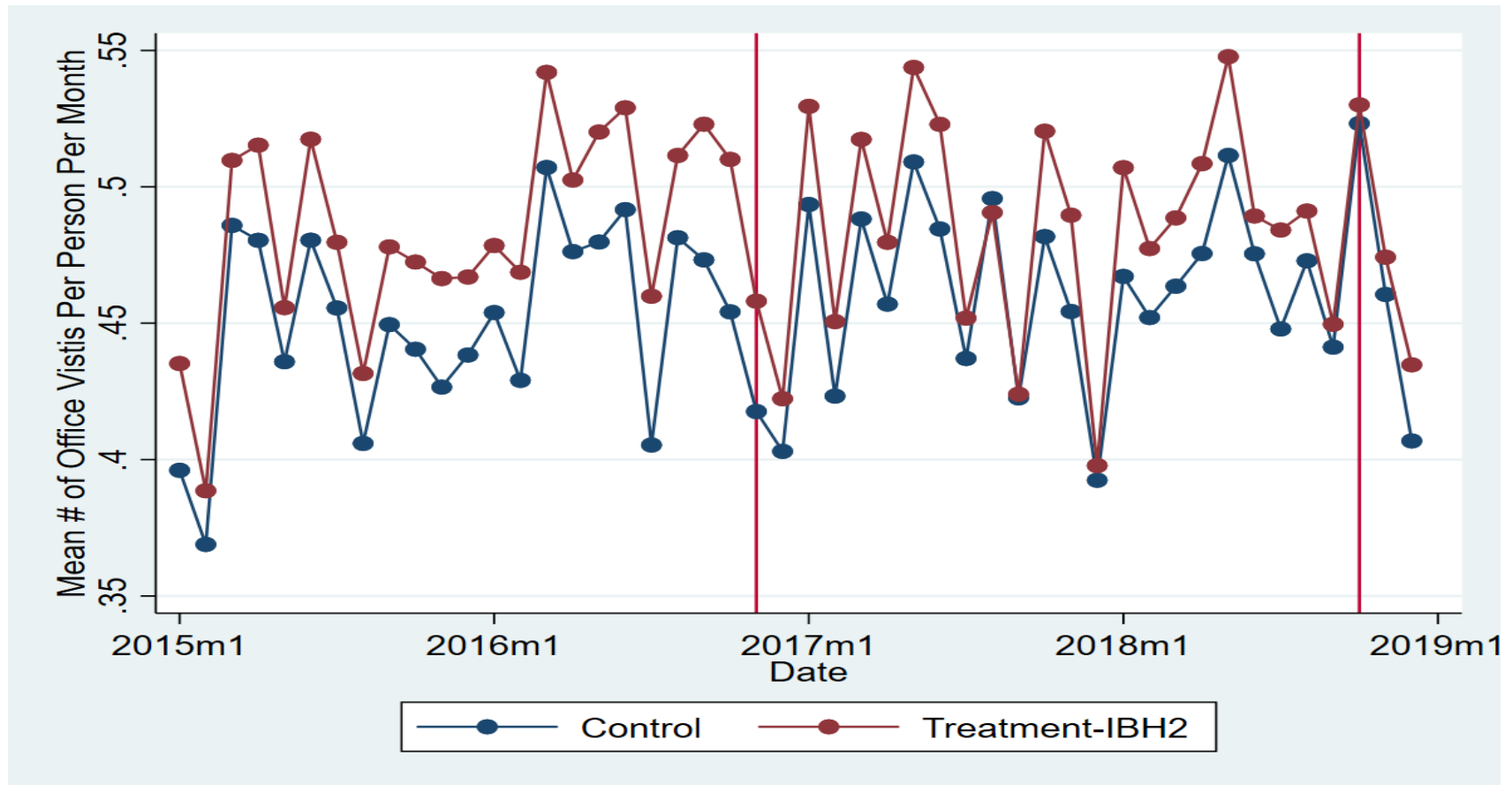
ED visits (unadjusted) – IBH2



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



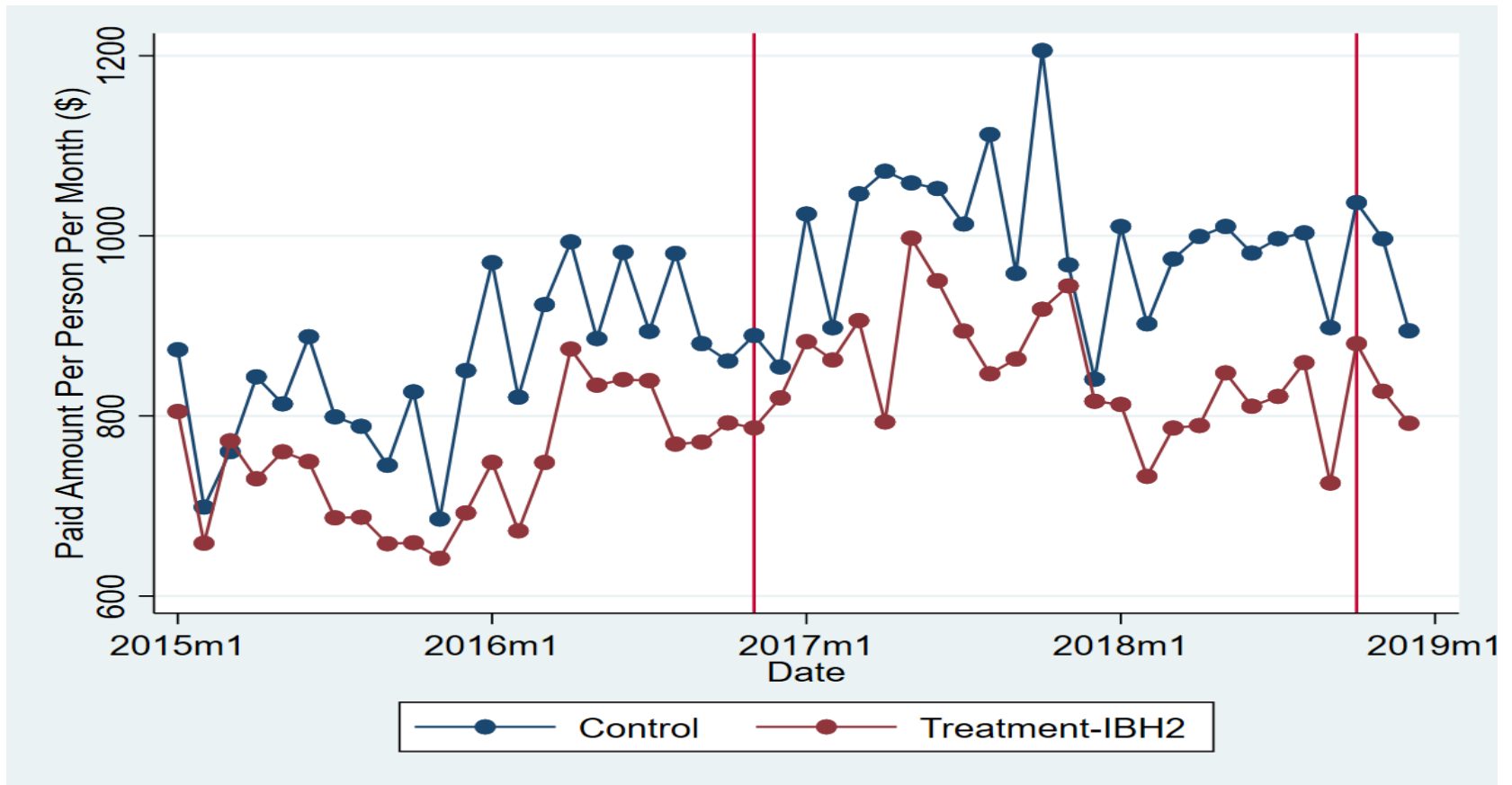
Office visits (unadjusted) – IBH2



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



Total cost of care (unadjusted) – IBH2



- Time before the first red line represents the **baseline period**.
- Time between the two red lines represents **intervention period**.



RESULTS: Regression



Regression specification

$$y_{it} = \alpha + \beta(IBH_i) + \gamma(Post_t) + \delta(IBH_i * Post_t) + \sigma X + v_t + \varepsilon_{it}$$

- y_{it} : outcome for person i at month t
- IBH_i : whether person i was an IBH participant or a (matched) control
- $Post_t$: indicator=1 for period after of IBH enrollment; =0 if before
- $IBH_i * Post_t$: interaction term between IBH_i and $Post_t$; **estimate of interest = δ**
- X : vector of demographic, eligibility and other characteristics (age, gender, Medicaid coverage, Medicaid eligibility basis, Medicare coverage, Dual eligibility, ZIP Code-level poverty rates, and comorbidities)
- v_t : year-month fixed effects
- ε_{it} : random error term with 0 mean
- All models have standard errors corrected for heteroscedasticity at person level
- Unit of analysis: per person per month



Utilization results: IBH cohort 1 (adjusted)

	ED Visits	Office Visits	Hospitalizations
DiD Estimate	-0.007***	-0.026***	-0.0002
	(0.002)	(0.005)	(0.001)
Constant	0.058***	0.052	0.020***
	(0.015)	(0.032)	(0.006)
N	1,510,791	1,510,791	1,510,791

Interpretation

- ED visits: reduction of 7 ED visits per 1000 people per month (this represents about 12% reduction, given the baseline of 58 visits per 1000 people per month).
- Office visits: reduction of about 26 office visits for 1000 people per month (this represents about 50% reduction, given the baseline of 52 office visits for 1000 people per month).



Utilization results: IBH cohort 2 (adjusted)

	ED Visits	Office Visits	Hospitalizations
DiD Estimate	-0.006***	-0.015***	-0.001
	(0.002)	(0.004)	(0.001)
Constant	0.029**	0.061**	0.009*
	(0.011)	(0.028)	(0.005)
N	1,725,991	1,725,991	1,725,991

Interpretation

- ED visits: reduction of about 6 ED visits per 1000 people per month (this represents about 20% reduction, given the baseline of 29 ED visits per 1000 people).
- Office visits: reduction of about 15 office visits per 1000 people per month (this represents about 25% reduction, given the baseline of 61 visits per 1000 people per month).



Cost results: IBH cohort 1 (adjusted)



	Total Cost	Outpatient Cost	Inpatient Cost	Prof. Services Cost	Drugs Cost	ED Costs
DiD Estimate	-36.649	-6.805	-10.244	-7.198*	-11.897*	-3.173**
	(32.632)	(5.722)	(29.117)	(3.978)	(7.138)	(1.394)
Constant	708.822***	74.475***	36.168	642.123***	150.715***	39.675***
	(186.778)	(22.907)	(163.115)	(46.506)	(4.413)	(7.328)
N	1,510,791	1,510,791	1,510,791	1,510,791	1,510,791	1,510,791

Interpretation

- ED cost: reduction of about 3 USD per person per month (this represents about 7.5% reduction, given the baseline of 40 USD per person per month).
- Drugs cost: reduction of approx. 12 USD per person per month (this represents about 8% reduction, given the baseline of 151 USD per person per month).
- Prof. services cost: reduction of 7 USD per person per month (this represents about 1% reduction, given the baseline of 642 USD).



Cost results: IBH cohort 2 (adjusted)

	Total Cost	Outpatient Cost	Inpatient Cost	Prof. Services Cost	Drugs Cost	ED Costs
DiD Estimate	-21.834	1.959	-30.915	7.828**	-0.186	-1.311
	(29.982)	(5.841)	(26.891)	(3.883)	(5.758)	(1.478)
Constant	925.959***	11.780	369.094***	514.620***	142.728***	19.632***
	(121.057)	(24.997)	(91.858)	(37.754)	(5.412)	(5.352)
N	1,725,991	1,725,991	1,725,991	1,725,991	1,725,991	1,725,991

Interpretation

- *Prof services cost: increase in about 8 USD per person per month (this represents about 1.5% increase, given the baseline of 515 USD)*



Results summary

Utilization

		ED Visits	Office Visits	Hospitalizations
IBH-1	<i>Had effect?</i>	Yes	Yes	No
	<i>Direction</i>	Fall	Fall	None
IBH-2	<i>Had effect?</i>	Yes	Yes	No
	<i>Direction</i>	Fall	Fall	None

Cost

		Total cost	Inpatient	Outpatient	ED	Professional services	Prescription drugs
IBH-1	<i>Had effect?</i>	No	No	No	Yes	Yes	Yes
	<i>Direction</i>	NA	NA	NA	Fall	Fall	Fall
IBH-2	<i>Had effect?</i>	No	No	No	No	Yes	No
	<i>Direction</i>	NA	NA	NA	NA	Rise	NA



Discussion

Utilization

- Overall, analysis suggests positive effects of IBH intervention
- Analysis suggests:
 - reduction in office and ED visits
 - no effects on hospitalization
- Holds true for both IBH-1 and IBH-2

Costs

IBH-1

- Analysis suggests lower ED costs
 - Linked to reduction in ED visits?
- Additionally, reduction in professional services cost and drugs cost

IBH-2

- Analysis suggests an increase in costs for professional services for IBH-2
 - Office visit costs are only part of the professional services (see appendix table for the category breakdown) – so difficult to say anything specific about office visit costs
 - Any of the classifying categories could be responsible for increase in the professional cost



Limitations

- Intervention at the practice level but analysis at the person level
 - No information on practices for the comparison group
- Due to non-random selection of IBH practices
 - From research perspective, design not as strong as an RCT
 - Matching was done to make controls more comparable
- Several elements of the intervention – no way to pinpoint
- Not everyone from RI is captured in the APCD



Next steps

- Abstract accepted for American Society of Health Economists (ASHEcon) conference – 2020
 - Virtual presentation in mid-June
- Abstract accepted for Academy Health's Annual Research Meetings (ARM) conference
 - Virtual presentation in late July
- Manuscript preparation



APPENDIX: Cost categories

MAJOR CATEGORY	CLASSIFYING CATEGORY
01: Inpatient Facility	01-01: Inp-Acute Inp or Hospital
	01-01: Inp-ICF
	01-01: Inp-Other
	01-01: Inp-Residential
	01-01: Inp-SNF
	01-01: Inp-Swing Beds
02: Outpatient Facility	02-01: Emergency
	02-02: Surgery
	02-03: Observation
	02-04: Ambulance
	02-05: DME/Prosthetics/Supplies
	02-06: Lab/Pathology
	02-07: Radiology Services
	02-08: Other
03: Professional Services	03-01: Office Visits
	03-02: Surgery
	03-03: Preventive Visits
	03-04: Administered Drugs
	03-05: Administration of Drugs
	03-06: Anesthesia
	03-07: Pathology/Lab
	03-08: Radiology
	03-09: Other
04: Prescription Drugs	04-01: Prescription Drugs

Major Cost Categories	Analyzed?	Remarks
01: Inpatient Facility	Yes	
02: Outpatient Facility	Yes	
03: Professional Services	Yes	
04: Prescription Drugs	Yes	
Classifying cost categories		
04-01: Prescription drugs	Yes	Same as 04 in major categories
02-01: Emergency	Yes	Part of OP cost
Others categories		
Total paid amount	Yes	Equal to the sums of total paid amount for the 4 major categories

