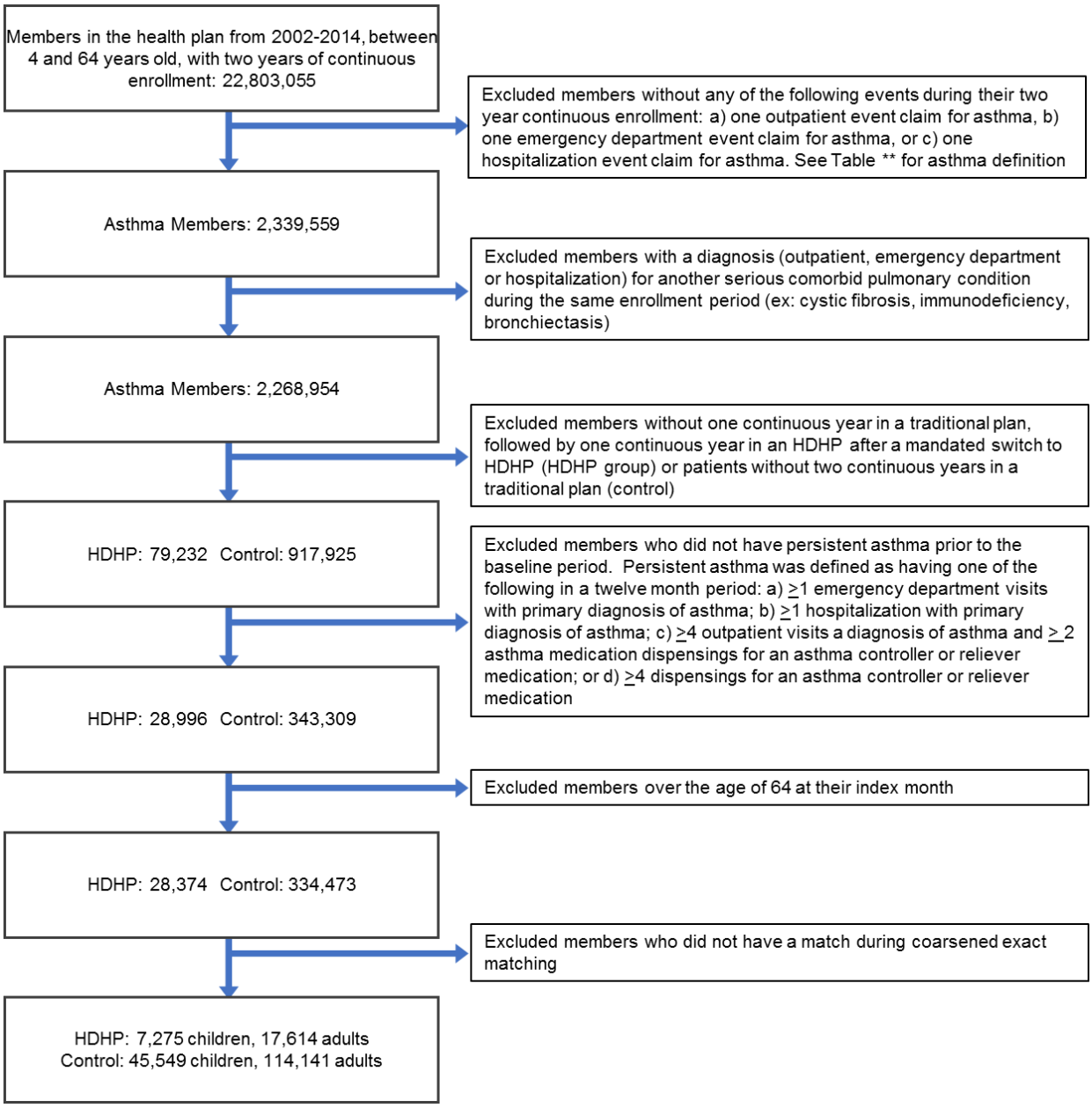
Supplementary Online Content

Galbraith AA, Ross-Degnan D, Zhang F, et al. Controller medication use and exacerbations for children with asthma in high-deductible plans. *JAMA Pediatr*. Published online May 10, 2021. doi:10.1001/jamapediatrics.2021.0747

This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Study Cohort Selection



eTable 1. Baseline Characteristics of Children and Adults in the Study Population, Before Matching

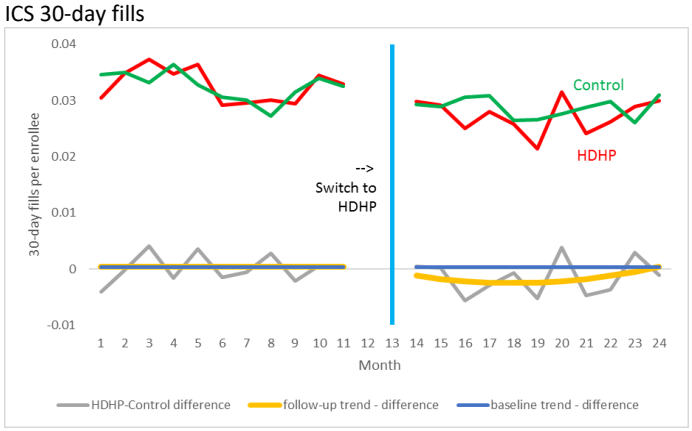
	Children, No. (%)					Adults, No. (%)				
	HDHP (n=7,961)		**Control (n=101,214)**		**Std. diff.**	**HDHP (n=20,413)**		**Control (n=233,259)**		**Std. diff.**
Age as of Index Date					-					0.107
4-16	7,961	(100)	101,214	(100)		-	-	-	-	
17-29	-	-	-	-		4396	(21.5)	53689	(23.0)	
30-39	-	-	-	-		3560	(17.4)	44481	(19.1)	
40-49	-	-	-	-		5655	(27.7)	61008	(26.2)	
50-64	-	-	-	-		6802	(33.3)	74081	(31.8)	
Female	3140	(39.4)	40648	(40.2)	-0.015	12337	(60.4)	143665	(61.6)	-0.024
Race/ethnicity[a]					0.211					0.137
Hispanic	781	(9.8)	11417	(11.3)		1567	(7.7)	19496	(8.4)	
Asian	217	(2.7)	4603	(4.6)		356	(1.7)	6605	(2.8)	
Non-Hispanic Black	75	(0.9)	2177	(2.2)		296	(1.5)	5481	(2.4)	
Mixed	1228	(15.4)	20457	(20.2)		3788	(18.6)	50927	(21.8)	
Non-Hispanic White	5653	(71.1)	62481	(61.8)		14389	(70.5)	150581	(64.6)	
Percent of neighborhood without high school degree					0.095					0.083
<15.0	6342	(79.8)	79272	(78.4)		15489	(76.0)	178970	(76.8)	
15.0-24.9	1090	(13.7)	14513	(14.4)		3307	(16.2)	36950	(15.9)	
25.0-39.9	419	(5.3)	5856	(5.8)		1266	(6.2)	14056	(6.0)	
≥40.0	96	(1.2)	1473	(1.5)		324	(1.6)	3077	(1.3)	
Percent of neighborhood below poverty					0.067					0.078
<5.0	2581	(32.5)	35111	(34.7)		5546	(27.2)	69071	(29.6)	
5.0-9.9	2356	(29.6)	28445	(28.1)		5783	(28.4)	65880	(28.3)	
10.0-19.9	2078	(26.1)	24878	(24.6)		5806	(28.5)	63782	(27.4)	
≥20	932	(11.7)	12678	(12.5)		3250	(15.9)	34223	(14.7)	
Mean ACG score (SD)	0.5	(0.9)	0.5	(0.9)	-0.003	1.4	(2.1)	1.3	(2.0)	0.010
US Region					0.277					0.248
Midwest	2733	(34.4)	27722	(27.4)		7638	(37.5)	75109	(32.2)	
Northeast	602	(7.6)	14865	(14.7)		1503	(7.4)	33510	(14.4)	
South	3794	(47.7)	44865	(44.4)		8814	(43.2)	90327	(38.8)	
West	819	(10.3)	13687	(13.5)		2432	(11.9)	34136	(14.6)	
Employer size (no. of employees)					1.590					1.460
1-99	5193	(65.2)	15066	(14.9)		13638	(66.8)	39555	(17.0)	
100-999	2430	(30.5)	28416	(28.1)		5785	(28.3)	68961	(29.6)	
1000+	338	(4.2)	57732	(57.0)		990	(4.8)	124743	(53.5)	

[a] We used geocoding to classify participants as from predominantly white, black, Hispanic, or mixed neighborhoods, and used a superseding Hispanic or Asian assignment based on flags created by the E-Tech system (Ethnic Technologies) which analyzes full names and geographic locations of individuals.
Abbreviation: Std. diff.= standardized mean difference

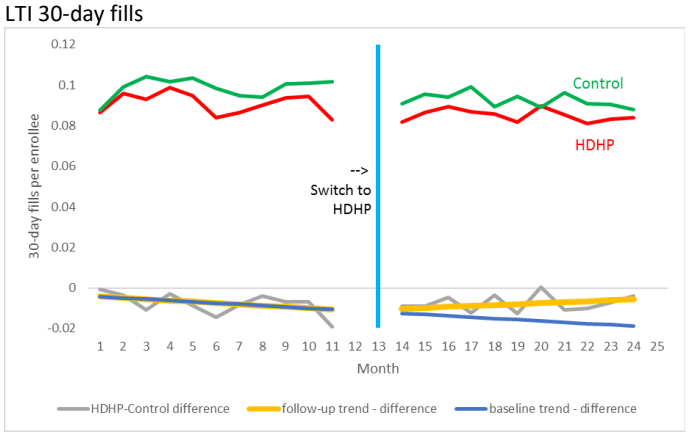
eFigure 2. Aggregate Interrupted Time Series Regression Results for Monthly 30-day Fill Rates for High-Deductible Health Plan (HDHP) and Control Enrollees and the Difference Between Them From Baseline Period (Months 1 – 12) to Follow-Up Period (Months 13-24)

30-Day Fill Rates - Children

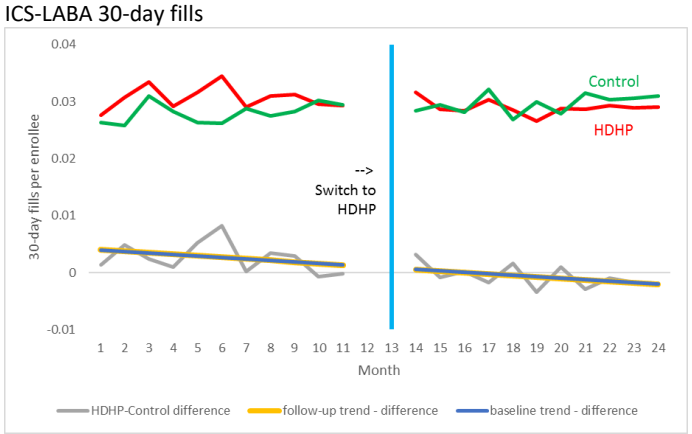
ICS 30-day fills



LTI 30-day fills

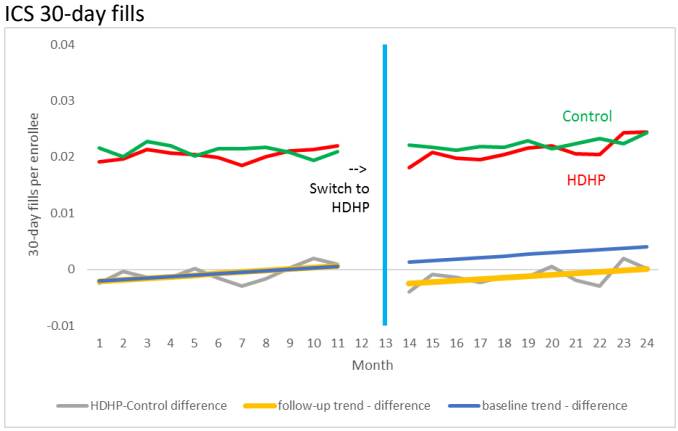


ICS-LABA 30-day fills

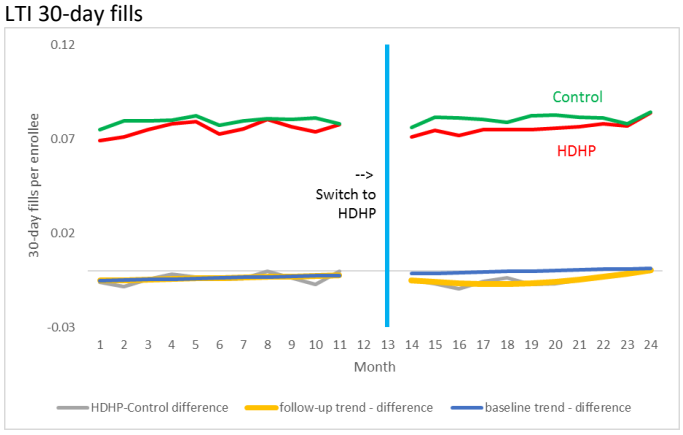


30-Day Fill Rates - Adults

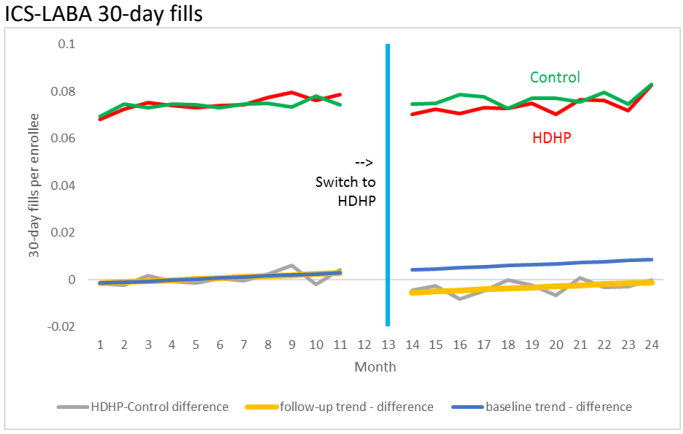
ICS 30-day fills



LTI 30-day fills



ICS-LABA 30-day fills



eFigure 3. Aggregate Interrupted Time Series Regression Results for Monthly Rates of Asthma Exacerbations (Oral Steroid Bursts (OCS) and Asthma-Related Emergency Department (ED) Visits) for High-Deductible Health Plan (HDHP) and Control Enrollees and the Difference Between Them From Baseline Period (Months 1 – 12) to Follow-Up Period (Months 13-24)

eTable 2. Adjusted Rates of Asthma Controller Medication Use, Adherence, and Exacerbations Before and After Switching to an HDHP Compared With a Control Group Remaining in a Traditional Plan, Among Adults and Children With Three or More Controller Fills [a]

	HDHP		**Control**		**Absolute change for HDHP vs. control group, (95% CI)** [b]
	pre	post	pre	post	
30-day fills, mean rate per enrollee	n=4,344		n=17,659		
ICS	0.97	0.80	1.03	0.90	-0.05 (-0.10 to 0.01)
LTI	3.82	3.82	4.10	3.64	-0.1 (-0.2 to 0.03)
ICS-LABA	2.93	2.59	2.75	2.50	-0.08 (-0.16 to 0.003)
Proportion of days covered (%)[c]					
ICS	n=737		n=1,925		
	39.3	27.0	40.1	27.5	-0.04% (-1.9% to 1.9%)
LTI	n=2,067		n=7,503		
	67.4	53.7	68.4	55.4	-0.8% (-2.3% to 0.7%)
ICS-LABA	n=1,840		n=6,202		
	56.1	44.4	55.6	45.4	-1.4% (-2.8% to -0.1%)
Exacerbations, rate per 100 enrollees	n=4,344		n=17,659		
OCS bursts	38.0	37.1	38.6	36.1	1.5 (-1.5 to 4.6)
Asthma-related ED visits	2.6	2.2	3.3	3.1	-0.2 (-1.1 to 0.6)

[a] Among those with 3 or more fills of any one type of controller in the baseline (pre) period
[b] None of these findings were statistically significant based on Holm-Bonferroni correction.
[c] Among those with at least one fill in the first six months of the baseline (pre) period
HDHP and control groups were matched separately for each controller subgroup for PDC analyses (i.e. ICS users, LTI users, ICS-LABA users).
Abbreviations:
ICS = inhaled corticosteroid
LTI = leukotriene inhibitor
ICS-LABA = inhaled corticosteroid-long-acting beta agonist
OCS = oral corticosteroid
ED = emergency department

eTable 3. Adjusted Rates of Asthma Controller Medication Use, Adherence, and Exacerbations Before and After Switching to an HDHP Compared With a Control Group Remaining in a Traditional Plan, Among Adults and Children Between 2009-2014

	HDHP		**Control**		**Absolute change for HDHP vs. control group, (95% CI)** [a]
	pre	post	pre	post	
30-day fills, mean rate per enrollee	n=7,976		n=38,610		
ICS	0.32	0.30	0.32	0.31	-0.01 (-0.04 to 0.01)
LTI	0.78	0.72	0.78	0.74	-0.02 (-0.06 to 0.02)
ICS-LABA	0.53	0.50	0.52	0.52	-0.04 (-0.07 to -0.01)
Proportion of days covered (%)[b]					
ICS	n=421		n=959		
	32.4	20.7	31.0	19.3	0.5% (-1.6% to 2.7%)
LTI	n=659		n=1,437		
	52.6	40.5	55.2	44.6	-2.0% (-4.6% to 0.6%)
ICS-LABA	n=540		n=1,274		
	44.0	34.4	44.9	37.5	-2.3% (-4.6% to -0.04%)
Exacerbations, rate per 100 enrollees[c]	n=1,707		n=5,067		
OCS bursts	34.8	31.0	36.1	34.7	-2.4 (-7.0 to 2.2)
Asthma-related ED visits	3.1	2.1	2.3	2.7	-1.6 (-3.4 to 0.2)

[a] None of these findings were statistically significant based on Holm-Bonferroni correction.
[b] Among those with at least one fill in the first six months of the baseline (pre) period
[c] Among those with any controller fill
HDHP and control groups were matched separately for each controller subgroup for PDC analyses (i.e. ICS users, LTI users, ICS-LABA users), and for users of any controller for exacerbation analyses.
Abbreviations:
ICS = inhaled corticosteroid
LTI = leukotriene inhibitor
ICS-LABA = inhaled corticosteroid-long-acting beta agonist
OCS = oral corticosteroid
ED = emergency department