

Evaluation of the NHS England Evidence Based Interventions programme: a difference in difference analysis (Supplementary Material)

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Table 1: Procedure and diagnosis codes for phase one of the EBI programme (Treatment Group)

Procedure	OPCS codes	Diagnostic codes
A Intervention for snoring (not OSA)	F324, F325, F326, Y114, F328	G473*
B Dilatation & curettage for heavy menstrual bleeding	Q103, Y113	O00-O08*, O60-O69*, O70-O75*, N92, N95
C Knee arthroscopy with osteoarthritis	W821, W822, W823, W828, W829, W851, W852, W853, W858, W859, W831, W832, W833, W834, W835, W836, W837, W838, W839, W841, W842, W843, W844, W861, W879, W901	M150, M151, M152, M153, M154, M158, M159, M170, M171, M172, M173, M174, M175, M179
D Injection for nonspecific low back pain without sciatica	A521, A522, A528, A529, A577, A735, V544, Z676, Z675, Z993	M518, M519, M545, M549
E Breast reduction	B311	Z853*, D051*, D059*, D486*
G Grommets	D151, D289	H652, H653, H661, H662, H663, H664, H669
H Tonsillectomy	F341, F342, F343, F344, F345, F346, F347, F348, F349, F361	G470, G471, G472, G473, G474, G478, G479, J36X
I Haemorrhoid surgery	H511, H512, H513, H518, H519	
J Hysterectomy for heavy bleeding	Q072, Q074, Q078, Q079, Q082, Q088, Q089	O00-O08*, O60-O69*, O70-O75*
K Chalazia removal	C121, C122, C124, C191, C198	H001
L Shoulder decompression	O291	M2551, M754
M Carpal tunnel syndrome release	A651, A659	G560
N Dupuytren's contracture release	T521, T522, T525, T526, T541, T561	M720
O Ganglion excision	T591, T592, T598, T599, T601, T602, T608, T609	M674
P Trigger finger release	T691, T692, T698, T699, T701, T702, T711, T718, T719, T723, T728, T729, Z894, Z895, Z896, Z897	M653, M6530, M6531, M6532, M6533, M6534, M6535, M6536, M6537, M6538, M6539
Q Varicose vein surgery	L832, L838, L839, L841, L842, L843, L844, L845, L846, L848, L849, L851, L852, L853, L858, L859, L861, L862, L868, L869, L871, L872, L873, L874, L875, L876, L877, L878,	I800, I801, I802, I803, I808, I809, I830, I831, I832, I839

		L879 , L881 , L882 , L883 , L888 , L889	
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*Exclude records whereby primary diagnosis code contains this ICD-10 code

Table 2: Procedure and diagnosis codes for phase two of the EBI programme (Control Group)

	Procedure	OPCS codes	Diagnostic codes
2B	Hernia repair	T20.1, T20.2, T20.3, T20.4 T20.8, T20.9	K40.2, K40.9
2C	Sinus surgery	Y76.1, Y76.2, E12.1, E12.2, E12.3, E12.4, E12.8, E12.9, E13.1, E13.2, E13.3, E13.4, E13.5, E13.6, E13.7, E13.8, E13.9, E14.1, E14.2, E14.3, E14.4, E14.5, E14.6, E14.7, E14.8, E14.9, E15.1, E15.2, E15.3, E15.4, E15.8, E15.9, E16.1, E16.2, E16.8, E16.9, E17.1, E17.2, E17.3, E17.4, E17.8, E17.9, E08.1	J32.0, J32.1, J32.2, J32.3, J32.4, J32.8, J32.9
2G	Kidney stone surgery	M09.4, M09.8, M16.4, M26.1, M26.2, M26.3, M27.1, M27.2, M27.3, M27.8, M28.1, M28.2, M28.3, M28.4, M28.5, M28.8, M28.9	N20.0, N20.1, N20.2, N20.9
2I	Benign prostatic hypertrophy surgery	M61.1, M61.2, M61.3, M61.4, M61.8, M61.9, M64.1, M65.1, M65.2, M65.3, M65.4, M65.5, M65.8, M65.9, M66.1, M66.2, M68.1, M68.3	N40

Table 3: Procedures under phase one and two of the NHS England Evidence Based Interventions Programme

First phase of EBI programme	Second phase of EBI programme
Category 1 Interventions	Category A Interventions
<ul style="list-style-type: none"> • Intervention for snoring (not OSA) • Dilatation & curettage for heavy menstrual bleeding • Knee arthroscopy with osteoarthritis • Injection for nonspecific low back pain without sciatica 	<ul style="list-style-type: none"> • Diagnostic angiogram • Repair of minimally symptomatic inguinal hernia • Surgical intervention for chronic rhinosinusitis • Adjuvant adenoidectomy for treatment of glue ear • Arthroscopic surgery for meniscal tears • Kidney Stone surgery • Cystoscopy for men with uncomplicated lower urinary tract symptoms (LUTS) • Surgical intervention for Benign Prostatic Hypertrophy (BPH) • Lumbar Discectomy • Radiofrequency facet joint denervation • Exercise electrocardiogram (ECG) • Upper gastrointestinal endoscopy
Category 2 Interventions	Category B Interventions
<ul style="list-style-type: none"> • Breast reduction • Removal of benign skin lesions • Grommets • Tonsillectomy • Haemorrhoid surgery • Hysterectomy for heavy bleeding • Chalazia removal • Shoulder decompression • Carpal tunnel syndrome release • Dupuytren's contracture release • Ganglion excision • Trigger finger release • Varicose vein surgery 	<ul style="list-style-type: none"> • Colonoscopy in the management of hereditary colorectal cancer • Repeat colonoscopy • ERCP in acute gallstone pancreatitis without cholangitis • Cholecystectomy • Appendicectomy without confirmation of appendicitis • Low back pain imaging • Knee MRI when symptoms are suggestive of osteoarthritis • Knee MRI for suspected meniscal tears • Vertebral augmentation for painful osteoporotic vertebral fractures • Scans for Shoulder Pain and Guided Injections • MRI scan of the hip for arthritis • Fusion surgery for mechanical axial low back pain
	Category C Interventions
	<ul style="list-style-type: none"> • Helmet therapy for treatment of positional plagiocephaly/brachycephaly in children • Pre-operative chest x-ray • Pre-operative ECG • Prostate-specific antigen (PSA) test • Liver function, creatinine kinase and lipid level tests • Blood transfusion

Source: NHS England Evidence Based Interventions Programme^{1,2}**Table 4: Cost per procedure and financial opportunity if activity achieved from baseline***

Intervention	Baseline FY 2017/18	Cost per procedure	Proposed Goal	Total financial opportunity (if goal activity achieved from baseline)
A Surgery for snoring without obstructive sleep apnoea	827	£ 973	0	£ 804,671.00
B D&C for heavy menstrual bleeding	231	£ 985	0	£ 227,535.00
C Knee arthroscopy with osteoarthritis	4,943	£ 2,682	0	£ 13,257,126.00
D Injections for non-specific lower back pain without sciatica	19,444	£ 589	0	£ 11,452,516.00
Cat 1 total	25,445		0	
E Breast reduction	988	£ 2,701	391	£ 1,613,277.36
F Removal of benign skin lesions	99,475	£ 626	61,720	£ 23,634,905.96
G Grommets	8,661	£ 727	5,415	£ 2,360,066.69
H Tonsillectomy	32,198	£ 1,172	24,951	£ 8,493,145.65
I Haemorrhoid surgery	8,517	£ 1,018	5,775	£ 2,791,399.99
J Hysterectomy for heavy menstrual bleeding	18,523	£ 2,941	14,068	£ 13,101,655.67
K Chalazia removal	6,007	£ 528	1,630	£ 2,311,318.67
L Shoulder decompression	13,647	£ 3,311	6,941	£ 22,203,480.15
M Carpal tunnel syndrome release	43,856	£ 1,204	28,902	£ 18,004,405.88
N Dupuytren's contracture release	14,938	£ 2,613	10,264	£ 12,213,245.57
O Ganglion excision	6,222	£ 1,212	3,641	£ 3,128,749.70
P Trigger finger release	7,768	£ 1,231	5,102	£ 3,281,592.07
Q Varicose vein surgery	28,776	£ 1,051	20,363	£ 8,842,041.84
Cat 2 total	289,576		189,162	
Cat 1 & 2 total	315,021		189,162	

Source: Provided by NHS England Evidence Based Interventions Team

Figure 1: Trends in EBI treatment and control group procedures (treatment group includes only low-cost procedures)

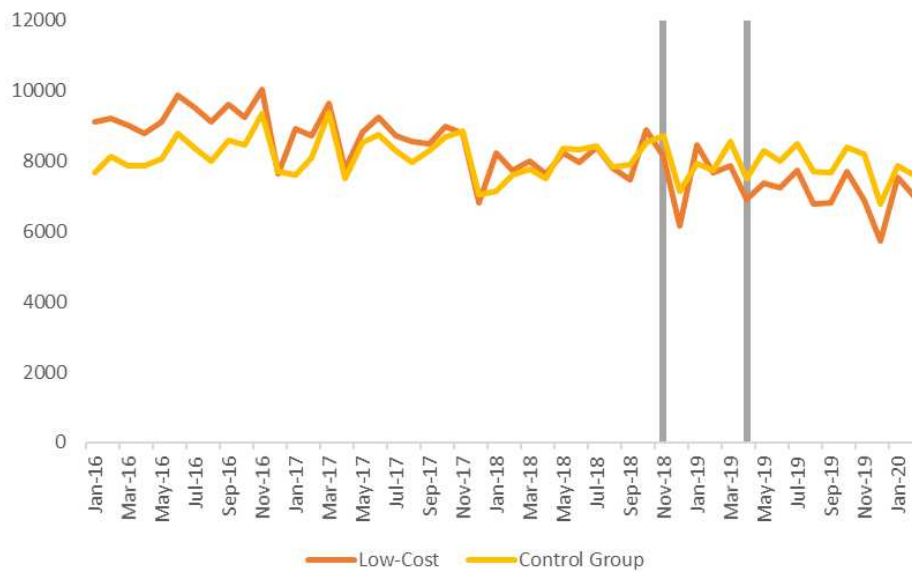


Figure 2: Trends in EBI treatment and control group procedures (treatment group includes only high-cost procedures)

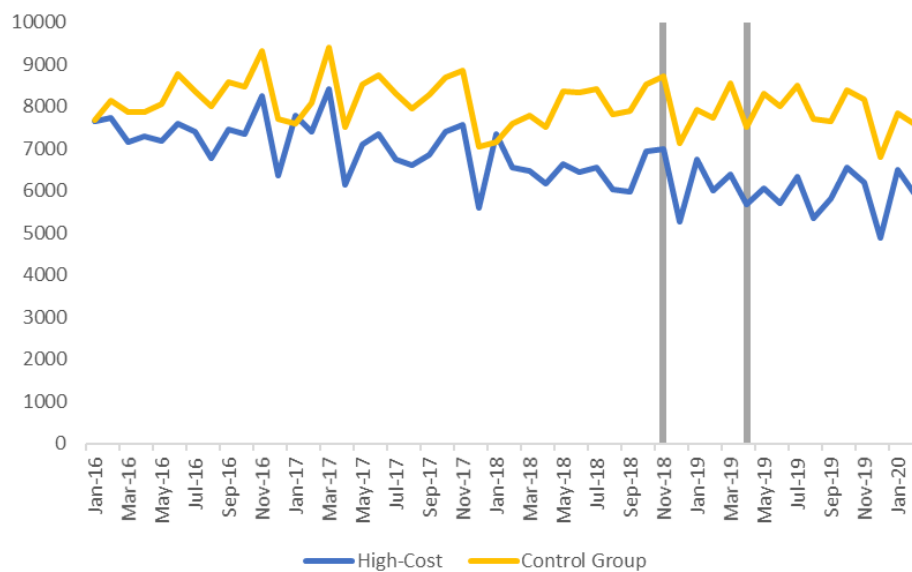


Figure 3: Trends in EBI treatment and control group procedures (treatment group includes all phase one category 2 procedures including removal of benign skin lesions)

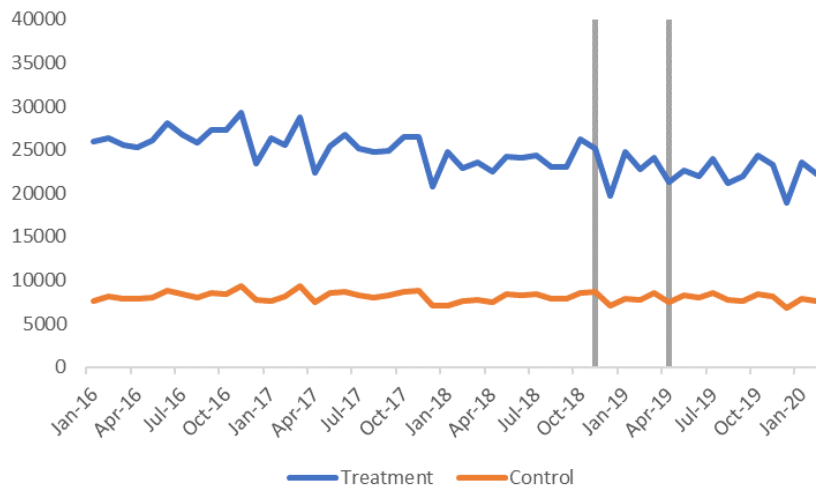


Figure 4: Trends in EBI treatment and control group procedures (treatment group includes all phase one category 1 and 2 procedures with the exception of removal of benign skin lesions)

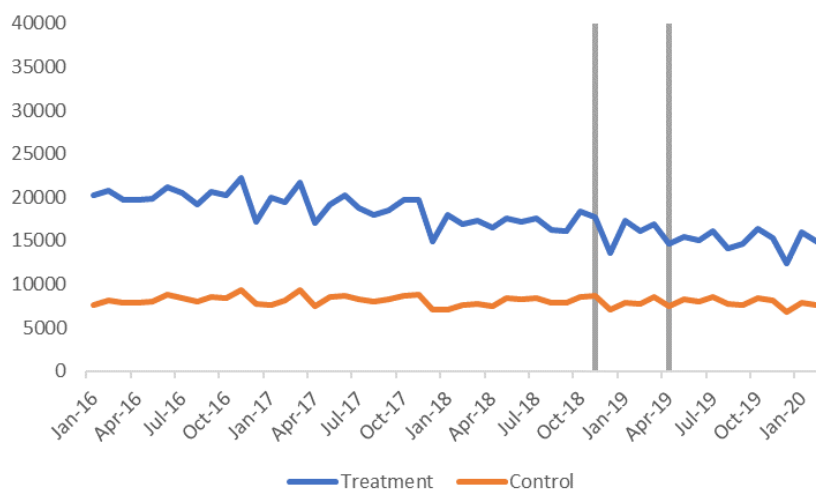


Table 5a: Descriptive Statistics of Patient Characteristics for Phase One and Phase Two Procedures (Mean and 95% CI)*

	Gender (Female=1)			Age		
	Before EBI	After EBI	Difference	Before EBI	After EBI	Difference
Phase One Procedures (Treatment)						
Category 1	0.62 (0.62, 0.63)	0.62 (0.61, 0.63)	-0.01 (-0.02, 0.00)	65.59 (65.47, 65.72)	67.01 (66.68, 67.34)	1.42 (1.07, 1.77)
Category 2	0.60 (0.60, 0.60)	0.60 (0.60, 0.60)	0.00 (-0.00, 0.00)	57.56 (57.51, 57.62)	58.61 (58.50, 58.72)	1.05 (0.92, 1.17)
Phase Two Procedures (Control)						
Total	0.15 (0.15, 0.15)	0.15 (0.15, 0.15)	0.00 (0.00, 0.01)	67.14 (67.07, 67.21)	67.92 (67.79, 68.06)	0.79 (0.64, 0.94)

*Before the implementation of EBI covers the period Jan 1st 2016-March 31st 2019, and after EBI covers the period April 1st 2019-Feb 28th 2020

Table 5b: Descriptive Statistics of Patient Characteristics for Phase One and Phase Two Procedures (Mean and 95% CI)*

	IMD Score			Charlson		
	Before EBI	Before EBI	Difference	Before EBI	After EBI	Difference
Phase One Procedures (Treatment)						
Category 1	22.23 (22.12, 22.33)	21.96 (21.70-22.21)	-0.27 (-0.55, 0.01)	0.39 (0.39, 0.40)	0.48 (0.46, 0.49)	0.09 (0.07, 0.10)
Category 2	22.08 (22.04, 22.12)	21.96 (21.89, 22.04)	-0.11 (-0.20, -0.03)	0.28 (0.28, 0.29)	0.32 (0.32, 0.33)	0.04 (0.04, 0.04)
Phase Two Procedures (Control)						
Total	20.42 (20.37, 20.26)	20.35 (20.25, 20.45)	0.07 (-0.18, 0.04)	0.43 (0.43, 0.43)	0.48 (0.48, 0.49)	0.05 (0.05, 0.06)

*Before the implementation of EBI covers the period Jan 1st 2016-March 31st 2019, and after EBI covers the period April 1st 2019-Feb 28th 2020

Table 6: Number of Procedures for Clinical Commissioning Group and Hospital Characteristics for Phase One and Phase Two of the EBI programme *

	CCG Deficit (FY 2018/19)		CCG Demonstrator		NHS vs ISP Hospital	
Number of CCGs or Hospitals						
	Yes	No	Yes	No	NHS	ISP
	38 (28.1%)	97 (71.9%)	48 (35.6%)	87 (64.4%)	162 (41.8%)	226 (58.2%)
Number of Low-value Procedures						
Phase 1 Procedures (Treatment)						
Category 1	41,344 (41.9%)	57,293 (58.1%)	30,630 (31.1%)	68,007 (68.9%)	82,178 (83.0%)	16,814 (17.0%)
Category 2	289,676 (37.0%)	494,181 (63.0%)	283,973 (36.2%)	499,884 (63.8%)	644,776 (81.8%)	143,567 (18.2%)
Total	331,020 (37.5%)	551,474 (62.5%)	314,603 (35.6%)	567,891 (64.4%)	726,954 (81.9%)	160,381 (18.1%)
Phase 2 Procedures (Control)						
Total	160,701 (39.0%)	251,288 (61.0%)	144,901 (35.6%)	267,088 (64.8%)	321,159 (79.5%)	82,720 (20.5%)

*Percentage in parentheses indicates the proportion of low-value procedures undertaken between January 1st 2016 and February 28th 2020. This table was created by the co-authors of this manuscript.

Table 7: Difference-in-Difference Analysis Results Table for Treatment Group that includes all phase one category 2 procedures including removal of benign skin lesions (%)

	Model 1 (Standard DiD)	Model 2 (Standard DiD)	Model 3 (High Cost Procedures)	Model 4 (Low Cost Procedures)	Model 5 (Time Trend Analysis)	Model 6 (Combinatio n)
Phase1	0.38*** (0.37,0.39)	0.38*** (0.37,0.39)	0.51*** (0.50,0.53)	0.92*** (0.89,0.94)	0.37*** (0.36,0.38)	0.37*** (0.36,0.38)
EBI	-8.46*** (-9.43,-7.49)	-9.34*** (-10.74,- 7.94)	-6.04*** (-7.56,-4.53)	-11.21*** (-13.00,- 9.42)	-	-4.25*** (-6.30,-2.20)
EBI x Phase1	0.04*** (0.04,0.05)	0.04*** (0.04,0.05)	0.03*** (0.03,0.04)	0.18*** (0.16,0.19)	-	0.02*** (0.01,0.03)
t	-	-	-	-	-0.19*** (-0.29,-0.09)	-0.15** (-0.26,-0.05)
t ≥ EBI	-	-	-	-	-0.61*** (-0.87,-0.35)	-0.21 (-0.53,0.11)
t x Phase1	-	-	-	-	0.00*** (0.00,0.00)	0.00*** (0.00,0.00)
t ≥ EBI x Phase1	-	-	-	-	0.00** (0.00,0.00)	0.00 (-0.00,0.00)
Year Dummies	No	Yes	Yes	Yes	Yes	Yes
Month Dummies	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes	Yes
Constant	4.56*** (4.54,4.58)	4.36*** (4.25,4.47)	4.10*** (3.99,4.22)	3.85*** (3.75,3.96)	4.39*** (4.27,4.50)	4.38*** (4.27,4.50)
Observation s	6750	6750	6750	6750	6750	6750
Units of Observation	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. In Models 1-4, *EBI x Phase1* represents the treatment effect of the EBI programme and is the percentage difference in difference of volumes before and after implementation between the treatment and control group. In Model 6, *EBI x Phase1* is the percentage difference in changes in volumes between the treatment and control group during implementation of the EBI programme. *t* reflects monthly percentage change in volumes for all procedures. *t ≥ EBI* reflects the monthly percentage change in volumes for all procedures after the implementation of the EBI programme. *t ≥ EBI x Phase1* reflects the difference in differences in the monthly percentage change in volumes between the treatment and group control after the implementation of the EBI programme. 95% Confidence intervals are contained in parentheses, *** p<0.001, ** p<0.01, * p<0.05, - = Not applicable to this model, All models used fixed effects therefore errors are clustered at the CCG level. This table was created by the co-authors of this manuscript.

Table 8: Difference-in-Difference Analysis Results Table for Treatment Group that includes all phase one category 1 and 2 procedures with the exception of removal of benign skin lesions (%)

	Model 1 (Standard DiD)	Model 2 (Standard DiD)	Model 3 (High Cost Procedures)	Model 4 (Low Cost Procedures)	Model 5 (Time Trend Analysis)	Model 6 (Combinatio n)
Phase1	0.46*** (0.45,0.47)	0.46*** (0.45,0.47)	0.67*** (0.65,0.69)	0.68*** (0.66,0.70)	0.44*** (0.43,0.45)	0.44*** (0.43,0.45)
EBI	-15.06*** (-16.12,- 14.00)	-15.43*** (-16.94,- 13.92)	-13.53*** (-15.26,- 11.80)	-15.34*** (-17.10,- 13.58)	-	-5.97*** (-8.15,-3.79)
EBI x Phase1	0.11*** (0.10,0.12)	0.11*** (0.10,0.12)	0.19*** (0.17,0.21)	0.20*** (0.18,0.22)	-	0.05*** (0.04,0.06)
t	-	-	-	-	-0.40*** (-0.50,-0.30)	-0.35*** (-0.46,-0.24)
t ≥ EBI	-	-	-	-	-0.91*** (-1.19,-0.63)	-0.30 (-0.64,0.04)
t x Phase1	-	-	-	-	0.00*** (0.00,0.00)	0.00*** (0.00,0.00)
t ≥ EBI x Phase1	-	-	-	-	0.01*** (0.00,0.01)	0.00 (-0.00,0.00)
Year Dummies	No	Yes	Yes	Yes	Yes	Yes
Month Dummies	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes	Yes
Constant	4.43*** (4.41,4.44)	4.22*** (4.11,4.33)	3.93*** (3.81,4.05)	3.95*** (3.85,4.05)	4.27*** (4.16,4.38)	4.26*** (4.15,4.37)
Observation s	6750	6750	6750	6750	6750	6750
Units of Observation	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. In Models 1-4, *EBI x Phase1* represents the treatment effect of the EBI programme and is the percentage difference in difference of volumes before and after implementation between the treatment and control group. In Model 6, *EBI x Phase1* is the percentage difference in changes in volumes between the treatment and control group during implementation of the EBI programme. *t* reflects monthly percentage change in volumes for all procedures. *t ≥ EBI* reflects the monthly percentage change in volumes for all procedures after the implementation of the EBI programme. *t ≥ EBI x Phase1* reflects the difference in differences in the monthly percentage change in volumes between the treatment and group control after the implementation of the EBI programme. 95% Confidence intervals are contained in parentheses, *** p<0.001, ** p<0.01, * p<0.05, - = Not applicable to this model, All models used fixed effects therefore errors are clustered at the CCG level. This table was created by the co-authors of this manuscript.

Table 9: Difference-in-Difference Analysis Results Table for Original Treatment Group with Treatment Period Changed to November 2018 (%)*

	Model 1 (Standard DiD)	Model 2 (Standard DiD)	Model 3 (High Cost Procedures)	Model 4 (Low Cost Procedures)	Model 5 (Time Trend Analysis)	Model 6 (Combinatio n)
Phase1	0.54*** (0.53,0.55)	0.55*** (0.54,0.56)	0.91*** (0.88,0.94)	0.91*** (0.88,0.93)	0.54*** (0.52,0.55)	0.54*** (0.52,0.55)
EBI	-10.71*** (-11.65,- 9.77)	-13.75*** (-15.45,- 12.05)	-11.58*** (-13.57,- 9.59)	-12.54*** (-14.56,- 10.52)	-	-6.22*** (-8.31,-4.13)
EBI x Phase1	0.09*** (0.08,0.10)	0.09*** (0.08,0.010)	0.13*** (0.12,0.15)	0.15*** (0.13,0.17)	-	0.02** (0.01,0.03)
t	-	-	-	-	-0.20*** (-0.31,-0.10)	-0.10 (-0.22,0.01)
t ≥ EBI	-	-	-	-	-0.76*** (-0.98,-0.54)	-0.70*** (-0.93,-0.47)
t x Phase1	-	-	-	-	0.00*** (0.00,0.00)	0.00*** (0.00,0.00)
t ≥ EBI x Phase1	-	-	-	-	0.00*** (0.00,0.01)	0.00*** (0.00,0.01)
Year Dummies	No	Yes	Yes	Yes	Yes	Yes
Month Dummies	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes	Yes
Constant	4.32*** (4.30,4.33)	4.19*** (4.08,4.30)	3.93*** (3.81,4.05)	3.87*** (3.76,3.97)	4.21*** (4.10,4.32)	4.22*** (4.10,4.33)
Observation s	6750	6750	6750	6750	6750	6750
Units of Observation	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs	135 CCGs

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. In Models 1-4, *EBI x Phase1* represents the treatment effect of the EBI programme and is the percentage difference in difference of volumes before and after implementation between the treatment and control group. In Model 6, *EBI x Phase1* is the percentage difference in changes in volumes between the treatment and control group during implementation of the EBI programme. *t* reflects monthly percentage change in volumes for all procedures. *t ≥ EBI* reflects the monthly percentage change in volumes for all procedures after the implementation of the EBI programme. *t ≥ EBI x Phase1* reflects the difference in differences in the monthly percentage change in volumes between the treatment and group control after the implementation of the EBI programme. 95% Confidence intervals are contained in parentheses, *** p<0.001, ** p<0.01, * p<0.05, - = Not applicable to this model, All models used fixed effects therefore errors are clustered at the CCG level. This table was created by the co-authors of this manuscript. *November 2018 is when the NHS England Evidence Based Interventions Programme Statutory Guidance was published

Table 10: Triple Difference Estimation Results Table for Treatment Group that includes all phase one category 2 procedures including removal of benign skin lesions (%)

	Model 1 (CCG Deficit)	Model 2 (CCG Demonstrator)	Model 3 (NHS hospitals)
Phase1	0.48*** (0.46,0.49)	0.39*** (0.38,0.40)	3.10*** (3.02,3.17)
EBI	-11.38*** (-12.94,-9.826)	-8.52*** (-10.09,-6.96)	-9.08*** (-11.78,-6.39)
EBI x Phase1	0.07*** (0.06,0.07)	0.03*** (0.03,0.04)	0.29*** (0.24,0.35)
EBI x X	3.19** (1.13,5.25)	-2.59* (-4.61,-0.56)	-2.75 (-6.57,1.08)
Phase1 x X	-0.21*** (-0.23,-0.20)	-0.02* (-0.04,-0.00)	-2.57*** (-2.65,-2.49)
EBI x Phase1 x X	-0.04*** (-0.05,-0.03)	0.02*** (0.01,0.03)	-0.23*** (-0.29,-0.17)
Constant	4.31*** (4.21,4.42)	4.36*** (4.24,4.47)	3.08*** (3.00,3.16)
Observations	6750	6750	16559
Unit of Observations	135 CCGs	135 CCGs	382 Hospitals

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. *EBI x Phase1* is the percentage difference in difference of volumes before and after the implementation of the EBI programme between the treatment and control group. *EBI x X* is the average percentage difference in difference in volumes for all procedures before and after the implementation of the EBI programme between different organisational characteristics defined by *X*. *Phase1 x X* is average percentage difference in changes in volumes for the treatment group for different organisational characteristics defined by *X*. *EBI x Phase1 x X* is the average percentage difference in difference in volumes before and after the implementation of the EBI programme for the treatment group between different organisational characteristics defined by *X*. In Model 1, *X* is 1 for CCGs which posted in financial year 2018/19, and 0 for those which did not. In Model 2, *X* is 1 for CCGs which were part of the demonstrator community, and 0 for those which were not. In Model 3, *X* is 1 for NHS hospitals and 0 for independent sector providers. 95% Confidence intervals in parentheses, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All models used fixed effects therefore errors are clustered at the CCG or hospital level. This table was created by the co-authors of this manuscript.

Table 11: Triple Difference Estimation Results Table for Treatment Group that includes all phase one category 1 and 2 procedures with the exception of removal of benign skin lesions (%)

	Model 1 (CCG Deficit)	Model 2 (CCG Demonstrator)	Model 3 (NHS hospitals)
Phase1	0.62*** (0.60,0.63)	0.45*** (0.44,0.47)	3.17*** (3.09,3.26)
EBI	-15.66*** (-17.31,-14.01)	-15.23*** (-16.96,-13.50)	-13.63*** (-16.52,-10.74)
EBI x Phase1	0.14*** (0.13,0.15)	0.11*** (0.10,0.12)	0.59*** (0.50,0.67)
EBI x X	2.64* (0.42,4.86)	-0.56 (-2.73,1.61)	-2.9 (-7.02,1.24)
Phase1 x X	-0.30*** (-0.32,-0.28)	0.01 (-0.01,0.03)	-2.45*** (-2.54,-2.36)
EBI x Phase1 x X	-0.07*** (-0.09,-0.05)	0.00 (-0.02,0.02)	-0.43*** (-0.52,-0.34)
Constant	4.19*** (4.09,4.29)	4.22*** (4.11,4.33)	2.97*** (2.88,3.05)
Observations	6750	6750	16559
Unit of Observations	135 CCGs	135 CCGs	382 Hospitals

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. *EBI x Phase1* is the percentage difference in difference of volumes before and after the implementation of the EBI programme between the treatment and control group. *EBI x X* is the average percentage difference in difference in volumes for all procedures before and after the implementation of the EBI programme between different organisational characteristics defined by *X*. *Phase1 x X* is average percentage difference in changes in volumes for the treatment group for different organisational characteristics defined by *X*. *EBI x Phase1 x X* is the average percentage difference in difference in volumes before and after the implementation of the EBI programme for the treatment group between different organisational characteristics defined by *X*. In Model 1, *X* is 1 for CCGs which posted in financial year 2018/19, and 0 for those which did not. In Model 2, *X* is 1 for CCGs which were part of the demonstrator community, and 0 for those which were not. In Model 3, *X* is 1 for NHS hospitals and 0 for independent sector providers. 95% Confidence intervals in parentheses, *** p<0.001, ** p<0.01, * p<0.05, All models used fixed effects therefore errors are clustered at the CCG or hospital level. This table was created by the co-authors of this manuscript.

Table 12: Triple Difference Estimation Results Table for Original Treatment Group with Treatment Period Changed to November 2018 (%)*

	Model 1 (CCG Deficit)	Model 2 (CCG Demonstrator)	Model 3 (NHS hospitals)
Phase1	0.68*** (0.66,0.70)	0.57*** (0.56,0.59)	3.87*** (3.77,3.97)
EBI	-14.11*** (-15.90,-12.32)	-13.31*** (-15.16,-11.47)	-6.03*** (-9.20,-2.85)
EBI x Phase1	0.11*** (0.10,0.12)	0.09*** (0.08,0.10)	0.34*** (0.27,0.42)
EBI x X	3.17** (1.15,5.18)	-1.16 (-3.08,0.76)	-4.02* (-7.65,-0.39)
Phase1 x X	-0.29*** (-0.31,-0.26)	-0.06*** (-0.08,-0.03)	-3.07*** (-3.18,-2.97)
EBI x Phase1 x X	-0.05*** (-0.07,-0.04)	-0.01 (-0.02,0.01)	-0.24*** (-0.32,-0.16)
Constant	4.15*** (4.05,4.26)	4.19*** (4.09,4.30)	2.84*** (2.75,2.92)
Observations	6750	6750	16559
Unit of Observations	135 CCGs	135 CCGs	382 Hospitals

Co-efficients are reported as percentages, and can be understood as follows: *Phase1* is the percentage difference in change in volumes between the treatment and control group. *EBI* is the percentage difference in volumes for all procedures before and after the implementation of the EBI programme. *EBI x Phase1* is the percentage difference in difference of volumes before and after the implementation of the EBI programme between the treatment and control group. *EBI x X* is the average percentage difference in difference in volumes for all procedures before and after the implementation of the EBI programme between different organisational characteristics defined by *X*. *Phase1 x X* is average percentage difference in changes in volumes for the treatment group for different organisational characteristics defined by *X*. *EBI x Phase1 x X* is the average percentage difference in difference in volumes before and after the implementation of the EBI programme for the treatment group between different organisational characteristics defined by *X*. In Model 1, *X* is 1 for CCGs which posted in financial year 2018/19, and 0 for those which did not. In Model 2, *X* is 1 for CCGs which were part of the demonstrator community, and 0 for those which were not. In Model 3, *X* is 1 for NHS hospitals and 0 for independent sector providers. 95% Confidence intervals in parentheses, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All models used fixed effects therefore errors are clustered at the CCG or hospital level. This table was created by the co-authors of this manuscript.

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