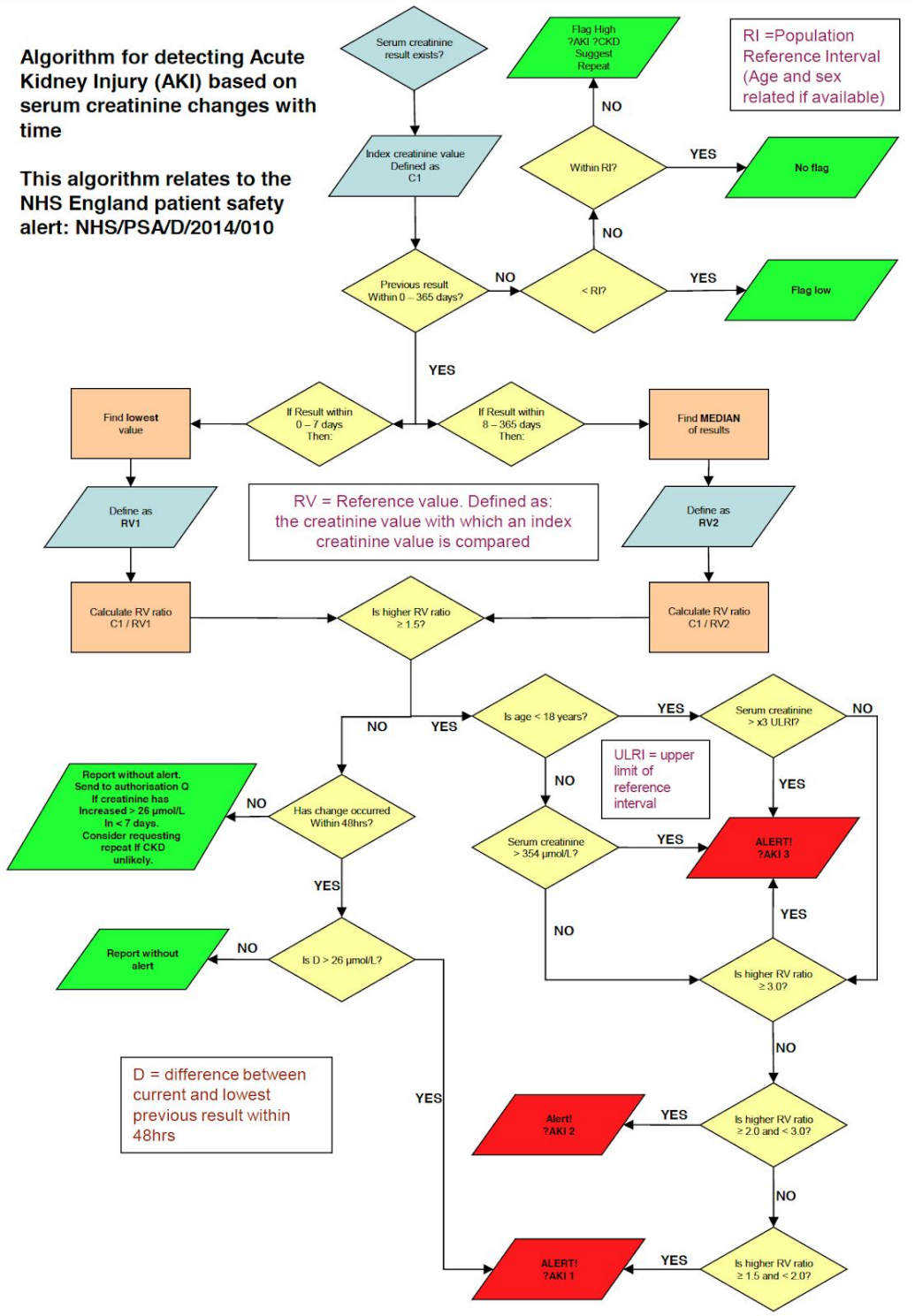

Figure 1: the NHS Early Detection Algorithm (NHSEDA)

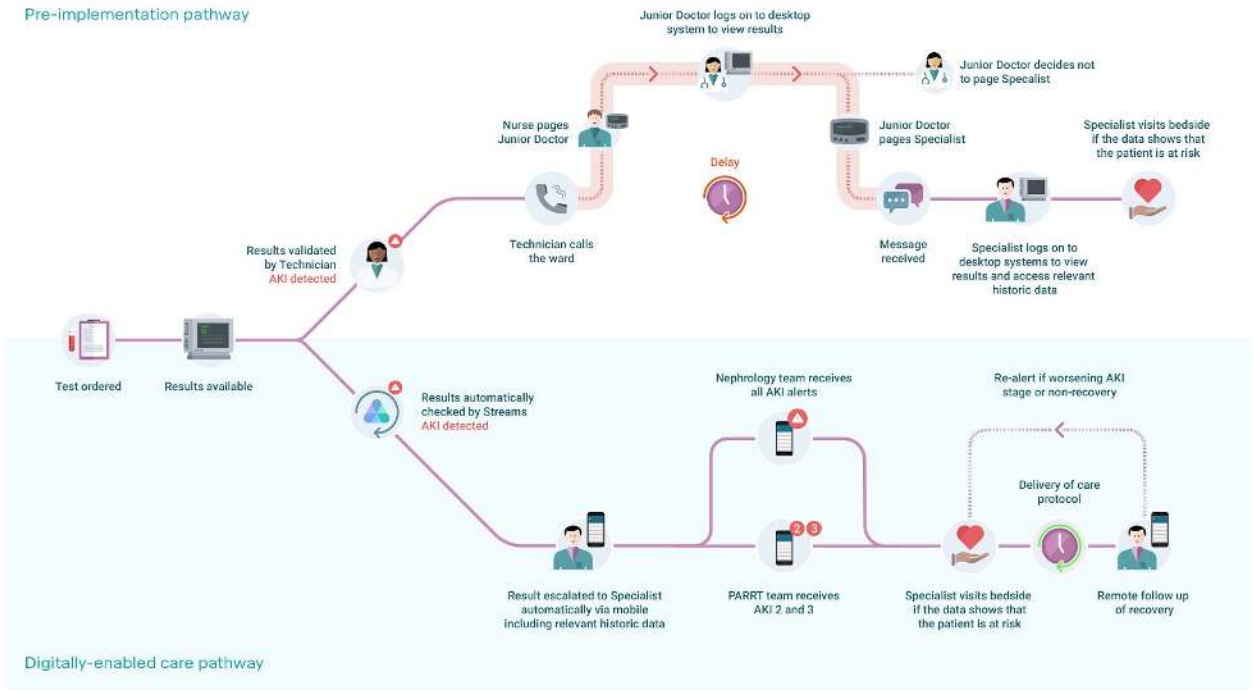

Figure 2: AKI care pathways before and after the introduction of the digitally-enabled care pathway

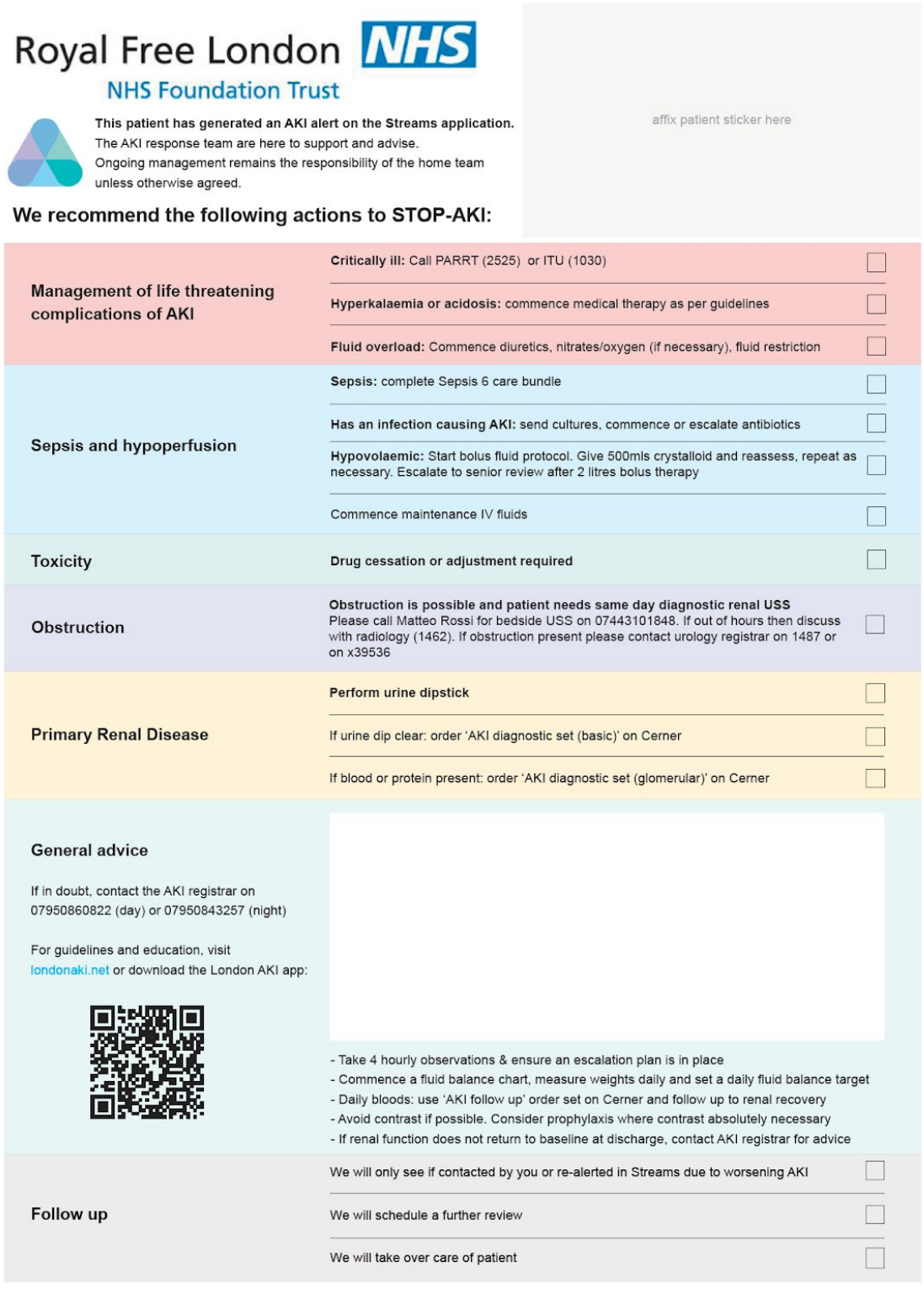

Figure 3: the care protocol

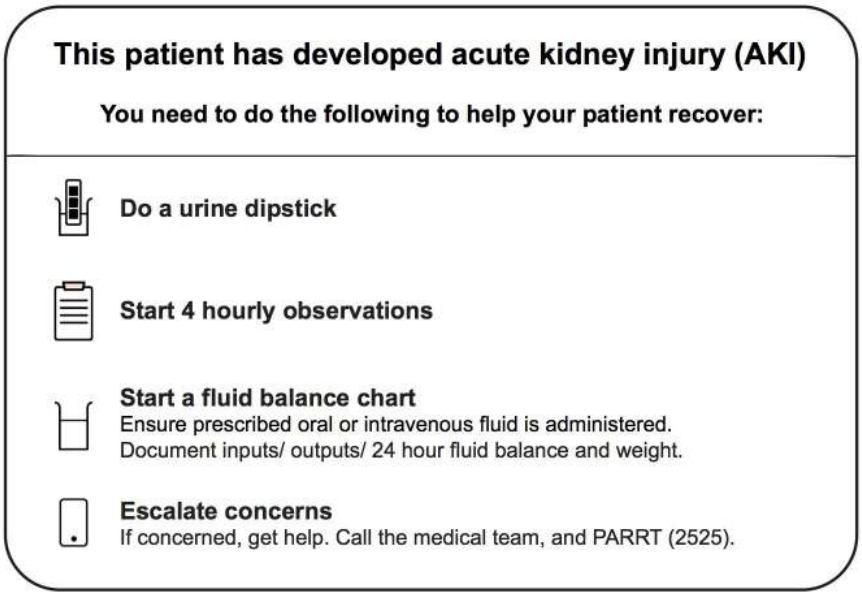

Figure 4: nursing advisory sticker

	Operator 1	Operator 2
Operator 1	κ = 0.83 (0.76 - 0.90)	
Operator 2	κ = 0.75 (0.65 - 0.84)	κ = 0.79 (0.71 - 0.87)

Table 1: Inter- and intra-operator variability analyses

From the pool of alerts, a random selection of 250 from each operator were validated again by both. For each comparison pair, Cohen's kappa coefficient was calculated to establish inter- and intra-operator variability. 95% confidence intervals are shown in brackets

Chair

Prof. Kevin Moore
Professor of Hepatology, Royal Free Hospital

Patient representative

Michael Wise
Acute Kidney Injury National Programme Board

External members

Sir Nick Black
Professor of Health Services Research, London School of Hygiene and Tropical Medicine

Dr. Neil Ashman
Consultant Nephrologist and Deputy Managing Director, Barts Health

Royal Free Hospital Members

Dr. Jim Buckley
Consultant in Intensive Care Medicine

Dr. Nick Murch
Consultant in Acute Medicine

Dr. Jonathan Costello
Clinical Director, Emergency Medicine

Dr. Bimbi Fernando
Consultant in Transplant Surgery

Dr. Penny Smith
Consultant in Acute Medicine and Chief Medical Informatics Officer

Dr. Banwari Agarwal
Consultant in Intensive Care Medicine

Dr. Rupert Negus
Consultant in Acute Medicine and Gastroenterology

Figure 5: RFH Data Monitoring Committee

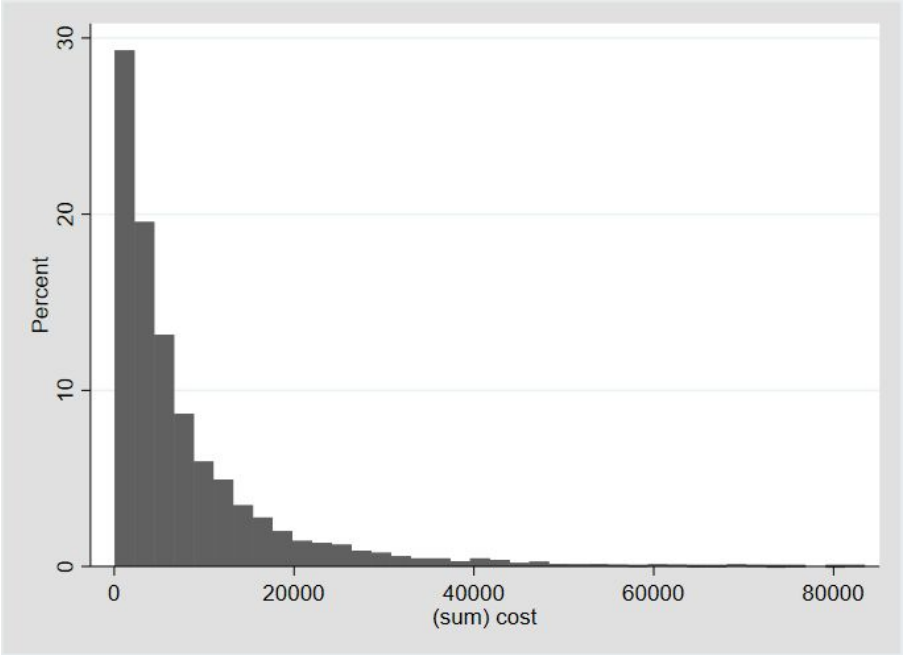

Figure 6: Distribution of cost per spell, across both sites and all times

	Renal recovery				Mortality			
	β	*P* value	OR	95% CI	β	*P* value	OR	95% CI
intervention	0.00	.99	1.00	(0.58-1.71)	0.17	.67	1.18	(0.55-2.52)
time	0.01	.39	1.01	(0.99-1.02)	0.00	.63	1.00	(0.98-1.01)
site	0.18	.58	1.20	(0.63-2.28)	0.73	.09	2.08	(0.90-4.79)
site×intervention	0.22	.62	1.24	(0.53-2.92)	0.06	.91	1.07	(0.36-3.15)
time×intervention	-0.01	.61	0.99	(0.96-1.03)	0.00	.89	1.00	(0.96-1.05)
time×site	-0.01	.58	0.99	(0.98-1.01)	0.01	.46	1.01	(0.99-1.03)
time×site×intervention	-0.03	.29	0.97	(0.92-1.03)	-0.03	.44	0.97	(0.91-1.04)

	Progression of AKI stage				Admission to ITU/Renal Unit			
	β	*P* value	OR	95% CI	β	*P* value	OR	95% CI
intervention	0.67	.11	1.96	(0.86-4.47)	0.40	.42	1.50	(0.57-4.00)
time	-0.01	.21	0.99	(0.97-1.01)	0.00	.86	1.00	(0.98-1.02)
site	0.52	.29	1.67	(0.64-4.38)	-0.17	.79	0.84	(0.24-2.85)
site×intervention	-0.71	.27	0.49	(0.14-1.71)	-1.18	.18	0.31	(0.05-1.68)
time×intervention	-0.01	.60	0.99	(0.93-1.04)	0.02	.55	1.02	(0.96-1.08)
time×site	0.01	.50	1.01	(0.98-1.04)	-0.01	.63	0.99	(0.96-1.03)
time×site×intervention	0.04	.32	1.04	(0.96-1.13)	0.07	.19	1.08	(0.97-1.20)

	Readmission at 30d				RRT use at 30d			
	β	*P* value	OR	95% CI	β	*P* value	OR	95% CI
intervention	0.20	.54	1.22	(0.65-2.29)	**-3.32**	**.03**	**0.04**	**(0.00-0.62)**
time	0.00	.91	1.00	(0.99-1.01)	**0.09**	**.03**	**1.09**	**(1.02-1.20)**
site	-0.13	.75	0.88	(0.40-1.91)	19.62	.33	3.33×10^{8}	$(0.04\text{-}8.27 \times 10^{30})$
site×intervention	-0.16	.77	0.86	(0.31-2.39)	-1.04	.99	0.35	$(1.61 \times 10^{-65}\text{-NA})$
time×intervention	-0.03	.23	0.97	(0.93-1.02)	0.00	.98	1.00	(0.83-1.23)
time×site	0.00	.86	1.00	(0.98-1.02)	1.24	.33	3.44	(1.19-96.08)
time×site×intervention	0.01	.84	1.01	(0.94-1.08)	-17.62	.99	2.22×10^{-8}	$(\text{NA-}4.86 \times 10^{56})$

	Cardiac arrests			
	β	***P* value**	**OR**	**95% CI**
intercept	-6.50			(-6.60 - -6.42)
intervention	**-0.60**	**<.001**	**0.55**	**(0.38-0.76)**
site	**-0.74**	**<.001**	**0.48**	**(0.38-0.59)**
site×intervention	0.12	.69	1.13	(0.63-1.99)

Table 2: Results of segmented regression analyses, including all estimated coefficients

The coefficient *intervention* provides an estimate of the difference in outcome between the intervention period and the pre-intervention period at RFH. The two-way interaction *site×intervention* provides an estimate of the difference-in-difference between the two hospital sites. The two-way interaction *time×intervention* provides an estimate of the difference in outcome trend over time in the intervention period compared to the pre-intervention period at RFH. The three-way interaction *time×site×intervention* provides an estimate of the difference-in-difference in the trend between the sites.

	Renal recovery			
	β	***P* value**	**OR**	**95% CI**
intervention	-0.10	.73	0.91	(0.52-1.58)
site×intervention	0.32	.47	1.38	(0.58-3.26)
time×intervention	-0.02	.40	0.98	(0.94-1.02)
time×site×intervention	-0.02	.42	0.98	0.92-1.03

Table 3: Results from binary logistic regression (sensitivity analysis)

The coefficient *intervention* provides an estimate of the difference in outcome between the intervention period and the pre-intervention period at RFH. The two-way interaction *site×intervention* provides an estimate of the difference-in-difference between the two hospital sites. The two-way interaction *time×intervention* provides an estimate of the difference in outcome trend over time in the intervention period compared to the pre-intervention period at RFH. The three-way interaction *time×site×intervention* provides an estimate of the difference-in-difference in the trend between the sites.

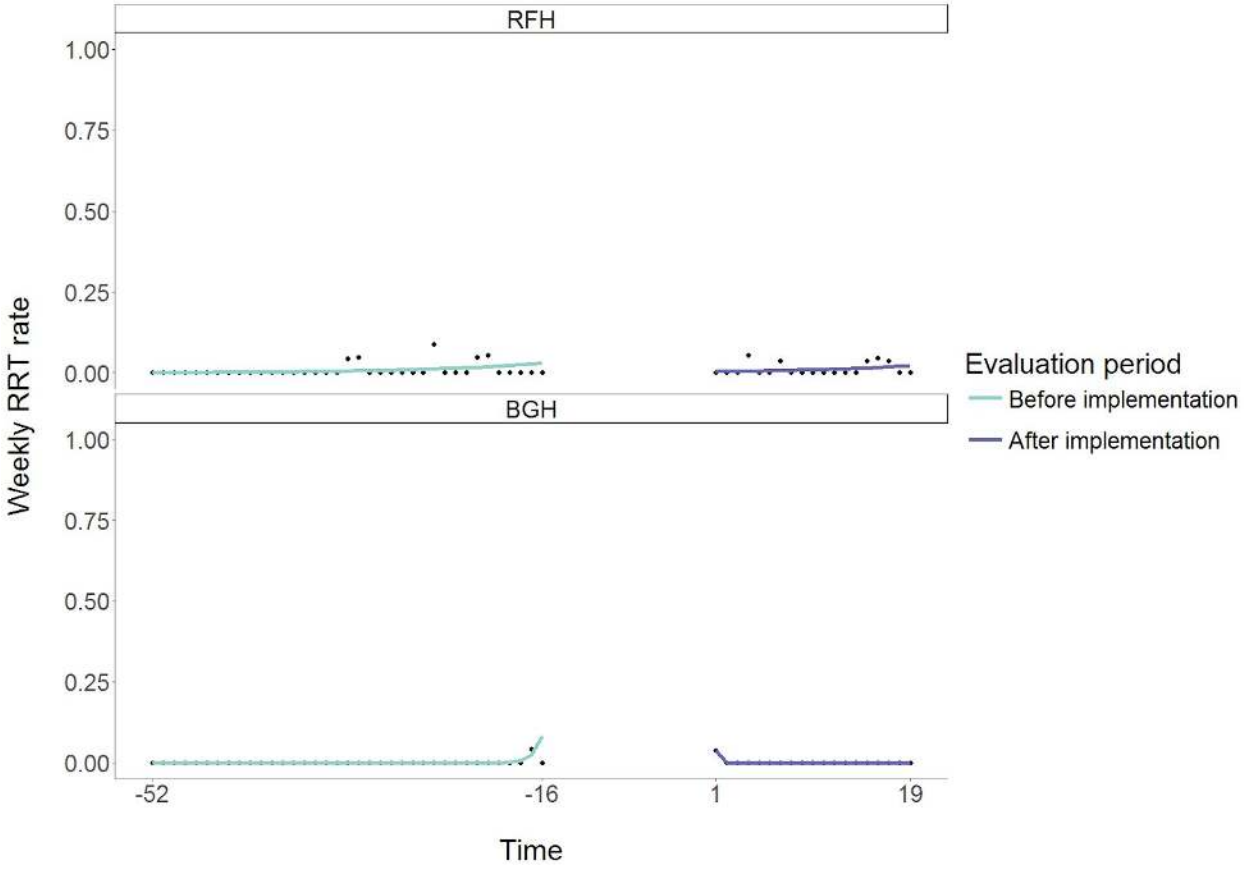

Figure 7: Weekly rates of 30-day dependence on renal replacement therapy at RFH and BGH before and after implementation of the care pathway

RFH = Royal Free Hospital, BGH = Barnet General Hospital.

Individual data points reflect the rate of each outcome for a single week.

Solid lines indicate fitted values from the modelling functions.

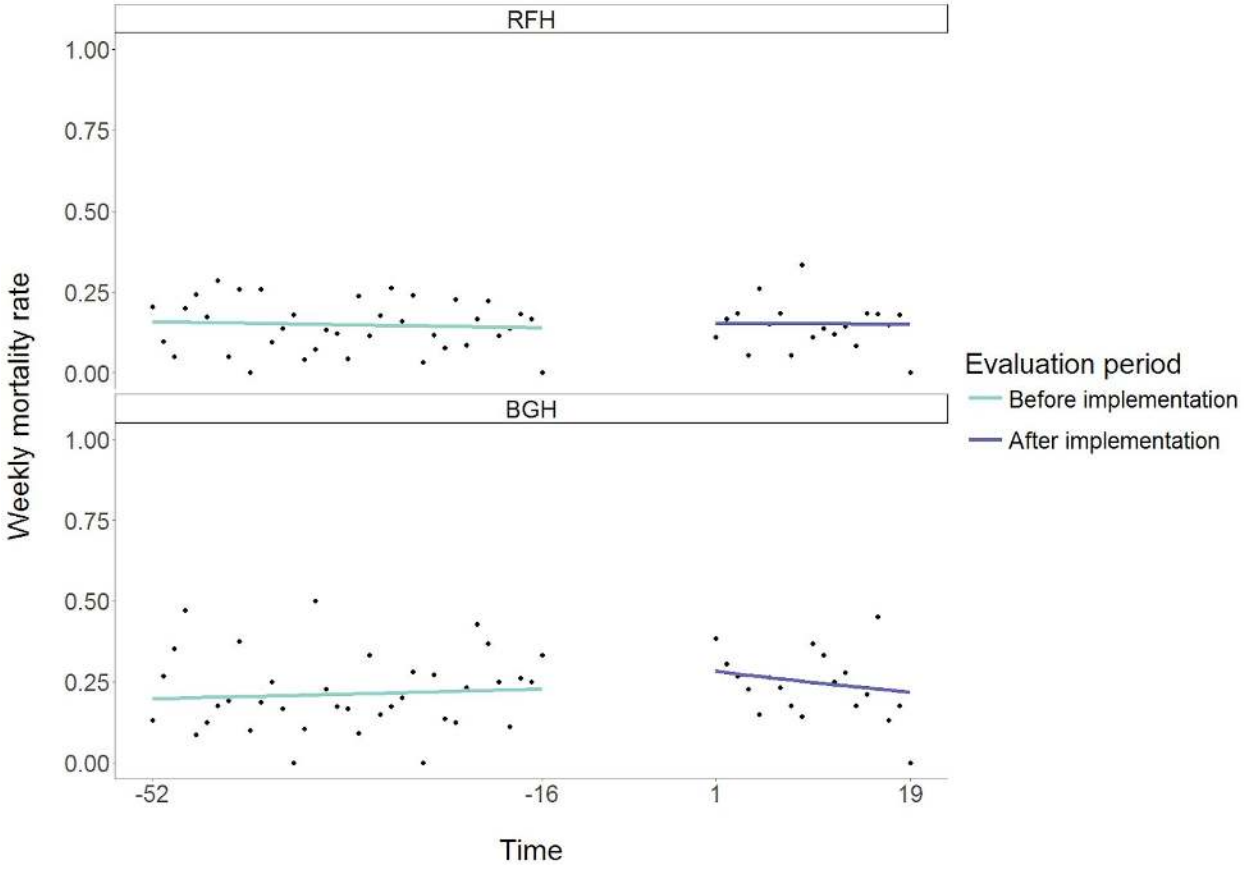

Figure 8: Weekly rates of mortality at RFH and BGH before and after implementation of the care pathway

RFH = Royal Free Hospital, BGH = Barnet General Hospital.

Individual data points reflect the rate of each outcome for a single week.

Solid lines indicate fitted values from the modelling functions.

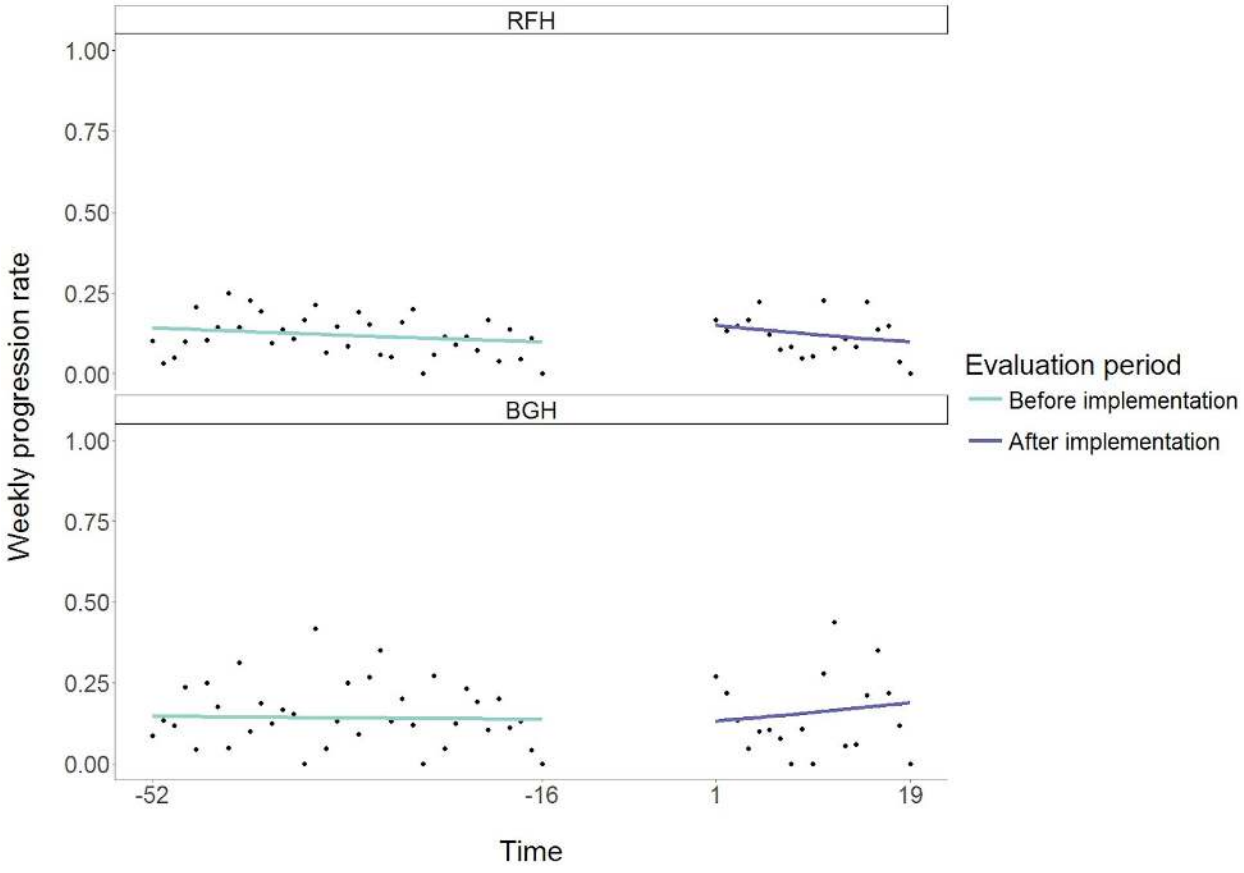

Figure 9: Weekly rates of AKI progression at RFH and BGH before and after implementation of the care pathway

RFH = Royal Free Hospital, BGH = Barnet General Hospital.

Individual data points reflect the rate of each outcome for a single week.

Solid lines indicate fitted values from the modelling functions.

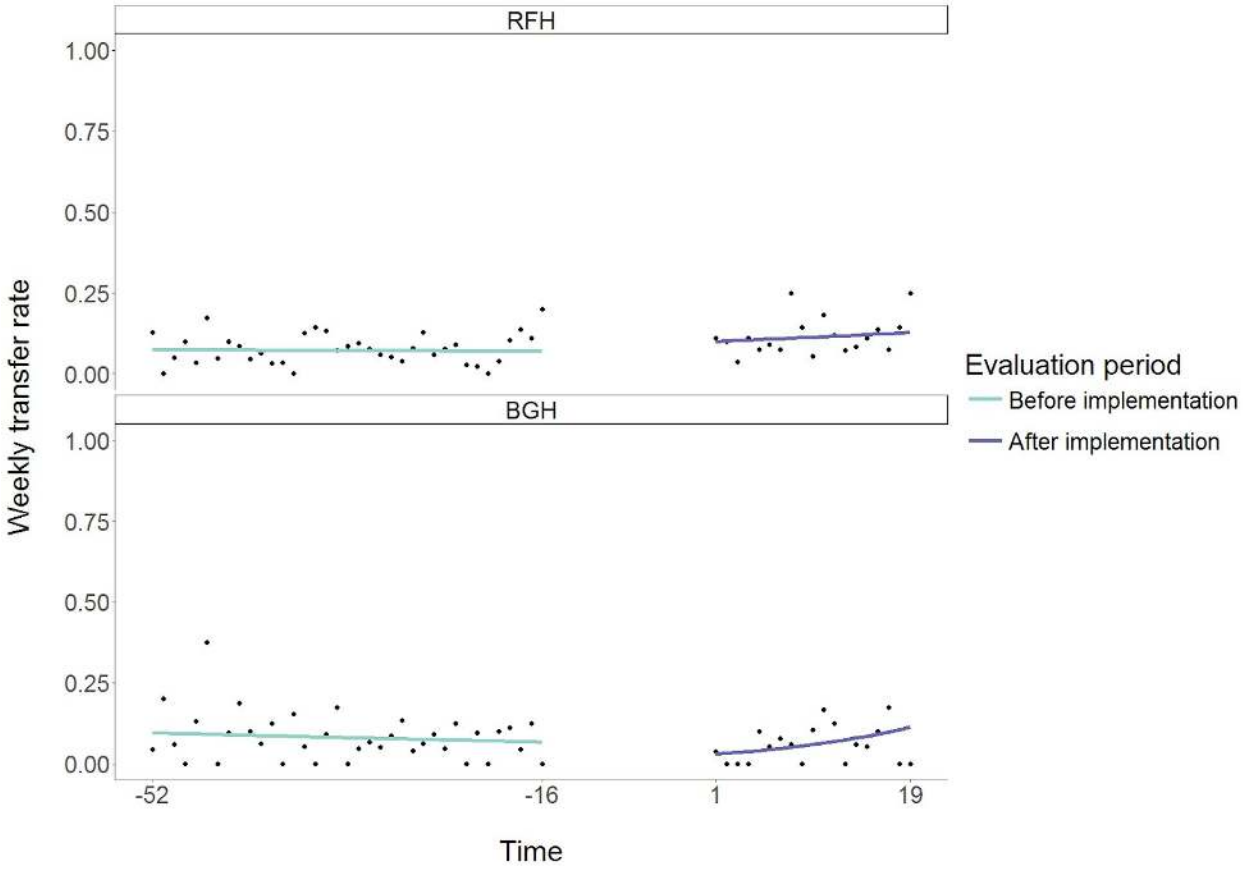

Figure 10: Weekly rates of transfer to ITU/ renal unit at RFH and BGH before and after implementation of the care pathway

RFH = Royal Free Hospital, BGH = Barnet General Hospital.

Individual data points reflect the rate of each outcome for a single week.

Solid lines indicate fitted values from the modelling functions.

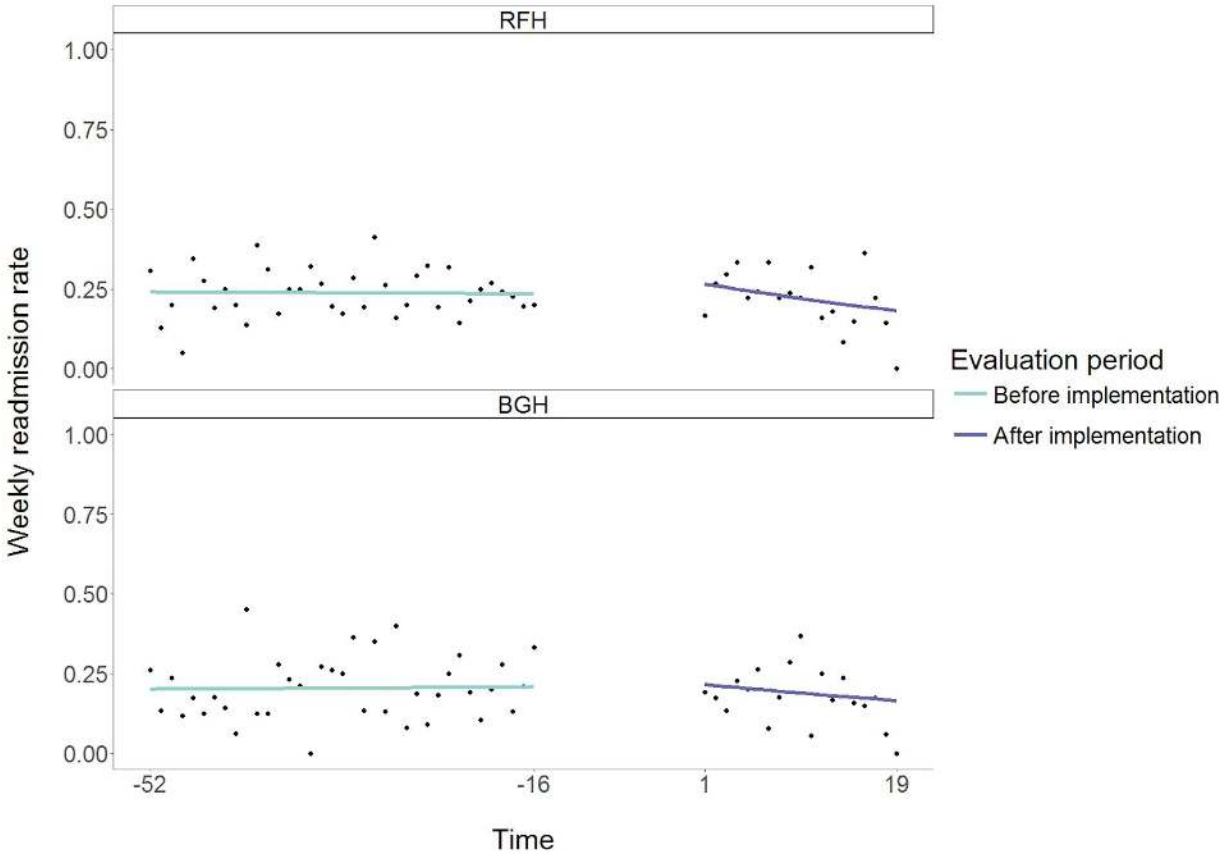

Figure 11: Weekly rates of readmission at RFH and BGH before and after implementation of the care pathway

RFH = Royal Free Hospital, BGH = Barnet General Hospital.

Individual data points reflect the rate of each outcome for a single week.

Solid lines indicate fitted values from the modelling functions.

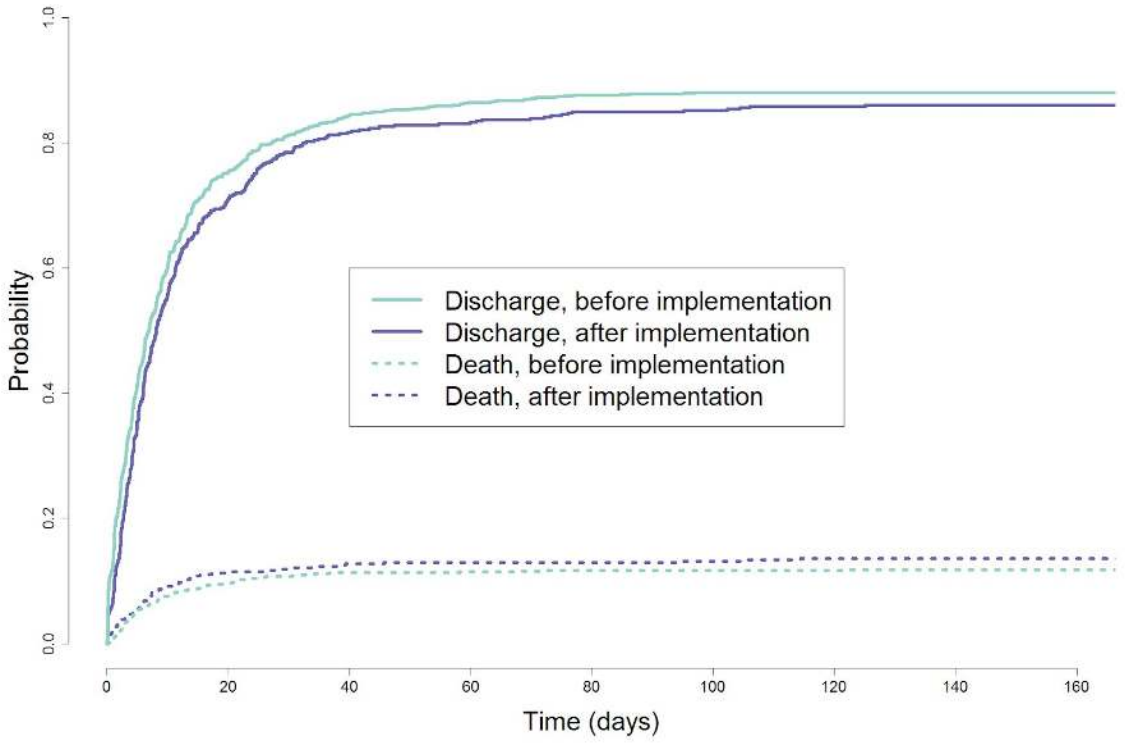

Figure 12: Plot of competing risk analysis for mortality and hospital discharge at RFH

Significant increase in LoS after implementation (*P*= .046). No significant difference in mortality after implementation (*P*=.32)

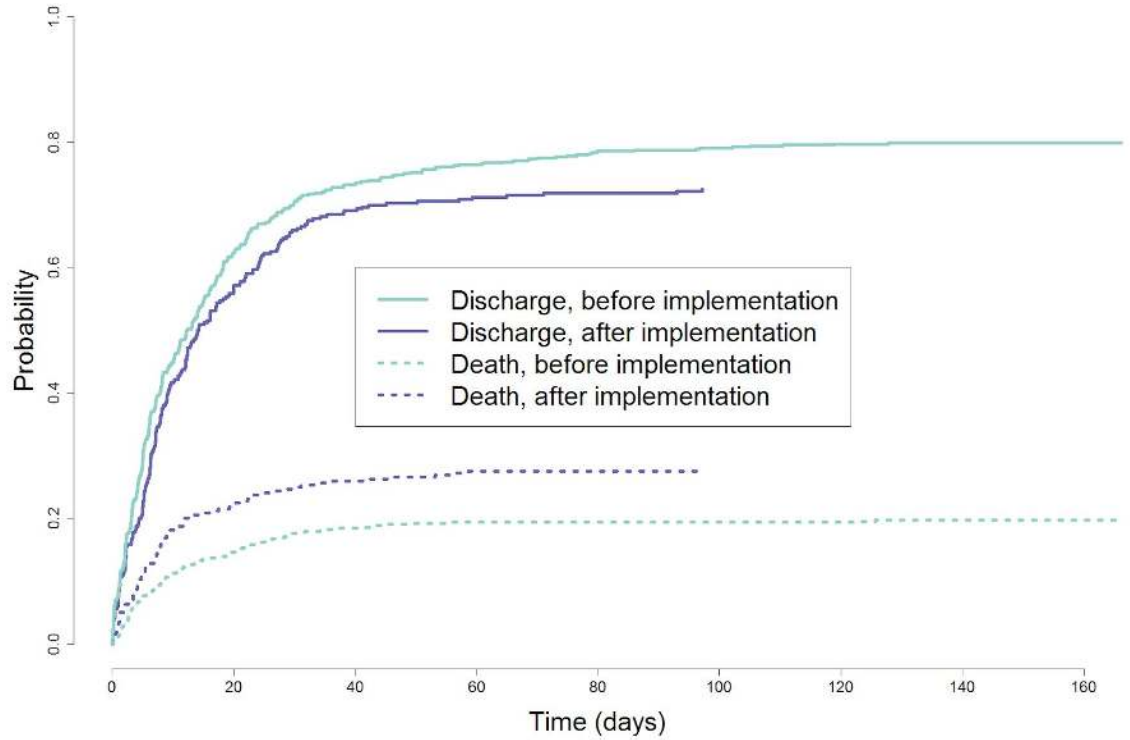

Figure 13: Plot of competing risk analysis for mortality and hospital discharge at BGH

Significant increase in LoS after implementation (*P*=.033). Significant increase in mortality after implementation (*P*=.003). NB: the model estimated odds ratio (OR) for the effects of the intervention on 30-day mortality was not significant (OR=2.08 (95%CI 0.90 - 4.79, *P*=.09).

RFH											
Component	Time period	Pre-intervention			Post-intervention			Difference			
		Mean	Lower CI	Upper CI	Mean	Lower CI	Upper CI	Mean	Lower CI	Upper CI	*P* value
Radiology exams	Periods t1&t3 only	£251.75	£228.98	£274.53	£219.32	£197.88	£240.76	**-£32.44**	**-£63.03**	**-£1.84**	**.04**
	All periods	£241.78	£225.89	£257.66	£215.37	£194.43	£236.30	**-£26.41**	**-£52.10**	**-£0.72**	**.04**
Pathology exams	Periods t1&t3 only	£534.45	£489.32	£579.58	£441.41	£402.10	£480.71	**-£93.04**	**-£151.76**	**-£34.32**	**.002**
	All periods	£507.40	£475.87	£538.93	£434.31	£395.92	£472.69	**-£73.09**	**-£121.53**	**-£24.65**	**.003**
Theatre cutting time	Periods t1&t3 only	£1,209.78	£982.57	£1,436.99	£949.20	£773.18	£1,125.23	**-£260.58**	**-£543.91**	**£22.75**	**.07**
	All periods	£1,106.97	£957.68	£1,256.26	£978.47	£792.31	£1,164.64	-£128.50	-£363.54	£106.54	.28
Theatre total time	Periods t1&t3 only	£901.27	£762.38	£1,040.16	£781.36	£651.20	£911.53	-£119.90	-£310.60	£70.79	.22
	All periods	£841.46	£745.99	£936.93	£798.94	£661.84	£936.04	-£42.52	-£209.88	£124.83	.62
Length of stay	Periods t1&t3 only	£6,412.47	£5,725.75	£7,099.20	£5,047.79	£4,490.96	£5,604.63	**-£1,364.68**	**-£2,227.27**	**-£502.10**	**.002**
	All periods	£6,312.34	£5,782.31	£6,842.37	£5,023.42	£4,464.65	£5,582.18	**-£1,288.92**	**-£2,018.84**	**-£559.01**	**.001**

BGH											
Component	Time period	Pre-intervention			Post-intervention			Difference			
		Mean	Lower CI	Upper CI	Mean	Lower CI	Upper CI	Mean	Lower CI	Upper CI	*P* value
Radiology exams	Periods t1&t3 only	£171.15	£154.52	£187.79	£157.83	£141.69	£173.96	-£13.33	-£35.80	£9.15	.25
	All periods	£172.87	£161.22	£184.52	£157.81	£141.77	£173.85	-£15.06	-£34.26	£4.13	.12
Pathology exams	Periods t1&t3 only	£618.41	£541.85	£694.97	£542.90	£483.49	£602.31	-£75.52	-£168.77	£17.74	.11
	All periods	£628.75	£579.91	£677.59	£536.59	£478.41	£594.78	**-£92.16**	**-£164.98**	**-£19.33**	**.01**
Theatre cutting time	Periods t1&t3 only	£717.52	£470.48	£964.55	£363.76	£239.74	£487.78	**-£353.75**	**-£615.93**	**-£91.57**	**.008**

	All periods	£570.91	£427.01	£714.81	£356.34	£229.38	£483.29	**-£214.57**	**-£401.39**	**-£27.76**	**.02**
Theatre total time	Periods t1&t3 only	£455.45	£330.19	£580.72	£292.41	£206.12	£378.71	**-£163.04**	**-£312.04**	**-£14.04**	**.03**
	All periods	£383.51	£305.42	£461.60	£292.34	£202.01	£382.66	-£91.18	-£211.39	£29.04	.14
Length of stay	Periods t1&t3 only	£5,469.91	£4,619.59	£6,320.22	£4,559.53	£3,991.79	£5,127.27	-£910.38	-£1,872.28	£51.53	.06
	All periods	£5,644.89	£5,099.14	£6,190.64	£4,511.97	£3,965.38	£5,058.56	**-£1,132.92**	**-£1,866.18**	**-£399.66**	**.002**

Difference-in-difference					
Component	Time period	Mean	Lower CI	Upper CI	*P* value
Radiology exams	Periods t1&t3 only	-£19.11	-£56.35	£18.12	.31
	All periods	-£11.35	-£42.97	£20.27	.48
Pathology exams	Periods t1&t3 only	-£17.53	-£127.13	£92.08	.75
	All periods	£19.07	-£67.80	£105.94	.67
Theatre cutting time	Periods t1&t3 only	£93.18	-£289.96	£476.31	.63
	All periods	£86.08	-£217.09	£389.25	.58
Theatre total time	Periods t1&t3 only	£43.13	-£196.92	£283.19	.72
	All periods	£48.65	-£158.95	£256.25	.65
Length of stay	Periods t1&t3 only	-£454.31	-£1,736.82	£828.21	.49
	All periods	-£156.00	-£1,170.46	£858.45	.76

Table 4: Cost components analyses

RFH = Royal Free Hospital, BGH = Barnet General Hospital. CI = Confidence Interval. t1 = May to September 2016; t2 = May to September 2017.