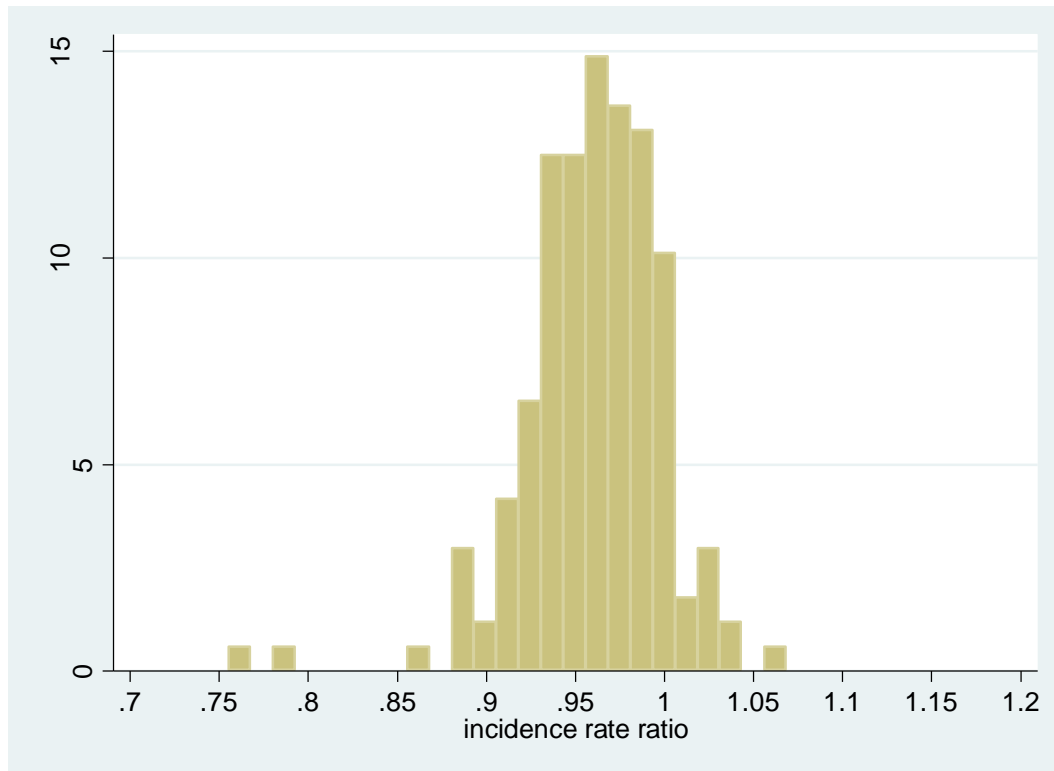
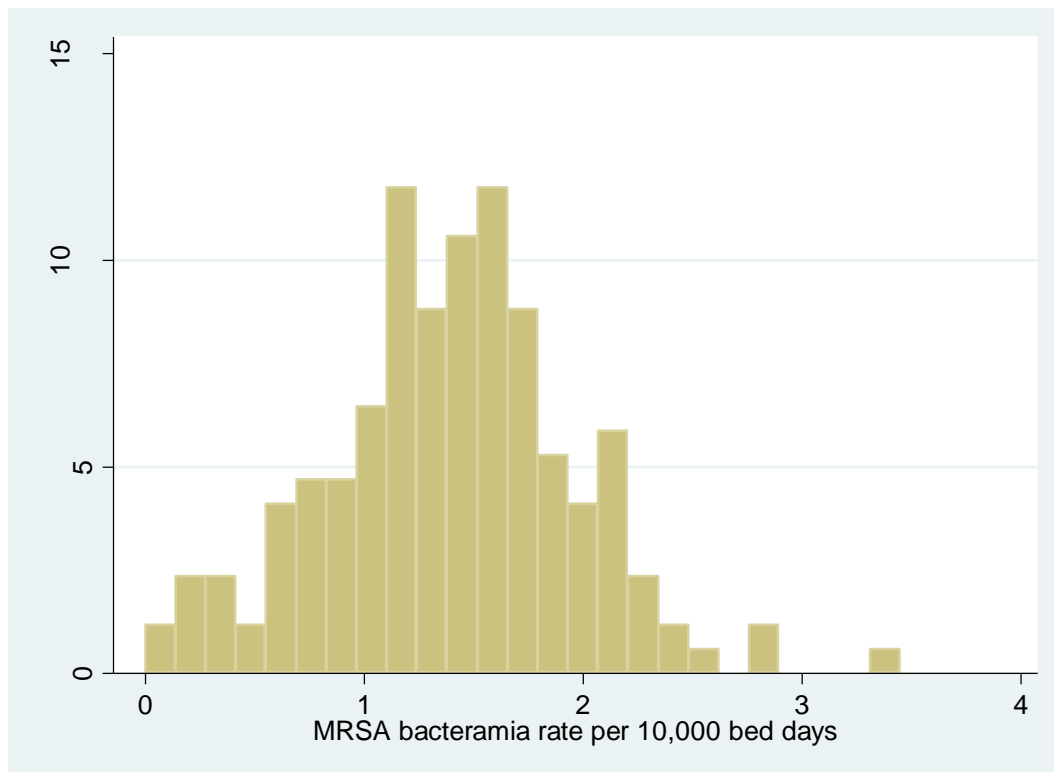


Web appendix: Supplementary information

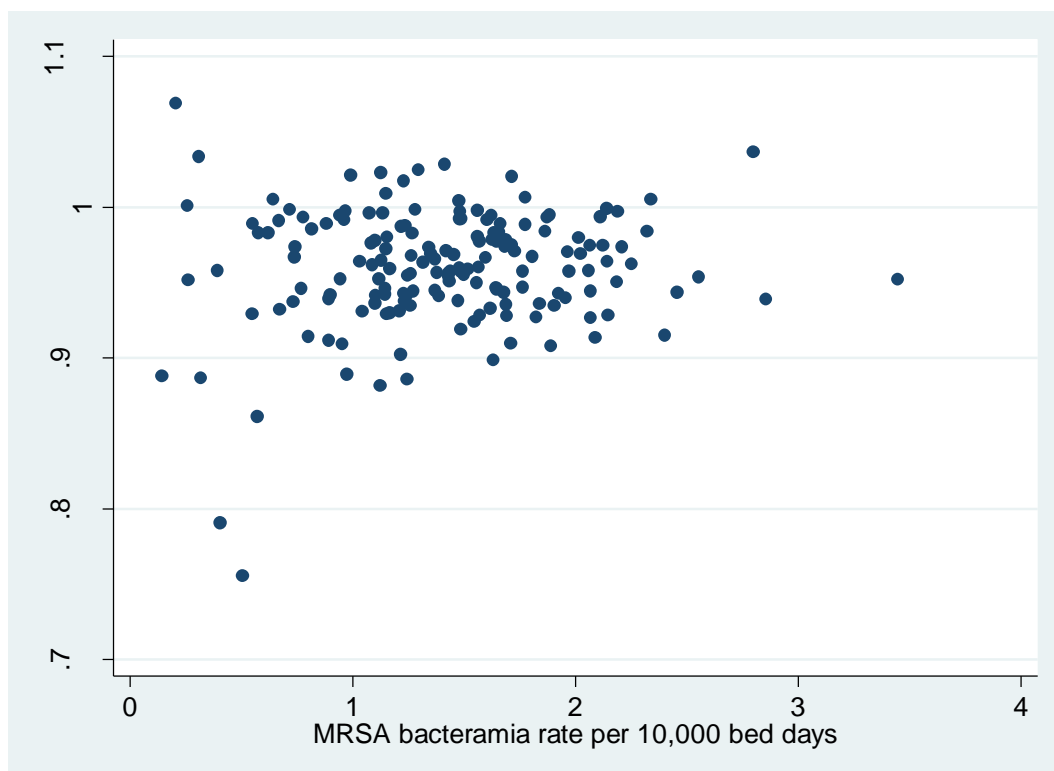
(i) Histogram of estimated average incidence rate ratio



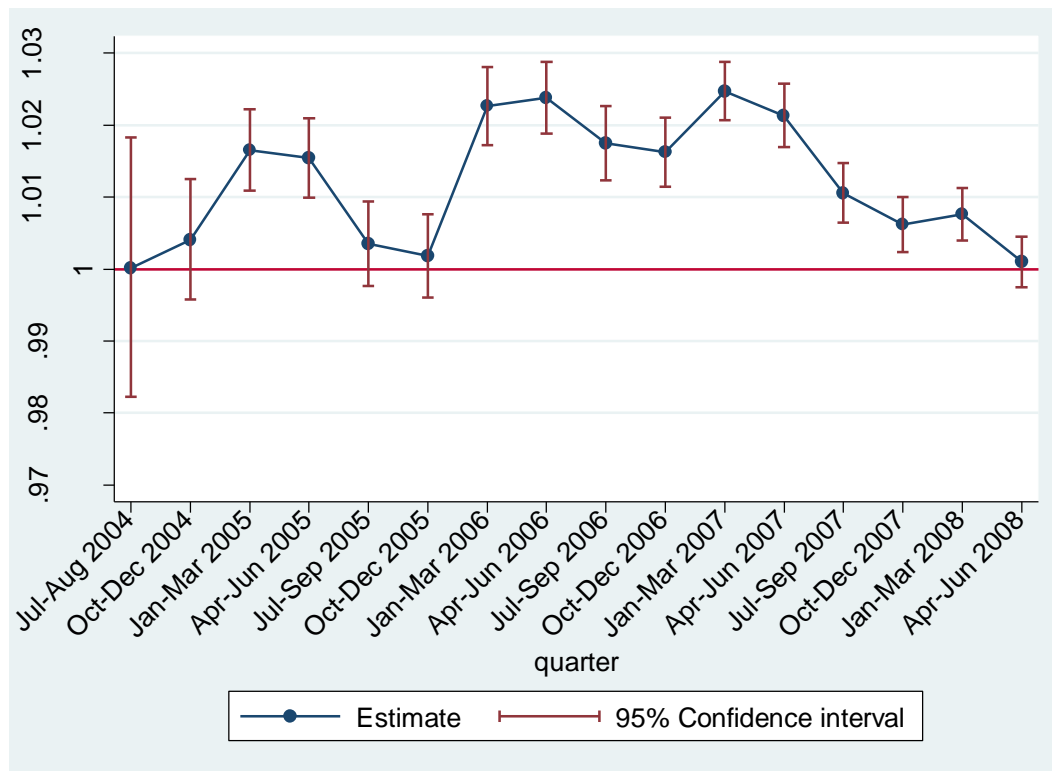
(ii) Histogram of estimated MRSAB rate



(iii) Scatter plot of average quarterly change in incidence rate ration against pooled MRSAB rate over all quarters



Estimated IRR for CDI for a 1 ml per bed day increase in AHR by quarter



Information available from authors regarding evidence for collinearity which might explain different trends in AHR and soap for CDI

There was strong positive correlation between soap and AHR for most trusts. In a simplified model if AHR is included alone there is as expected an negative association, more AHR lower CDI infections but AHR is likely to be acting as a proxy for soap.

cdiff	IRR	Std. Err.	z	P> z	[95% Conf. Interval]	
ahr_rate	.99729	.0012432	-2.18	0.029	.9948563	.9997296
healthact	.8761426	.0235249	-4.92	0.000	.8312269	.9234854
_Isaving_l~1	.9714076	.0363572	-0.78	0.438	.9026996	1.045345
_Isaving_l~2	1.130174	.0293394	4.71	0.000	1.074108	1.189166
_Iimp_team_1	1.038592	.0473717	0.83	0.406	.9497748	1.135716
_Iimp_team_2	1.03171	.0482152	0.67	0.504	.9414085	1.130673
_Iimp_team_3	1.018129	.0489342	0.37	0.709	.9265984	1.118701
_Iimp_team_4	.8300601	.0279145	-5.54	0.000	.7771128	.886615
_Icategory_2	.0302993	.0052515	-20.17	0.000	.0215726	.0425563
_Icategory_3	1.441694	.1961826	2.69	0.007	1.104189	1.88236

Soap is also negatively associated when included alone.

cdiff	IRR	Std. Err.	z	P> z	[95% Conf. Interval]	
soap_rate	.9963024	.0008587	-4.30	0.000	.9946207	.9979869
healthact	.9116977	.0282722	-2.98	0.003	.8579356	.9688288
_Isaving_l~1	.9597508	.0396689	-0.99	0.320	.885067	1.040736
_Isaving_l~2	1.108008	.0316261	3.59	0.000	1.047724	1.171761
_Iimp_team_1	1.073239	.0551437	1.38	0.169	.9704235	1.186949
_Iimp_team_2	1.072553	.0565366	1.33	0.184	.9672754	1.189289
_Iimp_team_3	1.063165	.0585742	1.11	0.266	.9543424	1.184396
_Iimp_team_4	.8620557	.0332724	-3.85	0.000	.7992486	.9297984
_Icategory_2	.0286115	.0056641	-17.95	0.000	.0194103	.0421744
_Icategory_3	1.348601	.2071378	1.95	0.052	.9980297	1.822315

When allowing for these together in the simplified model the AHR association is removed and only the negative association with soap remains. So although they are collinear and this may cause problems with the estimation the results are biologically plausible with would suggest that this isn't causing a major problem.

cdiff	IRR	Std. Err.	z	P> z	[95% Conf. Interval]	
ahr_rate	.9977479	.0017942	-1.25	0.210	.9942376	1.001271
soap_rate	.9967082	.0009148	-3.59	0.000	.9949169	.9985028
healthact	.9374057	.0307114	-1.97	0.048	.8791043	.9995735
_Isaving_l~1	.9669622	.0422754	-0.77	0.442	.8875547	1.053474
_Isaving_l~2	1.10949	.0342201	3.37	0.001	1.044407	1.178629
_Iimp_team_1	1.055368	.0569415	1.00	0.318	.9494635	1.173086
_Iimp_team_2	1.043489	.0572679	0.78	0.438	.9370721	1.161991
_Iimp_team_3	1.023369	.0587551	0.40	0.687	.9144535	1.145256
_Iimp_team_4	.8348745	.0338907	-4.45	0.000	.7710236	.904013
_Icategory_2	.0275942	.0055617	-17.81	0.000	.018589	.0409619
_Icategory_3	1.328385	.2088589	1.81	0.071	.9760941	1.807825

(i) Associations from the Poisson mixed effects model for mandatory MSSA bacteraemia (see text in results section iii regarding MSSA)

Predictor	Estimated Incidence rate ratio	95% confidence interval	P value
AHR rate per ml per bed-day	0.999	0.997 to 1.002	0.6
Soap rate per ml per bed per day	1.0029	1.0014 to 1.0043	0.0001
Saving lives			
Prior quarters	Referent		
Quarter implemented	1.01	0.94 to 1.09	0.5
Subsequent quarters	1.05	0.97 to 1.11	
Improvement team visit (MRSA)			
Prior quarters	Referent		
Quarter before visit	1.03	0.95 to 1.11	0.3
Quarter of visit	0.92	0.85 to 1.00	
Quarter post visit	0.97	0.89 to 1.05	
Subsequent quarters	0.98	0.92 to 1.04	
Health Act	1.05	0.99 to 1.13	0.13

(ii) Associations between additional use of consumables and MRSA or CDI improvement team visits

Time relative to visit	Estimated additional quarterly usage of AHR	
	MRSA visit	CDI visit
Prior quarters	referent	referent
Quarter of visit	0.96 (-1.22 to 3.13) p=0.39	-0.46 (-4.69 to 3.77) p=0.83
Post visit	0.81 (-0.67 to 2.29) p=0.28	0.53 (-1.99 to 3.05) p=0.68
Estimated additional quarterly usage of soap		
Prior quarters	referent	referent
Quarter of visit	-1.47 (-7.15 to 4.20) p=0.61	0.14 (-10.56 to 10.85) p=0.98
Post visit	-0.90 (-4.80 to 3.00) p=0.65	-0.67 (-7.26 to 5.91) p=0.84
Estimated additional quarterly usage of soap & AHR combined		
Prior quarters	referent	referent
Quarter of visit	-1.71 (-9.94 to 6.52) p=0.68	0.95 (-14.46 to 16.36) p=0.90
Post visit	-1.16 (-6.79 to 4.47) p=0.69	1.13 (-8.21 to 10.47) p=0.81