

Definitions

- Staffing:** number of nurses per cot
- Throughput:** admissions / days per cot per year
- Activity:** babies receiving / days of respiratory support per admission

Statistical methods

- Simple descriptive characteristics
- Standardised ratios
 - BAPM cot criteria:

$$IC + HD/2 + SC/4$$
 - Nurse recommendations:

$$5.5 * (1 + IC + HD/2 + SC/4)$$
- Linear regression of ratios

Unit numbers

- Sensitivity analyses for each regression model

	L1	L2	L3
1997	-	145	
2006	62	74	46
2011	43 (7)	72	44

	L1	L2	L3
1997	-	123 (84.8%)	
2006	18 (29%)	61 (82%)	44 (96%)
2011	18 (36%)	61 (85%)	44 (100%)

Unit numbers

- All IC – all intensive care units at all time points

	L1	L2	L3
1997	-	145	
2006	62	74	46
2011	43 (7)	72	44

	L1	L2	L3
1997	-	123 (84.8%)	
2006	18 (29%)	61 (82%)	44 (96%)
2011	18	61	44

Unit numbers

- All units – all units in 2006 and 2011

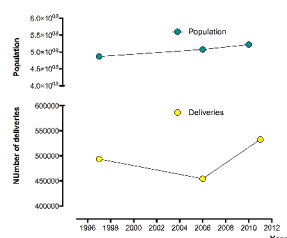
	L1	L2	L3	L1	L2	L3
1997	-	145		-	123 (84.8%)	
2006	62	74	46	18 (29%)	61 (82%)	44 (96%)
2011	43 (7)	72	44	18	61	44

Unit numbers

- All data – units with data at all time points

	L1	L2	L3	L1	L2	L3
1997	-	145		-	123 (84.8%)	
2006	62	74	46	18 (29%)	61 (82%)	44 (96%)
2011	43 (7)	72	44	18 (36%)	61 (85%)	44 (100%)

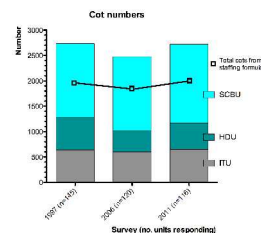
Population



	1997	2006	2011
Population (1000s)	48664.8	50763.9	52234*
Deliveries	493468	454103	532578
Units	145	120	115 (1)

* 2010

Cot numbers in England



	1997 (n=145)	2006 (n=120)	2011 (n=116)
ITU	637	602	650
HDU	650	420	516
SCBU	1445	1455	1554
Total	2725	2493	2683
BAPM	1929	1816	1974

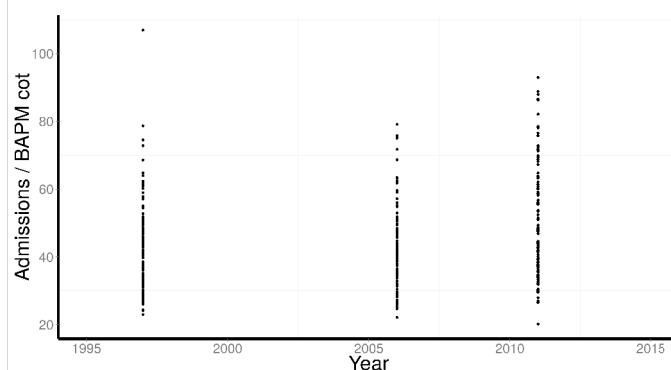
Nurse staffing



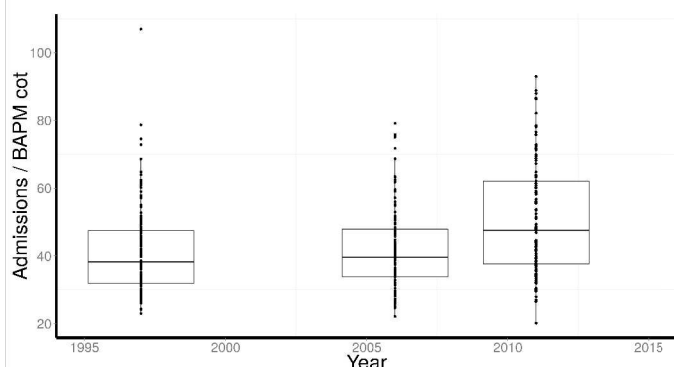
Year	QIS (n units)	All (n units)
1997	2978 (145)	4777 (145)
2006	3273 (120)	5052 (120)
2011 (n=116)	3449 (100)	5868 (106)

		Baseline	1997	2006	2011
All IC	Crude	0.57 (0.55 – 0.59)	(baseline)	0.12 (0.09 – 0.16)	0.23 (0.19 – 0.26)
	Adjusted	0.48 (0.43 – 0.52)		0.10 (0.06 – 0.14)	0.17 (0.13 – 0.21)
All units	Crude	0.70 (0.67 – 0.72)	(baseline)	(baseline)	0.11 (0.07 – 0.15)
	Adjusted	0.66 (0.63 – 0.69)			0.08 (0.04 – 0.12)
All data	Crude	0.57 (0.55 – 0.60)	(baseline)	0.13 (0.09 – 0.17)	0.22 (0.18 – 0.26)
	Adjusted	0.67 (0.57 – 0.78)		0.06 (0.01 – 0.11)	0.12 (0.06 – 0.18)

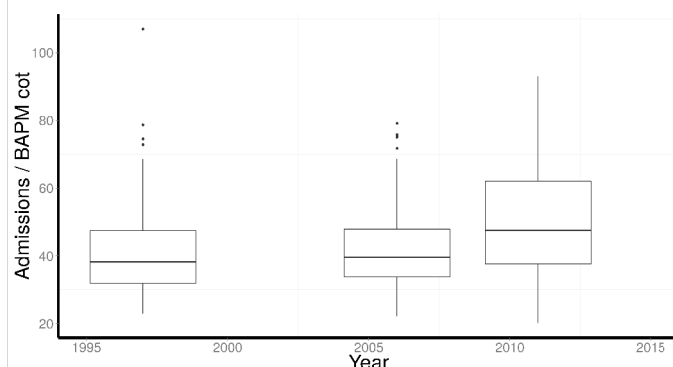
Admissions activity (per cot)



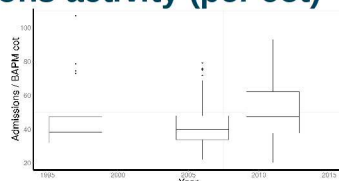
Admissions activity (per cot)



Admissions activity (per cot)

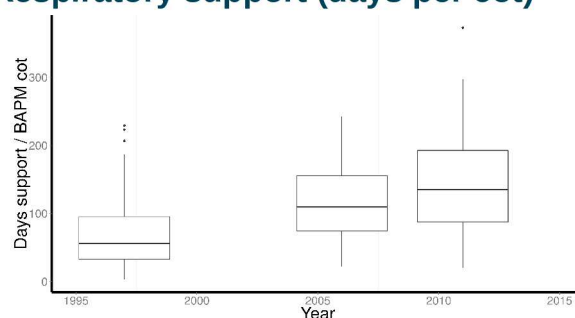


Admissions activity (per cot)



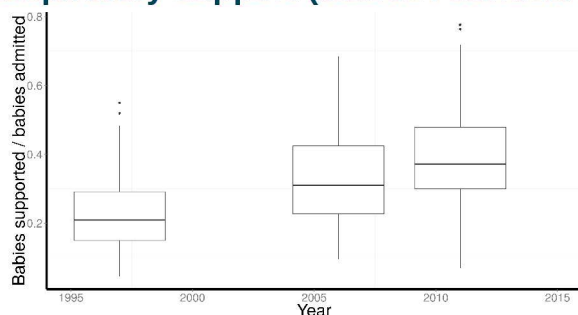
		Baseline estimate	Change (%)	
			2006	2011
All IC	Crude	39.5 (37.7 – 41.5)	1.9 (-5.1 – 9.1)	22.2 (13.6 – 31.3)
	Adjusted	41.6 (31.5 – 55.0)	0.1 (-8.3 – 9.2)	22.7 (10.9 – 35.9)
All units	Crude	48.2 (45.3 – 52.3)	--	18.3 (8.0 – 29.6)
	Adjusted	84.6 (70.3 – 101.8)	--	23.2 (14.8 – 32.1)
All data	Crude	39.1 (36.9 – 41.5)	8.5 (-0.1 – 17.8)	31.7 (21.2 – 43.1)
	Adjusted	67.4 (54.6 – 83.3)	-5.0 (-13.3 – 4.0)	16.4 (5.1 – 28.9)

Respiratory support (days per cot)



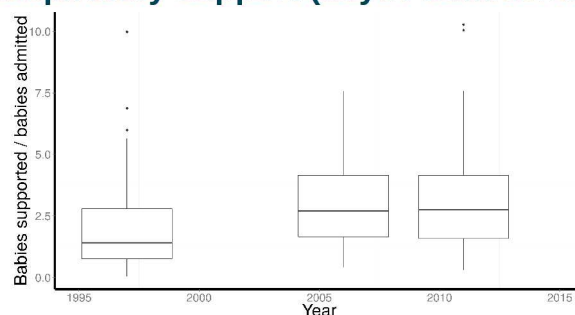
Change from:		1997-2006	2006-2011
All IC	crude	46.2 (30.3 – 60.1)	72.0 (55.6 – 88.3)
	adjusted	36.4 (17.5 – 55.2)	33.3 (10.0 – 56.5)

Respiratory support (babies / admission)



Change from:		1997-2006	2006-2011
All IC	crude	0.10 (0.06 – 0.13)	0.16 (0.12 – 0.19)
	adjusted	0.11 (0.07 – 0.15)	0.17 (0.12 – 0.21)

Respiratory support (days / admission)



Change from:		1997-2006	2006-2011
All IC	crude	1.07 (0.57 – 1.57)	1.23 (0.71 – 1.75)
	adjusted	1.17 (0.67 – 1.67)	0.90 (0.28 – 1.53)

Summary

	1997 - 2006	2006 - 2011
Nurses / cot	↑	↑↑
Admissions / cot / year	↔	↑
Respiratory support / year		
Days / cot	↑	↔
Babies supported / admissions	↑	↑
Days support / admissions	↑	↔

Conclusion

- Increased nurses – but low starting point
- Better cot utilisation
- Increased “sick” babies (i.e. needing respiratory support)

Thanks to...

- Supervisors:
 - Neil Marlow
 - Liz Draper
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 - Enid Hennessy
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 - Kate Fernandes
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 - Bliss
 - BAPM
 - NNAP
 - Stavros Petrou & colleagues
 - NDAU

