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Introduction

Quality assurance in maternity care requires integration of different perspectives. National regulators often adopt an inspection-informed approach to measure the quality of care. In England, the Care Quality Commission (CQC) conducts inspections to inform quality ratings of maternity services within hospitals. Inspections may involve interviews with service users and staff, observation, and reviews of care records, policies, incidents and information from national audits and maternity statistics¹⁻². At the same time, the National Maternity and Perinatal Audit (NMPA) supports quality improvement through national audits using linked maternity health data focussing on patient outcomes. The “Reading the Signals” (‘East Kent’) report highlighted the need to recognise meaningful and interpretable signals of quality³.

Rationale

Comparing outcomes according to the inspection-informed ratings would help us to understand their meaning, the relationship between the two quality assurance processes, and the role of population-based indicators in the quality assurance landscape. We tested the null hypothesis that outcomes did not vary according to a hospital’s overall maternity service rating.

Method

We used routinely-collected data from the maternal English Hospital Episode Statistics (HES) record linked with the neonatal HES record and the Maternity Services Data Set Version 1.5. We included women with a singleton pregnancy who gave birth at 37 or more completed weeks of gestation between 1st April 2018 and 31st March 2019. We excluded women without a hospital identifier, who gave birth outside of a maternity unit, or in a freestanding midwifery unit. We compared neonatal and maternal morbidity using the composite English Neonatal Adverse Outcome Indicator (ENAOI) and the English Maternal Morbidity Obstetric Indicator (EMMOI). We also compared perinatal mortality (stillbirth or neonatal death within 28 days of life), 5-minute Apgar <7, obstetric anal sphincter injury, neonatal or maternal length of stay >2 days, and neonatal readmission within 28 days or maternal readmission within 42 days. We compared outcomes by the contemporaneous overall CQC rating of the hospital maternity service (‘outstanding’, ‘good’, and ‘requires improvement’/ ‘inadequate’, using multilevel logistic regression models. We also compared outcomes according to the CQC domain rating for “Safe”.

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Results

Term, singleton pregnancy in HES birth episode 2018-19
n = 511,757, 219 units

Excluded

Missing unit identifier (325)
Birth in non-maternity unit (25, 11 units)
Birth in freestanding midwifery unit (6,515, 51 units)
Birth in unit without individual rating (3,173, 1 unit)

Included
n = 501,719, 156 units

Characteristics

Over one fifth of women (104,675/ 501,719 , 21%) gave birth in a unit rated ‘requires improvement’ or ‘inadequate’. Women who gave birth at a unit rated outstanding were older and a greater proportion were nulliparous and from an Asian, Black or ‘Other’ ethnic background, compared with other groups . Women who gave birth at a unit rated ‘requires improvement’/ ‘inadequate’ were younger, and a greater proportion were parous, smokers, in the most deprived IMD quintile, and from a White ethnic background, compared with other rating groups. Regarding hospitals, 71% were obstetric and alongside midwifery units and 29% were obstetric units only.

Proportions of neonatal and maternal outcomes according to the CQC overall maternity service rating

Maternity Service Rating						
	Outstanding		Good		RI/Inadequate	
	n = 39 930		n = 357 114		n = 104 675	
Neonatal outcomes	% (95% CI)		% (95% CI)		% (95% CI)	
EPNM	52/ 38 144	0.14 (0.10-0.18)	484/ 340 967	0.14 (0.12-0.16)	162/ 102 817	0.16 (0.13-0.19)
ENAOI	1 634/ 38 112	4.3 (3.3-5.6)	13 782/ 340 667	4.0 (3.6-4.5)	3 462/ 102 707	3.4 (2.9-3.9)
Apgar <7 at 5 min.	442/ 36 494	1.2 (0.81-1.8)	3 403/ 331 033	1.0 (0.95-1.1)	1 026/ 95 174	1.1 (0.93-1.3)
Prolonged stay	5 839/ 37 268	16 (12-20)	46 569/ 324 545	14 (13-15)	12 563/ 95 656	13 (11-15)
Readmission	1 815/ 37 207	4.9 (3.6-6.6)	16 993/ 324 273	5.2 (4.9-5.6)	4 549/ 95 564	4.8 (4.3-5.3)
Maternal outcomes						
EMMOI	462/ 39 930	1.2 (0.87-1.5)	4 466/ 357 114	1.3 (1.1-1.4)	1 041/ 104 675	1.0 (0.87-1.1)
OASI	905/ 27 567	3.3 (2.7-4.0)	8 031/ 255 034	3.1 (3.0-3.3)	2 336/ 75 412	3.1 (2.8-3.4)
Prolonged stay	6 577/ 38 058	17 (15-20)	57 761/ 346 916	17 (16-18)	16 571/ 100 691	16 (15-19)
Readmission	1 489/ 38 052	3.9 (2.9-5.2)	10 217/ 346 871	2.9 (2.7-3.2)	2 758/ 100 679	2.7 (2.5-3.0)
Process measures						
iatrogenic birth	16 866/ 35 099	48 (42-54)	149 171/ 311 695	48 (46-49)	42 109/ 87 882	48 (45-51)
Intrapartum CS	5 673/ 33 726	18 (16-20)	50 885/ 307 222	17 (16-18)	14 218/ 90 048	16 (15-17)

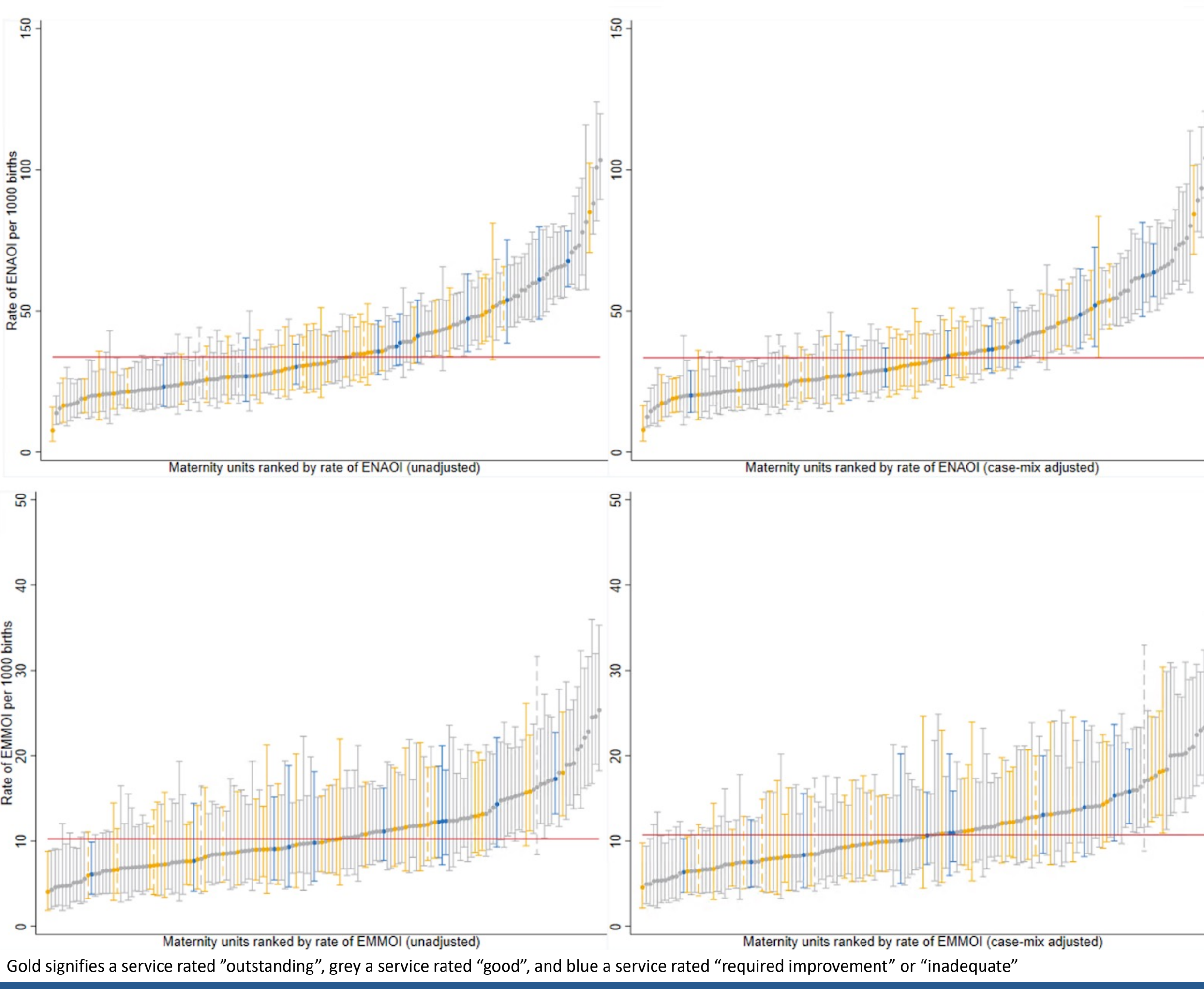
For OASI, the denominator included only women who had a vaginal birth. For EPNM, the ENAOI, and neonatal readmission the denominators included only babies with linkage to the neonatal HES record. For ENAOI, prolonged neonatal stay, and neonatal readmission the denominators excluded babies who were stillborn. Proportions and clustered 95% confidence intervals are to two significant figures. Prolonged stay signifies an admission that continues for >2 calendar days from birth.

Association between neonatal and maternal outcomes and the CQC overall maternity service rating

	Maternity Service Rating			P-value
	Outstanding	Good	RI/Inadequate	
	n = 39 930	n = 357 114	n = 104 675	
NEONATAL OUTCOMES				
EPNM				
Unadjusted	OR (95% CI) 0.99 (0.68-1.44)	-	OR (95% CI) 1.08 (0.86-1.37)	0.79
Case-mix	0.95 (0.66-1.37)	-	1.09 (0.87-1.37)	0.71
Case-mix and unit characteristics	0.88 (0.61-1.26)	-	1.15 (0.92-1.43)	0.32
ENAOI				
Unadjusted	1.15 (0.84-1.58)	-	0.87 (0.72-1.06)	0.21
Case-mix	1.12 (0.82-1.55)	-	0.88 (0.72-1.07)	0.28
Case-mix and unit characteristics	1.08 (0.79-1.48)	-	0.90 (0.74-1.10)	0.48
Apgar <7 at 5 minutes				
Unadjusted	1.17 (0.90-1.53)	-	1.05 (0.89-1.24)	0.46
Case-mix	1.16 (0.88-1.51)	-	1.06 (0.90-1.26)	0.49
Case-mix and unit characteristics	1.14 (0.88-1.48)	-	1.06 (0.90-1.25)	0.53
Neonatal prolonged stay				
Unadjusted	1.06 (0.81-1.38)	-	0.92 (0.78-1.08)	0.51
Case-mix	1.02 (0.80-1.31)	-	0.95 (0.82-1.11)	0.79
Case-mix and unit characteristics	1.01 (0.79-1.30)	-	0.97 (0.84-1.13)	0.93
Neonatal readmission				
Unadjusted	0.93 (0.74-1.17)	-	0.95 (0.83-1.10)	0.71
Case-mix	0.92 (0.73-1.16)	-	0.96 (0.83-1.11)	0.70
Case-mix and unit characteristics	0.94 (0.75-1.17)	-	0.95 (0.83-1.10)	0.72
MATERNAL OUTCOMES				
EMMOI				
Unadjusted	OR (95% CI) 1.00 (0.74-1.36)	-	OR (95% CI) 0.86 (0.71-1.04)	0.31
Case-mix	0.97 (0.72-1.30)	-	0.89 (0.74-1.08)	0.50
Case-mix and unit characteristics	0.93 (0.69-1.24)	-	0.91 (0.76-1.10)	0.58
OASI				
Unadjusted	1.09 (0.93-1.28)	-	0.95 (0.86-1.06)	0.33
Case-mix	1.04 (0.88-1.22)	-	1.03 (0.93-1.14)	0.78
Case-mix and unit characteristics	1.04 (0.89-1.22)	-	1.03 (0.94-1.14)	0.75
Maternal prolonged stay				
Unadjusted	1.11 (0.88-1.39)	-	1.01 (0.88-1.16)	0.67
Case-mix	1.08 (0.87-1.35)	-	1.05 (0.92-1.20)	0.64
Case-mix and unit characteristics	1.05 (0.85-1.31)	-	1.08 (0.94-1.23)	0.52
Maternal readmission				
Unadjusted	1.29 (1.05-1.59)	-	0.95 (0.84-1.08)	0.028
Case-mix	1.28 (1.04-1.58)	-	0.97 (0.85-1.11)	0.045
Case-mix and unit characteristics	1.29 (1.05-1.59)	-	0.97 (0.85-1.10)	0.041
PROCESS MEASURES				
Iatrogenic birth				
Unadjusted	1.01 (0.92-1.11)	-	1.00 (0.94-1.06)	0.98
Case-mix	1.00 (0.91-1.09)	-	0.99 (0.94-1.05)	0.95
Case-mix and unit characteristics	1.00 (0.83-1.22)	-	0.97 (0.86-1.09)	0.85
Intrapartum caesarean				
Unadjusted	1.04 (0.93-1.17)	-	0.97 (0.91-1.05)	0.57
Case-mix	0.99 (0.90-1.10)	-	1.02 (0.96-1.08)	0.80
Case-mix and unit characteristics	1.00 (0.91-1.10)	-	1.02 (0.96-1.08)	0.87

Case-mix adjustment: maternal age and ethnicity, Index of Multiple Deprivation quintile, Body Mass Index, smoking status, pre-existing hypertension, pregnancy-induced hypertension, pre-eclampsia, gestational diabetes, diabetes, obstetric cholestasis. Unit characteristics: unit delivery volume, neonatal unit type

Incidence of the composite outcomes for neonatal morbidity (ENAOI) and maternal morbidity (EMMOI) according to individual hospital and its CQC rating



Main Findings

A fifth of women in our sample gave birth in a unit rated ‘required improvement’ or ‘inadequate’. These units were more likely to serve women who were younger, parous, White, and smokers. We found no difference in outcomes or process measures according to either the overall CQC rating for maternity hospitals or the individual domain rating for “safe” except for a greater risk of maternal readmission among units rated ‘outstanding’, compared with ‘good’.

Conclusion

The NMPA’s maternity indicators did not differ by the inspection-informed unit rating for the maternity service overall. These two quality assurance processes appear to measure different aspects of quality. Decision makers involved in quality assurance and improvement may wish to consider the benefit of better informing holistic quality ratings with outcomes.

References

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