



A clinical audit on the application of cardiotocography: comparison of current national practice to international guidelines

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INTRODUCTION

Cardiotocography (CTG) has been integrated into routine assessment of fetal wellbeing, used on admission to identify cases for continuous electronic fetal monitoring for risk of intrapartum asphyxia. A case-based approach is recommended to justify the application of CTG and develop customized management plans. ***Efficient CTG application, interpretation, documentation, and communication are essential for effective patient management and correct escalation procedures where necessary, to minimize iatrogenic causes of poor outcome .***

The purpose of this clinical audit is to ***assess current clinical practice of CTG by doctors on patients at the major hospitals in Bahrain: King Hamad University Hospital (KHUH), Bahrain Defense Force Hospital (BDF), Salmaniya Medical Complex (SMC) & American Mission Hospital (AMH). Current practice on CTG application, interpretation, documentation and communication are compared to international standards of best practice outlined in NHS, NICE, ACOG and RANZCOG national guidelines, as well as FIGO international recommendations.***

OBJECTIVE

To assess the current clinical intrapartum application of cardiotocography (CTG) in 4 major hospitals in Bahrain. Compliance with international evidence-based recommendations set by the NHS, NICE, ACOG, RANZCOG and FIGO guidelines was analysed. It is hypothesised the hospitals are meeting international standards for evidence-based, patient-centred CTG application.

CONCLUSION

Areas of improvement were discussed and recommendations on relevant points of care were made in adherence with international standards of CTG application, followed by a final re-audit to assess post-intervention clinical application of CTG in Bahrain compared to set international guidelines. National-based guidelines to standardise practice and adhere to international standards are recommended. Results of this audit will be shared with Bahrain NHRA for consideration into national guidelines.

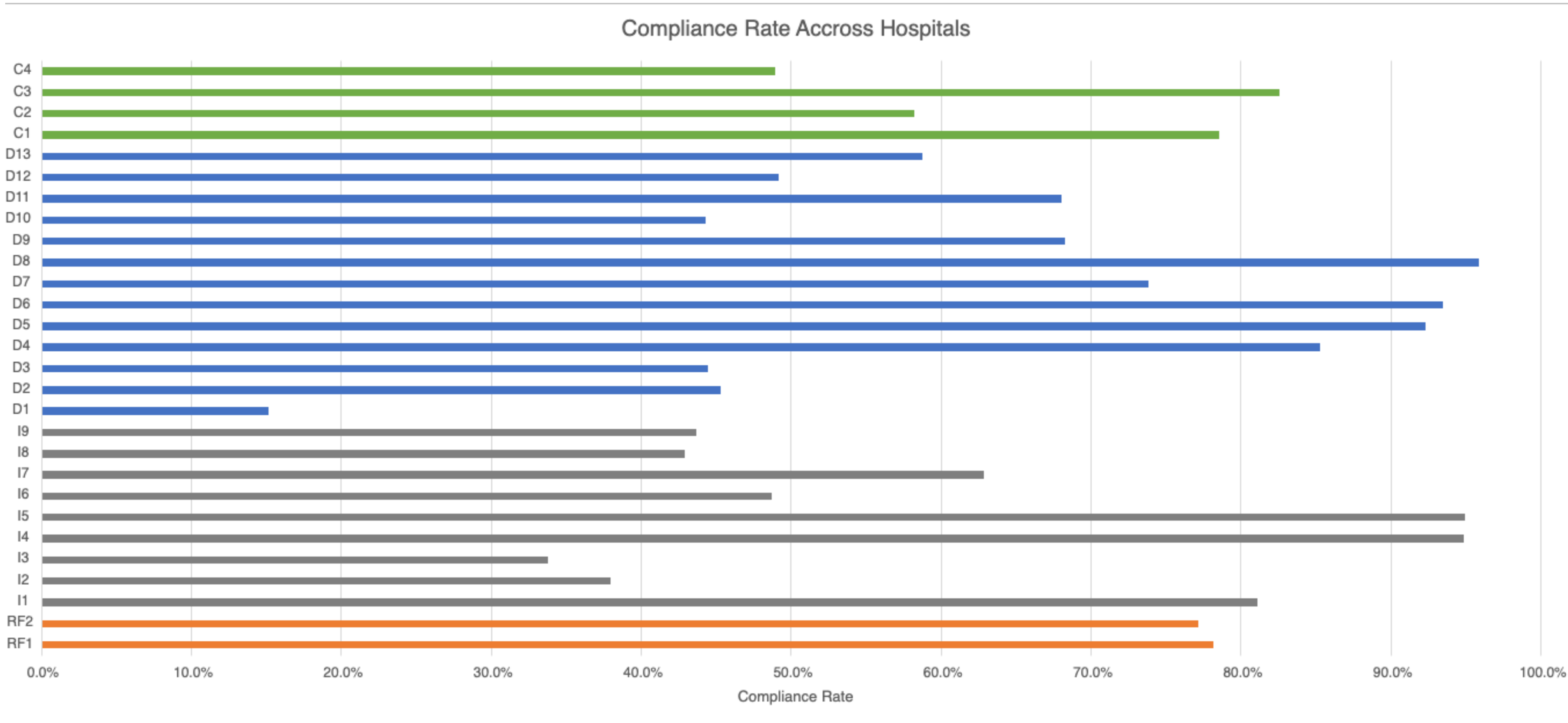


Table1: Compliance rate represents the percentage of instances where the applied guidelines or standards were followed correctly. Orange - CTG Risk Factors. Blue - CTG Interpretation. Gray - CTG Documentation. Green - CTG Communication.

Overall Compliance Rate Percentage	
Risk Factors	77.67 +/- 9.35
Interpretation	57.5 +/- 31.59
Documentation	64.20 +/- 28.42
Communication	67.10 +/- 22.32

Table 2: Overall average compliance rate percentages of the main four domains.

RESULTS

Average compliance to recommendations for risk factor assessment ranged from (57%-93.33%) with highest variation in case-based identification of risk-factors to indicate CTG application. Hospitals were (44%-71.88%) compliant with recommendations on proper CTG interpretation and appropriate response escalations. Application of the “fresh-eyes” approach for interpretation varied from 28% to 90% across target hospitals. Case-based documentation was achieved (46%-77.28%) of the time. 65.38% of the time, the patient’s refusal of CTG monitoring was not recorded in one of the 4 major hospitals. Recommendations for standardised communication achieved (41%-81.67%) compliance. Significant variance across criteria and hospitals was noted. Clear recommendations were customized for each target hospital to achieve satisfactory compliance.

METHODS

A prospective design was adopted. The audit was segmented into three stages: stage 1 (pre-intervention) stage 2 (intervention and education) and stage 3 (post-intervention). A referenced audit tool adapted from international recommendations.

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A CLINICAL AUDIT ON THE APPLICATION OF CARDIOTOCOGRAPHY: COMPARISON OF CURRENT NATIONAL PRACTICE TO INTERNATIONAL GUIDELINES_ QUESTIONNAIRE Audit Tool

Date: / / (Day/Month/Year)

Patient CPR/MRN Number:

1. Indication for CTG identified (intrapartum)^{7,2,3,4,7}

☐ Yes ☐ No

If yes, specify – indicate present risk factors: circle all that apply

Intrapartum Risk Factors^{4,7,1,4,4}

Maternal Factors	Fetal Factors	Intrapartum factors
Previous cesarean section/uterine surgery	abnormal auscultation or CTG	Induction/augmentation with prostaglandin/oxycotin
Hypertension	absent liquor following polyhydramnios/oligohydramnios	regional anesthesia (epidural/spinal)
Pre-eclampsia	Placenta ⁸	abnormal vaginal bleeding in labour
Placenta previa	Insufficient growth restriction	maternal pre-eclampsia > 38%
Post-term pregnancy (>42wks gestation)	Abnormal umbilical cord Doppler velocity	proceeding or blood-stained liquor
Prolonged membrane rupture ^{***}	Mismanagement	Confirmed delay 1 st or 2 nd stage
Diabetes treated pharmacologically	History of reduced fetal movements ^{***}	Suspected chorioamnionitis/sepsis
Pain not associated with contractions	Fetal anomaly	Tachycardia ^{**}
Anapartum hemorrhage		uterine hypertonus ^{***}
Previous stillbirth		Fetal heart rate less than 110 bpm or greater than 160 bpm
Other maternal medical disease (including drug abuse)		Contractions lasting > 60 secs or > 5 contractions in 10 mins
Vaginal birth after cesarean section		

^{*} pre-term labour less than 37 completed weeks

^{**} less than five active labor contractions in 10 minutes, without fetal heart rate abnormalities

^{***} contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities

^{****} less than 7 days, unless noted and and CTG subsequently abnormality

^{*****} greater than 24 hours unless a established before or after

¹ RANZCOG page 8-9

² NICE: Intrapartum guideline 1.4.3, 1.4.9

³ NHS NINCH & IPCH Joint page 3

⁴ NHS-GMRC/SCN, section 4.1

⁵ FIGO, section 2: (indications)

⁶ RANZCOG page 8

⁷ NHS-GMRC/SCN, Appendix 2 (admission and Intrapartum risk assessment)

⁸ RANZCOG page 12

⁹ RANZCOG page 9

¹⁰ NHS-GMRC/SCN Fetal Monitoring in Labour, section 4.1

¹¹ NICE: Integrated care for healthy women and babies, section 1.4.8

¹² NICE, section 1.4.8

¹³ RANZCOG page 10

¹⁴ RANZCOG page 10

¹⁵ FIGO, section 4.7

¹⁶ ACOG, clinical considerations and management

¹⁷ NHS-GMRC/SCN, section 4.10, 4.11

¹⁸ Grivell RM, Alfirevic Z, Gyte GML, Devane D. Antenatal Cardiotocography for fetal assessment. Cochrane Database of Systematic Reviews. [Internet] 2015. [Cited 2022 March 01].

¹⁹ Lin CW, Chang C, Yu C, Chen C. Comparison of a Novel Computerized Analysis Program and Visual Interpretation of Cardiotocography. PLOS One. [Internet] 2014. [Cited 2019 Jan 16]; 9(12):1-15.

²⁰ Davies, H. (2019). Cardiotocography (CTG). [Online] Ebme.co.uk. [Accessed 2 Jan 2019].

²¹ Ayres-de-Campos D & Nogueira-Reis Z. Technical characteristics of current cardiotocographic monitors. Best Practice & Research Clinical Obstetrics & Gynaecology. [Internet] vol. 30: pp 22 – 32. 2016. [Cited 2022 March 01].

²² Jeffery T, Peterson R, Quinlivan J. Does cardiotocography have a role in the antenatal management of pregnancy complicated by gestational diabetes mellitus? Australian and New Zealand Journal of Obstetrics and Gynecology [Internet]. 2016. [Cited 2018 Dec 29]; 56:358-363.

²³ Lowe G, Chandran E. Fetal monitoring, competency and assessment: a best practice toolkit. Clinical Networks [Internet]. London:scn.nhs.uk; 2015. [Cited 2019 Jan 2]

²⁴ Impey L, Reynolds M, MacQuillan K, Gates S, Murphy L. Admission cardiotocography: a randomized controlled trial. The Lancet. [Internet] vol 361: pp 465 – 470. 2003. [Cited 2022 March 01].

²⁵ Mires G, Williams F, Howie R. Randomised controlled trial of cardiotocography versus Doppler auscultation of fetal heart at admission in labour in low risk obstetric population. BMJ. [Internet] vol 322: pp 1457 – 1462. 2001. [Cited March 02 2022].

²⁶ Greater Manchester and Eastern Cheshire SCN. Fetal Monitoring in Labour including Fetal Blood Sampling Guideline. [Internet] 2020. Version 2.1: 1 – 28

²⁷ American College of Obstetricians and Gynaecologists. An educational aid to obstetrician-gynaecologists[10] Brown S, Lumley J. Satisfaction with care in labor and birth: a survey of 790 Australian women. Birth. 1994;21(1):4-13.

²⁸ Confidential Enquiry into Stillbirths and Deaths in Infancy. 7th Annual Report si-D. London: 1998.

Figure 1: Questionnaire adapted from guidelines, used by midwives to conduct the audit.

Convenience sampling was used, and intrapartum CTG application to 230 cases was assessed. Inclusion criteria was restricted to clinicians who directly manage and interpret CTG tracings and communicate findings with patients, family and staff. Midwives were trained to objectively observe blinded subject doctors during routine practice and complete the audit-tool. Data was analysed and results were compared to international standards of care for CTG use in intrapartum foetal monitoring. 100% compliance indicates satisfactory adherence to reference guidelines.

Random collected CTG samples target hospitals were analysed to ensure data validity. Following Stage 1, target hospitals will be given customised recommendations with an implementation period of 3-6 months and compliance re-audited (Stage 3).

REFERENCES