

**The Royal Australian and New Zealand
College of Obstetricians and Gynaecologists**

CLINICAL GUIDELINES

INTRAPARTUM FETAL SURVEILLANCE



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These Guidelines were commissioned by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG).

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Consultation

The Guideline Development Group, through the Project Team, consulted a range of clinical experts, consumers and stakeholders as to the

Evidence base

Clarity, and

Feasibility of the Guidelines.

Summary of the consultation process is outlined in Appendix A. Full details can be obtained from RANZCOG on request.

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TABLE OF CONTENTS

PREAMBLE	7
1. AIMS	9
2. INTRODUCTION	10
3. GUIDELINES AND GOOD PRACTICE NOTES	11
3.1 Information and communication	11
<i>Guideline 1</i>	11
<i>Good Practice Note</i>	11
<i>Good Practice Note</i>	11
<i>Guideline 2</i>	11
3.2 Standardisation	11
<i>Guideline 3</i>	12
<i>Good Practice Note</i>	12
3.3 Which modality of intrapartum fetal surveillance should be used?	12
<i>Guideline 4</i>	12
3.3.1 Intrapartum fetal surveillance in the presence of risk factors for fetal compromise	12
<i>Guideline 5</i>	12
<i>Good Practice Note</i>	12
3.3.2 Intrapartum fetal surveillance in the absence of risk factors for fetal compromise	13
3.3.2.1 Admission CTG	13
<i>Guideline 6</i>	13
<i>Good Practice Note</i>	13
3.3.2.2 Intermittent auscultation or continuous electronic fetal monitoring for low risk women?	13
<i>Guideline 7</i>	14
3.3.2.3 The place of intermittent electronic fetal monitoring in low risk pregnancies	14
<i>Guideline 8</i>	14
3.3.2.4 Method of intermittent auscultation	14
<i>Guideline 9</i>	15
<i>Good Practice Note</i>	15

3.4	Management of fetal heart rate patterns considered suggestive of fetal compromise	15
	<i>Guideline 10</i>	15
	<i>Good Practice Note</i>	15
3.4.1	Management of fetal compromise in association with excessive uterine activity	15
	<i>Guideline 11</i>	15
	<i>Good Practice Note</i>	15
3.4.2	Fetal blood sampling	16
	<i>Guideline 12</i>	16
	<i>Good Practice Note</i>	16
4.	GUIDELINE IMPLEMENTATION ISSUES	17
4.1	Education	17
4.2	Maintenance of competence	17
4.3	Local implementation	17
4.4	Recommendations	17
5.	SUMMARY OF GUIDELINES	18
6.	ALGORITHM	21
7.	CLASSIFICATION OF LEVELS OF EVIDENCE	22
	Levels of evidence	22
	Grading of recommendations	22
8.	REVIEW DATE	23
9.	REFERENCES	24
10.	APPENDICES	27



PREAMBLE

Dr John Campbell, President of The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), endorsed risk management in obstetrics as an on-going priority for the term of the 2001-2002 Council. The development and implementation of these guidelines represents a key initiative in the Council's risk management strategy.

In September 2000 the Victorian Managed Insurance Authority (VMIA) provided RANZCOG with a confidential report into obstetric cases reported to the authority between 1993 and 1998. The report identified cases in which the reviewers considered there were potentially avoidable factors resulting in an adverse outcome. Issues relating to the use and interpretation of cardiotocographs (CTGs) represented a high proportion of these cases. The RANZCOG Council endorsed a submission from its Practice Improvement and Medico-legal Committees to develop evidence based clinical practice guidelines in intrapartum fetal surveillance. This submission was approved for funding by VMIA.

While this project has been funded and developed in Victoria there has been an extensive consultation process outside the State. The draft guidelines were circulated throughout Australia and New Zealand to Fellows, Diplomates, Midwives, the Royal Australian College of General Practitioners (RACGP), The Australian College of Rural and Remote Medicine (ACRRM) and consumers.

In 2001, Prof Bruce Barraclough, Chair, Australian Council for Safety and Quality in Health Care at the launch of the National Action Plan 2001, argued that improving the quality and safety of patient care is the most important challenge facing health professionals. ".... we must stop blaming individuals and put much greater effort into making our systems of care safer and better"¹. The recently published Douglas Report: Inquiry into Obstetric and Gynaecological Services at King

Edward Memorial Hospital 1990–2000 also highlights key clinical governance issues in obstetric and gynaecology services². The report emphasises the importance of clinical risk management strategies based on the identification and analysis of risk in a framework that enables the establishment of processes to minimise risk. The development of clinical practice guidelines along with strategies to ensure the implementation via an effective education and credentialling process would provide a framework to support health professionals in the provision of safe, quality health care.

Clinical guidelines are an increasingly familiar part of clinical practice. Their principal aim is to improve the effectiveness and efficiency of clinical care through the identification of good clinical practice and desired clinical outcomes. The specific aim of the guidelines, in combination with continuing education, training and credentialling is to reduce adverse perinatal outcomes related to inappropriate or inadequate intrapartum fetal surveillance. The guidelines do not diminish the responsibility of health professionals to make considered judgements about intrapartum fetal surveillance, taking into account the risk assessment and preferences of the individual woman in labour.

The RANZCOG established a Guideline Development Group and contracted The Royal Women's Hospital Division of Research and Education (Project Team) to assist in the development of these evidence based guidelines.

The initial phase of this project involved a search and critical appraisal of recent publications addressing the topic of intrapartum fetal surveillance. In view of the release in May 2001 in the United Kingdom of the Royal College of Obstetricians and Gynaecologists (RCOG)/National Institute for Clinical Excellence (NICE) Guidelines on the use of electronic fetal monitoring³, which included a comprehensive bibliography and

evaluation of the literature, it was agreed to restrict the literature search and appraisal to articles published from July 2000 onwards.

Two areas were identified as requiring broader literature search and appraisal. These were:

- **Admission CTG for low risk women,* and**
- **Continuous electronic fetal heart rate monitoring (EFM) for low risk women.***

Following the launch of the RCOG/NICE guidelines, the Guideline Development Group decided to continue to develop guidelines for use in the Australian and New Zealand setting. In the opinion of the Guideline Development Group, the environment in which obstetrics is practised in Australia and New Zealand differs significantly from that of the United Kingdom; the health care system has a different public/private split, obstetrics is provided in a range of facilities at level 1, 2 or 3, with varying degrees of obstetric back up and rural and provincial practitioners are often providing services in isolation both professionally and geographically. There is concern that the number of health care professionals practising obstetrics and midwifery is diminishing^{4,5}.

The following guidelines were produced in order to provide a foundation on which clinicians providing intrapartum care in Australia and New Zealand should base their practice. These guidelines are written as a general guide, subject to the clinician's expert judgement in any particular clinical situation.

The Guideline Development Group and the Project Team have followed the process recommended by the National Health and Medical Research Council (NHMRC) for the development of guidelines⁶ (Appendix B).

These guidelines have been developed using the best available evidence. Where insufficient high level evidence was available, recommendations have been developed based on expert opinion and consensus development.

The specific aim of the guidelines, in combination with continuing education and training, is to reduce adverse perinatal outcomes related to inappropriate or inadequate intrapartum fetal surveillance. This will be achieved by encouraging best practice in:

- **decisions relating to the use and interpretation of EFM (continuous or intermittent) or intermittent auscultation,**
- **decisions relating to the use of admission CTG, and**
- **management of suspected fetal compromise both pre labour and intrapartum.**

The principal aim of intrapartum fetal surveillance is to prevent adverse perinatal outcomes arising from fetal metabolic acidosis/cerebral hypoxia related to labour. However, many factors contribute to the development and severity of an asphyxial injury (eg. tissue perfusion, tissue substrate availability, the duration and severity of the insult) such that the relationship between metabolic acidosis and cerebral damage is complex. Therefore, the degree of tissue damage and subsequent injury does not necessarily relate directly to the extent of fetal metabolic acidosis developed during labour. Furthermore, it is clear that most often damage is actually sustained during pregnancy, prior to labour, rather than arising *de novo* during labour and delivery.

Nonetheless, the practice of fetal surveillance during labour would be expected to detect those fetuses at risk of compromise, allowing appropriate intervention and thereby affording improved perinatal outcomes. Monitoring the health of the fetus during labour has therefore become a key component of modern obstetric care. Traditionally, this was undertaken by simple regular auscultation of the fetal heart with a stethoscope. However, this approach was considered by many to be inadequate, particularly for high risk pregnancies. Therefore, in an effort to reduce the incidence of intrapartum fetal mortality and morbidity, the use of intrapartum electronic fetal monitoring (EFM), particularly continuous EFM, has steadily increased over the last 25 years.

The use of continuous EFM for intrapartum fetal surveillance has now become entrenched in obstetric practice without robust randomised controlled trial evidence to support it. The randomised controlled trials which have been undertaken confirm that the use of continuous EFM significantly increases the rate of operative delivery. To a certain extent, this can be minimised with the concomitant use of fetal blood sampling⁷. No statistically significant improvements in long term neonatal outcomes such as cerebral palsy have been demonstrated in these randomised controlled trials. Not surprisingly, concerns about maternal hazards and small or absent

perinatal benefit have led some authorities to advise against the routine use of continuous EFM for low risk labours^{3,8,9}.

However, the interpretation of the available evidence is more complex. Firstly, it is widely acknowledged that the accumulated evidence of randomised controlled trials (RCTs), when subjected to meta-analysis, does not have sufficient patient numbers to validly assess effects on a rare outcome such as cerebral palsy¹⁰. It is therefore quite possible that continuous EFM does confer important benefits on neonatal outcome but that these benefits have not been revealed by the trials undertaken to date. Indeed, there is other evidence, both from RCTs and cohort studies using surrogate end points, that would support the routine use of continuous EFM^{11,12}. Secondly, it is now widely appreciated that the visual interpretation of continuously generated signals from the fetal heart, however derived, is subject to shortcomings in interpretation. Review of cases with poor outcomes repeatedly demonstrates that abnormal fetal surveillance was misinterpreted and the resulting management inappropriate¹³. This likely arises because health care professionals have not been supported by comprehensive ongoing education and credentialling programs.

It is therefore not surprising that the apparent inconsistencies in the currently available evidence and apparent inadequacies of professional training in the use of intrapartum fetal surveillance have resulted in significant differences in practice¹⁴. However, the avoidance of adverse outcome from intrapartum acidotic/hypoxic insult remains the objective of intrapartum fetal surveillance. This objective should be the same at all hospitals providing maternity services, regardless of their size or the casemix of their population. How this objective is met may vary according to local resources and patient mix. It is more likely to be met, and met consistently, through the provision of clinical guidelines pertaining to the practice of intrapartum fetal surveillance, supported by continuing professional development in the application and interpretation of fetal monitoring.

3.1

INFORMATION AND COMMUNICATION

Women are encouraged to involve themselves in making informed decisions together with their obstetrician, general practitioner or midwife about intrapartum fetal surveillance, based on accurate information and consideration of their particular risk factors, if any.

Women should have the same level of general care and support, regardless of their decision about intrapartum fetal surveillance.

Case reviews have indicated that adverse perinatal outcomes are more likely to occur where there is lack of clear communication between clinicians caring for the individual woman and failure to use clear and consistent terminology^{9,15}.

Fetal heart rate monitoring is a highly complex task, often undertaken in a stressful working environment, which requires:

- a sound understanding of fetal physiological responses to hypoxia,
- good pattern recognition skills, and
- the ability to integrate this knowledge with each clinical situation.

A comprehensive education and credentialling program can best address these issues, enabling suitably credentialled health professionals to identify and minimise system errors, which contribute to poor fetal monitoring practice².

Guideline 1

Institutions undertaking intrapartum care have a responsibility to ensure that clinicians have an understanding of the pathophysiology of and are able to demonstrate competence in the interpretation of fetal surveillance options.

Grading of recommendation: C

Good Practice Note

The Guideline Development Group has assessed grading and classification systems for fetal heart rate interpretation. Without an adequate appreciation of the underlying pathophysiology such systems may mislead the user. The Development Group recommends that all clinicians should participate in an on-going education program in fetal surveillance and that if used, the inclusion of grading/classification systems in such programs should be in addition to, rather than instead of, an understanding of fundamental physiology.

Good Practice Note

Hospitals should encourage processes to facilitate regular communication between all health professionals providing intrapartum care, with regard to intrapartum fetal surveillance use and interpretation.

Guideline 2

During their pregnancy, women should be offered appropriate information on care during labour, including fetal surveillance.

Grading of recommendation: C

3.2

STANDARDISATION

Recent reports on strategies to reduce medical errors have highlighted the need to simplify systems and standardise procedures^{16,17}. With respect to undertaking CTG monitoring, there is no evidence that any particular paper speed is preferable, but it is recognised that the paper speed selected should be familiar to all users. The Guideline Development Group endorses the NICE recommendation for standard CTG settings^{3,18}.

Guideline 3

Settings on CTG machines should be standardised to enable a consistent approach to teaching and interpretation of EFM traces, particularly as many clinicians move between different institutions in Australia and New Zealand.

Until there is clear evidence that interpretation based on one paper speed is superior to the others, it is recommended that the most commonly used settings be adopted universally:

- paper speed of 1 centimetre (cm) per minute,
- sensitivity displays of 20 beats per minute (bpm) /cm, and
- fetal heart rate (FHR) range displays of 50 – 210 bpm.

Grading of recommendation: C

Good Practice Note

Date and time settings on CTG machines should be regularly validated.

CTGs should be labelled with the mother's name, date and hospital number.

Any intrapartum events that may affect the FHR should be noted contemporaneously in the maternal notes (not exclusively on the CTG), including date, time and signature (eg. vaginal examination, obtaining a fetal blood sample (FBS), insertion/siting of an epidural).

All patients undergoing continuous electronic fetal monitoring should be reviewed at least every 15 minutes by their care giver and a record made in the patient's medical record. Where there is a centralised monitoring system in place electronic signatures may be recorded.

The CTG should be reviewed, signed and a record made in the patient's medical record.

3.3.

WHICH MODALITY OF INTRAPARTUM FETAL SURVEILLANCE SHOULD BE USED?

There is universal acceptance that the fetus in labour is at particular risk from hypoxic damage¹⁹. Detection of fetal compromise enables appropriate and timely intervention, thereby reducing the incidence of adverse outcomes²⁰.

Guideline 4

Fetal surveillance in labour, in accordance with these guidelines, should be recommended to all women.

Grading of recommendation: C

3.3.1

INTRAPARTUM FETAL SURVEILLANCE IN THE PRESENCE OF RISK FACTORS FOR FETAL COMPROMISE

A number of antenatal and intrapartum risk factors have been shown to be associated with the development of neonatal encephalopathy, cerebral palsy or perinatal death (see Algorithm). In the presence of any of these risk factors, continuous EFM should be recommended²¹⁻²⁶.

Guideline 5

Continuous EFM should be recommended when risk factors for fetal compromise are detected antenatally, at the onset of labour, or if any intrapartum risk factor develops (see Algorithm)

Grading of recommendation: B

Good Practice Note

Where continuous EFM is required for the substantive part of labour, and if the EFM to date is considered reassuring, monitoring may be interrupted for short periods of up to 15 minutes to enable personal patient care.

3.3.2.

INTRAPARTUM FETAL SURVEILLANCE IN THE ABSENCE OF RISK FACTORS FOR FETAL COMPROMISE.

3.3.2.1

ADMISSION CTG

Admission CTG is a commonly used screening test, which aims to identify, on admission to the delivery unit, the fetus at increased risk of intrapartum hypoxia. The literature search revealed one recent large single centre RCT²⁹ of admission CTG versus intermittent Doppler auscultation of fetal heart, which found low risk women assigned to the Admission CTG group were more likely to have continuous intrapartum EFM, augmentation of labour, epidural analgesia and operative delivery. The investigators failed to demonstrate any statistically significant improvements in neonatal outcome.

However, the study was not of sufficient size to show a statistically significant difference in the incidence of metabolic acidosis or other measures of neonatal outcome including hypoxic ischaemic encephalopathy (HIE), between the groups^{10,30,31}. Nonetheless, the incidence of HIE was almost doubled in the Doppler group compared to the admission CTG group (0.8% vs 0.4%). In addition, cohort studies³² and case control series³³ have shown statistically significant benefit of admission CTG in predicting perinatal acidaemia, death³², term neonatal encephalopathy³³ or long-term neurological impairment³⁴. Thus, the Guideline Development Group believe that owing to the very low incidence of adverse outcome in low risk populations, randomised clinical trials have not been able to achieve sufficient numbers to realistically address a benefit of admission cardiotocography^{10,30,31}. Whether the admission CTG offers benefits or not remains uncertain. Therefore, the increased intervention rates shown

in the RCT²⁹ must be considered in the light of a possible, if not probable fetal benefit based on cohort and case control studies.

Guideline 6

The use of admission CTG should be individualised, weighing the probable increase in intervention rates against a potential fetal benefit in a small number of low risk pregnancies.

Grading of recommendation: A

Good Practice Note

An admission CTG may be helpful in pregnancies between 41⁰ – 41⁶ in the absence of any other recent assessment of fetal well-being.

3.3.2.2

INTERMITTENT AUSCULTATION OR CONTINUOUS ELECTRONIC FETAL MONITORING FOR LOW RISK WOMEN?

The Cochrane systematic review comparing RCTs of intermittent auscultation and continuous EFM for low risk women in labour states that "the only clinically significant benefit from the use of routine continuous EFM monitoring was in the reduction in neonatal seizures"⁷. This statement may distract from significant problems with the RCT evidence. A meta-analysis of the current RCT literature does not have sufficient power to adequately address whether there are clinically important reductions in serious perinatal morbidity or mortality. This is due to the low incidence of these serious adverse outcomes in low risk populations³⁰. For example, the Cochrane systematic review reports that there is a 33% reduction in perinatal mortality in the continuous EFM group, yet this does not reach statistical significance⁷. It is therefore possible that continuous EFM may confer some benefit.

On the other hand, continuous EFM undoubtedly increases caesarean section and operative vaginal delivery rates, although this increase can be minimised with the judicious use of fetal blood sampling⁷. Therefore, the increase in intervention rate with continuous EFM must be balanced against a possible but unproven benefit in a small number of low risk pregnancies. The decision regarding the use of continuous EFM or intermittent auscultation must be reached jointly by the pregnant woman and her clinicians. In this regard, it is of interest that in one study it was found that most women would want a caesarean section if the risk of fetal death or damage to their child exceeded one in 4500³⁵.

Guideline 7

Intermittent auscultation is recommended as a minimum for women who, at the onset of labour, are identified as having a low risk pregnancy and of being at low risk of developing fetal compromise.

Grading of recommendation: A.

3.3.2.3

THE PLACE OF INTERMITTENT ELECTRONIC FETAL MONITORING IN LOW RISK PREGNANCIES

The place for intermittent EFM, if any, is as yet to be clearly defined. Intermittent EFM in conjunction with intermittent auscultation is sometimes used as an alternative to intermittent auscultation or continuous EFM in low risk pregnancies.

The role of intermittent EFM has been addressed in one RCT, which indicated equivalent outcomes when compared to continuous EFM for low risk women¹⁴. There is currently insufficient evidence to either recommend or reject the use of intermittent EFM for a low risk pregnancy^{14,36}.

Guideline 8

The use of intermittent EFM should be individualised, weighing the probable increase in intervention rates against a possible fetal benefit in a small number of low risk pregnancies.

Grading of recommendation: B

3.3.2.4

METHOD OF INTERMITTENT AUSCULTATION (IA)

Intermittent auscultation is defined as the auscultation of the fetal heart using a hand held Doppler at regular intervals and for a pre-defined duration during labour. There is evidence that use of Pinard stethoscope is not as accurate as a hand held Doppler in determining fetal heart rate³⁷. In the opinion of the Guideline Development Group it is preferable that the Doppler signal be on speaker mode.

In relation to the frequency of auscultation, there have been no clinical studies comparing different frequencies to guide practice. The Dublin study¹¹ used auscultation at 15 minute intervals and some authorities have accepted this frequency as appropriate without further evidence. However, the observational evidence of experts is that 30 minutes is adequate, which is frequently the standard practice in Australia, New Zealand and many overseas countries^{8,36,37}. Accordingly, it is recommended that IA should be undertaken at least every 15 – 30 minutes in the first stage of labour. In the second stage of labour, when fetal oxygenation is prone to change more rapidly, intermittent auscultation should be at least every 5 minutes in the absence of active pushing and after each contraction with active pushing⁴⁸.

Guideline 9

Intermittent auscultation should be performed using Doppler ultrasound rather than a Pinard stethoscope.

Grading of recommendation: A

Good Practice Note

In the absence of any identifiable risk factor auscultation may occur as follows:

- at least every 15 – 30 minutes in the active phase of the first stage of labour
- at least every 5 minutes in the second stage of labour, in the absence of active pushing
- after each contraction with active pushing in the second stage of labour
- with Doppler signal on speaker mode

3.4

MANAGEMENT OF FETAL HEART RATE PATTERNS CONSIDERED SUGGESTIVE OF FETAL COMPROMISE

Fetal compromise in labour may be due to placental insufficiency, uterine hyperstimulation, maternal hypotension, cord compression and placental abruption. Identification and management of reversible abnormalities may prevent unnecessary intervention. However, if significant abnormalities persist, further evaluation or delivery is indicated^{7,21,38,39,40}.

Guideline 10

In clinical situations where the FHR pattern is considered abnormal, immediate management includes:

- initiation or maintenance of continuous EFM,
- identification of any reversible cause of the abnormality and initiation of appropriate action, and

- consideration of further fetal evaluation or delivery if a significant abnormality persists.

Grading of recommendation: A

Good Practice Note

Maternal repositioning may alleviate maternal hypotension or cord compression and restore a normal trace.

3.4.1

MANAGEMENT OF FETAL COMPROMISE IN ASSOCIATION WITH EXCESSIVE UTERINE ACTIVITY

Meta-analysis confirms the benefit of acute tocolysis when uterine hypertonus is associated with abnormal fetal heart rate patterns^{41,42}.

Guideline 11

Management of an abnormal FHR pattern, in association with excessive uterine activity includes:

- cessation of an oxytocin infusion, and
- consideration of the use of acute tocolysis

Grading of recommendation: A

Good Practice Note

All institutions should be familiar with and have a protocol for acute tocolysis. Regimens currently available include:

- intravenous or subcutaneous Terbutaline: 250 micrograms
- sublingual GTN spray: 400 micrograms
- intravenous Salbutamol: 100 micrograms

3.4.2

FETAL BLOOD SAMPLING

When fetal blood sampling (FBS) is performed, the scalp pH or lactate result should be interpreted taking into account any previous measurement, the rate of progress in labour and other clinical circumstances.

In situations where FBS is contraindicated or not possible, decisions regarding delivery should take into account the severity of the FHR abnormality and the clinical situation^{9, 43-47}.

Guideline 12

Delivery should be expedited where:

- fetal acidosis is proven,
- there is clear evidence of serious sustained fetal compromise (FBS should not be undertaken),
- CTG abnormalities are of a degree requiring further assessment, but FBS is contraindicated, clinically inappropriate or not feasible.

Grading of recommendation: B

Good Practice Note

If FBS is undertaken it is recommended that the woman be in the left-lateral position or lithotomy with a wedge in place. Arterial and venous cord blood should be collected at the time of delivery to confirm acid-base status.

Contraindications to FBS include:

- clear evidence on continuous EFM of serious, sustained fetal compromise
- fetal bleeding disorders (for example suspected fetal thrombocytopenia)
- gestational age <34 weeks
- face presentation
- maternal infection* (for example HIV, hepatitis viruses, herpes simplex virus and suspected intrauterine sepsis).

*Group B Streptococcus carrier status does not preclude FBS

GUIDELINE IMPLEMENTATION ISSUES

4.1

EDUCATION

It is acknowledged that these guidelines need to be complemented by a comprehensive and ongoing education and credentialling program for clinicians.

The Guideline Development Group is unaware of any externally validated comprehensive education/credentialling resource currently developed and available for Australia or New Zealand. Until such a resource is available, the best opportunity for educational courses may be through local tertiary hospitals.

4.2

MAINTENANCE OF COMPETENCE

Staff with responsibility for performing and interpreting continuous EFM should receive regular training with assessment to ensure maintenance of competence.

4.3

LOCAL IMPLEMENTATION

It is anticipated that these guidelines will provide the basis for hospital policies and procedures, which will take into account the constraints of local resources.

The implementation of these guidelines should be undertaken as part of the quality improvement program for each hospital.

Hospitals should review existing service provision against these guidelines. This review should identify the resources required to implement these guidelines.

Clinicians with responsibility for the intrapartum care of women should review their current practice in line with these guidelines.

Local evaluation of the use of EFM should include an audit of aspects of structure (for example, education and credentialling of staff, availability of FBS facilities), process (for example, FHR features, blood pH measurement etc), and outcomes (eg. maternal satisfaction, operative delivery rates, and neonatal outcomes).

4.4

RECOMMENDATIONS

The Guideline Development Group recommends to RANZOG that it:

- 1 seeks funding at State and Commonwealth levels to develop education and credentialling programs in fetal surveillance
- 2 develop a patient information pamphlet on intrapartum fetal surveillance to complement these guidelines

SUMMARY OF GUIDELINES

Guideline 1

Institutions undertaking intrapartum care have a responsibility to ensure that clinicians have an understanding of the pathophysiology of and are able to demonstrate competence in the interpretation of fetal surveillance options.

Grading of recommendation: C

Good Practice Note

The Guideline Development Group has assessed grading and classification systems for fetal heart rate interpretation. Without an adequate appreciation of the underlying pathophysiology such systems may mislead the user. The Development Group recommends that all clinicians should participate in an on-going education program in fetal surveillance and that if used, the inclusion of grading/classification systems in such programs should be in addition to, rather than instead of, an understanding of fundamental physiology.

Good Practice Note

Hospitals should encourage processes to facilitate regular communication between all health professionals providing intrapartum care, with regard to intrapartum fetal surveillance use and interpretation.

Guideline 2

During their pregnancy, women should be offered appropriate information on care during labour, including fetal surveillance.

Grading of recommendation: C

Guideline 3

Settings on CTG machines should be standardised to enable a consistent approach to teaching and interpretation of EFM traces, particularly as many clinicians move between

different institutions in Australia and New Zealand.

Until there is clear evidence that interpretation based on one paper speed is superior to the others, it is recommended that the most commonly used settings be adopted universally:

- paper speed of 1 centimetre (cm) per minute,
- sensitivity displays of 20 beats per minute (bpm) /cm, and
- FHR range displays of 50-210 bpm.

Grading of recommendation: C

Good Practice Note

Date and time settings on CTG machines should be regularly validated.

CTGs should be labelled with the mother's name, date and hospital number.

Any intrapartum events that may affect the FHR should be noted contemporaneously in the maternal notes (not exclusively on the CTG), including date, time and signature (eg. vaginal examination, obtaining a FBS, insertion/siting of an epidural).

All patients undergoing continuous EFM should be reviewed at least every 15 minutes by their care giver and a record made in the patient's medical record. Where there is a centralised monitoring system in place electronic signatures may be recorded.

The CTG should be reviewed, signed and a record made in the patient's medical record.

Guideline 4

Fetal surveillance in labour, in accordance with these Guidelines, should be recommended to all women.

Grading of recommendation: C

Guideline 5

Continuous EFM should be recommended when risk factors for fetal compromise are detected antenatally, at the onset of labour, or if any intrapartum risk factor develops (see – Algorithm)

Grading of recommendation: B

Good Practice Note

Where continuous EFM is required for the substantive part of labour, and if the EFM to date is considered reassuring, monitoring may be interrupted for short periods of up to 15 minutes to enable personal patient care

Guideline 6

The use of Admission CTG should be individualised, weighing the probable increase in intervention rates against a potential fetal benefit in a small number of low risk pregnancies.

Grading of recommendation: A

Good Practice Note

An Admission CTG may be helpful in pregnancies between 41⁰ – 41⁶ in the absence of any other recent assessment of fetal well-being.

Guideline 7

Intermittent auscultation is recommended as a minimum for women who, at the onset of labour, are identified as having a low risk pregnancy and of being at low risk of developing fetal compromise

Grading of recommendation: A

Guideline 8

The use of intermittent EFM should be individualised, weighing the probable increase in intervention rates against a possible fetal benefit in a small number of low risk pregnancies.

Grading of recommendation: B

Guideline 9

Intermittent Auscultation should be performed using Doppler ultrasound rather than a Pinard stethoscope.

Grading of recommendation: A

Good Practice Note

In the absence of any identifiable risk factor Auscultation may occur as follows:

- at least every 15 - 30 minutes in the active phase of the first stage of labour
- at least every 5 minutes in the second stage of labour, in the absence of active pushing
- after each contraction with active pushing in the second stage of labour
- with Doppler signal on speaker mode

Guideline 10

In clinical situations where the FHR pattern is considered abnormal, immediate management includes:

- initiation or maintenance of continuous EFM,
- identification of any reversible cause of the abnormality and initiation of appropriate action, and
- consideration of further fetal evaluation or delivery if a significant abnormality persists.

Grading of recommendation: A

Good Practice Note

Maternal repositioning may alleviate maternal hypotension or cord compression and restore a normal trace.

Guideline 11

Management of an abnormal FHR pattern, in association with excessive uterine activity includes:

- cessation of an oxytocin infusion, and
- consideration of the use of acute tocolysis

Grading of recommendation: A

Good Practice Note

All institutions should be familiar with and have a protocol for acute tocolysis. Regimens currently available include:

- intravenous or subcutaneous Terbutaline: 250 micrograms
- sublingual GTN spray: 400 micrograms
- intravenous Salbutamol: 100 micrograms

Guideline 12

Delivery should be expedited where:

- fetal acidosis is proven
- there is clear evidence of serious sustained fetal compromise (FBS should not be undertaken)
- CTG abnormalities are of a degree requiring further assessment, but FBS is contraindicated, clinically inappropriate or not feasible

Grading of recommendation: B

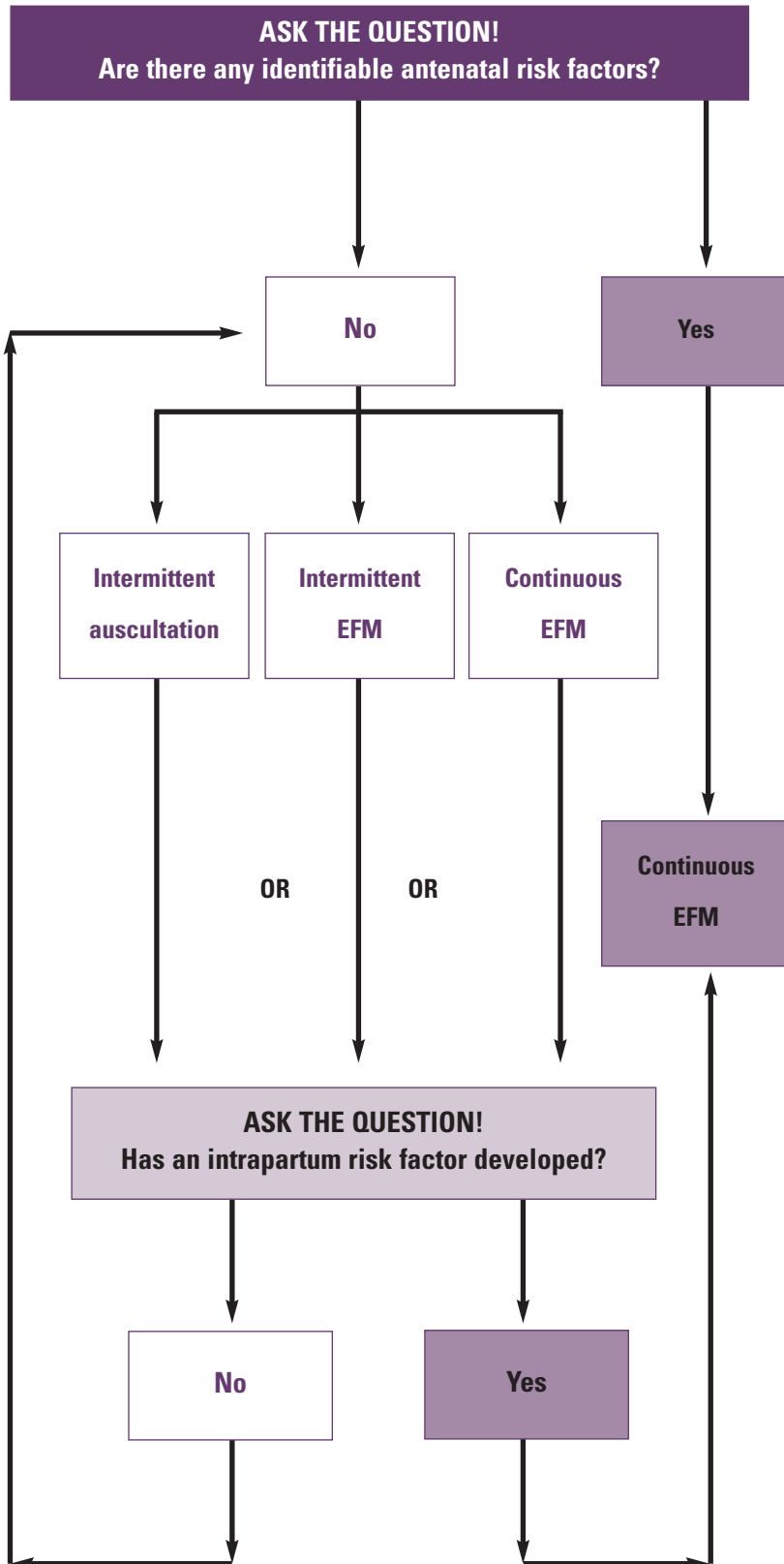
Good Practice Note

If FBS is undertaken it is recommended that the woman be in the left-lateral position or lithotomy with a wedge in place. Arterial and venous cord blood should be collected at the time of delivery to confirm acid-base status.

Contraindications to FBS include:

- clear evidence on continuous EFM of serious, sustained fetal compromise
- fetal bleeding disorders (for example suspected fetal thrombocytopaenia)
- gestational age <34 weeks
- face presentation
- maternal infection* (for example HIV, hepatitis viruses, herpes simplex virus and suspected intrauterine sepsis).

ALGORITHM



ANTENATAL RISK FACTORS

Evidence of fetal compromise, including:

- Abnormal Doppler artery velocimetry
- Abnormal antenatal CTG
- Suspected intrauterine growth restriction
- Oligohydramnios
- Prolonged pregnancy >42^{0,27}
- Multiple pregnancy^{51,52}
- Breech presentation⁴⁹
- Antepartum haemorrhage (significant)
- Prolonged rupture of membranes (>24 hours)
- Known fetal abnormality which requires monitoring
- Prior uterine scar/caesarean section
- Pre-eclampsia (current pregnancy)
- Diabetes on insulin or poorly controlled
- Other medical conditions which constitute a significant risk of fetal compromise

INTRAPARTUM RISK FACTORS

- Induction of labour with prostaglandin/syntocinon²⁸
- Abnormal admission CTG (if performed)
- Oxytocin augmentation²⁸
- Epidural analgesia⁵⁰
- Excessive vaginal bleeding in labour
- Maternal pyrexia >38⁰C
- Meconium or blood-stained liquor^{24,25,53}
- Oligohydramnios at amniotomy
- Active first stage of labour >12 hours (ie regular uterine activity, cervix >/=4cm dilated)
- Active second stage (ie pushing) >1 hour⁴⁸
- Abnormal auscultation

CLASSIFICATION OF LEVELS OF EVIDENCE

The definitions of the types of evidence used in these guidelines have been adapted by the Guideline Development Group from the National Health and Medical Research Council (NHMRC)⁶.

LEVELS OF EVIDENCE

- I** Evidence obtained from a systematic review of all relevant randomised controlled trials.
- II** Evidence obtained from at least one properly-designed randomised controlled trial.
- III-1** Evidence obtained from well-designed pseudorandomised controlled trials (alternate allocation or some other method).
- III-2** Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case-control studies, or interrupted time series with a control group.
- III-3** Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group.
- IV** Evidence obtained from case series, either post-test or pre-test/post test.

Note:

The Guideline Development Group agreed that evidence gathered from expert opinion should be considered as level IV.

The definitions of the grades of recommendation used in these guidelines have been adapted from 'The Use of Electronic Fetal Monitoring' by the Royal College of Obstetricians and Gynaecologists (RCOG) NICE guidelines.

Grading of Recommendation*

- A** Requires adequate randomised controlled trial evidence as part of a body of literature of overall good quality and consistency addressing the specific recommendation (evidence levels Ia, Ib).
- B** Requires the availability of well-conducted clinical studies on the topic of the recommendation (evidence levels IIa, IIb, III).
- C** Requires evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates an absence of directly applicable clinical studies of good quality (evidence level IV).

Good Practice Notes

Recommended good practice based on the clinical experience of the Guideline Development Group.

REVIEW DATE

It is recommended that these guidelines be updated in eighteen months following a review of feedback from clinicians.

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- Appendix A** Consultation process
- Appendix B** Clinical practice guidelines flow chart
- Appendix C** Project management
- Appendix D** Descriptions of fetal heart rate patterns
- Appendix E** Abbreviations

APPENDIX A

CONSULTATION PROCESS

METHODOLOGY

1 Purpose of consultation

The purpose of this consultation was to obtain comment from those involved in maternity services as providers (obstetricians and midwives) and as users (consumer groups) on draft guidelines, good practice notes and clinical practice algorithms for intrapartum fetal surveillance. For each guideline, good practice note and clinical practice algorithm, comment was invited on the issues of:

- **Clarity,**
- **Feasibility,**
- **Evidence base,**
- **Support,**
- **Implementation, and**
- **Additional comments.**

2 Who was consulted?

The RANZCOG Guideline Development Group provided names of 64 representatives of various special interest groups to be consulted including RACGP, ACCRM and ACMI, to the Royal Women's Hospital (RWH) Project Team.

3 Process of consultation

An initial mailout was conducted on the 15th November 2001. Two subsequent mailouts were requested to include greater representation from other states.

Those invited to comment were provided with a covering letter, a copy of the Draft Clinical Guidelines document, response framework and a prepaid return addressed envelope.

Telephone reminders to all (with the exception of New Zealand participants) regarding the mailouts were undertaken on the 20th December 2001 and 7th January 2002.

4 Who responded?

Of the sixty-six invited to comment, forty-three responded by the 11th January.

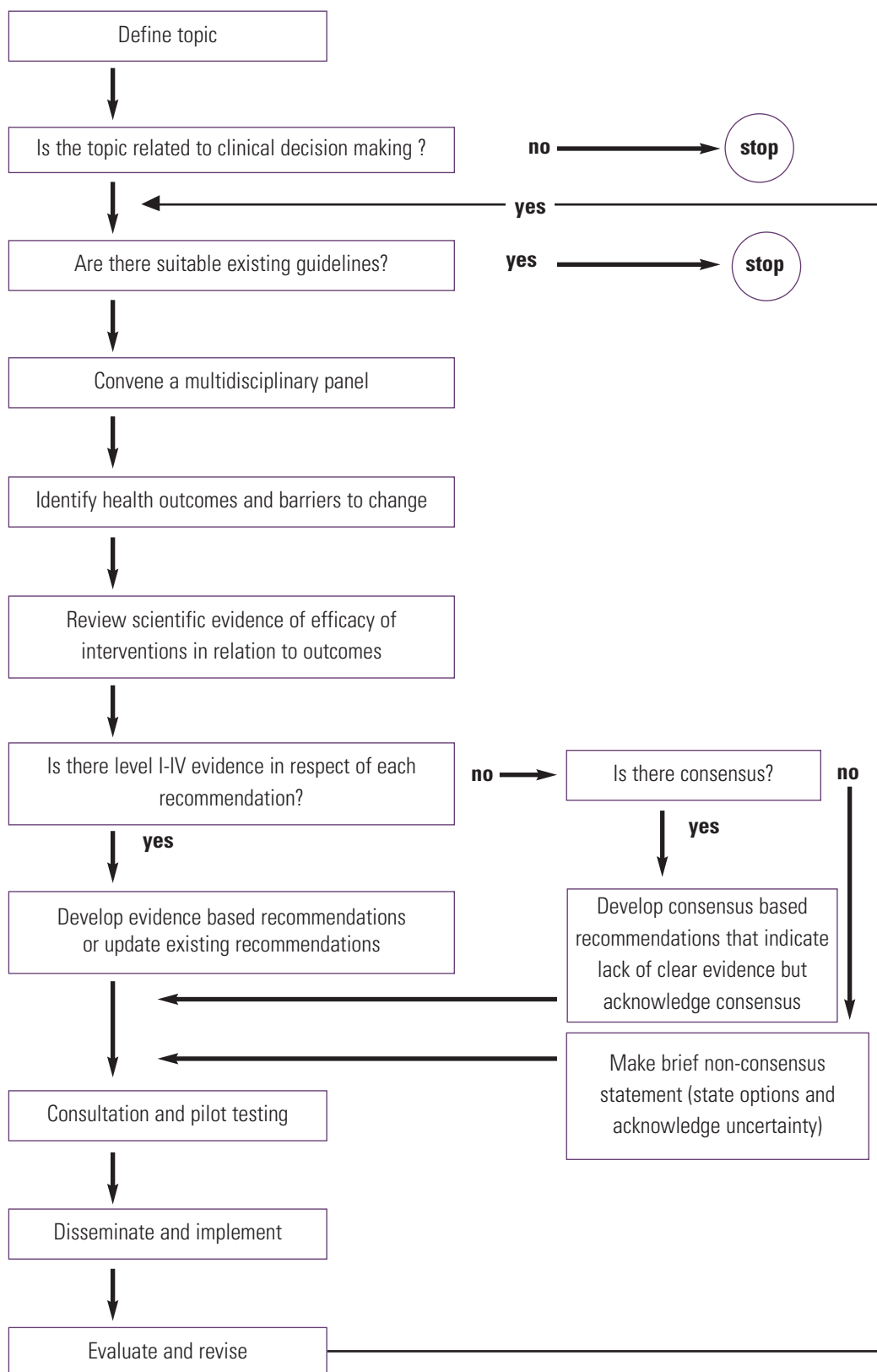
State	Total distributed	Total returned
Victoria	28	19
NSW	9	5
WA	4	2
Tasmania	1	1
SA	5	3
Queensland	10	8
ACT	2	1
New Zealand	7	4

Key personnel from special interest groups were invited to comment.

	Total distributed	Total returned
Obstetricians	48	35
GPs	11	4
Midwives	5	4
Consumer Groups	2	0

APPENDIX B

CLINICAL PRACTICE GUIDELINES FLOW CHART



APPENDIX C

PROJECT MANAGEMENT

1.

GUIDELINE DEVELOPMENT GROUP

The Guideline Development Group is a multiprofessional team brought together on a project basis, to consider the evidence and develop the Guidelines.

Dr Miriam O'Connor

(Chair to May 2002)
Director of Delivery Suites
Royal Women's Hospital

Associate Professor E Wallace

(Chair May 2002)
Consultant
Maternal Fetal Medicine
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2.

PROJECT TEAM

Dr S P Higgins

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Mrs L Rigg

Project Officer
Royal Women's Hospital

Associate Professor J F King

Consultant in Perinatal Epidemiology
Royal Women's Hospital

Ms Hilary Russell

Manager
Royal Women's Hospital

3.

REFERENCE GROUP

Members of the Reference Group were invited to attend a meeting at College House on 8th February 2002. The Reference Group were further consulted with the final draft in July 2002.

Dr John Campbell

Dr Andrew Child

Dr Brian Peat

Dr David Morris

Dr Ian Pettigrew

Prof David Ellwood

Dr Fung Yee Chan

Dr Peter Kirker

President RANZCOG

President Elect

Obstetrician

Director of Obstetrics

Obstetrician

Chair of MFM Committee

MFM

General Practitioner

APPENDIX D

DESCRIPTION OF FETAL HEART RATE PATTERNS*

Term	Description
Baseline fetal heart rate	The mean level of the FHR when this is stable, excluding accelerations and decelerations. It is determined over a time period of 5 or 10 minutes and expressed in bpm. Preterm fetuses tend to have values towards the upper end of this range. A trend to a progressive rise in the baseline is important as well as the absolute values
Normal baseline	FHR 110 –160 bpm
Bradycardia ^a	<110 bpm
Tachycardia ^a	>160 bpm
	^a These ranges of baseline are not associated with hypoxia in the presence of accelerations or with normal baseline variability and no decelerations
Baseline variability	The minor fluctuations in baseline FHR occurring at three to five cycles per minute. It is measured by estimating the difference in beats per minute between the highest peak and lowest trough of fluctuation in a one-minute segment of the trace
Normal baseline variability	5 – 25 bpm between contractions
Reduced baseline variability	3 – 5 bpm
Absent baseline variability	< 3 bpm
Increased baseline variability	> 25 bpm
Sinusoidal	A regular oscillation of the baseline long-term variability resembling a sine wave. This smooth, undulating pattern, lasting at least 10 minutes, has a relatively fixed period of 3 – 5 cycles per minute and an amplitude of 5 – 15 bpm above and below the baseline. Baseline variability is absent
Accelerations	Transient increases in FHR of 15 bpm or more above the baseline and lasting 15 seconds. The significance of no accelerations on an otherwise normal CTG is unclear
Decelerations	Transient episodes of slowing of FHR below the baseline conforming to one of the patterns below:
Early decelerations	Uniform, repetitive, periodic decrease of FHR with slow onset early in the contraction and slow return to baseline at the end of the contraction.
Variable decelerations	Intermittent periodic slowing of FHR with rapid onset and recovery. Time relationships with contraction cycle may be variable but most commonly occur simultaneously with contractions.

* Modified from the RCOG Evidence-based clinical guideline Number 8, May 2002, p11.

Variable decelerations continued

The following additional components increase the likelihood of fetal hypoxia:

- i rise in baseline rate
- ii slow return to baseline FHR after the end of the contraction
- iii large amplitude and/or long duration

Late decelerations

Uniform, repetitive, periodic slowing of FHR with onset mid to end of the contraction and nadir more than 20 seconds after the peak of the contraction and ending after the contraction. In the presence of a non-accelerative trace with baseline variability <5 bpm, the definition would include decelerations <15 bpm

APPENDIX E

ABBREVIATIONS

bpm	Beats per minute
BP	Blood pressure
CTG	Cardiotocograph(y)
EFM	Electronic fetal monitoring
FBS	Fetal blood sampling
FHR	Fetal heart rate
FSE	Fetal scalp electrode
IA	Intermittent auscultation
RCT	Randomised controlled trial
VE	Vaginal examination

