Author's response to reviews

Title: Intelligent Structured Intermittent Auscultation (ISIA): Evaluation of a decision-making framework for fetal monitoring of low-risk women

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Dear Executive Editor BMC Pregnancy and Childbirth,


Thank you for the comments and feedback from the peer reviewers of our manuscript. We have revised the manuscript accordingly. Below are details of the revisions made in response to the peer reviewers concerns. The responses are structured in four sections - Major Compulsory Revisions, Minor Essential Revisions, Discretionary Revisions, and Additional Editorial Requests. The peer review comments are in black and our responses are in blue.

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We look forward to hearing from you.

Yours sincerely,

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Response the Peer Reviewer Feedback

MS: 6272343981198379 - Intelligent Structured Intermittent Auscultation (ISIA): Evaluation of a decision-making framework for fetal monitoring of low-risk women, by Robyn M Maude, Joan P Skinner and Maralyn J Foureur

Section One: Major Compulsory Revisions

Reviewer One

1. Throughout this paper there is reference to CTG use during labour, the admission CTG and then simply the CTG; this makes it confusing for the reader to determine what type of monitoring is being evaluated and/or discussed at that time. It would be important, for clarity, that you are explicit on what exactly is being evaluated (e.g. many women may have CTG on admission but then have IA during labour or vice-versa); for example, on page 3, 2nd paragraph, line 1 - you refer to monitoring during labour, but then in line 3 you refer to the admission CTG as if was the same thing; similarly on page 8, you state that there was a relative increase of 12% in the use of IA for eligible women, and then in the discussion, page 10, 3rd paragraph you state that fewer low-risk women were exposed to admission CTG and this finding sits alongside a relative increase of 12% in IA use; but is this 12% not related to monitoring by IA during labour or is it referring to IA on admission with signs of labour? – So the question is, is this study about the effectiveness of the intervention on IA use on admission and during labour (together) or IA either on admission or during labour separately?

You have to look hard to find this and it is not really clear – although page 7 refers to challenging decisions for non-clinically indicated admission CTG?

Perhaps if you defined the term admission CTG, defined continuous monitoring during labour (to differentiate) and then consistently used the terms in the paper, or in your setting is monitoring during labour a continuum of admission CTG, and if so, then this need to be made clear (as they are differentiated in other units internationally).

Explanation: I have gone through the manuscript to clarify the distinction between admission CTG and continuous CTG during labour – see example below from page 3, 2nd paragraph, lines 1 and 3

The use of the CTG monitoring, for assessment and screening on admission to the maternity unit (admission CTG) and continuously during labour, has increased in the United States and Canada from 62% to around 93% in the past two decades [1, 2]. The increased use of admission CTG and continuous CTG monitoring for low-risk women in the absence of clinical indications is of particular concern as it has been shown to be detrimental [3]. Systematic reviews of intermittent auscultation versus admission CTG have found increased interventions such as epidural analgesia, continuous CTG, fetal blood sampling, and an increased risk of caesarean section and instrumental delivery in women receiving admission CTG without consequent improvement in neonatal outcomes such as the five minute Apgar score [4, 5]. The admission CTG has been shown to have poor predictive value of adverse fetal outcomes, a high rate of error, falsely identifying ‘fetal distress’, and offers no benefit in low-risk women [5].
As well I have provided the following definitions of FHR modality - Now included in the section under medical records review on page 5

Categorisation of monitoring type for data collection purposes were based on the study reported by Cheyne and colleagues (2003) where continuous CTG was defined as use of the CTG machine for fetal heart monitoring for 75% or more of the labour. For this study, the category electronic fetal monitoring (EFM) comprised all fetal heart monitoring performed with the CTG machine i.e. continuous CTG, intermittent CTG (short strips of continuous fetal heart monitoring [for about 30 minutes] throughout active labour) and where a mixture of continuous or intermittent CTG were used throughout the labour care. Admission CTG was defined as approximately 20 – 30 minutes of CTG monitoring conducted at the time of admission. Intermittent auscultation (IA) was defined as listening to and counting the fetal heart rate using a Pinard stethoscope or a hand-held Doppler device following a protocol for frequency, timing and duration.

I have made the following revision on page 8
Following the intervention, there was a relative change of 1.12 in the use of IA for low-risk women for ongoing fetal heart monitoring during labour. …and to page 9 (discussion – page 10 in the comments above)

Decision-making around choice of ongoing fetal heart monitoring during labour is the end result of a thorough assessment at admission to the maternity unit or at first contact in labour. The ISIA admission assessment framework provided an alternative means of assessing maternal and fetal well-being at this first contact point that negated the unnecessary application of the admission CTG.

2. Page 8 – the results for the total sample (pre and post intervention) of 615 are provided; this does not make sense in the context of this evaluation; rather these should be separated out; i.e. the number, and proportion, of women who received IA, CTG monitoring (is this during labour and should there be a separate number/proportion for admission CTG?), and women receiving no monitoring separately for pre-intervention and post-intervention.

Explanation: The column headings for Table 1 and Table 2 have been amended and the results have been separated into pre- and post-intervention with reference to Figure 1 and Figure 2. Findings for admission CTG are addressed under the sub-title Admission criteria on page 8.

In the pre-intervention phase, a total of 511 records were reviewed, of which 324 (63.4%) were for low-risk women. Main exclusion criteria were previous caesarean section, hypertension, pre-eclampsia and other medical conditions, suspected intra uterine growth restriction (IUGR) and post-term pregnancy. Of these 324 low-risk women, 157 (48.5%) received IA for ongoing fetal heart monitoring during active labour, whilst 130 (40.1%) received continuous CTG monitoring for ongoing fetal heart monitoring during active labour. Thirty seven (11.4%) of low risk women had no ongoing fetal heart monitoring during active labour mainly due to giving birth soon after admission (Figure 1). A total of 422 medical records were reviewed in the post-intervention phase, of which 291
(69%) were for low risk women. In this phase 158 (54.3%) low risk women received IA for ongoing fetal heart monitoring during active labour and 107 (36.8%) low risk women received continuous CTG monitoring for ongoing fetal heart monitoring during active labour. Twenty six 8.9%) low risk women had no ongoing monitoring due to giving birth soon after admission (Figure 2).

Admission CTG and Admission Assessment Criteria. In this group of women, the risk of receiving an admission CTG was significantly reduced following the intervention (RR 0.75, 95% CI, 0.60 – 0.95, p = 0.016). Following the intervention, there was a risk benefit for all women of increased recordings of maternal pulse in conjunction with fetal heart monitoring during admission assessment (IA group - RR 4.54, 95 % CI, 2.06 – 9.98, p=0.0002; and CTG group - RR 4.10, 95 % CI, 1.94 – 8.64, p=0.0002). There was an increase in documenting fetal heart rate during a fetal movement (Fisher’s Exact p=.015) in the post-intervention phase. However, whilst there was a small increase in the recording of fetal movements on admission, this result failed to reach statistical significance (Table 2).

Reviewer Two

1. Phase 2 Intervention. The last line of this section refers to feedback from local, national and international midwifery exerts. It would be useful to provide more detail about how this was achieved.

Explanation: Further detail of the discussions with local, national and international midwives is now provided on page 6

The ISIA framework was influenced by a critical synthesis of research evidence, clinical guidelines, and with feedback during 2007 from midwifery experts on three yahoo discussion groups of which we are members (nzmidwives@yahoogroups.com; Midwifery-Reasearch@jiscmail.ac.uk and Normalbirth-Research@Jiscmail.ac.uk). Discussion was triggered by asking midwives their opinions around the frequency, timing and duration of IA. There were 55 postings from 31 midwives from New Zealand, Australia, UK, USA, and Europe with discussions around barriers to the use of IA in practice. These included the role of evidence/guidelines, staffing levels impacting on midwives’ ability to perform IA, EFM used as a defensive practice, and questioning the accuracy/variability of IA. There was widespread agreement for using normal physiology as the starting point for understanding and interpreting IA along with the use of fetal movements in conjunction with IA as an indicator of fetal well-being. The midwives highlighted a need for a tool or strategy that contained information to assist clinicians develop an understanding of the physiology behind FHR monitoring and to facilitate the successful teaching and implementation of IA in practice.

ISIA was developed by the authors as an algorithm for the midwife or other health care professional use at the admission assessment, or first contact in labour, to determine what heart rate monitoring approach is suitable for the individual woman for ongoing fetal heart monitoring in active labour (see Figure 3 and Figure 4).

2. The first paragraphs of the discussion repeat the study findings. The
discussion does not situate the study findings within the context of other relevant national or international literature.

Thank you, we have made changes to the discussion to incorporate relevant national and international literature.

Discussion

This study addressed the clinical problem of exposing low risk birthing women to the unnecessary use of CTG monitoring, both on admission to hospital and continuously during labour. The choice and use of IA for fetal heart monitoring has been largely displaced by the ubiquitous availability of technology in the modern birthing room, together with the increased use of epidural anaesthesia and synthetic oxytocin in ‘normal’ birthing women [27]. Arguably, the displacement of IA has implications midwifery practice and the safety of mothers and babies since CTG monitoring increases the likelihood of operative birth with increases in maternal and neonatal morbidity. As a consequence we proposed that IA should be re-established as a fundamental midwifery skill and offered to low risk women as a safe and effective alternative to CTG monitoring. Few robust IA guidelines with established validity and reliability exist to guide the practice of IA [1, 28]. Therefore the ISIA framework, developed for this purpose, was evaluated in this pre-post intervention study.

The ISIA decision-making framework for fetal heart monitoring, overtly informed by an understanding of fetal physiology and research evidence, is a knowledge translation innovation developed to guide maternity care providers in their decision making regarding fetal heart monitoring choice, clinical practice, and interpretation. The new ISIA framework has two parts: “Admission Assessment or First Contact in Labour” and “Ongoing IA in Active Labour”. The findings are discussed in the context of these two parts of the ISIA framework.

ISIA for Admission Assessment or First Contact in Labour

Labour is one part of the whole childbirth continuum from conception to discharge at six weeks [6] and risk factors may develop at any stage throughout pregnancy. A thorough examination and assessment of the woman on admission to hospital or at the first contact in labour (which could be at home) will help midwives to determine whether there are risk factors, either previously present or recently developed, that signal potential for fetal compromise during labour. This determination of the woman’s risk status represents a key decision point in the choice of fetal heart monitoring modality [29].

In the hospital setting, it is at this admission assessment that some maternity care providers believe an admission CTG is justified; and indeed many midwives and doctors still recommend and use this technology despite a lack of evidence supporting its use for low-risk women [4, 5]. For some women, the admission CTG becomes continuous because staff are too busy to take off the monitor or there are not enough midwives to provide one-to-one care and the CTG becomes a ‘baby-sitter’ [29].

The baseline findings from this study confirmed that low risk women were unnecessarily exposed to CTG monitoring as reported by other authors [29-33] with over half of all women receiving an admission CTG. However, following the
intervention, the risk of receiving an admission CTG was significantly reduced. The ISIA framework provided guidance to midwives’ decision-making.

ISIA in Active Labour

The second key decision point associated with choice of fetal heart monitoring modality occurs after the initial assessment has been completed and the woman’s risk status determined [29]. The collective findings from the assessment are discussed with the woman and a decision about FHR monitoring modality can be made and documented on the care plan. In the absence of any risk factors and when all other parameters of the ISIA admission assessment are normal, it is appropriate to offer and recommend intermittent auscultation for ongoing FHR monitoring during labour, and a statement to this effect is entered in the woman’s medical record [22].

A change in midwives’ practice was evidenced by a relative change 12% in the use of IA for ongoing fetal heart monitoring during labour following the intervention. This increased use of IA complies with evidence-based guidelines for fetal monitoring for low risk women [11 - 19]. Other important changes following the intervention were demonstrated in the recording of maternal clinical findings associated with high quality fetal heart monitoring. These included the recording of maternal pulse rate, contraction frequency, strength and duration and writing the fetal heart rate as a single number as opposed to a range of numbers.

With IA and continuous CTG monitoring, it is vital to differentiate between maternal heart rate and fetal heart rate [1, 6, 34]. Serious adverse outcomes have been reported when this differentiation has not been identified. This is especially relevant in the case of increased fetal activity, poor placement of the CTG transducer, and maternal tachycardia due to infection or medications such as those used to prevent pre-term labour, or during second stage of labour. There are increasing reports of CTG machines recording what appears to be a ‘normal’ fetal heart rate with the subsequent birth of a severely compromised or stillborn baby [6, 34]. In this study the ISIA framework and the teaching associated with its use during labour appears to have influenced midwives’ understanding and practice around this very important aspect of care and fetal monitoring.

Simultaneous auscultation of the fetal heart and palpation of uterine contractions are necessary to evaluate fetal well-being [1, 6]. Whilst there was improvement in the documentation of contraction frequency, timing and duration following the intervention, there is still room for improvement in documentation of uterine tenderness, irritability and resting tone between contractions. Midwives were more likely to auscultate the fetal heart every 15 to 30 minutes, as required by the hospital protocol following the intervention however, there was no change in the way in which fetal movements were recorded or described during labour. There is a dearth of research investigating a link between fetal movement and fetal well-being during labour, which may have contributed to it not being incorporated into practice at this stage. Studies of antenatal fetal movement patterns [35-37] might potentially be extrapolated to labour care, but this needs further investigation.
One of the criticisms of IA as a monitoring modality is that fetal heart rate variability is unable to be ascertained simply by listening and counting. Determination of baseline variability is associated with continuous CTG monitoring and fluctuations of 15 beats per minute or more from the baseline rate are considered a marker of fetal well-being. CTG monitoring is the recommended monitoring modality for women with complicated pregnancies associated with a higher risk of fetal compromise. For well women with uncomplicated pregnancies and well grown fetuses, the likelihood of fetal compromise is less, therefore determination of fetal heart rate variability is not required. The relevance of baseline variability to this study is in the way in which midwives document the fetal heart rate (FHR) when using IA. As IA is a listening and counting method (counted over one minute) the FHR should be recorded as a single number, such as when the maternal pulse is documented. Many midwives, especially those using a hand-held Doppler device with a digital display of numbers, document the FHR as a range of numbers such as FHR 130-146, in the mistaken belief this demonstrates baseline variability (and by default, a higher quality of FHR monitoring).

The ISIA framework encourages midwives to make decisions about fetal well-being by assessing for fetal heart rate increases associated with fetal movements and following contractions. An increase in the FHR above the pre-determined average FHR at these times provides reassurance of fetal well-being. Midwives are encouraged to use the findings from their assessment using ISIA rather than converting what they understand from CTG monitoring to the interpretation of IA findings. ISIA encourages the midwife to document the FHR as a single number. Following the intervention the medical records demonstrated a reduced risk of not recording the auscultated FHR as a single number.

Limitations

This research was conducted in only one New Zealand maternity unit, and as such may not be generalisable to other maternity units. However, the idea of fittingness [38] may be more appropriate to consider. Fittingness is described as the findings ‘fitting’ the context outside the current study site or when the reader/practitioner considers the findings as applicable and meaningful in terms of their own experience [39].

The use of the clinical record as the main source of data for this study has potential limitations such as availability, accessibility, adequacy, veracity and completeness. However, medical record review is a widely used method of data collection in health disciplines for the assessment of knowledge use and quality improvement in particular. Most records were available and accessible. Data extraction was undertaken by a specially trained midwife audit team to ensure veracity and completeness of the data. Length of follow up may be an issue since the post intervention audit was conducted three - six months after the delivery of the intervention. A longer follow up would have revealed long-term sustainability of practice change; although the final data was collected at six months after the intervention. A time series analysis would reveal any decay in the practice over time. This would need to be addressed in any future study of this intervention.
Conclusion

The ISIA decision-making framework incorporates clinical skills and indicators that include listening to the fetal heart, into one framework. The framework establishes the importance of all elements of care that make up ISIA, which is its point of difference from usual practice. Even though IA has been around a long time, ISIA is asking something new of practitioners in relation to auscultating the fetal heart.

The ISIA informed decision-making framework supported midwives to make changes to their practice, with a higher adherence to the use of intermittent auscultation as one component of the admission assessment, and for ongoing fetal heart monitoring in active labour. ISIA has provided this group of midwives with a means of systematically assessing each woman and fetus in labour and to document their findings during the assessment in a manner that demonstrates their critical thinking and clinical reasoning.

Most fetal surveillance guidelines simply provide a protocol for intermittent auscultation outlining the frequency, timing and duration of intermittent auscultation. We recommend that fetal monitoring guidelines be amended to include a more comprehensive description of IA using the ISIA framework for admission assessment and ongoing FHR monitoring during labour.

3. Page 11 states “in eligible women who received CTG monitoring instead of IA, the caesarean section rate was higher”. This is an interesting point. Was this difference statistically significant? Did the authors test this comparison? Please clarify this point.

Explanation: Thank you. There was a statistically significant difference and this is now noted on page 9 under the results section.

There was a statistically significant difference in the rate of caesarean section across the combined pre- and post-intervention samples between women monitored with IA compared to women monitored with continuous CTG (RR 0.29, 95% CI, 0.17 – 0.48, p=<0.0001).

4. Conclusion. I am not sure that the data supports the conclusion that the ISIA informed decision making framework supported midwives to make changes to the culture of the organisation. This statement needs better support.

Explanation: Reference to changes to the culture of the organisation has been removed. This is a major finding from the qualitative part of the study that are being prepared for further publications from this study.

5. The conclusion draws in some interesting qualitative material for example; “in both formal and informal feedback, midwives stated that exposure to the education session and ISIA framework challenged them to think differently…."

The methods section describes a pre intervention focus group but it is not clear from where the formal feedback is derived post intervention. This new piece of information would also be better placed in the findings section of the paper.

Explanation: The reference to focus groups has been removed from the methods section as per the comments above. The following paragraph has been removed from the conclusion
The ISIA framework supported midwives’ verbal and written communication. Importantly, in both formal and informal feedback, midwives stated that exposure to the education session and ISIA framework challenged them to think differently about fetal monitoring practice, and helped them to gain new confidence to return to what they knew about fetal heart monitoring in the pre-CTG days. In other words, they felt empowered to trust their fundamental midwifery skills and knowledge. Their involvement in the study and education has encouraged them to reflect on their practice, to shift their thinking and to take a stronger position on changing the culture within the unit.

6. Table 1. Last lines comparing self-employed and hospital midwife. I am not sure from which comparison the p value is derived. It is comparing the self-employed midwife results pre and post intervention or the employed midwife pre and post intervention or it is comparing the employed and self-employed midwife? Could this be clarified?

Explanation: It is has now been removed.

7. Table 2. “Maternal pulse noted” first column seems to have an error with the proportions (44.5% yes and 95.5% no)

Explanation: Corrected to 4.5% thank you

8. Table 3. “Duration” there is an error in the “no” row where 989.1 should read (89.1) 9. Table 3. “Uterine activity duration”. Correct error in bracket

Explanation: Thank you – ‘No’ rows are now removed. Bracket corrected in uterine activity duration in table 3.

Section Two: Minor Essential Revisions

Reviewer One

1. Page 3; regarding - the use of admission CTG has been identified as a dangerous practice; can you say why? This is a strong statement and readers may need a little bit more information as to why it is described as dangerous

Explanation: The word dangerous has been replaced with detrimental. The follow-on sentence outlines the reasons why admission CTG is detrimental taken from the literature review

The increased use of admission CTG and continuous CTG monitoring for low-risk women in the absence of clinical indications is of particular concern as it has been shown to be detrimental [3]. Interventions such as epidural analgesia, continuous CTG monitoring, fetal blood sampling, and an increased risk of caesarean section and instrumental delivery in women receiving admission CTG without consequent improvement in neonatal outcomes such as the five minute Apgar score were found in systematic reviews of intermittent auscultation versus admission CTG [4, 5]. The admission CTG has been shown to have poor predictive value of adverse fetal outcomes, a high rate of error, falsely identifying ‘fetal distress’, and offers no benefit in low-risk women [5].

2. Page 3, reference [5] at end of 2nd paragraph: is that correct? It is reference 4, Blix et al. that appear to evaluate the predictive ability of the admission CTG and not study 5?
Explanation: You are correct, thank you. The reference has been changed to [4]


Explanation: I have strengthened the argument by including further references. The reference ‘Smith et al (2012) Professional views on fetal monitoring during labour: a systematic review and thematic analysis. BMC Pregnancy and Childbirth 2012, 12:166’ is included now, however their findings will be better used to strengthen the arguments in the manuscript of the qualitative findings of this current study which is under development.

For midwives, a number of factors influence their decision to use continuous CTG monitoring for low risk women. These include a lack of knowledge or skills with intermittent auscultation [Atif et al, 2006], being reassured by the sound of the fetal heart in the background [Smith et al, 2012], and the fear of medico-legal consequences offset against a perception of continuous CTG as being a protective measure because of the hard copy evidence of monitoring [Smith et al., 2012], even despite midwives’ lack of confidence in its reliability to detect fetal compromise [Hindley, Hinsliff, & Thomson (2006); Hindley & Thomson (2007).

4. Page 4; references 8 to 16 are all in separate brackets; should this not be written as [8-13], and similarly, references [8, 10, 14, 15, 16] – should this not be [8, 10, 14-16]; please check formatting of references throughout and ensure consistency.

Changed, Thank you

5. On page 5 there is reference to 5 records being excluded; can you explain why these were excluded? – were these the 5 that went straight to CS on admission?

Explanation: We have included the following amendment to this sentence and linked it to Figure 1.

Five records were excluded (four babies were born before arrival at hospital and one was 23 weeks gestation) (Figure 1), leaving a sample of 511 medical records.

6. Page 9; you refer to a small increase in vaginal birth; can you state in text if this increase was statistically non-significant or significant?

Changed to: Following the intervention there was a small non-statistically significant increase in vaginal birth

Reviewer Two

1. Setting page 5; it would be useful to add a paragraph that describes the hospital setting in which the study was undertaken e.g. tertiary level hospital in a major city etc

Changed: The methods section on page 4 has been amended with the following
inclusion.

The intervention involved presenting the ISIA decision-making framework during a one-hour education session targeted at maternity care providers in one New Zealand secondary level maternity service in a major city, where the most common means of fetal heart rate monitoring both on admission and during labour was to use the CTG machine.

Section Three: Discretionary revisions

Reviewer Two

1. I was at times confused about the term “eligible women” though the article very clearly explains that this refers to women who were eligible for IA. I thought that “low risk” might be a term that is more familiar to the readership though if this term were used it would also require definition (defining what it means in terms of this study).

Explanation: The reason the term “eligible women” is used throughout the article related to the questions guiding the pre-intervention medical record review, the purpose of which was to identify the size of the clinical problem i.e. that low risk women were unnecessarily exposed the CTG monitoring on admission and in labour. These questions were:

• how many women in this cohort were eligible to receive IA (i.e., low-risk women);
• how many eligible women actually received IA;
• were midwives compliant with the DHB protocol for the conduct and documentation of IA during labour;
• and what were the maternal and fetal outcomes of care when IA was used?

I have changes the word ‘eligible’ to low risk and provided a definition for low risk in the background on page 3.

Intermittent auscultation, or listening to and counting the sounds of the fetal heart beat, is a suitable monitoring method for ‘low risk’ women (well women with uncomplicated pregnancies), and a fundamental midwifery skill.

2. Background page 3; consider replacing “dangerous practice” with something like “has been shown to be detrimental....”

Changed. Thank you.

3. Background page 4; consider replacing “critical synthesis of the principles of these guidelines” with “critical synthesis of these guidelines”

Changed. Thank you.

4. The tables are quite long and I wondered if having a row for both “yes” and “no” responses was necessary since the “no” responses can be calculated if you just provided the “yes” numbers and proportions. This would halve the length of the tables.

Changed. Thank you.

Reviewer Three
5. The discussion in part is descriptive and is well supported by the data but is mainly about what was done rather than enlarging on what was done and placing it alongside other work that may inform or otherwise this study – it feels like a lost opportunity for what is an important piece of research. I also think the conclusion could be stronger – I think the significance of this tool is its structured approach and that midwives and health professionals should be challenged to see IA in this way and to view it in the much more holistic way than the article suggests.

Thank you, we have made changes to the discussion by incorporating relevant national and international literature, and made stronger arguments for the significance of the tool – see previous addition.

Section Four: Additional Editorial Request

Title Page

Please include a title page at the front of your manuscript file. It should contain, at minimum, the names, institutions, countries and email addresses of all authors, and the full postal address of the submitting author.

This has been done.

Consent statement:

Please state in the Methods section whether written informed consent for participation in the study was obtained from participants or, where participants are children, a parent or guardian.

Explanation: The study employed retrospective medical record review (RMRR) (audit) as the data collection method in the pre- and post-intervention phases. Consent from individuals whose medical records were reviewed is not required when undertaking audit (National Ethics Advisory Committee. 2012), however there is an ethical framework that guides the use of data obtained in this manner. The following consent statement has now been included in the methods section on page 4.

The RMRR was conducted within an ethical framework: maintenance of patient and staff confidentiality, anonymised information in the final report, no unnecessary data collection, and destruction of data collection forms once they had served their purpose. A confidentiality agreement was signed by all involved in the RMRRs. District Health Board (DHB) and local Māori (indigenous people of New Zealand) approval to conduct research was granted. Ethical approval for the study was granted by the Health and Disability Ethics Committees (Central Region) New Zealand in November 2009 (CEN/09/10/077).

Tables as additional files:

We notice that you have included tables as additional files. If you want the tables to be visible within the final published manuscript please include them in the manuscript in a tables section following the references. Alternatively, please cite the files as Additional file 1 etc., and include an additional files section in the manuscript.

Figures and tables have now been included at the end of the manuscript following the references.
Reference