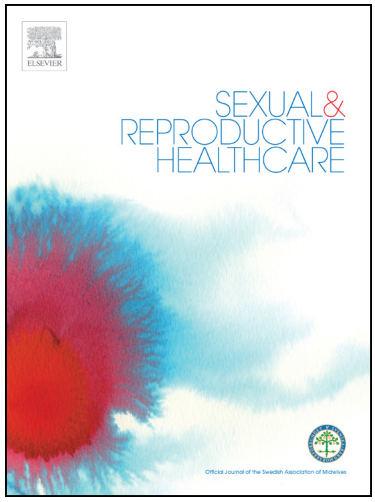

Routine interventions in childbirth before and after initiation of an Action Research project

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PII: S1877-5756(16)30190-2
DOI: http://dx.doi.org/10.1016/j.srhc.2016.11.001
Reference: SRHC 271

To appear in:

Received Date: 18 April 2016
Revised Date: 27 September 2016
Accepted Date: 9 November 2016

Please cite this article as: V. Nyman, L. Roshani, M. Berg, T. Bondas, S. Downe, A. Dencker, Routine interventions in childbirth before and after initiation of an Action Research project, (2016), doi: http://dx.doi.org/10.1016/j.srhc.2016.11.001

Title page:

Routine interventions in childbirth before and after initiation of an Action Research project

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Acknowledgements

We acknowledge the contribution of the midwives who co-created the data through their action learning sets, and the Fyrbodal Research and Development Council Region Västra Götaland, Sweden for financial support of this research.

Abstract

Background: Unnecessary routine interventions in uncomplicated labour and birth, like cardiotocography (CTG), amniotomy, use of scalp electrode and oxytocin treatment, are associated with further interventions that could harm the woman and the infant. A four year Action Research (AR) project was done on a labour ward to enhance the capacity of local midwives in the promotion of physiological labour and birth.

Aim: To describe the use of interventions during labour and birth in healthy women at term with spontaneous onset of labour, before and after initiation of an Action Research project.

Methods: A retrospective before and after comparative study of clinical records from 2009 (before) and 2012 (after), based on a random selection of records from primiparous and multiparous women. Outcome measures were duration of admission CTG, frequency of admission CTG over 30 minutes, frequency of amniotomy, use of scalp electrode, and frequency of oxytocin augmentation in spontaneous labour.

Results: 903 records were included**.** The duration of admission CTG (p=0.001), frequency of admission CTG duration over 30 minutes (p=<0.001), the use of scalp electrodes (p=<0.001), and use of oxytocin augmentation of spontaneous labour (p=0.014) were reduced significantly after initiation of the AR project. There were no significant differences in frequency of amniotomy, duration of total CTG, postpartum bleeding, sphincter tears, Apgar score <5 at 5 minutes, and mode of birth.

Conclusion: Following an AR project, several interventions were reduced during labour and birth. Controlled studies in other settings are needed to assess the impact of collaborative action on decreasing unnecessary interventions.

Keywords: Action Research, childbirth, cardiotocography, interventions, midwife, physiological birth

Background

There are good clinical, psychosocial, and economic reasons to keep labour and birth as a normal physiological event as far as possible. Unnecessary routine interventions in labour are associated with further interventions and result in decreased rates of spontaneous vaginal birth [1]. Cardiotocography (CTG), amniotomy, scalp electrodes and oxytocin treatment are often used routinely in labour. For healthy women, routine use of an admission CTG instead of intermittent auscultation has been shown to increase the risk of later use of continuous CTG throughout labour [2], which further could increase the risk for a caesarean section and instrumental births [3]. Amniotomy is a standard routine management to speed up labour. However, there is no evidence that it shortens the labour or improves childbirth experience for women who have had a prolonged labour [4]. Use of oxytocin treatment to speed up labour in women with slow progress does not increase the rate of spontaneous vaginal birth [5]. Despite international clinical awareness of this issue, several reports show a continued increase in the routine use of medico-technical and pharmacological interventions for healthy women and babies [6-9].

A Normal Labour Process group was formed in 2010 in a hospital based labour ward in the western part of Sweden, to undertake a systematic quality development project to enhance the capacity of local midwives in the promotion of physiological labour and birth. The Normal Labour Process group's mission was to map and identify weaknesses in the routine management of normal labour. This process work has been previously described by the first author (VN), both in her role as an insider Action Researcher, and as midwife and a full member of the labour ward in which the study was undertaken. The purpose of Action Research (AR) is to describe, understand and explain, as well as to change [10] and, as part of ordinary work, to make a useful contribution to the organization [11].

In the process of the study reported in this paper, the course of normal labour was mapped, and actions taken based on the Action Research cycle [12], where one action led to another (Table 1). Many different changes occurred more or less concurrently as the study progressed. The emphasis developed from, initially, being concerned with the first encounters between the midwife and the expectant parents on the labour ward, to the need to optimize the routine management of labour and birth. Based on dialogue with colleagues, the insider Action Researcher (VN) was able to document the process and evaluate actions that were associated with quality improvement. Various aspects of this project have already been reported. These include women´s and their partners´ experiences of the first encounter with midwives when arriving at the labour ward. This was described as an asymmetric power relationship and an obedient acceptance of waiting for attention in an unfamiliar situation [13]. The midwives reactions and reflections on their care approach in the first encounter were described as creating the possibility of glancing beyond routines, in contrast to their normal state of being confined to inherent routines [14]. The collegial discussions as a consequence of this 'glancing beyond routines' eventually highlighted the need to address unnecessary interventions.

The aim of the study reported in this paper, therefore, was to explore interventions before and after the local Action Research study was initiated, starting with the woman's and partners' arrival on the labour ward. We hypothesised that the use of specific interventions: would be reduced as the AR project and the Normal Labour Process project progressed. These were length of CTG at admission and overall, amniotomy (artificial rupture of membranes) use of scalp electrode, and oxytocin augmentation. The study was undertaken in a context where, before the study commenced, there were no specific protocols for use of amniotomy or use of fetal scalp electrode. However, the local routine was that a 20-30 minute admission CTG [15] should be used for all women, and augmentation of labour with oxytocin was recommended when there was no progression of labour in three hours according to a 3-hour partogram [16].

Methods

A retrospective before and after observational study was undertaken to assess if pre-specified interventions in labour had decreased after the AR was initiated. The selection of records is described in Figure 1. The study was approved by the Regional Ethical Review Boards at the University of Gothenburg, Sweden (Dnr: 786-14).

Inclusion criteria: Records from women of all parity were eligible if they were healthy, with an uncomplicated pregnancy, a single live fetus in cephalic presentation, with spontaneous onset of labour at between 37 complete weeks and 41 weeks + 6 days gestation.

Exclusion criteria: Records from all women who had a diagnosis that indicated any of the following risks or complications in the current or earlier labours: induction of labour, elective caesarean, a prior caesarean before the index birth, breech presentation, multiple pregnancy, preterm birth in the current pregnancy, or if they had a history of chronic disease, diabetes mellitus and/or hypertonia, or other conditions developed during pregnancy that required increased surveillance of the baby or woman during labour. Further, women without an admission CTG were excluded.

The interventions for the exploration in this paper were chosen as there is scientific evidence for not using them routinely [1-7]. Interventions studied were duration of admission CTG, number of admission CTG over 30 minutes, duration of total CTG, frequency of amniotomy, use of scalp electrode, and frequency of oxytocin augmentation of spontaneous labour. The interventions were noted in the electronic records and within the management of normal labour where midwives could influence the routine use of interventions, including length of admission CTG. In Sweden an admission CTG of 20-30 minutes is clinical standard [15] and therefore frequency of admission CTG over 30 minutes was chosen as one of the outcome measures. Data were also collected on outcomes including mode of delivery, sphincter tears, postpartum haemorrhage, meconium stained liquor, and Apgar score at 5 minutes.

Sample size was calculated to show a 10% reduction in duration of admission CTG. With 80% power and an alpha level of 0.05 in a two-sided test, 400 records were needed each year, 2009 and 2012. A sample of 800 records corresponds to approximately 20% of all total births year 2009 and 2012. From the obstetric database at the hospital all births in 2009 and 2012 were listed (45% primiparous each year). A random selection of even number of records (2 primiparous and 2 multiparous women) was done every third day around the clock from January to December to give a good representation of labours throughout each year. Exclusions were applied prior to random selection, but during the analysis of the initially selected records, 101 more records were excluded, as, on close examination, they did not meet the inclusion criteria or did not have an admission CTG (Figure 1).

Median and range were used as descriptive measures. The Mann-Whitney U-test was used for continuous data analysis. Fisher's exact test and Chi-square test were used for categorical data. Data were analysed with the statistical software SPSS version 23 (SPSS Inc., Chicago, IL, USA) and p-values below 0.05 were considered significant.

Results

From all births (n=6,455) during the years 2009 and 2012, 4,503 women were healthy (without prior caesareans or complicated pregnancies) with an uncomplicated pregnancy, a single live fetus in cephalic presentation, and with spontaneous onset of labour at between 37 complete weeks and to 41 weeks + 6 days gestation. From the 4,503 records that met the inclusion criteria 20% (n=903) of the records were randomly selected (Figure 1). Table 2 summarises the characteristics of the study population divided by year and parity. There was wide variation in the range of both admission and total CTG duration from admission to birth among both primiparous and multiparous women.

Between the 2009 cohort and the 2012 cohort, the mean duration of admission CTG decreased from 35 to 31 minutes (p=0.001). The frequency of admission CTG duration over 30 minutes decreased from 63% to 51% (p<0.001). The use of scalp electrode decreased from 84% to 68% (p<0.001) and use of oxytocin treatment for spontaneous labour reduced from 43% to 35% (p<0.001). Rates of amniotomy (p=0.053) and duration of total CTG were non-significant (p=0.124), see Table 3.

There were no significant differences in postpartum bleeding over 1,000 mL, sphincter ruptures, meconium stained liquor, low Apgar score at 5 minutes, and mode of birth between the years (see Table 4). Of the 30 caesarean sections in this data set all but two women were diagnosed with prolonged labour defined by crossing the action line at a 3 hour partogram.

Discussion

These results show that there was a statistically significant reduction in duration and number of admission CTG over 30 minutes, use of fetal scalp electrodes and of augmentation of labour after the Normal Labour Process project and the associated AR

study started. The data also showed a downward trend in the number of amniotomies performed.

The women included in this study were all healthy women with spontaneous onset of labour. In usual Swedish practice, a 20-30 minutes admission CTG is used for all women [15], a routine all midwives followed at the clinic. The number of CTG admission traces that met the standard of being no more than 30 minutes long was more likely to be met following the AR project. However, the mean number of minutes for total CTG duration throughout labour was not changed. Although this AR project had an impact on admission CTG, it did not appear to influence the underlying use of CTG as a routine method of assessing fetal wellbeing. Reduced length of admission CTG may also lead to reduced use of continuous fetal monitoring thus avoiding further unnecessary interventions in low-risk labour and birth [1].

The reduction in the use of scalp electrodes suggests that midwives were more inclined to challenge routines after the Normal Labour Process. The use of a fetal scalp electrode can cause traumatic damage to the fetal scalp, and a risk of maternal-fetal blood transfer. It also can entail an increased amount of vaginal examinations if the electrode becomes loose and a new one needs to be applied. There is general agreement that the use of fetal scalp electrodes should be restricted to occasions when it is clinically indicated [17, 18]. Most importantly, it was agreed among midwives that women's experience of discomfort of having to endure several unnecessary vaginal examination [19] and the discomfort of having the device in the vagina attached to the fetal head should not be underestimated. Further, if the amniotic fluid is meconium stained the local guidelines advised continuous CTG with a scalp electrode. However, the evidence suggests that thin, old meconium staining does not carry any risks for the neonate [20], so the reduced use of scalp electrodes even though there was a trend for increased meconium stained liquor from 14% to 19% (p=0.050) may suggest that the midwives had increased confidence in physiological labour and birth as the Normal Labour Process and AR projects progressed.

We also found that the use of oxytocin treatment of spontaneous labour reduced significantly. Oxytocin treatment for augmentation reduces length of labour but does not reduce the risk for caesarean delivery [5, 21]. The midwives frequently discussed their own decisions about augmentation of labour with oxytocin. The local guidelines follow the Swedish national guidelines [16] on when and how to use oxytocin treatment. Before the AR project, oxytocin was widely used when labour progress in spontaneous labour was judged to be slow, especially in women having their first baby. The significant reduction in use of oxytocin treatment can be interpreted as a change in usual clinical practice.

As for the average total duration of use of CTG, reduction in the rates of use of amniotomy did not reach clinical significance between the two time periods, although it did show a downward trend (from 52% to 46%). .This is somewhat surprising, as, during the AR process, the need to do amniotomy routinely versus preserving the membranes (no amniotomy) for spontaneous labour was frequently highlighted among staff, as evidence

shows no difference in key outcomes between women randomised to amniotomy compared to those randomised to the control groups [4]. It isn't clear why this particular practice did not change significantly, but it may be that the study was too small for this result to be generalisible. The absolute change of 6% may be partly explained by the lower use of fetal scalp electrodes, as amniotomy is required to apply the electrode if the membranes are intact.

The data in our study showed no adverse effects on mother or child in terms of postpartum haemorrhage over 1,000 mL, sphincter ruptures, mode of delivery and Apgar score below 7 at 5 minutes (Table 4). Whether it had an impact on the parents' experiences was not assessed in this study.

Methodological discussion

The purpose of AR is to describe and change regular work concurrently with undertaking research [11]. This paper has described changes in rates of interventions in labour ward care between two time periods, between which there had been a Normal Labour Process with a focus on reflection and action on attitudes and labour ward routines. A significant feature of all Action Research is to build a direct link between intellectual knowledge/theory and action to develop human persons and their communities [10]. As part of this AR study, scientific articles on a range of issues, including processes of care, women's experiences of treatment during labour, and various interventions, were distributed and discussed on the labour ward.

The interventions were noted in the electronic records and within the management of normal labour where midwives could influence the routine use of interventions, including length of admission CTG. In Sweden an admission CTG of 20-30 minutes is clinical standard [15] and therefore frequency of admission CTG over 30 minutes was chosen as one of the outcome measures.

Study limitations

Study designs with before and after measurements are known to overestimate the effects of quality improvement and have to be interpreted with caution [22]. The major problem with observational studies is how to deal with confounding factors. On the other hand, in AR, the intention is to achieve change in every day practice, by explicitly involving 'confounding factors' as contributors to improvement, making the whole process interdependent with other possible effective interventions. One of the goals in AR is to achieve action oriented outcomes, educate both researchers and participants, and get results that are relevant to the local setting [23]. The attribution of effect is therefore controversial. For example, in the local setting, an earlier local retrospective observational study about use and misuse of oxytocin [24] was highlighted during the process as one of many articles that were shared and discussed about routines and behaviours. Despite the controversy over attribution of effect, change did happen during the AR study. This was, in itself valuable, and was in opposition to a trend for a continued increase in the routine use of

unnecessary medico-technical and pharmacological interventions for healthy women and babies in other maternity settings over the time of the study [6, 8, 9].

Conclusions

This study reports on a significant reduction in duration of admission CTG, number of admission CTGs over 30 minutes, reduced use of fetal scalp electrodes, and reduction in oxytocin augmentation of spontaneous labour after the introduction of a Normal Labour Process project and an AR study. There were no significant differences in postpartum haemorrhage, mode of delivery, or low Apgar score at 5 minutes between the years. These results suggest that an AR process can be influential in changing the approach to normal labour in a specific organization, especially when this is based on a collaborative intent. The generalizability of our findings has yet to be demonstrated, and further studies are needed in other settings to assess the impact of collaborative action on decreasing unnecessary interventions.

Competing interests

The authors declare that they have no competing interests.

References

1. Petersen A, Poetter U, Michelsen C, Gross MM: **The sequence of intrapartum interventions: a descriptive approach to the cascade of interventions**. *Arch Gynecol Obstet* 2013, **288**(2):245-254.
2. Devane D, Lalor JG, Daly S, McGuire W, Smith V: **Cardiotocography versus intermittent auscultation of fetal heart on admission to labour ward for assessment of fetal wellbeing**. *Cochrane database of systematic reviews* 2012(2).
3. Alfirevic Z, Devane D, Gyte GM: **Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour**. *The Cochrane database of systematic reviews* 2013(5):Cd006066.
4. Smyth RM, Markham C, Dowswell T: **Amniotomy for shortening spontaneous labour**. *The Cochrane database of systematic reviews* 2013(6):CD006167.
5. Bugg GJ, Siddiqui F, Thornton JG: **Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour**. *The Cochrane database of systematic reviews* 2013(6):CD007123.
6. Begley CM: **Intervention or interference? The need for expectant care throughout normal labour**. *Sexual & Reproductive Healthcare* 2014, **5**(4):160-164.
7. Chalmers B, Kaczorowski J, Levitt C, Dzakpasu S, O'Brien B, Lee L, Boscoe M, Young D, Maternity Experiences Study Group of the Canadian Perinatal Surveillance S, Public Health Agency of C: **Use of routine interventions in vaginal labor and birth: findings from the Maternity Experiences Survey**. *Birth* 2009, **36**(1):13-25.
8. Scamell M, Alaszewski A: **Fateful moments and the categorisation of risk: Midwifery practice and the ever-narrowing window of normality during childbirth**. *Health, risk & society* 2012, **14**(2):207-221.
9. Walsh D: **Evidence-based care for normal labour and birth: a guide for midwives / [Elektronisk resurs]**, vol. 1. Abingdon: Routledge; 2007.
10. Reason P, Bradbury H: **The SAGE handbook of action research: participative inquiry and practice**, vol. 2. Los Angeles: SAGE; 2008.
11. Coghlan D, Brannick T: **Doing action research in your own organization**, vol. 4th. London: SAGE; 2014.

12. Nyman V, Berg M, Downe S, Bondas T: **Insider Action research as an approach and a method - Exploring institutional encounters from within a birthing context**. *Action Research* 2016, **14**(2):217-233.
13. Nyman V, Downe S, Berg M: **Waiting for permission to enter the labour ward world: First time parents' experiences of the first encounter on a labour ward**. *Sexual & Reproductive Healthcare* 2011, **2**(3):129-134.
14. Nyman V, Bondas T, Downe S, Berg M: **Glancing beyond or being confined to routines: labour ward midwives' responses to change as a result of action research**. *Midwifery* 2013, **29**(6):573-578.
15. Devane D, Lalor J, Daly S, McGuire W, Smith V: **Fosterövervakning med kardiotokografi (CTG) vid förlossning**.
16. Berg M, Dykes AK, Nordström L, Wennerholm U-B: **Indikation för värkstimulering med oxytocin under aktiv förlossning**. In.: Göteborg U6 - ctx_ver=Z39.88-2004&ctx_enc=info%3Aofi%2Fenc%3AUTF-8&rfr_id=info%3Asid%2Fsummon.serialssolutions.com&rft_val_fmt=info%3Aofi%2Ffmt%3Akev%3Amtx%3Ajournal&rft.genre=article&rft.title=Indikation+f%C3%B6r+v%C3%A4rkstimulering+med+oxytocin+under+aktiv+f%C3%B6rlossning&rft.au=Berg%2C+Marie&rft.au=Dykes%2C+AK&rft.au=Nordstr%C3%B6m%2C+L&rft.au=Wennerholm%2C+Ulla-Britt&rft.date=2011-01-01&rft.pub=G%C3%B6teborg&rft.externalDBID=svep%3Amed&rft.externalDocID=oai_gup_ub_gu_se_158561&paramdict=en-US U7 - Report; 2011.
17. Kawakita T, Reddy U, Landy H, Iqbal S, Huang CC, Grantz K: **Neonatal complications associated with use of fetal scalp electrode: a retrospective study**. *BJOG: An International Journal of Obstetrics & Gynaecology* 2015.
18. de Groot PF, Mol BWJ, Onland W: **Complications of fetal scalp electrode placement: a case report, literature review and summary of case reports**. *Expert Review of Obstetrics & Gynecology* 2013, **8**(2):113-120.
19. Ying Lai C, Levy V: **Hong Kong Chinese women's experiences of vaginal examinations in labour**. *Midwifery* 2002, **18**(4):296-303.
20. Ziadeh SM, Sunna E: **Obstetric and perinatal outcome of pregnancies with term labour and meconium-stained amniotic fluid**. *Arch Gynecol Obstet* 2000, **264**(2):84-87.
21. Dencker A, Berg M, Bergqvist L, Ladfors L, Thorsen LS, Lilja H: **Early versus delayed oxytocin augmentation in nulliparous women with prolonged labour--a randomised controlled trial**. *BJOG* 2009, **116**(4):530-536.
22. Eccles M, Grimshaw J, Campbell M, Ramsay C: **Research designs for studies evaluating the effectiveness of change and improvement strategies**. *Qual Saf Health Care* 2003, **12**(1):47-52.
23. Herr K, Anderson GL: **The action research dissertation: a guide for students and faculty / [Elektronisk resurs]**. Thousand Oaks, Calif;London;: SAGE; 2005.
24. Selin L, Almstrom E, Wallin G, Berg M: **Use and abuse of oxytocin for augmentation of labor**. *Acta Obstet Gynecol Scand* 2009, **88**(12):1352-1357.

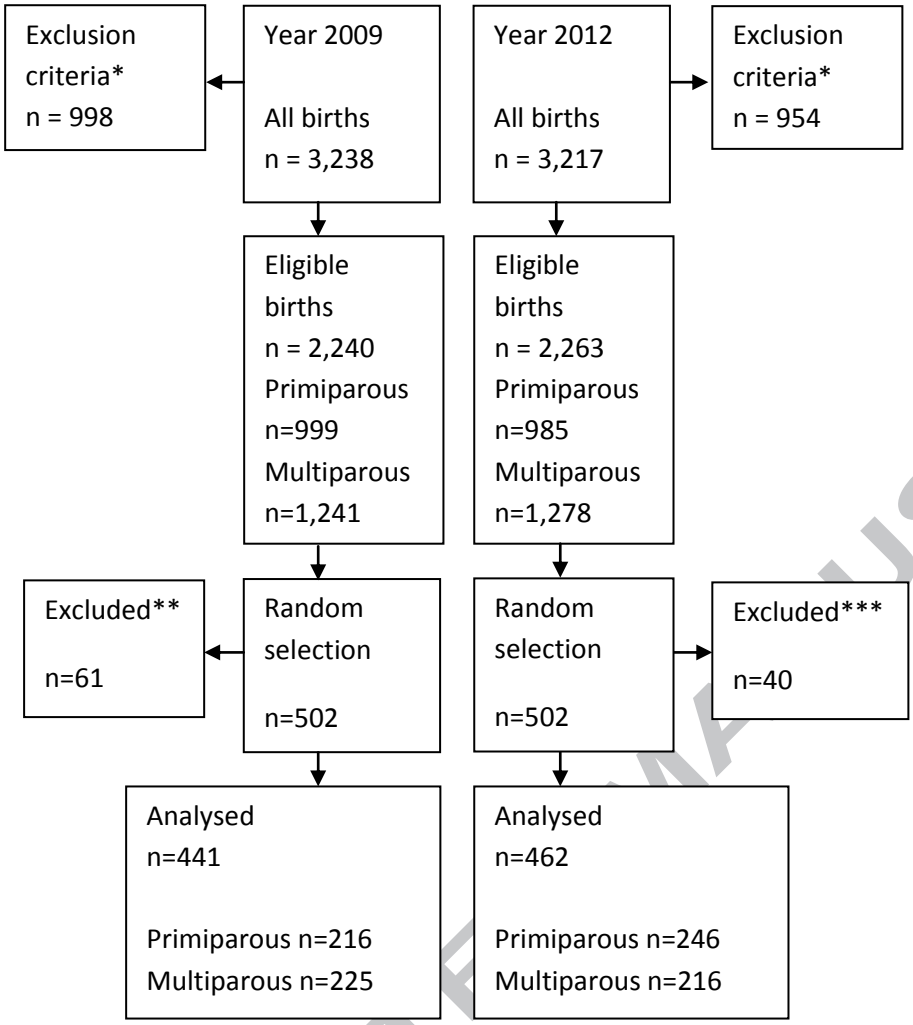

Figure 1. Flow diagram of selected birth records. * Induction, any caesarean section, breech, multiple pregnancy, premature birth, chronic disease. ** Induction, breech position, post-term pregnancy, pre-hospital birth, missing data. *** Pre-hospital birth, parity error in database, missing data.

Table 1. Time period of the actions in the AR (action research) and Normal Labour Process project.

Action time period	**One action led to another**
2009 Parents' experiences in focus	Parents' experiences of entering the labour ward were explored (Nyman et al., 2011) and that led to a focus on the care approach in the first encounter.
2011 - onwards First encounter in focus	Midwives experiences of the collegially negotiated implementation changes to the first encounter with a woman's and partner's arrival to the labour ward (Nyman et al., 2013).
2011 - onwards Routine interventions in focus	Discussions with midwife colleagues indicated that interventions decided by the midwife in the routine management of labour could be the subject of examination. Local evaluations of interventions were presented iteratively to staff to illuminate trends and to maintain momentum. These actions lead in 2014 to the plan of a study to evaluate the amount of interventions that were occurring in healthy women and babies.
2014 Evaluation of routine interventions in normal labour in focus	Evaluation of routine management in healthy women with spontaneous onset of labour before the change process started (2009) and one year after the process was ongoing (2012) to explore if routines had changed. Described in this paper.

Table 2. Obstetric characteristics for primiparous and multiparous women before and after initiation of the action research project.

	Year 2009 Primiparous n=216 Multiparous n=225	Year 2012 Primiparous n=246 Multiparous n=216
Admission CTG, minutes		
Primiparous women	35.0 (6-636)	30.0 (7-478)
Multiparous women	34.0 (7-380)	33.5 (1-651)
Admission CTG over 30 minutes		
Primiparous women	147 (68.1)	124 (49.6)
Multiparous women	132 (58.7)	115 (53.2)
Amniotomy		
Primiparous women	111 (51.4)	114 (46.3)
Multiparous women	116 (52.7)	96 (44.7)
Meconium stained amniotic fluid		
Primiparous women	30 (13.9)	46 (18.7)
Multiparous women	33 (14.7)	43 (19.9)
Scalp electrode		
Primiparous women	203 (94.0)	207 (84.1)
Multiparous women	166 (73.8)	105 (48.6)
Oxytocin augmentation		
Primiparous women	136 (63.0)	126 (51.2)
Multiparous women	53 (23.6)	35 (16.2)
Spontaneous vaginal birth		
Primiparous women	185 (85.6)	215 (87.4)
Multiparous women	219 (97.3)	210 (97.2)

Instrumental vaginal birth		
Primiparous women	21 (9.7)	18 (7.3)
Multiparous women	4 (1.8)	1 (0.5)
Emergency caesarean section		
Primiparous women	10 (4.6)	13 (5.3)
Multiparous women	2 (0.9)	5 (2.3)
Total CTG-duration, hours		
Primiparous women	5.08 (0.13-17.95)	4.91 (0.37-19.08)
Multiparous women	1.75 (0.12-9.20)	1.99 (0.17-12.33)
Apgar score <7 at 5 minutes		
Primiparous women	2 (0.9)	2 (0.8)
Multiparous women	1 (0.4)	2 (0.9)

Data are given as median (range) or n (%)

Table 3. Comparisons of rates of interventions before and after initiation of the action research project.

	Year 2009 n=441	Year 2012 n=462	p-value
Duration of admission CTG, minutes	35.0 (6-636)	31.0 (7-651)	0.001[a]
Admission CTG over 30 minutes	279 (63.3)	237 (51.3)	< 0.001[b]
Total CTG duration, hrs	3.0 (0.1-18.0)	3.2 (0.2-19.1)	0.124[a]
Amniotomy	227 (52.1)	210 (45.6)	0.053[b]
Scalp electrode	369 (83.7)	312 (67.5)	< 0.001[b]
Oxytocin augmentation	189 (42.9)	161 (34.8)	0.014[b]

Data are given as median (range) or n (%). [a] Mann-Whitney U-test. [b] Fisher's exact test.

Table 4. Comparisons of childbirth outcomes before and after initiation of the action research project.

	Year 2009 n=441	Year 2012 n=462	p-value[a]
Postpartum haemorrhage > 1000mL	22 (5.0)	22 (4.8)	0.879 [a]
Sphincter rupture	7 (1.6)	6 (1.3)	0.785 [a]
Meconium stained amniotic fluid	63 (14.3)	89 (19.3)	0.050 [a]
Apgar score <7 at 5 minutes	3 (0.7)	4 (0.9)	1.000 [a]
Mode of delivery			0.356 [b]
Spontaneous vaginal birth	404 (91.6)	425 (92.0)	
Instrumental vaginal birth	25 (5.7)	19 (4.1)	
Emergency caesarean section	12 (2.7)	18 (3.9)	

Data are given as median (range) or n (%). [a] Fisher's exact test. [b] Pearson Chi-Square analysis.

Highlights:

- Use of the Action Research approach facilitated staff's reflection in and on their own management of normal labour and birth on a labour ward
- Admission CTG over 30 minutes, use of scalp electrodes, and use of oxytocin augmentation of spontaneous labour were reduced significantly after initiation of the action research project.
- The Action Research approach puts the emphasis on describing, understanding, and changing practice.