Fetal health surveillance: a community-wide approach versus a tailored intervention for the implementation of clinical practice guidelines

Research

Recherche

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Abstract

Background: The decreased use of electronic fetal monitoring (EFM) for healthy women in labour and the increased provision of professional support to all women in labour is recommended by experts. We evaluated the effectiveness of a community-wide approach to transferring research results to practice using a regional committee, newsletter articles and annual conference presentations compared with an additional tailored hospital intervention involving workshops to enhance self-efficacy for nurses, policy review, multidisciplinary meetings, rounds and unit discussions.

Methods: We compared the proportion of women at low risk who received EFM and the proportion of nurses' time spent providing labour support before and after the intervention within each of 4 hospitals (2 tertiary and 2 secondary). One hospital of either type was randomly selected to receive the tailored intervention. Randomly selected charts (n = 200) were reviewed for the use of EFM at each hospital before (1995) and after (1996) the intervention. Trained observers at randomly selected times recorded the nurses' activities, including time spent providing labour support before and after the intervention.

Results: At the intervention secondary hospital, there was a large decrease in the use of EFM, from 90.1% before to 41.0% after the intervention ($p < 0.001$), but no change in nurses' time spent providing labour support. At the intervention tertiary hospital there was no change in EFM rates, but there was a small, statistically significant increase in time spent providing labour support (23.5% to 29.8%, $p < 0.001$). A negative effect on time spent providing labour support was found at the control secondary hospital (decrease from 19.6% to 12.8%, $p < 0.001$), with no change in the EFM rate. At the control tertiary hospital there was a small decrease in the use of EFM, from 99.5% to 91.4% ($p < 0.001$), but no change in time spent providing labour support.

Interpretation: The results are mixed, and the tailored intervention thus appeared to have limited effects. No association was found between the reduction in the use of EFM and an increase in nurses' time spent providing labour support.

In a systematic review of 9 trials involving 18 561 women, Thacker and colleagues[1] compared a policy of continuous electronic fetal monitoring (EFM) with intermittent auscultation. Overall, with EFM there was a decrease in the frequency of neonatal seizures, although the seizures prevented by EFM were not associated with long-term consequences. EFM was associated with an increase in the rates of cesarean delivery and operative (forceps or vacuum) vaginal delivery.

Clinical practice guidelines in Canada and other countries[2–5] recommend intermittent auscultation as the preferred method of fetal health surveillance for women at low risk. However, 75% of labouring women in Canada receive EFM,[6,7] despite the fact that most women (70%–80%) are at low risk.[3]

Labour support includes physical comfort measures, reassurance, and advice and information. A systematic review of 14 trials involving 5000 women showed the following benefits of continuous support for women in labour:[8] decreased use of analgesia/anesthesia in labour, decreased rate of operative vaginal delivery, decreased cesarean section rate and decreased frequency of a 5-minute Apgar score less than 7.

Clinical practice guidelines recommend continuous support from a professional 80%–90% of the time during active labour.[2,3,9,10] In Canadian hospitals, nurses provide most of the ongoing care to women in labour, yet observational studies have shown that nurses spend just 6%–10% of their time providing labour support.[11,12]

We sought to determine whether using an active approach[13] with an interactive educational workshop designed to influence nurses' self-efficacy[14] coupled with hospital policy reviews, multidisciplinary meetings, rounds and unit discussions would lead to more appropriate implementation of guidelines on fetal health surveillance. Specifically, we sought to determine the frequency of use of EFM and the time spent providing labour support before and after the intervention at 2 intervention hospitals in contrast with 2 control hospitals that did not receive the tailored program. We also examined longer-term trends in these hospitals using an existing database.

Methods

The study community, a city in southeastern Ontario, provided a natural setting for the comparison of 2 hospitals of similar size and different levels of care (secondary and tertiary). Central random allocation was done so that 1 hospital of either type was designated to receive the tailored intervention. Study protocols received ethics approval from the University of Toronto Ethics Review Committee and the hospital review committees.

The 2 control hospitals received the usual community-wide approach to new policy implementation coordinated by the regional perinatal education program. This included the formation of a regional multidisciplinary subcommittee, newsletter publications and presentations at the annual conference of the Perinatal Partnership Program of Eastern and Southeastern Ontario (PPPESO).

In addition to this community-wide approach, a tailored program was offered at the 2 intervention hospitals. Existing communication channels, such as rounds, departmental meetings and posters, were used. References were made available. Four 8-hour interactive workshops with groups of 14–35 nurses from both hospitals were taught by one of us (B.D.) and a member of the PPPESO (M.-J.T.). The workshop involved discussion of experiences, skill practice, case studies, videotapes, demonstrations, information about the research evidence, clinical decision-making protocols and discussion of perceived barriers. More than 80% of the nurses at the intervention hospitals attended. Each nurse received an 85-page workbook. The workshops and workbook were evaluated positively by the participants.[15]

The intervention period was 9 months, with follow-up data collected 6 months after the last workshop. After data collection, nurses at the control hospitals were also offered the workshop, and more than 80% of the nurses attended.

To determine the proportion of women who received EFM, we randomly selected charts for all women who gave birth in an 8-week period. We used an adapted perinatal data collection form that included the frequency of any EFM use after admission.[16]

Because the follow-up period was only 6 months — possibly too short for a change in practice to be assimilated — we reviewed data from the regional database on the use of EFM from 1993 to 1997. These data include rates among all women in labour at the 4 hospitals, not just those at low risk, and are available as 6-month aggregate data. The regional rate of EFM in 1995 (before the intervention) was 90% in the participating hospitals. Detection of a clinically meaningful and statistically significant absolute reduction of 20% in the EFM rate among women at low risk required a sample size of 85 charts in each hospital at each time period (z-test for difference between proportions, 80% power, $\alpha = 0.025$ [two-tailed]).[17] Because it was not feasible to identify women at low risk from antenatal records owing to incomplete records, the sample size for the chart review was preset at 200.

We used a work-sampling approach[11] to measure the proportion of nurses' time spent providing labour support. Times for the observation of nurses' activities were randomly selected in 10-minute blocks, with 48 observations per day. Observations were made by 2 nurse research assistants who were instructed to make instantaneous classifications of nursing behaviours according to a structured 24-item worksheet.[15] One research assistant did the observations before the intervention and assisted with the training of the second research assistant, who did the observations after the intervention. Consistent ratings (greater than 95%) of the same behaviours were obtained by the 2 research assistants in practice sessions. Preintervention data were collected in consecutive weeks in November and December 1995, and postintervention data were collected in November and December 1996. All research assistants (observers and chart reviewers) were blind to the study design and had not worked at any of the study hospitals.

The objective of work sampling is to estimate the frequency of an activity, such as labour support, based on random observations.[18,19] We determined sample size with an α level set at 5% and assuming a 50/50 split between supportive versus other care. A minimum of 384 observations of staff on each nursing unit were needed before and after the intervention. Since the number of patients per nurse may be an influential factor, we also compared the median number of patients cared for on each observation day with the actual labour support observations. Each nurse received a self-report form to indicate the number of patients under care.

We constructed questionnaires to measure nurses' self-efficacy for intermittent auscultation and labour support. The psychometric properties were assessed in a pilot study at a hospital in another city. The scales had good content validity, construct validity, internal consistency and test–retest reliability.[20]

We compared the 2 primary outcomes (any EFM and labour support) before and after the intervention within each hospital using χ^2 tests for categorical data. The α level was preset at 0.025. The data entry accuracy rate was 99.9% for the primary outcome variables. The proportion of missing data at both study periods for use of EFM and labour support was 2% or less.

Results

The 2 secondary hospitals and the 2 tertiary hospitals had similar numbers of births, staffing goals and numbers of nurses before the intervention (Table 1). The intervention secondary hospital had the lowest rates of epidural anesthesia (39%) and of oxytocin augmentation (20%). In addition, this hospital had the only midwifery service.

We reviewed 2864 randomly selected charts of women who had given birth in the fall of 1995 or the fall of 1996. Of these charts, 1264 were excluded for the following reasons: induced labour (759 charts [26.5%]), birth before 37 weeks' gestation (286 [10.0%]), no labour or cesarean section (268 [9.4%]), breech presentation (172 [6.0%]), multiple birth (89 [3.1%]) and infant stillborn (11 [0.4%]). A further 27 charts were excluded because no method of fetal health surveillance was recorded after the initial admission report; this was because the women gave birth in less than an hour after admission.

Electronic fetal monitoring

After the intervention, there was a statistically significant decrease in the proportion of women who received any EFM at the intervention secondary hospital (90.1% before v. 41.0% after the intervention) ($\chi^2 = 102.9$, $p < 0.001$) (Table 2). However, there was no change in the use of EFM at the other intervention hospital. The control tertiary hospital had a small but statistically significant decrease in the use of EFM (99.5% before v. 91.4% after the intervention) ($\chi^2 = 13.0$, $p < 0.001$). There was no change in the use of EFM at the other control hospital (secondary care).

The EFM rates from the regional database at the 4 hospitals before the intervention (1993–95) ranged from 84.4% to 99.3% (Table 3). Within each hospital during these 3 years, the rate did not differ by more than 5%. At the intervention secondary hospital, the rate during the study period before the intervention (July–December 1995) was 84.4%, as compared with 61.0% during the study period after the intervention (July–December 1996), an absolute decrease of 23.4%. At the control tertiary hospital, the rate decreased from 95.3% to 88.3%, an absolute decrease of 7.0%. There was no change (less than 1.0%) at the other 2 hospitals. One year later (July–December 1997), there were further absolute decreases in the EFM rate at all 4 hospitals (10.0% at the intervention secondary hospital, 9.2% at the intervention tertiary hospital, 13.2% at the control secondary hospital and 29.8% at the control tertiary hospital) (Table 3).

Table 1: Number of births, staffing and resources for labour support and fetal health surveillance at 4 hospitals (2 intervention and 2 control) before a tailored intervention to transfer research results regarding electronic fetal monitoring (EFM) to clinical practice

	Hospital			
	Intervention		Control	
Characteristic	Secondary	Tertiary	Secondary	Tertiary
Total no. of births in 1995	2134	3381	2624	2928
% of nulliparous women*	47	42	53	45
Rate of epidural anesthesia, %*	39	64	76	55
Rate of oxytocin augmentation, %*	20	36	50	35
Target nurse:patient ratio	1:2	1:1–2	1:2	1:1–2
Typical no. of nurses on day shift	4	8	4	8
No. of nurses				
Full-time	15	30	15	17
Part-time	11	22	10	32
No. of obstetricians	10	16	7	18
No. of family physicians	13	18	8	7
No. of midwives	6	–	–	–
No. of handheld Doppler units	12	8	1	1
No. of EFM machines	8	15	11	16
Central monitor system	No	No	No	Yes
Scalp pH machine	Yes	Yes	No	Yes
No. of chairs per labour room	4	3	1	2
No. of showers	6	10	7	10
No. of bathtubs or whirlpool baths	5	0	1	1

*Data for women at low risk.

Labour support

A total of 98% of the nurses who provided care on the observation days before the intervention (132/135) and after the intervention (118/120) agreed to be observed. Patients refused to have their care observed for 24 (0.3%) of the 8887 observation times.

At the intervention tertiary hospital, there was a statistically significant increase in the proportion of nurses' time spent providing labour support (23.5% before the intervention v. 29.8% after the intervention) ($\chi^2 = 13.5$, $p < 0.001$) (Table 4). There was no significant change in the proportion of time spent providing labour support at the intervention secondary hospital. A statistically significant decrease in the proportion of nurses' time spent providing labour support was observed at the control secondary hospital (19.6% before v. 12.8% after the intervention) ($\chi^2 = 16.6$, $p < 0.001$). No significant change was observed at the control tertiary hospital.

The response rate for completion of the nurses' self-report questionnaire of the number of patients cared for on each observation day was 78.0% (103/132) before and 100% (118/118) after the intervention. The only pattern of increased labour support with fewer patients was observed after the intervention at the only hospital with a significant increase in time spent providing labour support (the intervention tertiary hospital).

Interpretation

The large absolute decrease in the rate of EFM (49%) after the tailored intervention at the intervention secondary hospital is a clinically relevant change. The results were consistent with data from the regional perinatal database. The decrease in EFM use was sustained over the following year.

We are aware of no other studies evaluating a protocol to decrease the use of EFM. In a quality-improvement project to reduce cesarean section rates, the rate of EFM decreased from 80.7% in 1995/96 to 69.5% in 1997.[21] At one Canadian hospital, where only 30% of women receive EFM, staff reported that it took 2–3 years for them to feel confident and comfortable with intermittent auscultation.[22]

Table 2: Rates of any EFM after the initial admission, before and after the intervention

	Before intervention		After intervention			
Hospital	No. (and %) of women with any EFM	95% CI	No. (and %) of women with any EFM	95% CI	Difference in % (and 95% CI)	*p* value
Intervention						
Secondary	173/192 (90.1)	85.0 to 93.9	80/195 (41.0)	34.0 to 48.3	–49.1 (–57.2 to –41.0)	< 0.001
Tertiary	166/194 (85.6)	79.8 to 90.2	171/195 (87.7)	82.2 to 92.0	2.1 (–4.7 to 8.9)	0.54
Control						
Secondary	200/200 (100.0)	97.7 to 100.0	195/195 (100.0)	97.6 to 100.0	0 (–)	–
Tertiary	196/197 (99.5)	96.8 to 100.0	181/198 (91.4)	86.4 to 95.0	–8.1 (–12.2 to –4.1)	< 0.001

Note: CI = confidence interval.

Table 3: EFM rates among all women in labour by hospital, 1993–1997*

	Period; EFM rate, %							
	Before intervention				After intervention			
Hospital	Jan–Dec 1993	Jan–Dec 1994	Jan–June 1995	July–Dec 1996†	Jan–June 1996	July–Dec 1996†	Jan–June 1997	July–Dec 1997
Intervention								
Secondary	89.6 (2072/2312)	86.3 (1976/2290)	85.7 (936/1092)	84.4 (867/1027)	88.2 (923/1046)	61.0 (624/1023)	46.8 (491/1049)	51.0 (501/982)
Tertiary	91.0 (2858/3139)	94.9 (3044/3207)	95.2 (1626/1707)	93.8 (1515/1615)	93.8 (1454/1550)	94.2 (1417/1505)	91.9 (1414/1539)	85.0 (1274/1499)
Control								
Secondary	93.3 (2529/2711)	93.4 (2498/2674)	94.5 (1295/1370)	96.0 (1191/1240)	95.6 (1181/1235)	96.7 (979/1012)	87.7 (915/1043)	83.5 (844/1011)
Tertiary	99.3 (2973/2995)	98.6 (2919/2959)	95.1 (1420/1493)	95.3 (1301/1365)	95.6 (1275/1333)	88.3 (1173/1329)	55.1 (673/1221)	58.5 (733/1253)

*Data supplied by each hospital and reported by the local health department.
†Study period.

Several factors likely contributed to the decrease in the use of EFM at the intervention secondary hospital. Administrators and care providers were receptive to the idea, and 90% voted in favour of a practice change early in the study. Practitioners were familiar with the use of intermittent auscultation in the adjoining birth centre. New standing medical orders for intermittent auscultation were instituted. Supplemental financial support was provided to pay the full salary of nurses to attend workshops. Finally, the rates of epidural anesthesia (39%) and oxytocin augmentation (20%) at this hospital were the lowest of all the hospitals.

Despite the large decrease in EFM use at this hospital, a significant increase in nurses' time spent providing labour support was not observed. The unit manager thought that the follow-up time of 6 months was too short. Anecdotal information revealed that greater use was being made of new bathtubs or whirlpool baths for women in labour. Another possible explanation is that during the follow-up period there was an increase in the number of women receiving midwifery care compared with the period before the intervention. Future studies need to include observations of midwives and doulas to describe the provision of labour support.

The increase in time spent providing labour support at the intervention tertiary hospital was statistically significant, but it is questionable whether this result is clinically meaningful. However, the nurses at this hospital were the only ones observed providing more labour support with fewer patients; the change may reflect a shift in attitudes.

Organizational factors at the intervention tertiary hospital may have contributed to the significant increase in time spent providing labour support. There was no central EFM system, in part because of the belief that nurses should be with their patients, not at a central nursing station. Furthermore, this hospital was the only one in which the chart was kept in the patients' rooms (thereby enabling nurses to remain there) and included specific documentation about labour support.

The proportion of nurses' time spent providing labour support after the tailored intervention at the intervention tertiary hospital (29.8%) was higher than that reported in earlier studies,[11,12] but there is still room for improvement. Staffing policies to ensure 1-to-1 labour support were a critical success factor described by the maternal–newborn program staff at 4 hospitals in Ontario with low cesarean section rates.[22]

Why practitioners in some hospitals are more likely to adopt certain policy changes than practitioners in other hospitals is unknown. The type of hospital (secondary or tertiary) did not appear to be a factor in our study. At both the study follow-up time and 1 year later, one hospital of either type implemented the policy regarding decreased EFM use. Rogers[23] commented that much effort has been spent studying people differences, but relatively little effort has been spent analyzing innovation differences.

Self-efficacy, although a useful concept for the study of individual behaviour, may not be relevant for the study of implementation of clinical practice guidelines. Nurses' self-efficacy to provide labour support was high at all the study hospitals, with no statistically significant changes over time.[20] Hulscher and associates[24] found that, although practitioners had positive self-efficacy, few organizations were sufficiently well prepared to provide effective services.

Organizational variables influence behaviour over and above the aggregate of individual members.[25] Experienced guideline implementers have ranked organizational capability for change and infrastructure as the most important factors in implementing guidelines in a medical group.[26]

The main limitation of our study is the small number of participating agencies. A randomized clinical trial selecting individual practitioners was considered, but we decided that it was more important to focus on an institution as a whole. It seemed prudent to evaluate the intervention in a limited number of hospitals before proceeding to a multicentre trial.

In summary, the results at the hospitals that received the tailored intervention were mixed, with changes in 1 of the 2 primary outcomes at each hospital. In addition, at the control tertiary hospital, there was a small but significant decrease in the use of EFM. Thus, the tailored program appeared to have a limited effect. Factors in the practice settings, including practitioner beliefs and previous experience, the charting system, and administrative and financial support, may have contributed to the observed changes. Additional research is needed to determine the elements necessary to implement clinical practice guidelines and thereby facilitate evidence-based health care for Canadians.

Table 4: Proportion of nurses' time spent providing labour support before and after the intervention

	Before intervention		After intervention			
Hospital	No. (and %) of observation times	95% CI	No. (and %) of observation times	95% CI	Difference in % (and 95% CI)	*p* value
Intervention						
Secondary	136/812 (16.7)	14.2 to 19.5	139/685 (20.3)	14.2 to 19.5	3.6 (–0.4 to 7.6)	0.08
Tertiary	344/1461 (23.5)	21.4 to 25.8	375/1259 (29.8)	27.3 to 32.4	6.3 (3.0 to 9.6)	< 0.001
Control						
Secondary	211/1075 (19.6)	17.3 to 22.1	114/892 (12.8)	10.7 to 15.2	–6.8 (–10.0 to –3.6)	< 0.001
Tertiary	166/1250 (13.3)	11.5 to 15.3	170/1453 (11.7)	10.1 to 13.5	–1.6 (–0.9 to 4.1)	0.21

Competing interests: None declared.

Contributors: Barbara Davies was the principal author and completed this study as part of the requirements of her doctoral degree in Nursing Science at the University of Toronto. Ellen Hodnett was the thesis supervisor, and Mary Hannah, Linda O'Brien-Pallas, Dorothy Pringle and George Wells were thesis committee members; all contributed to the concept, design and data analysis and to the revising of the manuscript. Members of the Perinatal Partnership Program of Eastern and Southeastern Ontario committee provided substantive advice on the workshop design, materials developed (workbook), interpretation of results and feedback to finalize the manuscript.

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