The development and initiation of the NSW Department of Health interprofessional Fetal welfare Obstetric emergency Neonatal resuscitation Training project

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Background: The Fetal Welfare Obstetric emergency Neonatal resuscitation Training (FONT) project was initiated on a background of rising notifications of adverse events in NSW maternity units, the significant proportion of which were related to fetal welfare assessment.

Aims: The aim of the study is to describe the development and introduction of the NSW state-wide interprofessional FONT project.

Methods: Following development and risk assessment, FONT was launched in February 2008. The project consists of an online component and two face-to-face training days to be completed each 3 years; the first day for fetal welfare assessment and the second for obstetric and newborn emergencies. Eight, 2-day training sessions were conducted throughout NSW for FONT trainers. Each trainer underwent pre- and post-testing for changes in knowledge of fetal welfare assessment. The 2005–2008 NSW adverse event report numbers were assessed.

Results: From 20 February to 17 April 2008, 240 trainers had been trained in fetal welfare assessment, and by the end of 2008 these trainers had trained 954 clinicians. There were significant improvements in the interpretation and management planning of electronic fetal heart rate patterns following training. Analysis of Severity Assessment Codes 1 and 2 showed no significant trend in the number of notifications for adverse events related to fetal welfare assessment.

Conclusions: In the first 11 months, 25% of the state’s maternity practitioners had received training in the first stage of the FONT project. The FONT project has shown short-term improvements in learning and communication skills and in the participants of the project.

Key words: fetal monitoring, Fetal welfare Obstetric emergency Neonatal resuscitation Training project, interprofessional teaching, short-term outcome.

Introduction

New South Wales is the most populous state in Australia with a population of 6.7 million with 1 in 3 Australians living in NSW. There has over the past 5 years been an increase in the number of births each year rising from 90 610 in 2005 to 96 026 in 2007 and to 96 056 in 2008. There are eight Area Health Services (AHS) in NSW with 80 public hospitals with 3800 staff providing birthing services. The levels of care vary from the seven tertiary referral teaching hospitals to units supplying postnatal care only. There are 53 units with less than 200 births per year. Furthermore, 30% of the births are provided by 53 (66%) rural hospitals outside the metropolitan areas.1 In 2005, NSW Health introduced a comprehensive computerised system for monitoring and managing reported incidents occurring in public health facilities known as the Incident Information Management System (IIMS).2 Incidents are reported as Reportable Incident Briefs (RIB’s) that have an identified Severity Assessment Code (SAC), which classifies each incident depending on both the severity and likelihood of occurrence. Following the institution of the IIMS and analysis of the SAC 1 and 2 RIB’s (incidents resulting in death and significant morbidity), the highest proportion (40%) were seen to be related to fetal welfare assessment or surveillance1 and in particular were associated with electronic monitoring of the fetal heart rate (EFM) during labour and the antenatal period. The inappropriate use or interpretation of fetal heart rate monitoring had been previously highlighted in the literature with up to 70% of medico-legal claims being based on EFM abnormalities.3

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requested that the NSW Maternal and Perinatal Health Priority Taskforce (M&PHPT) develop a strategy to address these issues. The M&PHPT (comprising of senior clinicians from obstetrics, neonatology, paediatrics, midwifery and general practice, as well as consumers, who report directly to the Director General of NSW Health) formulated a plan for reducing the number of critical incidents occurring across the state. A particular focus was on the issues faced by rural areas, including lack of resources and the significant distances needed to be covered. They considered that local strategies had proven to be of limited benefit, and there was a wide variety of fetal welfare educational programmes being offered throughout the state. This was consistent with reports from Canada and the United States\(^4\)\(^6\) and a 2004 survey undertaken in Victoria by Beaves \({et al.}\)\(^7\) In 2005, Beaves and colleagues have subsequently reported significant intrapartum fetal surveillance deficiencies in 10 hospitals surveyed within Victoria.\(^8\)

In early 2006, a selected group of NSW clinicians met for a 1-day review of state and national fetal welfare and maternity emergency education programmes. They reviewed a number of currently available training programmes. The group decided that none of these offered a total solution for improving safety in fetal welfare surveillance and that a specifically designed, interprofessional, combined online and face-to-face educational programme that would be consistent across the state needed to be developed. A key aim was to build local strength and capacity through a ‘train-the-trainer’ approach for the development of the Fetal welfare, Obstetric emergencies Neonatal resuscitation Training (FONT) Project. The project outline was for online training through the K2 Medical Systems Program (K2 Medical Systems, Devon, UK) and two 2-day interprofessional ‘train-the-trainer’ education programmes for obstetricians, general practitioners and midwives in each AHS. The first 2 days provided fetal monitoring training and the second 2 days maternity emergency and neonatal resuscitation education. This study describes the short-term outcomes for the first of the 2-day ‘train-the-trainer’ education programmes completed in April 2008.

**Methods**

From April 2007, the FONT Project Officer undertook the development of the project plan, coordinated the Clinical Advisory Group, developed the educational material, assisted with the contractual arrangements for K2 Medical Systems to provide online fetal surveillance training for all maternity practitioners in NSW and led the face-to-face education of the medical and midwifery trainers for the state.

There were three stages of development proposed. First, the state-wide implementation of the K2 Medical System Computerised Training Programme to all public hospitals in NSW responsible for the provision of maternity care; secondly, the development and provision of the ‘train-the-trainer’ education program for the fetal welfare assessment component (the first 2-day training programme) and finally the development and provision of the ‘train-the-trainer’ education programme for the obstetric emergency and neonatal resuscitation component (the second 2-day training programme).\(^9\)

An initial step undertaken was a structured risk assessment of the FONT project by the NSW Government Insurance Office (GIO) ‘Treasury Managed Funds (TMF) to identify risks and possible controls to deal with the risks identified. The individual steps identified were that; 240 maternity care providers (obstetricians, general practitioners and midwives) would need to become FONT trainers (30 for each AHS); these trainers would need to maintain ongoing regular training sessions in their AHS; staff would need to be allocated time to attend and provide the training and all providers of maternity care in NSW public hospitals would be required to attend a full day of FONT training each 3 years as well as complete the K2 online training programme. The threats were identified as lack of funding to send staff to training; the willingness of staff to be trainers and to be trained in interprofessional groups and absence of skilled staff to provide the education. The controls put in place were that; a NSW Department of Health Policy Directive mandating the education programme was implemented; funding was allocated to provide maternal, fetal and neonatal training equipment; the state-wide K2 online education programme was funded and all clinicians were to attend the same educational days with no special training days to be organised to meet the needs of individual professions.

The two trainers for the ‘train-the-trainer’ phase were a midwife trainer (HC the FONT Project Officer) and an obstetrician trainer (WG who was seconded to the FONT project). The clinicians attending were selected by their AHS as potential trainers and consisted of midwives, obstetricians and general practitioners. The inclusion of all clinicians associated with maternity care is an important issue as teamwork has been highlighted in the literature as crucial in improving care.\(^10\)\(^11\)

The proposed evaluation of the training sessions was reviewed by the FONT Clinical Advisory Group. A single group, pre-test–post-test design was approved to assess the effectiveness of the training sessions. Access to the maternity SAC incident types (Table 1) was approved by the NSW Clinical Excellence Commission, and ethics approval was from the University of Technology Sydney. Following consent, clinicians completed pre- and post-testing at each ‘train-the-trainer’ education session which required assessment and grading of two EFM patterns; one normal

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<tr>
<th>Table 1 Classification of maternity Severity Assessment Codes 1 and 2 that resulted in mortality or severe morbidity</th>
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<tr>
<td>Antepartum haemorrhage</td>
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<td>Breech delivery</td>
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<td>Cord prolapse</td>
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<td>Neonatal resuscitation</td>
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<td>Postpartum haemorrhage</td>
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<td>Shoulder dystocia</td>
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(Fig. 1) and one pathological (Fig. 2). The clinicians were asked to assess basic information regarding the patterns reporting the baseline fetal heart rate, the heart rate variability, the presence of accelerations (and reactivity if that was appropriate), decelerations and their overall diagnosis of the EFM pattern and proposed management. Pre- and post-test results were compared to determine the short-term effect of the training days.

The differences in pre- and post-test scores were assessed for significance using Minitab (Minitab Release 12, State College, PA, USA) with the assessment of Chi-square for the percentage differences. Significance was designated at the $P < 0.05$ level. Tests for trend in SAC 1 and 2 data were carried out using STATA version 10 and StatXact (Cytel Incorporated, Cambridge, MA, USA).

**Results**

From 20 February to 17 April 2008, 240 trainers trained people in the fetal welfare assessment programme (day 1). These were comprised of 202 midwives and 38 doctors (25 obstetricians and 13 general practitioner obstetricians) with at least one representative from each of the maternity units of their AHS. They had then provided 53 training sessions within their AHS with 954 clinicians (25% of the state’s maternity practitioners) trained for fetal welfare assessment by the end of December 2008.

For the normal EFM pattern, the clinicians could clearly recognise this as normal, but after the training their ability to define the elements of normality improved (Fig. 3). The improvements were in their identification...
and definition of variability ($P = 0.02$), accelerations ($P = 0.033$) and decelerations ($P = 0.033$). For the pathological EFM pattern, there was a significant improvement in the clinicians’ ability to diagnose the pathological nature of the pattern ($P = 0.005$) (Fig. 4). Specifically, the understanding of the components of the pathological pattern namely baseline heart rate ($P = 0.004$), variability ($P = 0.023$), accelerations ($P = 0.001$) and decelerations ($P = 0.0000$).

Trend analysis showed that there was no significant trend in the absolute numbers of adverse events over the 4-year period.

**Discussion**

The development of FONT followed the ability of NSW Health to acquire data from IIMS, which allowed the quantification of SAC 1 and 2 (death and significant morbidity) events in maternity care. The initial purpose of FONT was to improve clinical acumen around fetal assessment by maternity practitioners working in the birthing units of NSW Health. Following initial discussions with senior clinicians, the project expanded to include a wider spectrum of fetal, maternity and neonatal emergency treatment. The first series of train-the-trainer sessions (fetal monitoring and assessment) was completed in April 2008 allowing an initial appraisal of impacts on knowledge of fetal welfare assessment, management planning and adverse events related to fetal welfare. The second series (maternity and neonatal emergencies) was completed in February 2009 (a total of 32 days), and a future study will assess the outcomes for this aspect of the FONT project when the data are available for analysis. This study presents the pre- and post-testing of the trainers in fetal monitoring and assessment. The importance of assessing the impact of this training project is essential if continued funding and support is to be maintained.

In reviewing the literature, a number of reports dealing with interprofessional education and its effect on maternity care and outcomes were found. These were notably in Bristol, United Kingdom dealing with eclampsia, shoulder dystocia and umbilical cord prolapse in the United States from the Hospital Corporation of America (where courses in EFM are only mandated for nurses) and two randomised controlled trials from the UK and United States. These studies varied between single referral hospitals and hospitals grouped in areas or regions. All reports described the importance of fostering teamwork as being a crucial part of the learning process and success of the project. Interestingly, specific training in teamwork dynamics was not associated with an increase in learning and effectiveness. One report of a cluster randomised controlled trial undertaken in the United States involving 1307 clinicians (given a standardised teamwork training curriculum) and analysing 28 536 births did not show a detectable impact on outcomes. However, the study excluded antepartum intrauterine fetal deaths, and used a complex scoring system to assess maternal and neonatal outcomes. As antenatal intrauterine fetal deaths comprise up to 45% of perinatal mortality, their exclusion from analysis weakened the study dramatically. There were other issues with this study namely that only 15 units were recruited and randomised (seven treatment, eight controls), and follow up and review were limited to 4 months following completion of training. These weaknesses were acknowledged by the authors who stated that 9 to 12 months follow-up was needed along with a larger number of units being studied to provide adequate power.

Surprisingly, programmes which have been in use for some years such as the ALSO programme have not been assessed with respect to any effect on patient outcomes.
We could not find an assessment of the effect of the introduction of a multidisciplinary education project on a similar scale to New South Wales. Therefore, this report adds to the evidence regarding the importance of an interprofessional education approach for all maternity care practitioners in the improvement of outcomes for mothers and babies. The compartmentalising of separate disciplines in maternity care has in the past resulted in miscommunication, terminology confusion and role ambiguity.6,20

The data from FONT pre- and post-testing demonstrate a significant improvement in skills for the interpretation of EFM, particularly with respect to the use of a shared/common nomenclature for the description of changes and consistent management plan for normal and pathological EFM patterns. A major limitation of the single group pre-test–post-test design with post-testing conducted on the same day as the education programme is the potential contribution of recall bias to the improvements in scores. Recall bias may have led to an overestimate of the effect of the education. However, there are problems with the use of different EFM traces with studies having shown reduced intra- and inter-observer reliability in interpretation of fetal heart rate patterns even when experienced clinicians are evaluated.21,22 In an effort to assess the change in knowledge at the education days, the Clinical Advisory Group chose the pre- and post-testing using the same normal and abnormal FHR patterns given that intra-observer variation could make the use of other FHR patterns nearly impossible to evaluate. It is important to note that between the pre- and post-test, the participants had spent the day studying a multitude of other FHR patterns.

The single group, pre-test–post-test design is a commonly employed design for evaluating staff development initiatives that aim to improve clinician's knowledge and teaching effectiveness.23 A systematic review of 53 such studies identified a range of positive effects of such initiatives, including significant gains in knowledge by the participants.23 Characteristics that were consistently associated with effectiveness included experiential learning, feedback, the importance of peers and the use of multiple instructional methods to accommodate different learning styles.

In recognition of the need to track changes over time, the results of the FONT project will be assessed over a 3-year period and will utilise a mixed methods approach. It had been anticipated that in increasing the skills and awareness of clinicians in the interpretation and recognition of the pathological EFM pattern, there would be an initial increase in the numbers of SAC 1 and 2 notifications via the IIMS reporting system following FONT training. There were no significant trends noted over the 4-year period.

This initial assessment of the first series of training workshops for FONT has shown the results of a state-wide approach and commonality in interpretation of fetal heart rate assessment with a standardisation and consistency in clinical management. This was achieved by a consistency in the multidisciplinary education of clinicians throughout the state. Finally, this has been supported as a mandated education process for clinicians practising in NSW public hospital maternity units; a situation that wasfavoured by the majority of respondents surveyed in Victoria in 2004.8

We believe that this is the first occasion that a State Health Department has endeavoured to undertake the education of all clinicians within its maternity units (midwives, obstetricians and general practitioners) in the management of fetal welfare assessment and maternity emergencies. The initial analysis is encouraging with respect to fetal assessment.

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