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Exploration of preterm birth rates associated with different models of antenatal midwifery care in Scotland: Unmatched retrospective cohort analysis

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ABSTRACT

Objectives: preterm birth represents a significant personal, clinical, organisational and financial burden. Strategies to reduce the preterm birth rate have had limited success. Limited evidence indicates that certain antenatal care models may offer some protection, although the causal mechanism is not understood. We sought to compare preterm birth rates for mixed-risk pregnant women accessing antenatal care organised at a freestanding midwifery unit (FMU) and mixed-risk pregnant women attending an obstetric unit (OU) with related community-based antenatal care.

Methods: unmatched retrospective 4-year Scottish cohort analysis (2008–2011) of mixed-risk pregnant women accessing (i) FMU antenatal care ($n=1107$); (ii) combined community-based and OU antenatal care ($n=7567$). Data were accessed via the Information and Statistics Division of the NHS in Scotland. Aggregates analysis and binary logistic regression were used to compare the cohorts' rates of preterm birth; and of spontaneous labour onset, use of pharmacological analgesia, unassisted vertex birth, and low birth weight. Odds ratios were adjusted for age, parity, deprivation score and smoking status in pregnancy.

Findings: after adjustment the 'mixed risk' FMU cohort had a statistically significantly reduced risk of preterm birth (5.1% [$n=57$] versus 7.7% [$n=583$]; AOR 0.73 [95% CI 0.55–0.98]; $p=0.034$). Differences in these secondary outcome measures were also statistically significant: spontaneous labour onset (FMU 83.9% versus OU 74.6%; AOR 1.74 [95% CI 1.46–2.08]; $p<0.001$); minimal intrapartum analgesia (FMU 53.7% versus OU 34.4%; AOR 2.17 [95% CI 1.90–2.49]; $p<0.001$); spontaneous vertex delivery (FMU 71.9% versus OU 63.5%; AOR 1.46 [95% CI 1.32–1.78]; $p<0.001$). Incidence of low birth weight was not statistically significant after adjustment for other variables. There was no significant difference in the rate of perinatal or neonatal death.

Conclusions: given this study's methodological limitations, we can only claim associations between the care model and or chosen outcomes. Although both cohorts were mixed risk, differences in risk levels could have contributed to these findings. Nevertheless, the significant difference in preterm birth rates in this study resonates with other research, including the recent Cochrane review of midwife-led continuity models. Because of the multiplicity of risk factors for preterm birth we need to explore the salient features of the FMU model which may be contributing to this apparent protective effect. Because a randomised controlled trial would necessarily restrict choice to pregnant women, we feel that this option is problematic in exploring this further. We therefore plan to conduct a prospective matched cohort analysis together with a survey of unit practices and experiences.

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Introduction

Preterm birth is rising in almost all countries with reliable data (WHO, 2012). Preterm babies are disproportionately represented in mortality and morbidity figures. In addition to the personal distress involved – which includes potential long-term health deficits for the child - this clinical feature involves significant financial and organisational resources (Petrou, 2005; Mangham et al., 2009). Lisonkova et al. (2011) note the importance of the iatrogenic element which was held to have increased preterm birth rates in the USA. Although the US rate has fallen slightly in recent years (from a peak of 12.8% in 2006 to 11.7% in 2011; March of Dimes 2012) – it is still a critical concern. Associated US medical and educational expenditure was estimated in 2005 to exceed $26 billion. Whereas the UK preterm birth rate is significantly lower (7.6% in 2010; WHO, 2012), it is still a matter of grave concern, not least for the financial implications: Mangham et al. (2009) estimate that the public sector cost in England and Wales in 2006 was £2.95 billion (US$4.57 bn).

It is acknowledged that preterm birth has a complex epidemiology (Goldenberg et al., 2008), but despite extensive research (Steer, 2005; Goldenberg et al., 2008) its incidence has not been reduced (Steer, 2006). Nevertheless, growing evidence suggests that the model of antenatal care may have an effect on the likelihood of spontaneous preterm birth. A recently revised Cochrane review found significantly reduced preterm birth rates for 'continuity models' of midwifery care (Sandall et al., 2013), although most of the included studies were for 'low-risk' women. The two studies which reflected a mixed-risk caseload showed a non-statistically significant reduction; only one of the seven included trials included community-based care.

Allen et al.'s (2012) review of alternative maternity care provision found that 'non-standard' models were associated with a reduced incidence of preterm birth, as well as more frequent antenatal visit attendance and increased breast-feeding initiation. Allen et al. (2012) defined 'standard' care as that provided by rostered hospital staff, whereas 'non-standard' care included midwifery group practices, group antenatal care, and Young Women's Clinics. Their review included a discussion of the Centering Pregnancy™ Group Antenatal Care scheme (Klima et al., 2009; Dellos and Marshall, 2011). Results from such schemes suggest that outcomes are significantly improved even in groups which usually have poorer than average outcomes (such as teenage mothers and those from deprived backgrounds), although to date the scheme has not been the subject of a randomised controlled trial within the UK. A non-statistically significant difference in preterm birth rates (4% versus 6%) was found in Tracy et al.'s (2013) comparison of 'caseload' and 'standard' midwifery care. A finding of a highly significant difference in preterm birth rates was also found in a matched cohort study comparing clinical outcomes for women receiving 'standard' National Health Service (NHS) care and women employing an independent midwife (Symon et al., 2009); 87% of the latter were planning a home birth [66% achieved this]. In that study results were adjusted for several risk factors including medical and previous obstetric complications, so off-setting one of the criticisms levelled at evaluations of 'non-standard' antenatal care packages – that they focus principally on birth outcomes for 'low-risk' women (cf. Reddy et al., 2004). However, Hollowell et al. (2011) systematic review found that there was insufficient evidence of different antenatal care programmes reducing infant mortality (and preterm birth, a major factor in such mortality) in disadvantaged or vulnerable groups, and they concluded that the quality of evidence overall was poor.

Re-shaping midwifery care in an attempt to reduce preterm birth is an emerging theme (McNeil and Reiger, in press) and offers significant potential savings (Skelton et al., 2009). However, the low numbers in the UK accessing the independent midwifery and Centering Pregnancy™ models make evaluations of such schemes problematic; and the fact that many midwife-led units (MLUs) focus largely on 'low-risk' women is a limiting factor. Much of the literature concerning MLUs does not distinguish between different types of unit, treating freestanding and alongside units as a single entity (Stewart et al., 2005). If only 'low-risk' women are included in most MLU studies this restricts comparisons with other models which cater for women of all risk levels. A potential solution is to explore the mixed-risk freestanding midwifery unit (FMU) model because women of any risk status may receive at least some of their antenatal care there.

'Freestanding' midwifery units (FMU)

Although there is no single FMU model, over 23,000 women a year give birth in a FMU in England (TIC, 2006); in Scotland over 1200 women gave birth in a FMU in 2010 (BirthChoice UK, 2010). In addition, many FMUs offer antenatal care to women with a range of risk levels within a defined locality, irrespective of planned place of birth. This broader risk profile offers up the possibility of comparing results with 'standard' antenatal care models which cover women of all risk levels.

Most FMUs, known in some places as 'stand-alone units', are 'situated away from a main obstetric hospital, often in a small community hospital' (BirthChoice UK, nd). Women with defined medical conditions or obstetric risk factors will receive most antenatal care on a 'shared' basis in the obstetric unit, and may be booked to give birth there, but in some cases are also free to access local FMU care. This focus on providing care away from centralised hospitals reflects government priorities throughout the UK (DH, 2004; MSAG, 2011; Welsh Government, 2011; DHSSPS, 2013). This is particularly the case in Scotland, where many of those in remote and rural areas (such as the Highlands and Islands) do not have immediate access to obstetric unit (OU) services. BirthChoice UK lists 35 maternity units in Scotland, of which 20 are designated 'small' (range 6–330 births per year; average <100).

Many women receiving FMU care will plan to have their baby in that unit; some will be transferred to an OU because of pregnancy or intrapartum complications. Transfer rates vary by type of unit ('freestanding' or 'alongside') and parity (NICE, 2007), but in most if not all such cases the woman will have received the antenatal care package originating in the FMU. Whereas reviews of FMUs focus largely on intrapartum care (Newburn and Singh, 2003; Overgaard et al., 2011), it is the antenatal care package with which we are interested here because our principal focus is on the risk of preterm birth. We emphasise that this study was concerned with the locus of antenatal care, not with planned or actual place of birth.

The study

Within our locality is a FMU which offers antenatal care to women of all risk levels, irrespective of planned place of birth. Uptake of this antenatal care package is extremely high, with very few women opting for exclusive care at the associated obstetric unit 30 miles away. Those women who require obstetric input or review (for example because of pre-eclampsia or previous caesarean section) can receive this on-site when a consultant obstetrician visits on a periodic basis (usually fortnightly). Specialist services, for example for insulin-dependent diabetics, are accessed at the associated OU, but in almost all cases these women also attend the FMU for midwife-led antenatal care. The presence of defined risk criteria does not preclude access to antenatal care there, and indeed only in exceptional cases do pregnant women receive all their care at the OU.

The FMU claims to promote a calm environment dedicated to woman/family-centred care, a flexible 'drop-in' service, and encouraging the woman to be an active participant (Winters and Nicoll, 2006). Because all women living in this locality are eligible for at least some antenatal care at the FMU (and indeed uptake is known to be

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