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Process lessons from evaluating a combined continuity of carer and
home birth scheme

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Abstract

Introduction

Continuity of midwifery carer improves outcomes, but there is significant variation in how such schemes are implemented and evaluated cross-culturally. The Angus home birth scheme in Scotland incorporates continuity of carer throughout pregnancy, labour, birth and the postnatal period.

Methods

Manual maternity case note review to evaluate the 80% continuity of carer and 3% planned home birth rate targets.

Results

Of 1,466 women booking for maternity care, 69 joined the scheme. Forty-four had a planned home birth (3% overall), of whom seven were originally deemed ineligible. Of the 44, eight (18%) also achieved 80% continuity of carer with the primary midwife; by including a home birth team colleague the continuity rate rose to 73%. Women whose care achieved home birth and continuity targets had lower deprivation scores. Eligibility issues, women's changing circumstances and data recording lapses were complicating issues.

Conclusions

Targets must be both feasible and meaningful and should be complemented by assessing a broad range of outcomes while viewing the scheme holistically. By expanding eligibility criteria, the home birth rate target was met; including input from a home birth team colleague in the calculation meant the continuity target was nearly met. With dedicated and competent staff, adequate resource and political support, and when considered in the round, the scheme's viability within local services was confirmed. Other generalizable learning points included the

43 need to standardise definitions and data recording methods. Comparability across schemes
44 helps grow the evidence base so that the links between processes and outcomes can be
45 identified.

46

47

48 **Keywords**

49 Continuity of carer Home birth Maternal choice

50 Caseload midwifery Socio-economic inequality Record keeping

51

Background

Continuity of midwifery care is known to improve clinical and psychosocial outcomes¹⁻⁴ and to be cost-effective.^{5,6} While not a new concept,⁷ the United Kingdom's (UK) renewed policy focus on implementing continuity of carer^{8,9} includes a drive to identify robust evaluation mechanisms. In England, the Maternity Transformation Programme¹⁰ is designed to deliver *Better Births*⁸, while in Scotland an Implementation Programme Board¹¹ co-ordinates the adoption of the Scottish Government's *Best Start*⁹ recommendations. Principal among these is ensuring continuity of carer within a high quality and accessible family-centred care package.

Continuity of carer schemes vary, but most involve care by a primary midwife, together with a 'buddy midwife' who deputises when required;¹² both provide the same care. While all new schemes' targets must be evaluated (in this case 80% for continuity of carer and 3% for planned home birth), the definitions for several key elements are only now being broadly agreed upon. As such, the evaluation process is complex.¹³ There is also a danger of confusing process and outcome variables. Continuity of carer – the process – is only a means to achieving improved clinical and psychosocial outcomes. However, most studies do not explicitly measure the continuity of care or carer provided, leaving unanswered the question of whether the claimed benefits are subject to either a dose-response or a certain threshold of continuity.

The advantages and disadvantages of planned home birth have long been debated.¹² Choice about place of birth is advocated within UK national policy guidelines.^{9,14} However, in practice, real choice is often restricted¹² with the evidence on safety and choice hotly contested.¹⁵ Home birth rates vary around the UK from virtually nil in some areas to as high as 10% in others.¹⁶ Any home birth scheme must be able to demonstrate that it is offered equitably. While not unchallenged,¹⁷ the idea that home birth is a middle class preserve has been noted internationally.¹⁸⁻²⁰ In this paper, we present the evaluation of a new scheme offering planned home birth within a package involving continuity of carer throughout pregnancy, childbirth and

the postnatal period as an awareness raising exercise for others planning continuity of carer or combined home birth and continuity schemes.

The local context

The planned home birth rate in NHS (National Health Service) Tayside – one of 14 regional Health Boards in Scotland – is historically low: in 2015 it was 0.28% (12/4285 births). To address this issue in Angus - a county within Tayside with an annual birth rate of circa 1,000 - local midwifery management introduced a caseloading continuity of midwifery carer package incorporating planned home birth. The Angus Home Birth (AHB) scheme ('the Angus scheme') was initially offered only to parous women deemed 'low risk', consistent with the Birthplace in England study criteria¹² (which informed guidance from the National Institute for Health and Care Excellence [NICE]²¹). Approximately 30% of pregnant women in Angus were deemed eligible.

Two part-time midwives (0.5 whole-time-equivalent [WTE]) started this caseload scheme, splitting the workload equally. The two principal targets were: 1) a 3% home birth rate (county-wide, about 30 births annually); and 2) at least 80% continuity of carer by the primary midwife throughout pregnancy, labour and the postnatal period. Another community midwife from the wider community team provided care if neither primary nor 'buddy' midwife could attend antenatally or postnatally, and also provided 'on call' home birth cover when required. Both original Angus scheme midwives left in the initial 18 months for reasons unrelated to the scheme and were replaced by three midwives initially working part-time (0.5 WTE), now full-time. All the midwives in the home birth team and the wider community team had undergone the same midwifery education and training, worked for the same employer, and were subject to the same working guidelines.

The evaluation

This paper reports our evaluation of the Angus scheme in relation to its planned home birth (3%) and continuity of carer (80%) targets. Our secondary objectives included evaluating the characteristics of the women whose care achieved the home birth and continuity targets, those whose care did not, those who declined the service, and those who were not eligible.

Methods

Phase I involved a case note review of all women entering the Angus scheme.

Group 1 included women whose care package achieved both home birth and continuity targets; Group 2 included women who entered the scheme but whose care package achieved either just one of the targets, or neither of them; Group 3 included women who were eligible but declined the care package. For additional comparisons, we randomly selected women who were ineligible (Group 4), and also included women who were ineligible according to the original criteria but who nevertheless joined the scheme (Group 5). Data extraction and analysis of hard copy notes was carried out by AS (academic midwife), and SS (clinical midwife). Formal ethics approval was not required for Phase I as it was deemed a service evaluation. However, approval to access records was obtained from the local NHS Caldicott Guardian – a senior Health Board official responsible for ensuring patient-identifiable information is handled appropriately. Research University data management regulations applied throughout. Data were entered directly into a password-protected Excel database on a laptop and uploaded to the university's secure cloud-based system. No personal identifiers were recorded. All mothers and midwives were given a unique anonymous identifier.

We included women who booked from the scheme's inception (April 2016) to October 2017 (latest recorded Expected Date of Delivery 31/3/2018) giving an 18-month evaluation period. We conducted an inter-group analysis of basic clinical and socio-demographic data, using

Anova and Chi-square (χ^2) as appropriate. Parity was grouped: primigravida; Para 1; and Para 2+. We used the Scottish Index of Multiple Deprivation (SIMD)²² estimation of an individual's deprivation score using their postcode (zip code). This is a standard mechanism for evaluating the significance of deprivation in health outcomes.

We recorded the relevant gestation of each planned and unplanned antenatal visit. We recorded which midwives attended the woman throughout pregnancy, labour/birth and the postnatal period. We used a standard 'density' approach to calculate continuity of carer²³ by identifying the denominator (the number of planned antenatal / postnatal visits; labour counted as one visit), and the numerator (how many of these involved the primary midwife; and, alternatively the primary midwife and a home birth team colleague).

Phase II involved qualitative evaluation of stakeholder perceptions. These findings are described in detail in the accompanying paper (this volume).

Results

Primary Outcome

During the 18-month evaluation period, 1,466 women booked for antenatal care in Angus, of whom about 440 would have been considered eligible for this study. While we cannot be certain that all 440 were told about the scheme due to documentation issues, 52 accepted. A further 17 women, previously ineligible before the criteria were expanded to include nulliparous women and multiparous women with some medical complexity, were also accepted following discussions which included a consultant obstetrician, meaning that a total of 69 joined the scheme. Forty-four had a planned home birth for a rate of almost 3.1% (44/1435), thus meeting the scheme's first target [the denominator was reduced by a calculated 2.1% non-continuing pregnancy rate²⁴ from 1,466 to 1,435]).

Twenty-five of the 69 did not have a planned home birth. Reasons included change of mind (n=7); requiring induction (n=9); medical advice [large baby; fetal abnormality; breech] (n=3); intra-uterine death (n=1). Five were transferred during labour (augmentation n=2); preterm (n=2); prolonged rupture of membranes (n=1). Of these 25, 17 had a normal birth at term. There were also four postnatal transfers: perineal suturing (n=2); post-partum haemorrhage (n=1); retained placenta (n=1).

Eighteen percent of the women who gave birth at home also achieved the 80% continuity of carer target with their primary midwife throughout (8/44 - last row; Figure 1). Excluding the postnatal period increased the rate to 55% (24/44) (third row; Figure 1). Including the buddy midwife in the 'care throughout' calculation resulted in a continuity rate of 73% (i.e. 32/44).

Figure 1

Many women did not enter the scheme at booking (usually around 10-12 weeks) as initially anticipated. Recruitment 'spikes' occurred at 16, 24, 28 and 35 weeks (mean 23 weeks; mode

24; range 6-38). Having fewer antenatal visits in the scheme reduces the denominator when calculating continuity of carer.

Secondary outcomes

There were no statistically significant differences between the deprivation (SIMD) profiles of those joining and those not joining the scheme ($\chi^2=1.779$; $p=.77$; $df=4$). Women who achieved both home birth and continuity targets were less likely to have high deprivation scores. None was in the most deprived quintile, while those in the scheme who had a hospital birth were more likely to be from the two most deprived quintiles (Figure 2).

Figure 2 SIMD profiles

Those not eligible for and not in the scheme (see fifth row, Figure 2) had a similar SIMD profile to the women who were in it and achieved all targets (see first row, Figure 2). A quarter of those giving birth at home were from the two highest deprivation quintiles (SIMD 1 and 2).

The SIMD profile of women entering the scheme and the general county population profile appeared broadly similar. However, women from the ‘least deprived’ quintile (SIMD 5) were much more likely to join the scheme (12.9% Angus scheme vs. 1.6% general population) ($\chi^2 = 45.665$; $p<.001$; $df=4$).

Age was not a significant variable, either between the five groups ($F=1.116$; $p>.05$) (Table 1), or between those in the scheme who achieved a home birth and those who did not (mean 30.7 vs. 29.5; $F=.898$; $p>.05$).

Table 1 Age and clinical data

For those having a home birth, analysis of parity showed no significance ($r=1.956$; $df=2$; $p>.05$).

188 Of ten women in the Angus scheme who had a previous instrumental birth, seven had a planned
189 home birth. One of these seven, and the three who did not give birth at home, were all designated
190 ‘not low risk’ towards the end of the pregnancy. Of the seven achieving a home birth, five also
191 achieved the 80% continuity target (rates for the other two were 70% and 79%). The one woman
192 in the scheme who had had a previous caesarean birth required a further caesarean. Two of the
193 women entering the scheme – one eligible, one theoretically ineligible - had a preterm birth;
194 both births were in hospital.

195

Discussion

Improving pregnancy outcomes is both a research and a policy priority.^{14,25,26} Evaluating an innovative scheme as safe, effective and popular can be said to address satisfactorily its political, clinical and social requirements. These include ensuring clinical safety and social acceptability, as well as meeting management-specified targets. Cheyne et al¹³ note that continuity is ‘deceptively complex’ and that evaluating all the physical, political, financial, environmental, resource and personnel factors requires a thorough understanding of terminology and context. Our evaluation focused on the Angus scheme’s planned home birth and continuity of carer targets and, through our qualitative evaluation (this volume), its acceptability to stakeholders.

The debate about place of birth varies around the world. In some low resource settings, birth in maternity units is encouraged in order to reduce maternal and neonatal mortality and morbidity rates.²⁷ In high resource countries with effective infrastructure and a strong autonomous midwifery profession, the debate more often concerns choice.²⁸ Had the Angus scheme become associated with mortality or significant morbidity it would have been suspended by management. While we noted relevant clinical outcomes, these were not part of our formal evaluation. This evaluation focused on the scheme’s principal targets (percent home birth and continuity of carer), as well as acceptability with stakeholders.

Calculating the home birth rate is not difficult. However, evaluating continuity of carer is more complex because of competing understandings about what to count and different recording systems. From our evaluation of the Angus scheme, we offer a discussion of salient issues regarding the process evaluation of home birth and continuity of carer. Our accompanying paper reports our assessment of stakeholder perceptions.

Eligibility and awareness

The Angus Home Birth scheme achieved its 3% planned home birth target. However, this included some women originally deemed ineligible but who nevertheless chose home birth. Eligibility was initially restricted to ‘low risk’ parous women using the Birthplace study’s definition - effectively meaning the absence of a medical condition or obstetric complication¹². However, increasing demand and the midwives’ growing confidence led to greater choice and flexibility about informed birthplace discussions. In addition to eight women originally excluded because they were primigravid, nine parous women were accepted following discussion - which included the consultant obstetrician - about risk factors (high parity; previous caesarean; elevated BMI; medical history). The Birth in Angus Facebook page reported a 5% home birth rate in 2019. This greater demand was partly driven by women’s positive stories, some of them on the Angus Home Birth private Facebook page. Referring to the Albany Midwifery Practice, a continuity of carer scheme in a deprived area of London, Reed²⁹ called this “the cultural norm of birth at home”, something we address in our accompanying paper. Such schemes should be advertised and promoted equitably. A long-standing body of literature details the possible influence of social class on childbirth decisions,³⁰⁻³² although before its closure, the Albany Midwifery Practice had demonstrated home birth’s viability even in areas of high social disadvantage.¹⁷ To those who suspect that home birth is a middle class phenomenon, we can offer a qualified rebuttal. Using the standard Scotland-wide calculation of deprivation scores, we found that a quarter of the women achieving planned home birth in Angus were from the two *most* deprived quintiles. However, our analysis also suggests that better-off women were over-represented in the scheme and were also more likely to achieve both planned home birth and continuity of carer targets. Any evaluation of similar schemes must examine the issues of eligibility and uptake.

Which targets?

Meeting the continuity of carer target was significantly helped by flexible working patterns whereby midwives could schedule antenatal visits to suit the women's other commitments and their own workloads; such flexible planning also helped to ensure adequate cover for home births (see our accompanying paper for more detail). The original continuity of carer target throughout pregnancy, labour/birth and the postnatal period was 80%. Less than a fifth of those having a planned home birth achieved this continuity with just the primary midwife; our initial conclusion is that this target was unrealistic. Including a 'buddy' midwife (the scheme comprising two, then three midwives) significantly improved the continuity of carer rate. Our qualitative evaluation established that each woman could meet this 'buddy midwife' before labour. However, it becomes harder in larger teams to ensure a meaningful relationship, which is, after all, the purpose of continuity of carer. In pursuing its 75% continuity of carer target, the Scottish Government's *Best Start* implementation group suggests up to one colleague during the antenatal and postnatal periods, and up to two during labour and birth. It is acknowledged that it is difficult for a labouring woman to build up a trusting rapport with someone whom she has just met, but the intention is that there is at least a known caregiver present. In England, the *Better Births* target is a 20% annual increase of births having continuity of carer.¹⁴ To have comparable data, consultation between those monitoring different schemes is essential.

A care package may only just reach, or just fail to reach, a target. Thresholds, however defined, produce a binary outcome, although the actual difference in care terms may be marginal. They are also, to an extent, arbitrary: one woman's continuity of carer rate was 79%, which 'failed' to meet the Angus scheme's target while meeting the later Scotland-wide target. Targets can be altered by allowing the inclusion of colleagues. Target-setting should not be arbitrary or done simply to ensure targets are met. Perhaps most importantly, targets produce binary outcomes which may mask a dose-response finding.

We raise three notes of caution regarding targets: firstly, a target of *all women* receiving at least 75% continuity of carer from two named midwives is quite different from a target of 75% of

women receiving *all* their planned visits from those midwives. Both options have been suggested in national strategy discussions, but despite appearing similar, these are quite different calculations. Secondly, meeting a target may be satisfying, but this is merely a proxy for achieving good care and better clinical and psychosocial outcomes. Thirdly, it is important to see targets in the wider context of care evaluation; care planners should identify how to respond when targets are missed.

Which visits are counted?

Continuity of midwifery carer is an evolving model in the UK.^{9,14} Schemes variously include individual caseloading and team continuity.³³ While Sandall's monitoring and evaluation framework offers helpful definitions and advice,³³ a diversity of schemes and implementation strategies risks inconsistency. Various instruments are available to complement the process evaluation,³⁴ but first it must be established whether the process is being implemented effectively. Targets may reflect local priorities and circumstances. The Angus scheme covers pregnancy, labour/birth and the postnatal period. The 80% primary midwife continuity target was achieved in most cases for the antenatal and intrapartum periods, but not when including the postnatal period. Having only two (then three) part-time midwives was a factor: having two present at the birth made it less likely that one would also be working when postnatal visits were needed. With all three midwives now full-time, this situation has eased.

Some schemes omit labour/birth or postnatal figures in their targets; parallel calculations for different combinations of antenatal, labour/birth and postnatal care are feasible. Crucially, the 'visits' denominator should only include planned visits, whether they are midwife-only or involve the midwife and a doctor or other specialist. The intrapartum period counts as a single visit, and unplanned visits (e.g. to triage) do not count.

Late booking (or, as here, late entry to the scheme) affects the visits denominator. This is a potential risk where the planned number of visits is low, as is common in many low resource countries.³⁵ Missing just one visit may mean that the target is missed. Threshold continuity targets raise the possibility of perverse incentives: arranging extra visits where continuity can be guaranteed increases both numerator and denominator, and therefore the continuity of carer rate. Since health service managers have been accused of manipulating figures so as to achieve targets,³⁶ this is not entirely fanciful. It is our impression that autonomous midwives would resist such manipulation.

Which midwives provide the care?

In the Angus scheme the primary midwife provided care, involving a ‘buddy’ or other community midwife when required. The ‘buddy’ should be designated in advance to avoid the criticism that continuity of carer occurs by chance rather than by design. Some schemes plan care around a wider midwifery team.³³ With a small team a woman can feasibly meet each midwife during pregnancy, but covering the birth is more problematic. The first postnatal visit may also be difficult if more than one team midwife attended intrapartum, especially with a prolonged or overnight labour. In the UK, teams of up to six-eight midwives (perhaps comprising six Whole Time Equivalents [WTEs]) have been suggested.³⁷ Over 60% of UK midwives work part-time,³⁸ so in practice, this means at least eight midwives. Whether genuine continuity of carer can be achieved may be questioned if a critical ingredient is a meaningful, trusting relationship. Additional group-based meetings can be arranged, including group care visits and social get-togethers; the content of such meetings will determine whether meaningful relationships can develop. This can be assessed by asking women if they knew the midwife before the onset of labour, and felt safe and supported in her care.¹¹

Staff turnover, a recognised feature of contemporary healthcare, should be factored in when setting targets. Both initial midwives left the Angus scheme within 18 months, inevitably impacting continuity rates.

Record keeping and monitoring issues

When evaluating this scheme, the switch from hand-written to electronic recording was incomplete. Nevertheless, the same recording issues apply whether the record is digital or paper-based. Additional (i.e. not pre-planned) visits must be clearly flagged to avoid being included in continuity calculations. When and why women meet other members of the team (e.g. through 'joint visits'), and whether this is significant enough to be included in continuity calculations must be recorded carefully. In our analysis, most women were deemed 'low risk', so few additional visits were required; this will not apply in all schemes. The rationale for including 'ineligible' women was also sometimes hard to identify in the documentation, but appears to have resulted from greater demand from women, and greater confidence among midwives, with a corresponding desire to empower women with more choice.

We are aware that databases are being created to monitor continuity. Busy midwives may resist recording yet more information. Indeed, we could not always identify when joint visits occurred. If recording practices vary, then establishing an accurate picture or making comparisons becomes difficult. Electronic records should allow for visits to identify more than one practitioner's name. Recording and monitoring requirements must be practicable, and compliant with data storage regulations.³⁹

Limitations

The statistical analysis in this small-scale study is for illustrative purposes only. Comprehensive evaluations would require considerably more planning and resources.¹³ Nevertheless, while not

claiming generalisability, we believe others in similar situations may benefit from considering some of process issues we identified. Continuity schemes linked to *Better Births*¹⁴ and *The Best Start*⁹ are being rolled out across the United Kingdom and are also being implemented in many other countries. In addition, the focus on high quality midwifery care is of broad international interest.⁴⁰

Local health records were not fully digitised. There were documentation quality issues, notably around which women were told about the scheme, and regarding when women changed their mind. However, assigning women to the appropriate groups for analysis was feasible. As we conducted a total population sample of women entering the Angus scheme, selection bias in Groups 1-3 was unlikely; it was minimised for Groups 4 and 5 by selecting these case notes at random.

Conclusion

Although the Angus scheme had mixed success regarding meeting its targets, and this was a small-scale study, this paper's principal purpose is to describe the lessons which may assist others when considering similar schemes. Firstly, the parameters must be clearly defined (which visits count; which practitioners are included in the calculations). Local data collection tools may reflect local circumstances. However, developing a robust and broad evidence base requires a commonly agreed-upon set of measures.

Secondly, targets must be meaningful and feasible. In retrospect, the Angus scheme's 80% primary midwife continuity of carer target was unrealistic. However, simply setting achievable targets should be avoided as these may not represent meaningful improvements in care. Achieving continuity targets does not of itself indicate any benefit; assessments must be broader, and include stakeholder perspectives. Those whose care packages do not meet the targets must also be considered carefully.

Lastly, good care models should be broadly available. Choice around planned home birth is sometimes contentious; indeed, in Angus, some technically ineligible women did join the scheme, following negotiation with the midwives. Assessments of clinical and social risk do inform decisions about birthplace. We found that many of those achieving a planned home birth had higher deprivation scores, reinforcing the need to offer such schemes equitably.

List of abbreviations

AHB: Angus Home Birth

CoCer: Continuity of Carer

df: degrees of freedom

EDD: Expected Date of Delivery

NHS: National Health Service

SD: Standard Deviation

SIMD: Scottish Index of Multiple Deprivation

UK: United Kingdom

WTE: Whole Time Equivalent

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

393 **Table 1** **Age and clinical data**

		AHB, Home birth and CoCer targets met N=32	AHB, Home birth but not CoCer N=12	AHB, but did not achieve home birth N=25	Eligible for AHB but declined N=33	Not eligible and not in AHB N=26
Age	mean [SD] range	30.4 [4.9] 20-42	31.6 [5.1] 22-38	29.5 [6.1] 19-41	28.2 [6.4] 18-39	28.9 [5.6] 15-40
Parity	0	0	1	7	6	4
	1	18	6	10	19	13
	2	6	3	3	8	9
	3+	8	2	5	0	0
Previous instrumental birth		5	2	3	7	1
Gestation	<37 weeks	0	0	2	4	4
	37-41	30	12	20	27	22
	42+	2	0	3	2	0

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Figure 1 80% continuity of carer target for the 44 women who had a planned home birth: a) with their primary midwife only;
b) with their primary midwife + an AHB team colleague

486 **Figure 2** SIMD profiles

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