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A cost-comparison of midwife-led compared with consultant-led maternity care in Ireland (the MidU study)

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ABSTRACT

Objective: to compare the cost of maternity care between two midwife-led units, and their linked consultant-led units, following a large randomised trial in Ireland.
Design: ethical approval was received for this unblinded, pragmatic randomised trial (MidU) funded by the Health Service Executive (Dublin North-East, Ireland), conducted 2004–2009. A comparison of costs analysis was conducted on the outcomes from the trial.
Setting: two maternity units in Ireland, with 'alongside' midwife-led units.
Participants: all women without risk factors for labour and birth who booked at the two maternity units before 24 weeks' gestation were assessed for inclusion. Consenting women ($n=1653$) were centrally randomised on a 2:1 ratio (1101:552) to midwife-led or consultant-led care.
Interventions: women randomised to consultant-led care received standard care. Women randomised to the midwife-led arm received midwife-led care provided by a small group of midwives in two units, situated 'alongside' the consultant-led units, throughout pregnancy, birth and postnatal.
Measurements: mean difference in clinician salaries, cost of care based on managers' data, known costs of postnatal bed days and costs of key interventions were measured.
Findings: the average cost of caring for a woman allocated to the midwife-led units was €2598, compared to €2780 in the consultant-led units (average difference €182 per woman, analysed by 'intention to treat').
Key conclusions and implications for practice: care in these two midwife-led units costs less than care provided by the consultant-led units. Given the clinical findings, which showed that care provided in the midwife-led units is as safe as that in the consultant-led units and results in less intervention, more midwife-led units should be incorporated into maternity care in Ireland so that scarce resources can be used more effectively.

Introduction

Prior to 2004, no midwife-led maternity units existed in the Republic of Ireland and maternity care was mainly hospital-based and consultant-led. A few hospitals provided antenatal and postnatal clinics, and home birth services, but there were no national community midwifery services available. Within two days of discharge from hospital, postnatal women received one home visit from a Public Health Nurse, with further visits as necessary. General practitioners provided a free check-up of

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mother and baby at six weeks postnatal. Home births were facilitated by a small number of self-employed community midwives, accounting for approximately 0.2% of annual births (Economic and Social Research Institute, 2011).

In 2001, a report on maternity care in one region of Ireland recommended the establishment of midwife-led units in Cavan and Drogheda (Kinder, 2001), two towns situated in the North-East of Ireland. The former North-Eastern Health Board commissioned the introduction of two 'alongside' midwife-led units within the context of a randomised trial (the 'MidU' study). This trial found no difference in outcome between women randomised to midwife-led care, as practised in that particular study in two 'alongside' midwife-led units, and consultant-led care and those allocated to midwife-led care had less intervention. In particular, women allocated to the midwife-led unit arm of the trial were significantly less likely to have their labour augmented, or to have continuous electronic fetal heart rate monitoring, with no statistically significant difference in either neonatal (low Apgar scores, resuscitation, admission to Special Care Baby Unit), or maternal (instrumental birth, caesarean section, or postpartum haemorrhage) outcomes (Begley et al., 2011).

Randomised trials are the most reliable test of the effects of health-care interventions and, when undertaken with an economic evaluation, provide a measure of the most efficient use of the scarce resources available (Drummond et al., 2005). Furthermore, the report of the Commission on financial management in the health service in Ireland found 'insufficient evaluation of existing programmes and related expenditure' (Department of Health and Children, 2003:5). Accordingly, an economic evaluation was included in the MidU study, and is presented here.

Henderson and Petrou (2008) provide a review of the economic implications of home births and birth centres, and four of the economic evaluations of birth centres/midwife-led units (MLUs) were relevant to economic questions posed by the MidU study. All were cost-effectiveness analyses; three were North American observational studies of freestanding birth centres (Walker and Stone, 1996; Reinharz et al., 2000; Stone et al., 2000) and one was a Scottish study of a birth centre on a hospital site (Hundley et al., 1995). All four found that freestanding birth centres/midwife-led units appeared to be a safe, effective alternative to the consultant-led units for a normal birth. Table 1a–c analyses these trials using a template based on quality guidelines (Drummond and Jefferson, 1996).

Reinharz et al. (2000) found that the hospital-based medical service was more expensive than midwifery services although the difference following sensitivity analysis was only CAN$90. Walker and Stone (1996) found that the total cost per low-risk birth was US$3385 in a freestanding birth centre in New York State, compared with US$4673 for traditional obstetric practice in a hospital setting, for women at low risk. Stewart et al. (2005) review of birth centre studies argued that the higher antenatal costs were due to the low volume of women and high fixed costs, mainly salaries, and that birth centres would be more cost-effective with a higher throughput. They stated that the exclusion of building or equipping costs from evaluations was the factor that most affected the outcome (Stewart et al., 2005:74).

Stone et al. (2000), similarly, found that birth in a free-standing birth centre cost US$6087 and in hospital cost US$6803. Univariate sensitivity analysis demonstrated the effect of increasing the number of women receiving care under the assumptions that variable costs including ancillary staff would be affected proportionately, but fixed costs, midwife labour costs, or costs associated with the type of care received in the birth centre, such as diagnostic tests, would not be affected. Under this scenario, antenatal costs had the potential to decrease by more than US $1000 per woman less than the medical model (Stone et al., 2000).

Hundley et al.'s (1995) randomised trial in Scotland, using intention to treat analysis, found that the 'baseline extra cost' (the extra cost per woman, in terms of staff, consumable and capital costs) of the introduction of midwife-led intrapartum care was £40.71 per woman and, in scenario (sensitivity) analyses using nine scenarios, midwife-led care ranged from a saving of £9.74 to an additional cost of £44.23. The increase in midwifery staffing levels was the main driver of the costs in the midwife-led unit (Hundley et al., 1995).

The four studies displayed similar limitations and it is unclear if their findings are applicable to other geographical areas. The average cost estimates for a normal birth varied widely in line with Henderson et al.'s (2001) findings. There was no measure of benefit used except by Walker and Stone (1996) and, in that case, it was unclear how this was derived. Indirect societal costs were only measured by Reinharz et al. (2000). The validity of the cost estimates was undermined because capital costs were only measured by Hundley et al. (1995) and incremental analysis was not conducted. Capital costs of converting the delivery suite for use as a midwife unit were obtained and the equipment costs considered were those for the midwife unit, but the costs of equipment that was used in the consultant-led unit were not considered. An equivalent annual cost was calculated using a 6% discount rate (Hundley et al.,1995). Hundley also reported the incremental cost of the alternatives but did not provide average cost figures (Hundley et al., 1995), whereas the other three studies only provided average costings.

Hundley's basic assumption that additional midwives were needed to set up the midwife-led unit, despite the fact that it was an alternative method to the consultant-led unit for normal births led to a higher cost than would apply if additional midwives were not required (as may be more often the case). In addition, Hundley et al. (1995) did not examine the possibly high cost implications of the additional length of postnatal stay in the consultant-led group. However, the scarcity of good quality evaluations combined with the wide variety of costs per birth presented makes it difficult to rely on the results reported. Since completion of the MidU trial, other economic evaluations of midwife-led services have been conducted: a randomised trial of 1110 women in Norway (Bernitz et al., 2012) showed a difference of €278 per woman between MLU and CLU care. An Australian randomised trial of caseload midwifery versus standard care found caseload midwifery cost €394 less (Tracy et al., 2013). Furthermore, a systematic review of trials also agreed that midwife-led care cost less (Ryan et al., 2013).

Primary outcomes from MidU trial

Seven primary outcomes from the trial (caesarean birth, induction of labour, episiotomy, instrumental birth, Apgar scores, postpartum haemorrhage, and breast-feeding initiation) showed no significant differences between the two groups and two (continuous electronic fetal monitoring and augmentation of labour) did (Begley et al., 2011).

Aim

To compare the cost-effectiveness of care in midwife-led units (MLUs) and consultant-led units (CLUs) on an 'intention to treat' basis. Since the MidU study did not detect any differences in primary outcomes, the economic evaluation presented here compares the costs of care in the two types of service.

Methods

Economic evaluation and costing methods

Drummond et al. (2005) define economic evaluation as the 'comparative analysis of alternative courses of action in terms of both their costs and consequences' (Drummond et al., 2005:8). The

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Table 1
Analysis of birth centre trials.

	Reinharz et al. (2000)	Walker and Stone (1996)	Hundley et al. (1995)	Walker and Stone (2000)
(a)				
Study design stated and justified				
Perspective of study	Societal	Health Insurer or patient	Hospital health care provider	Health care sector
Economic study type	Cost-effectiveness analysis	Cost-effectiveness analysis	Cost analysis	Cost-effectiveness analysis
Study setting	Quebec, Canada	New York, USA	Aberdeen, Scotland	Rural New York, USA
Study sample	1922 women	2000 women	2844 women	146 women
Data collection methods stated and justified				
Source of effectiveness data	Single cohort study with a randomised control group	Delphi model based on cohort study	Randomised controlled trial	Observational study
Source of cost data	Prospective costing of effectiveness sample data	Costing of diagnostic related groups (DRG)	Prospective costing of effectiveness sample data	Prospective costing of patient charts
Effectiveness results	Quality of care results were higher in the midwifery group than in the physician group	Found no difference in outcomes	Midwifery unit is safe, effective alternative and a lower rate of intervention	Women in the midwifery unit were more satisfied with their care and had better clinical outcomes
(b)				
Validity of measure of benefit	No benefit measure used	Utility values derived but source or method not explained	No benefit measure used	No benefit measure used
Validity of estimate of cost	No discounting required as less than one year. Only short-term costs were considered			
	Av. costs only reported.	Av. costs only reported.	Average costs only reported.	Average costs only reported.
	Antenatal, intrapartum, and postnatal (P/N) costs included.	Antenatal, intrapartum, and P/N costs included.	Postnatal costs not included.	Antenatal, intrapartum, and postnatal costs included.
	Incremental analysis not carried.	Incremental analysis not carried.	Incremental cost only reported	Incremental analysis not carried.
	Capital costs not analysed.	Capital costs not analysed.	Capital costs analysed.	Capital costs not analysed.
Indirect cost/ productivity changes reported	Minimum wage was used to price indirect societal costs	Indirect costs not considered	Community health care costs not analysed. Indirect family costs considered similar for alternatives.	Patient or family costs not considered.
(c)				
Analysis and interpretation of results				
Statistical analysis	No statistical analysis of the costs	Unclear if statistical analysis done.	No statistical analysis of costs.	Small sample size
Sensitivity analysis	On the consumption of services and on prices when some imprecision was apparent	Sensitivity analysis of 'opening balance' but not clearly defined.	On capital costs; staff involvement in caesarean section; epidural length.	Univariate analysis of impact of increasing patient volume.
Average cost of a normal birth	Can$1699 in the midwifery led unit Can$1847 in the consultant led unit	US$3385 in the midwifery led unit. US$4673 in the consultant led unit	Stg£428 in midwifery led unit. Stg£387 in consultant led unit.	US$6087 in the midwifery led unit. US$6803 in the consultant led unit
Currency	Can$	US$	Stg£	US$
Generalisability of findings	External validity of the study was quite low. Possible selection bias in picking midwifery patients with better outcomes. Unit costs and resource quantities not reported separately.			External validity low as limited to small rural community.

original intention in this study was to compare costs and outcomes of care, but as no differences in the main outcomes were detected the comparison here is of costs of care only. (Drummond et al., 2005:96–135). Since the evidence on outcomes is based on a well conducted randomised trial, it can be considered strong. The Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist (Husereau et al., 2013) was used as a guide for the results reported here.

Design

The cost differences by intention to treat for major items of care provided, in the control and intervention groups, were compared. The sample size required for the MidU trial was 1,539 (alpha 0.05, power ≥0.80, using two-tailed tests) to detect clinically significant differences in the primary outcomes (Begley et al, 2011).

Ethical approval was received from the Research Ethics Committee of the Faculty of Health Sciences at Trinity College Dublin for the cost analysis, in January 2006. The trial was held in two Irish maternity hospitals, Our Lady of Lourdes Hospital, Drogheda (OLOL) and Cavan General Hospital (CGH), where two midwife-led units were to be introduced. Full details of inclusion criteria, trial methodology and clinical results have been published (Begley et al, 2011).

All women without risk factors for labour and birth, who booked for care at these two units before 24 weeks of pregnancy, were assessed for inclusion, from 2004 to 2007. Eligible women

were given the opportunity to discuss the study, written informed consent was obtained, and they were randomised centrally on a 2:1 ratio (1101:552) to MLU or CLU care. The 2:1 ratio was used so that the refurbished midwife-led units and allocated staff could be used to full capacity, and to meet the demand from pregnant women, as midwife-led care was not available outside of the trial format. Women randomised to the CLU arm received consultant-led care, provided by both midwives and medical staff.

Data collection

The study recorded use of those services that can vary between women, and unit costs for these services were estimated to allow the total costs for each woman to be calculated. The most important cost elements were the costs of medical and midwifery staff for antenatal care, labour and post-natal care, costs of specific tests and interventions such as ultrasonography and cardiotocography, and costs related to hospital stays. Where data on individual women were not recorded, estimates were based on the care pathway for each service.

Capital costs. Capital costs posed particular problems in this study. The MLU facilities were developed from existing buildings, and detailed costs related to the conversion and equipping of these were collected from the Health Service Executive (Table 2). The original aim had been to estimate annual equivalent costs (using a 5% discount rate as specified in economic evaluation in the Irish health system; Health Information and Quality Authority, 2014) for the facilities and equipment in MLU and CLU, but this was not possible given that no recent investment was made in the CLU. In any case the capital costs of refurbishment would be unlikely to be generalisable to other settings, and certainly would not reflect the cost of new developments in MLU or CLU. However, the costs of the MLU adaptations are presented for information (Table 2).

For the purpose of the cost comparisons capital costs have been excluded. Since the CLU has the same equipment for birthing facilities as the MLU (with the exception of birthing pools in the MLU, estimated to have capital cost of €1 per birth, based on the annual equivalent cost using a discount rate of 5%), excluding the capital costs should not bias the results. A further problem arose regarding capital cost estimates. It is a common problem in the evaluation of new services that capacity utilisation is low, and therefore the overhead and capital costs per user can be high. This can bias the costs against new services unless the costs are estimated on the basis of normal capacity use.

Estimating unit costs of services and hospital stays. As stated above, the approach taken to costing services for patients in each arm of the study was to record the use of specific services and to calculate a total costs of care for each patient using estimates of unit costs. Unit cost estimates are based on the actual time taken to perform tasks, the staff involved and other consumable and variable costs. The cost of hospital stays (antenatal, postnatal and neonatal) were estimated on the basis of the care provided in the wards for each of these. The unit cost of bed days are estimated on the basis of normal capacity use, and did not take account of temporary additional costs relating to low capacity use (especially in the early stages of the trial when recruitment into the MLU arm was slow). The unit costs are therefore estimated on the basis of normal service provision in each type of facility. Costing of staff time for care tasks takes account of the need for time devoted to training and other duties.

Financial data were gathered, by an experienced hospital accountant, from the finance managers of Our Lady of Lourdes Hospital (OLOL) and Cavan General Hospital (CGH). Budget and management information reports for the relevant units were accessed to estimate the staff time devoted to different tasks, the full pay costs of different grades of staff, costs of consumables such as medical and surgical supplies and other costs related directly to provision of care in the different maternity units. Detailed discussions were held with financial and services managers to review the estimates of unit costs and use of resources. The data included estimates of costs for various interventions, such as individual analgesia/anaesthesia processes (nitrous oxide, pethidine, pudendal block, spinal anaesthetic, general anaesthetic, epidural, TENS or hydrotherapy). Midwifery managers in both hospitals were interviewed to clarify the pathways that women took through the units from antenatal to postnatal, and to explain the staff resources used at various stages, such as average length of time and grade of staff to undertake a cardiotocograph recording, ultrasound examination or perineal suturing.

Calculation of all staff pay costs was based on 2009 salary rates and included basic pay plus permanent allowances, employer's social insurance and pension costs. Pay levels in 2009 were slightly above those in 2015, but as the changes are not uniform between different grades of staff, and given that the outcomes data are for 2009 it was decided not to update these. The pay costs at 2015 levels would be around 7.5% lower than in 2009 and overall costs (and therefore the savings) would be around 5% lower than those quoted here.

Antenatal visits (staff costs involved). Antenatal visits in the MLUs are to one of a team of midwives, for an average duration of 15 minutes, as opposed to a team of midwives and a consultant, registrar or senior house officer in the CLU. The consultant's role, in the CLU only, was to oversee an antenatal clinic lasting up to three hours, during which approximately 37–40 women would be seen (4.5 minutes of consultant time per woman, on average). A registrar would conduct consultations with the majority of women during this time, and their time is counted as 4.5 minutes per woman as well. A midwife would also be in attendance for the three-hour period, and for an hour of preparation beforehand, so her time is costed as 1/10th of an hour per antenatal visit per woman (six minutes). The midwifery managers estimated that an average of eight hospital visits was normal in the antenatal period. MLU women attended their GP for a mean of 3.86 times (SD1.83) and those in the CLU had an average of 3.85 visits (SD1.81). As GP visits occurred at the same rate across MLU and CLU groups, and

Table 2
Capital costs of opening the midwife led units.

Cost component		Cavan General Hospital	OLOL Hospital
Floor space of MLU in m^2		151	163
Total building costs		€319,144	€823,431
Birthing pool – free standing		€7744	€7744
Total building cost	A	€326,888	€831,175
Discount factor for capital outlay over 50 years at 5%	B	18.2559	18.2559
Equivalent annual cost	(A/B)	17,906	45,529
Capacity number of women eligible for MLU per year	C	450	850
Equivalent annual cost per birth	(A/B)/C	39.79	53.56

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Table 3
Incremental cost of an elective and emergency caesarean section.

Grade of Staff	Duration	Staff required Elective caesarean section	Cost €	Staff required Emergency caesarean section	Cost €
Combination of obstetrician, registrar or SHO	90 minutes	2	125	3	328
Anaesthetist	90 minutes	1	203	1	203
Paediatrician	90 minutes		0	1	203
Midwives	30 minutes	2	23	2	23
Theatre staff nurses	90 minutes	3	105	3	105
Special care nurse	90 minutes		0	1	35
Recovery nurse	30 minutes	1	12	1	12
Pay cost per caesarean section			467		908

are covered under the Maternity and Infant Care scheme, they have not been included in cost estimates.

Ultrasonography and cardiotocography (staff costs involved). In the MLU, one routine ultrasound scan was offered as there is no evidence to support repeated, non-indicated examinations (LeFevre et al., 1993). Similarly, antepartum cardiotocographs and biophysical profiles are not done routinely and if needed would be done after a woman randomised to the MLU had been transferred to CLU. These investigations have been costed on the basis of 20 minutes of midwife's time.

Women attending MLU sometimes had one or more visits to CLU for ultrasound scan or cardiotocography assessment, as a temporary transfer of care. This resulted in women attending the MLU having an average of 0.40 visits (SD=0.50) with CLU personnel.

Care in labour (staff costs involved). One midwife is involved, in MLU and CLU, in the first stage of labour and two for the second and third stages of normal birth. Women remaining in the MLU, having no oxytocic acceleration in labour, had longer than average first stages than women in CLU, thus raising the average length of the first stage in the MLU arm. Pay costs for first, second and third stages of labour were measured in both arms.

Provision of epidurals (staff costs involved). Spinal anaesthetic or epidurals, requiring the input of an anaesthetist, are only used in the CLU. The anaesthetist's set-up time in relation to preparing for these procedures was estimated by the midwifery managers at 30 minutes, consistent with the figure used in Hundley et al.'s (1995) trial. Drug unit costs were taken from Our Lady of Lourdes Hospital's pharmacy stock reports.

Perineal suturing was included to cover both episiotomy and perineal trauma. The number of women requiring perineal repair was approximately the same in both groups. However, 90–95% of repairs in the CLU in Our Lady of Lourdes Hospital (and all in Cavan General Hospital) are done by registrars, whereas they are almost all done by midwives in the MLUs. In the CLU, a midwife would also be there supporting the woman while the registrar is suturing. There is therefore no additional cost of repairs carried out by MLU midwives (who would be present in any case), and the cost of repairs carried out by registrars in either MLU or CLU is estimated on the basis of 15 minutes of registrar's time per repair (included in 'costs of birth' in Table 4). Third/fourth degree tears were similar in both groups (6/315 (1.90%) in CLU, 12/656 (1.83%) in MLU). The costs of the few repairs conducted by registrars in the MLU were divided across all MLU women and included in the 'costs of birth' amount presented in Table 4. Similarly, the costs of the repairs conducted by registrars in the CLU were divided across all CLU women to obtain the average of €3.06 (included in 'costs of birth' in Table 4).

Similarly, for induction and augmentation of labour using oxytocin infusion, approximately 50% of intra-venous lines were sited by a doctor and 50% by the midwives. As the midwife's time is accounted for in the costs of caring for the woman, only the registrar's time is costed in Table 4. Costs of registrar's time to conduct an instrumental birth were included similarly.

Cost per antenatal, postnatal and neonatal bed days. The cost of wards and the cost per bed day were estimated based on staffing and activity in antenatal and postnatal wards at OLOL Hospital. The cost per postnatal bed day was calculated as €452, including catering, cleaning, heating and hospital overheads. The cost per antenatal bed day was calculated as €168 and neonatal days as €135.

Postnatal home visits. In the MLU, the midwives undertake home visits (on average one hour), as necessary, up to the seventh day after discharge. In the CLU, in accordance with national practice, women had a minimum of one visit by the public health nurse. Women in the MLU group who had a normal birth and therefore remained in MLU care (n=460) had an average of just over two visits from MLU midwives.

Costs of caesarean section. The incremental costs, over and above the cost of a normal birth, of an elective and emergency caesarean section (CS) are €467 and €908 respectively (Table 3). There were some differences between OLOL and CGH in the grade and quantity of staff present at a CS and the figures in the costing are based on an average.

Administration (staff costs involved). The role of the MLU midwife manager involves an increase in administrative duties, over and above their counterpart in CLU, of approximately 50% of their time.

Overheads. The hospital's general administration and maintenance overheads were recharged to the units based on floor space occupied, divided by the projected number of births (1300, Table 2). The same recharge was used for both MLUs and CLUs.

Costs not assessed. Some interventions were omitted from the analysis on the basis of a minimal cost implication, such as the use of transcutaneous electrical nerve stimulation, episiotomy, application of fetal scalp electrode and continuous and intermittent fetal heart rate monitoring during labour. A consultant obstetrician is on call when women are in labour and would be requested to attend if a complication arose in either MLU or CLU. Their commitment is therefore the same to both units. The consultant has no commitment at postnatal stage of normal birth in either unit. The pharmacological methods of analgesia, nitrous oxide and pethidine, are used in the same proportions in both units with minimal cost implications.

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Table 4
Average cost of care per woman allocated to MLU and CLU (€ 2009 Prices)

	MLU cost (Euro)	CLU cost (Euro)
Antenatal clinic (midwife only)	88.71	0.19
Antenatal clinic (obstetrician/ registrar/midwife)	53.97	220.10
Antenatal clinic (consultant obstetrician oversight)	16.23	
Midwife home visits after birth in MLU, Public Health Nurse visit to CLU women	59.30	14.47
Costs of birth*	587.55	631.86
Antenatal bed day costs	244.45	305.45
Postnatal bed day costs	1,144.57	1,196.33
Neonatal bed day costs	403.28	411.6
Total	2,598.06	2,780.00

CLU=consultant-led unit; MLU=midwife-led unit

* including average cost per woman of caesarean section, instrumental birth, induction of labour, oxytocin and paediatric cover where relevant.

Data analysis

An 'intention-to-treat' analysis was used to compare costs between the two groups. On booking, all women were healthy and without risk factors but a proportion did develop complications during pregnancy or labour that, if they had been allocated to MLU, required them to transfer to CLU. Of those randomised to MLU, 492 (44.7%) women transferred permanently to CLU in the antenatal period, 144 (13.1%) during labour and 5 (0.5%) in the postnatal period. The high transfer rates were reflective of conservative clinical transfer criteria.

Comparison of main MLU and CLU costs on an 'intention to treat' basis. The cost of a birth for women randomised to the MLU arm, on an 'intention to treat' basis, is €2598. The average cost for women randomised to the CLU is €2780. This difference in cost is significant at the 5% level.

There is therefore a saving of €182 per birth for women randomised to care in the MLU (Table 5).

Comparison with previous studies. Henderson et al. (2001) found the cost of a vaginal birth to vary from £37 to £1350 and a caesarean section cost between £69 and £2755. These estimates vary widely and the authors commented that correct guidelines for economic evaluation were not applied in most cases (Henderson et al., 2001). More recent estimates on the national average cost of a normal birth in the UK is reported to be £1824 (Department of Health, 2014). A randomised trial of caseload midwifery care versus standard care found a difference in costs of AUS$567 (€394) in favour of caseload midwifery (Tracy et al., 2013). A recent individual level cost-effectiveness of planned place of birth in the UK reported a difference of £98.00 in the total mean cost per 'low risk' multiparous woman cared for in an obstetric unit (£1076.9) and a free-standing midwife-led unit (£953.7) (Schroeder et al., 2014), similar to findings reported in this study.

Sensitivity analysis

The cost of a birth in the MLU arm, on an 'intention to treat' basis, is €182 lower than in the CLU. On the basis of bootstrapped confidence intervals this difference is significant at the 5% level. It is unlikely that there are systematic errors in data on service use in hospital between women in the different arms of the trial as they were collected as part of the care delivery processes. However, there may be some problems in recording antenatal and postnatal activity both at home and in outpatient settings. For example, if there were one additional midwife visit to mothers in the MLU arm, this would reduce the cost difference to around €170 with a bootstrapped 95% confidence interval ranging from 20–231. This shows that the difference in means is smaller but remains significant after the increase in costs in the MLU arm. Equally, it is possible that some women in the MLU arm did not receive the full quota of postnatal visits.

Table 5
Mean cost per birth MLU and CLU arms.

	MLU (N=1103)	**CLU (N=553)**	**Cost difference**
Mean cost	€2598.06 95% CI (2527–2670)	€2780 95% CI (2672–2915)	€181.94 95% CI (33–330)

CLU=consultant-led unit; MLU=midwife-led unit.

Limitations

These findings are based on the clinical outcome data provided by the MidU study. For the first year of the trial recruitment was slow, as this was a new service in Ireland, thus both MLUs were operating at less than their full service capacity and staff numbers were not always at full complement throughout the study period. Length of postnatal stay and the number and duration of antenatal visits may not, therefore, be at their optimal level. Whilst it is important to cost services for those actually treated within the trial, for the purpose of this study, it would be interesting to carry out a costing exercise on the two types of unit when these were well established and working at full capacity. The sample size was based on the need to detect significant differences in primary outcomes. Given the patterns of costs, a slightly larger sample would have been desirable to ensure that differences in costs were correctly estimated.

Discussion

The 'intention to treat' analysis provided an overall estimate of the average cost of care of a woman in an MLU and found it to be €182 less than the average cost of care in the CLU. Given a throughput of 1000 women per year in an MLU, the savings would be over €180,000 per year. The differences in cost stem from the shorter hospital stays for women randomised to the MLU arm and the lower level of some tests and interventions. Some of these differences may be reduced in future if hospital stays in general are reduced, although the need to provide extra postnatal care in the community instead would offset these savings.

This study has shown a difference in cost of care between the two units of €182 in favour of the MLU (using 2009 pay costs), similar to other work. Bernitz et al. (2012) in a randomised trial of 1110 women found a difference of €278 between women attending for MLU and CLU care. Tracy et al. (2013), similarly, in a randomised trial of caseload midwifery care versus standard care found that costs differed in their group of 1748 women by AUS$567 (€394) in favour of caseload midwifery. A recent review also concurred that midwife-led care was likely to lead to cost savings (Ryan et al., 2013). The conclusion from the present study is that midwife-led care, as practised in this study, is a cost-effective alternative method of delivering maternity services for healthy women who have no risk factors for labour and birth. The main study findings showed that the care provided by the midwife-led units is as safe as consultant-led care in their respective hospitals and results in less intervention (Begley et al., 2011). Given those clinical findings, and the results of the economic analysis presented here, more midwife-led units should be incorporated into maternity care in Ireland so that scarce resources are used more

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effectively. These results have significant implications for future policy-makers, and funders, of maternity care in Ireland.

Conflict of interest statement

None of the authors have any conflict of interest.

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