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The Impact of an Aromatherapy and Massage Intrapartum Service upon Use of Analgesia and Anaesthesia in Women in Labour; A Retrospective Case Note Analysis.

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| Abstract: | <p>Research Objective: To explore whether an aromatherapy and massage intrapartum service (AMIS) improved maternal outcomes during labour.</p> <p>Setting/Location: Over the past decade interest in complementary therapies and alternative medicine has escalated among midwives and the general public in response to increased demand from expectant mothers for more choice, control and continuity in labour.</p> <p>The aim in this paper is to report on results relating to the effects of an Aromatherapy and Massage Intrapartum Service (AMIS) upon type of analgesia chosen by women in labour, and on rates of anaesthesia; one aspect of the full study. The study was conducted in a general maternity unit in south west England, UK.</p> <p>Design: A quantitative research approach was taken whereby contemporaneously completed service evaluation forms of 1079 women (601 nulliparous and 478 multiparous women) (AMIS Group) were retrospectively analysed in comparison with the birth records of an equal number of similar women (Comparison Group). Data analysis was achieved by inputting data from the forms and comparison sample into the SPSS package and running statistical tests.</p> |

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| | <p>Results: In the AMIS Group overall analgesia usage was higher for TENS 34% compared with 15.9% ($p<0.001$ allowing for parity) and for Nitrous Oxide and Oxygen 87.6% compared with 80.8% ($p<0.001$). Pethidine use did not differ after adjustment for parity 30.1% compared with 24.2% ($p=0.27$). Rates were lower in the AMIS Group for epidural anaesthesia 29.7% compared with 33.8% ($p=0.004$ allowing for parity), spinal anaesthesia 6% compared with 12.1% ($p<0.001$) and general anaesthesia 0.8% compared with 2.3% ($p=0.033$).</p> <p>Conclusion: Having an AMIS appears to have a positive impact on reducing rates of all types of intrapartum anaesthesia. The Service is recognised as a beneficial addition to conventional midwifery practice which may influence mode of delivery and reduce general anaesthesia rates.</p> |
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**The Impact of an Aromatherapy and Massage Intrapartum Service upon
Use of Analgesia and Anaesthesia in Women in Labour; A Retrospective
Case Note Analysis.**

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Aromatherapy and Massage Intrapartum Service

Summary

Birth has become increasingly influenced by the medical model whereby technology and obstetric interventions have often overruled the preferences and requests of women giving birth. However, in the last decade, interest in and use of complementary and alternative medicine has meant that women have been offered a wider provision of care with a more naturalistic individualised option.

This article describes a study undertaken in a maternity unit in south west England, UK in which an intrapartum aromatherapy and massage service was introduced. Using a retrospective case analysis design the birth records of 1079 women who chose to use the service were compared to an equal number of similar women who did not, comprising a comparison group.

Having an aromatherapy and massage service appears to have a positive impact on reducing rates of epidural, spinal and general anaesthesia.

*Aromatherapy and Massage Intrapartum Service***Abstract**

Research Objective: To explore whether an aromatherapy and massage intrapartum service (AMIS) improved maternal outcomes during labour.

Setting/Location: Over the past decade interest in complementary therapies and alternative medicine has escalated among midwives and the general public in response to increased demand from expectant mothers for more choice, control and continuity in labour.

The aim in this paper is to report on results relating to the effects of an Aromatherapy and Massage Intrapartum Service (AMIS) upon type of analgesia chosen by women in labour, and on rates of anaesthesia; one aspect of the full study. The study was conducted in a general maternity unit in south west England, UK.

Design: A quantitative research approach was taken whereby contemporaneously completed service evaluation forms of 1079 women (601 nulliparous and 478 multiparous women) (AMIS Group) were retrospectively analysed in comparison with the birth records of an equal number of similar women (Comparison Group). Data analysis was achieved by inputting data from the forms and comparison sample into the SPSS package and running statistical tests.

Aromatherapy and Massage Intrapartum Service

Results: In the AMIS Group overall analgesia usage was higher for TENS 34% compared with 15.9% ($p<0.001$ allowing for parity) and for Nitrous Oxide and Oxygen 87.6% compared with 80.8% ($p<0.001$). Pethidine use did not differ after adjustment for parity 30.1% compared with 24.2% ($p=0.27$). Rates were lower in the AMIS Group for epidural anaesthesia 29.7% compared with 33.8% ($p=0.004$ allowing for parity), spinal anaesthesia 6% compared with 12.1% ($p<0.001$) and general anaesthesia 0.8% compared with 2.3% ($p=0.033$).

Conclusion: Having an AMIS appears to have a positive impact on reducing rates of all types of intrapartum anaesthesia.

The Service is recognised as a beneficial addition to conventional midwifery practice which may influence mode of delivery and reduce general anaesthesia rates.

5 Key words; Aromatherapy Massage Labour Analgesia Anaesthesia

Introduction

Birth has become globally entrenched in a medicalised model ¹ whereby intrusive technology and cumulative obstetric interventions have led childbirth to become controlled by a paradigm of linearity, time constraints, pathology and avoidance of risk ². In the United Kingdom (UK) risk management strategies such as Clinical Negligence Scheme for Trusts (CNST), the current litigious climate and the fear of being criticised by colleagues ³ all contribute towards midwives practising in a defensive 'just in case' medicalised manner.

Bodecker *et al.* ⁴ identify how over the past decade interest in complementary therapies and alternative medicine (CAM) has escalated among midwives and the general public. Incorporating CAM into healthcare settings provides a more holistic approach which not only cares for the body but also the mind, spirit and the environment the person is in. After reviewing literature surrounding the use of CAM within the maternity arena, it became evident that an increasing number of maternity units are developing CT services for women during pregnancy and labour alongside conventional care in order to offer a wider provision of care with a more naturalistic, individualised option.

There is a dearth of credible experimental research about the effectiveness of CAM use in pregnancy and labour. However from anecdotal evidence, the benefits are thought to include increased choice of coping mechanisms in labour with a more naturalistic option ⁵ improved continuity of care as the midwife spends longer with the woman which is known to be a critical component to achieve improved birth outcomes ^{6,7} and a possible reduction in medical intervention as well as possible reductions in labour

Aromatherapy and Massage Intrapartum Service

duration and perception of pain ^{8,9,10,11}. There may also be a reduction in occurrence of nausea and vomiting, headaches, hypertension and pyrexia ⁸.

It is 3 years since the AMIS was launched in the study site, and comprehensive documentation forms for all women that have used the Service have been maintained. These record women's personal details, medical history, intrapartum events and delivery outcomes.

This article reports on the part of the study concerned with impact of the AMIS upon analgesia types and rates given to women in labour.

Methods

The full study aimed to identify comparisons between two samples of women who had given birth in one maternity unit since 2007.

The feasibility of conducting a randomised controlled trial was considered, with the intention of examining the effects of the AMIS and making comparisons with a control group. However it was recognised that pregnant women and women in labour are particularly vulnerable groups (those with diminished autonomy who deserve greater protection of their rights) for subjects of research ^{12,13,14} and to randomise to an intervention group could be considered unethical. Therefore data were collected contemporaneously using evaluation forms from the AMIS group. The form requested clinical information including name, hospital number, age, ethnicity, parity, gestation, pre-existing medical conditions and pregnancy complications. The women were asked to express agreement or disagreement to questions on a five or seven point Likert scale. Each degree

Aromatherapy and Massage Intrapartum Service

of agreement was given a numerical value and thus a total numerical value was calculated from all responses.

The clinical details and labour outcomes, following the intervention of aromatherapy and massage, were examined. The treatment details of which essential oils were used and how they were administered was included on the form as well as labour and delivery details and outcomes. These were all dependent variables that were identified in the literature review as possibly being affected by the use of aromatherapy and massage in labour.

The AMIS sample comprised 1079 records, 601 of which were from nulliparous women and 478 multiparous women. These records were taken from the first woman who received the AMIS since the service was launched in July 2007.

Clinical data of women who had not used the AMIS were accessed via mandatory computerised data which represented a Comparison Group (CG). This enabled us to make comparisons between the clinical details and labour outcomes of the AMIS Group and CG.

Every woman who gives birth in the local maternity unit has comprehensive pregnancy, labour and delivery records entered onto a computer system. This computer system enables labour and delivery statistics to be retrieved and filtered. Anonymised data of all women who had given birth between July 2007 and July 2010 and who had not used the AMIS were retrieved (5,500 records).

In order to obtain a similar size sample to the AMIS group, the records of every 5th person in the computerized data were obtained. Women were

Aromatherapy and Massage Intrapartum Service

excluded from both sample groups if they had pre-existing medical conditions, previous uterine surgery or contra-indications to certain essential oils.

The sample size for each of the AMIS and Comparison Groups (CG) was 1079 - total sample size 2158. Stratification was employed to ensure both groups contained the same proportions of nulliparous and multiparous women; the goal of stratification was to achieve a greater degree of comparability, as it is widely recognised that labour and delivery outcomes of nulliparous and multiparous women greatly vary ¹¹. The parity breakdown of these samples was 56% (n=601) Nulliparous women (Nullips) and 44% (n=478) Multiparous women (Multips).

We used the statistical software SPSS to analyse the data. SPSS requires a codebook approach whereby defining and labelling each variable and assigning numbers to each possible response is performed ¹⁵. All 2158 records were inputted by the first author to ensure consistency in the approach used. Maimon and Rokach ¹⁶ explain how data entry and acquisition is prone to errors; therefore, after all data had been inputted, a process of data cleansing took place ^{17,18}.

We aimed to gather data from the AMIS and Comparison Groups and identify the differences between these samples. Independent Sample *t*-tests between the groups were conducted for numerical variables, and chi-square tests were undertaken for categorical variables. Logistic regression was used to estimate the effects of AMIS versus no AMIS on use of analgesia and anaesthesia, and on mode of delivery, while allowing for the effects of parity, which is known to influence these variables.

Aromatherapy and Massage Intrapartum Service

Motulsky¹⁹ advises setting a threshold *P value* before conducting research based on the relative consequences of missing a true difference or falsely finding a difference. The threshold value was set to $p=0.05$.

Approval was obtained from a NHS Research Ethics Committee which concluded that the study was evaluative in nature and posed no risks to women, as only their anonymised data were required. Approval for the study to proceed was also sought from the NHS Trust's Head of Midwifery and Medical Director.

One of the prime ethical considerations for this study was that data were taken from a clinical record documentation form and NHS birth database. Both contain confidential information regarding individual women's age, parity, medical and pregnancy history, labour and delivery information, usage of the service and personal comments. The forms and the extracted records from the computerized birth database were anonymised prior to entry into SPSS.

Results

The mean age of women in the AMIS group was 30.43 with a standard deviation of 6.05 compared with a mean age of 29.86 in the Comparison group and standard deviation of 6.08. The mean gestational age of women included in the AMIS sample was 40.04 weeks with a standard deviation of 2.15. This was compared with a mean gestational age of 39.72 weeks in the Comparison Group with a standard deviation of 1.65. Classification of ethnicity for this study was in accordance with the UK National Statistics

Aromatherapy and Massage Intrapartum Service

Classification for Ethnic Groups developed by the Office for National Statistics (2001). The majority of women in both the AMIS and the Comparison Groups were in the White British or Mixed British category (AMIS 91.8% (n=967): CG 93.2% (n=988)).

Four modes of analgesia and three modes of anaesthesia were compared in this study: Transcutaneous electrical nerve stimulation machine (TENS machine), Nitrous Oxide 50% and Oxygen 50% (Entonox), Pethidine, Epidural, Spinal Anesthesia and General Anesthesia (GA). Table 1 shows a comparison of analgesia and anaesthesia used in labour for both the AMIS and Comparison Group (CG). Results of the logistic regressions are shown in Table 2.

Use of a TENS machine in labour was higher in the AMIS Group (34% compared with 15.9% in the CG); the difference in use was seen in both nulliparas (41% compared with 19%) and multiparas (26% compared with 13%). TENS use was statistically significantly more likely ($p<0.001$) in the AMIS than in the CG after adjustment for parity.

Use of Nitrous Oxide and Oxygen (Entonox) was higher in the AMIS Group (88%) than in the CG (81%). (nulliparas: 88% versus 80%; multiparas 87% versus 82%). Entonox use was statistically significantly more likely ($p<0.001$) in the AMIS than in the CG after adjustment for parity.

For pethidine overall comparison revealed that 30% of the AMIS Group received Pethidine in labour compared to 24% in the CG (nulliparas 34% versus 31%; multiparas 26% versus 16%). After adjustment for parity, Pethidine use did not differ significantly by AMIS or CG ($p=0.27$).

Aromatherapy and Massage Intrapartum Service

An overall comparison of Epidural use between the AMIS and Comparison Groups revealed lower use in the AMIS Group (30% versus 34% in the CG; nulliparous 39% versus 48%; multiparous 18% versus 16%). Epidural use was statistically significantly less likely ($p=0.004$) in the AMIS than in the CG after adjustment for parity.

An overall comparison of Spinal Anaesthesia (SA) use in labour revealed lower use of SA in the AMIS Group (6% compared with 12% in the CG; nulliparas 8% versus 15%; multiparas 3% versus 8%). SA use was statistically significantly less likely ($p<0.001$) in the AMIS than in the CG after adjustment for parity.

An overall comparison of General Anaesthesia (GA) intrapartum use revealed that GA was used less in the AMIS Group (0.8% compared with 2.3% in the CG; nulliparas 1.2% versus 3.0%; multiparas 0.4% versus 1.5%). GA use was statistically significantly less likely ($p=0.033$) in the AMIS than in the CG after adjustment for parity.

Onset of labour for the majority of women in both the AMIS Group and CG was spontaneous; AMIS 77% compared with CG 74% (nulliparas 73% versus 75%; multiparas 76% versus 79%). This difference was not statistically significant ($p=0.30$ after adjustment for parity) (Table 1).

Discussion

The experience of labour pain differs amongst women and the response to pain is highly individual²⁰. It is interesting to consider why this might be. Alehagen *et al.*²¹ explain how labour discomfort is thought to arise from the fear of the unknown, which leads to sympathetic arousal producing tension in

Aromatherapy and Massage Intrapartum Service

the circular fibres of the uterus and rigidity at the opening of the cervix. Field *et al.*²² elaborates that this force acts against the expulsive muscle fibres in labour, producing tension within the uterine cavity which is interpreted by the labouring mother as pain, therefore it is suggested that women who are particularly fearful of labour may suffer increased pain. Zwelling²³ believes that excessive anxiety in labour produces increased catecholamine secretion that may actually increase pain perception in the brain and decrease uterine contractions by blocking the release of Oxytocin from the posterior pituitary. It has been identified in this study that one of the main reasons for using the aromatherapy and massage was to reduce fear and anxiety, therefore it is likely that when midwives perceive a woman to be particularly anxious or frightened they would have offered the AMIS. These anxious and frightened women, who may be struggling to deal with the pain of labour, are therefore perhaps pre-disposed to being offered the AMIS as the midwife perceives the service will be of greatest benefit to these women, and secondly, due to the chemical physiology of anxieties increasing pain these women perhaps subsequently have increased pharmacological requirements, increasing their need for Pethidine.

One of the main aims of this study was to explore whether the use of the AMIS reduced use of pharmacological analgesia and anaesthesia. In addition to these pharmacological modes of analgesia are TENS machines which are commonly used as a naturalistic, non pharmaceutical option²⁴.

The Gate Control Theory suggests that stimulation of larger peripheral nerve fibres inhibits pain signals entering the central pain pathway, reducing perception of pain – TENS provides this stimulation, additionally, it is believed

Aromatherapy and Massage Intrapartum Service

that the electrical stimulation also activates the release of the body's own endorphins ²⁴. As TENS is a non-pharmacological analgesic which allows women to mobilise with no known side effects to the mother and fetus it is a popular choice. Women in the AMIS Group had a significantly higher usage rate of TENS than women in the CG.

It may be that women who choose TENS are more likely to want a more natural birth and therefore more likely to use essential oils in preference to pharmacological analgesia. This may also account for the epidural rate being significantly lower in the AMIS Group. The midwife may also influence choice of analgesia and those promoting aromatherapy and massage may be keen to avoid pharmacological analgesia if possible.

Entonox acts as an effective analgesic when it is inhaled, can be used during all stages of labour and has no known effects on the fetus ²⁴. Entonox is often a first option analgesia offered to women in labour and is extremely quick and easy to self administer making it a popular choice for midwives to offer ²⁵. The use of Entonox is significantly higher in the AMIS Group, but our records do not account for the amount used because this is not possible to assess. The increased use of Entonox may be a contributory factor to a reduction in the Epidural rates in this group. In future it would be interesting to record recommendations and dialogue between women and midwives about analgesia and the considerations upon which decisions are made.

Although Entonox is a pharmacological substance, it is not accumulative and has a short life in the body (excreted from the body after 2-5 minutes and does not cross the placenta) ²⁶, it is considered a fairly naturalistic option of analgesia ²⁴ and does not have the side effects and long

Aromatherapy and Massage Intrapartum Service

term complications of other anxiolytic drugs used for labour²⁷. Similar to the explanation for increased TENS usage, many women like to avoid pharmacological or invasive methods of pain relief in labour²⁸ and it may be that women keen on avoiding pharmacological drugs in labour which can affect the baby will instead opt for low risk analgesias such as Entonox alongside the AMIS. In a study conducted by Tate²⁹ postoperative use of peppermint aromatherapy reduced the need for traditional anti emetics and participants received and tolerated more opioid analgesia postoperatively ($p=0.02$). This explanation may also account for why Entonox rates were higher in the AMIS Group.

Pethidine is a synthetic phenylpiperidine derivative which is commonly administered intramuscularly (IM) during labour³⁰. Pethidine is well known to cross the placenta and has been shown to make babies sleepier, less attentive and less able to establish breastfeeding. Despite these well documented effects, since 1947 Pethidine has been the most widely systemically used opioid for the relief of pain during childbirth³¹. Contrary to Burns *et al.*'s (8) finding that the use of systemic opioids was greatly reduced with the use of aromatherapy and massage in labour (6% in 1990 reduced to 0.4% in 1997) this study found that the use of Pethidine did not differ overall between AMIS and comparison groups, and, in the multiparas, use was higher in the AMIS group. .

The possible reasons for this were explored with a group of midwives and it was considered that if women had received Pethidine in their first labour and liked its effects they might opt for it again. Nilsson and Lundgren³² explain that previous birth experience is central to shaping subsequent labour

Aromatherapy and Massage Intrapartum Service

and birth choices. The other significant feature between nulliparous and multiparous women's labours is that multiparas' labours and births are usually quicker and less complicated than those of nulliparas³³. It therefore could be considered that the Pethidine usage was higher in multiparas with a subsequent lower epidural rate as there was not enough time to get an epidural inserted.

It could be argued that whilst Pethidine has known effects its method of administration is less invasive than an epidural, still enables mobilisation and does not increase likelihood of instrumental delivery in the way epidurals do²⁴.

Greulich and Tarrant³⁴ identify how both Pethidine and aromatherapy are often used as a relief measure in the latent phase of labour, when women have not yet met the criteria of being able to have Entonox or an Epidural.

Conclusions

Use of TENS, Entonox and Pethidine was higher in the AMIS group possibly because these women chose to have less invasive modes of analgesia.

It should be acknowledged that the AMIS group had significantly lower incidence of epidural, spinal and general anaesthesia. However, when there are more normal deliveries and less instrumental and operative deliveries, inevitably anaesthesia rates will be lower.

Women who have epidurals in labour are more likely to have longer second stages of labour, increased need for syntocinon augmentation, experience hypotension, increased risk of an instrumental delivery, will be unable to mobilise during labour or for a period of time after birth and are more likely to

Aromatherapy and Massage Intrapartum Service

have postnatal urinary concerns and fever ³⁵. The physiological, psychological and financial benefits of reducing these risks are apparent.

When administering a GA to pregnant or labouring women it is recognised there are increased difficulties in intubating and ventilating ³⁶. There is increased incidence of gastric aspiration for pregnant women having GAs and the risk of the anaesthetic drugs crossing the placenta to the baby and depressing breathing in the baby ³⁷ and blood loss are also increased. In addition, if mother has a GA during birth she is consequently not able to enjoy the moment of birth ³⁸; this has been associated with having a negative influence upon mother and baby bonding and may impact upon the establishment of breastfeeding. Therefore any measure to reduce the likelihood of a mother needing a GA is beneficial.

The financial equability of having the AMIS service in place has been acknowledged through considering the approximate annual cost of running this service calculated from invoices for a financial year (April 2009 to April 2010) (Table 3).

To put this into context, a year's supply of aromatherapy and massage oils costs £333.74 in the centre in which this research was conducted where there are 3000 births per year. From this information it is recognised that the use of the AMIS is inexpensive and may have the potential for significant savings.

Despite the methodological limitations of conducting a retrospective case analysis rather than a prospective trial, we consider that the sample size of

Aromatherapy and Massage Intrapartum Service

women included in this study is adequate to provide results which give good indication that the Service is of benefit.

The results show that having an AMIS appears to have a positive impact in reducing anaesthesia in labour which in turn has the potential to improve maternal and neonatal outcomes.

In future, research is required to identify the impact of extraneous variables, such as the preferences and influences of midwives upon pain relief choices made by women in labour.

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Author Disclosure Statement

No competing financial interests exist.

Aromatherapy and Massage Intrapartum Service

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| Analgesia | Sample | Number | Percentage |
|------------------|------------|--------|------------|
| TENS | AMIS | 366 | 34% |
| | Comparison | 171 | 15.9% |
| ENTONOX | AMIS | 944 | 87.6% |
| | Comparison | 871 | 80.8% |
| PETHIDINE | AMIS | 324 | 30.1% |
| | Comparison | 259 | 24.2% |
| EPIDURAL | AMIS | 320 | 29.7% |
| | Comparison | 362 | 33.8% |
| SPINAL | AMIS | 65 | 6% |
| | Comparison | 130 | 12.1% |
| G.A. | AMIS | 9 | 0.8% |
| | Comparison | 25 | 2.3% |

Table 1. Comparison of analgesia and anaesthesia given to women in labour

| Odds ratio (95% confidence interval), <i>p</i> value | AMIS versus no AMIS | Multiparous versus Nulliparous |
|--|------------------------------------|------------------------------------|
| TENS | 3.07 (2.36, 4.00), <i>p</i> <0.001 | 0.67 (0.48, 0.95), <i>p</i> =0.022 |
| Entonox | 1.89 (1.37, 2.60), <i>p</i> <0.001 | 1.12 (0.82, 1.52), <i>p</i> =0.48 |
| Pethidine | 1.15 (0.90, 1.46), <i>p</i> =0.27 | 0.43 (0.32, 0.58), <i>p</i> <0.001 |
| Epidural | 0.71 (0.57, 0.90), <i>p</i> =0.004 | 0.22 (0.16, 0.29), <i>p</i> <0.001 |
| Spinal anaesthetic | 0.50 (0.35, 0.72), <i>p</i> <0.001 | 0.50 (0.34, 0.74), <i>p</i> <0.001 |
| General anaesthetic | 0.38 (0.16, 0.92), <i>p</i> =0.033 | 0.48 (0.20, 1.17), <i>p</i> =0.11 |

Table 2. Results of logistic regressions on use of analgesia and anaesthesia by AMIS versus comparison group and by parity.

| Product | Quantity used | Cost |
|-------------------------------------|-------------------------|-----------------------------|
| | Apr 2009-Apr2010 | |
| Base Oil | 6x1 Litre = 6 Litres | £61.50 |
| Bergamot Essential Oil | 2x50mls = 100mls | £22.30 |
| Clary Sage Essential Oil | 1x25mls 1x50mls= 75mls | £15.15 |
| Frankincense Essential Oil | 2x50mls = 100mls | £43.10 |
| Jasmine Essential Oil | 1x50mls = 50mls | £139.95 |
| Lavender Essential Oil | 2x50mls = 100mls | £14.80 |
| Peppermint Essential Oil | 1x50mls = 50mls | £6.05 |
| Rose Essential Oil | 1x10mls = 10mls | £29.05 |
| Taper as mode of Application | 4 Boxes | £20 |
| Total Cost | | £351.30 |
| | | 5% Discount =£333.74 |

Table 3. Annual Running Cost of AMIS Service in the Study Site.