

# **Third stage of labour**

- studies on management, blood loss and pain  
in Angola and Sweden

Elisabeth Jangsten

**Göteborg 2010**

© Elisabeth Jangsten 2010

All rights reserved. No part of this publication may be reproduced or transmitted, in any form or by any means, without written permission.

ISBN 978-91-628-8163-4

Printed by Geson Hylte Tryck, Göteborg, Sweden 2010



## ABSTRACT

Management of the third stage of labour and risk factors for blood loss have been the focus of investigation for a long time. The overall aim of this thesis was to investigate management of the third stage of labour and its influence on blood loss and women's experience of afterpains in both a low- and a high-income country, as well as midwives' experience of managing this stage. The studies were performed in hospital-based settings in Angola and Sweden.

The first two studies (Papers I and II) were performed at the University Hospital in Luanda, the capital of Angola. Blood lost during the third stage of labour was collected and measured up to two hours post partum. In a prospective, comparative study, 782 parturients handled with expectant management of the third stage of labour (EMTSL) were compared to 814 parturients handled with active management of the third stage of labour (AMTSL). The latter were given 10 IU oxytocin with the Uniject™, a disposable injection device. Post partum haemorrhage (PPH) ( $\geq 500$  mL) occurred in 40.4% and severe PPH ( $>1000$  ml) occurred in 7.5% before introduction of AMTSL. These figures declined to 8.2% and to 1%, respectively, after the introduction of AMTSL (Paper I). The occurrence of afterpains and discomfort was compared in 51 expectantly managed and 51 actively managed women. Verbal Rating Scale (VRS) responses to semi-structured questions showed that AMTSL did not cause significantly more afterpains (Paper II).

In the third study, experienced midwives in Sweden participated in focus group discussions concerning their experiences of the management of the third stage of labour. The midwives exhibited self-confidence in evaluating the physiological process and endeavoured to leave it undisturbed if no risks were apparent, thus questioning the recommendation that AMTSL be implemented in all healthy women with normal deliveries in high-income countries. Their decision-making concerning management was based on a combination of previous experience, hospital guidelines, risk assessment and sensitivity to each woman's needs (Paper III).

A randomised controlled trial (RCT) was conducted at two delivery units in a university hospital in Sweden (Papers IV and V). Women were randomised to either AMTSL ( $n=903$ ) or EMTSL ( $n=899$ ). The blood lost was collected and measured at the time of delivery and up to two hours post partum. The mean blood loss was less in actively managed women. Blood loss  $>1000$  mL occurred in 10% of AMTSL and 16.8% of EMTSL, although the number of blood transfusions did not differ between the two groups (Paper IV). Afterpains were assessed at four occasions: twice at two hours after delivery and twice the day after delivery. The intensity of the afterpains was assessed with the Visual Analogue Scale (VAS) and the Pain-o-Meter with Word Descriptors (POM-WDS) was used for describing afterpains. A significant difference in experience of afterpains was detected between the two groups and multiparas scored higher than primiparas, irrespective of management (Paper V).

This thesis demonstrates that AMTSL is related to significantly less blood loss and does not aggravate afterpains. Furthermore, nulliparous women have a higher risk for PPH. This supports the standpoint that AMTSL is appropriate for women giving birth vaginally in hospital settings, both in Angola and Sweden, i.e. in both low- and high-income settings.

*Keywords:* third stage of labour, active management of the third stage of labour, AMTSL, expectant management of the third stage of labour, EMTSL, postpartum haemorrhage, maternal mortality, oxytocin, uterine contractions labour pain

## ORIGINAL PAPERS

The thesis is based on the following papers, referred to in the text by their Roman numerals:

- I. Strand R, da Silva F, Jangsten E, Bergström S. Postpartum haemorrhage: a prospective, comparative study in Angola using a new disposable device for oxytocin administration.  
*Acta Obstet Gynecol Scand* 2005; 84: 260–265.
- II. Jangsten E, Strand R, da Glória de Freitas E, Hellström A-L, Johansson A, Bergström S. Women's perceptions of pain and discomfort after childbirth in Angola.  
*African Journal of Reproductive Health* Vol. 9 No.3 December 2005.
- III. Jangsten E, Hellström A-L, Berg M. Management of the third stage of labour-focus group discussions with Swedish midwives.  
*Midwifery* (2009), doi:10.1016/j.midw.2008.12.004.
- IV. Jangsten E, Mattsson LÅ, Lyckestam I, Hellström AL, Berg M. A comparison of active and expectant management of the third stage of labour – a Swedish randomised controlled trial.  
*Accepted for publication in BJOG.*
- V. Jangsten E, Bergh I, Mattsson LÅ, Hellström AL, Berg M. Afterpains - a comparison between active and expectant management of the third stage of labour.  
*In manuscript.*

The papers are reprinted with the publishers' permission.

## ABBREVIATIONS

<b>AMTSL</b>	Active management of the third stage of labour (previously abbreviated as AML or AMTL)
<b>CAOL</b>	Coordenação de Atendimento Obstétrico em Luanda
<b>CCT</b>	Controlled cord traction
<b>EDA</b>	Epidural analgesia
<b>EMTSL</b>	Expectant management of the third stage of labour
<b>FIGO</b>	International Federation of Gynaecology and Obstetrics
<b>HCT</b>	Haematocrit
<b>ICM</b>	International Confederation of Midwives
<b>MCH</b>	Maternal and Child Health
<b>MLP</b>	Maternidade Lucrecia Paím
<b>MMR</b>	Maternal mortality ratio: the number of maternal deaths per 100 000 live births
<b>NRS</b>	Numeric Rating Scale
<b>PPH</b>	Post partum haemorrhage
<b>POM</b>	Pain-o-Meter
<b>RCT</b>	Randomised controlled trial
<b>SBA</b>	Skilled birth attendant
<b>SD</b>	Standard deviation
<b>SPSS</b>	Statistical Package for Social Sciences
<b>VAS</b>	Visual Analogue Scale
<b>VRS</b>	Verbal Rating Scale
<b>WHO</b>	World Health Organisation

## CONTENTS

ABSTRACT	
ORIGINAL PAPERS	
ABBREVIATIONS	
CONTENTS	
PREFACE	
INTRODUCTION	10
BACKGROUND	11
The third stage of labour	11
Postpartum haemorrhage	11
Assessment of blood loss	13
Management of the third stage of labour	14
Uterotonic drugs	17
Cord clamping	18
Uterine massage and cord drainage	19
Promotion of the normal childbirth process	19
Safe Motherhood	20
Pain during the third stage of labour and afterpains	21
Assessments of pain	22
Evidence-based practice in the third stage of labour	23
What remains to be studied?	24
AIMS OF THE THESIS	25
MATERIAL AND METHODS	26
Design	26
Settings	26
Angola	27
Sweden	
DATA COLLECTION AND ANALYSIS	29
Paper I (Angola)	29
Paper II (Angola)	29
Paper III (Sweden)	30
Paper IV and Paper V (Sweden)	30
ETHICAL APPROVALS	32
RESULTS	33
Paper I	33
Paper II	33
Paper III	33
Paper IV	34
Paper V	35
Comparison of Angola and Sweden	36

DISCUSSION	38
Blood loss	38
Afterpains	39
Management	41
Methodological considerations	42
CONCLUSIONS	46
CLINICAL IMPLICATIONS	47
SVENSK SAMMANFATTNING	48
ACKNOWLEDGEMENTS	50
REFERENCES	52
Appendix	
PAPERS I-V	

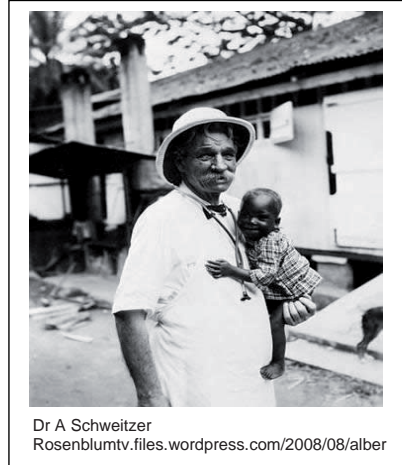




## PREFACE

I wrote this thesis mainly because of my involvement in the maternal health project in Angola. But it all actually started before I came to Angola. The Church of Sweden raised the funds for a missionary hospital in Gabon in 1970 and there was a picture of Dr Albert Schweitzer on the collection box which made a deep impression on me. This experience inspired me to become a midwife because I wanted to work in Africa.

I was licensed as a midwife in 1979, went to Mozambique in 1983 and worked at 'Maternidade 24 de Julho' in Beira for two years. Although the majority of childbirths were normal and uncomplicated, unnecessary maternal and neonatal deaths occurred. I was concerned by the situation and asked the Swedish obstetrician Staffan Bergström, who was working in Maputo, for advice. He suggested that I record the outcome of all deliveries every month on a piece of paper hanging on the wall of the Maternidade. This was my first contact with 'medical statistics'.



The maternal health project in Angola started in 1995. In close collaboration with Angolan doctors and midwives, we arranged week-long seminars twice a year focusing on the three big killers: eclampsia, haemorrhage and sepsis. The research project on post partum haemorrhage started in March 1998, at the university hospital in Luanda. The first two papers are derived from this project.

My interest in the management of the third stage of labour grew stronger through the Angola project, which led to further research in Sweden.

## INTRODUCTION

The third stage of labour is considered to be the most critical part of childbirth due to the risk of post partum haemorrhage (PPH) (Rogers et al., 1998, El-Refaey and Rodeck, 2003). PPH is defined as excessive bleeding from the genital tract at any time from the baby's birth until six weeks after delivery. According to the World Health Organisation (WHO), normal blood loss during the third stage of labour should not exceed 500 mL (WHO, 2006). Although blood loss of up to 1000 mL may still be considered to be physiological and not life-threatening in healthy women, blood loss of 500 mL can cause maternal death in a low-income country with a high prevalence of severe anaemia (Enkin, 2000, McDonald, 2007).

Active management of the third stage of labour (AMTSL) has been demonstrated to decrease blood loss in women undergoing vaginal childbirth. Consequently, WHO, the International Council of Midwives (ICM) and the International Federation of Gynaecology and Obstetrics (FIGO) recommend that AMTSL should be implemented in all women undergoing vaginal deliveries in hospitals (Joint Statement, 2004, WHO, 2006). Childbirth can be considered to be a natural process and this recommendation and the need for AMTSL have thus been questioned by care providers who promote an intervention-free birth process (Soltani, 2008, Hastie and Fahy, 2009).

This thesis aims at highlighting the third stage of labour, by comparing the effects of AMTSL and expectant management of the third stage labor (EMTSL) on blood loss and women's experiences of afterpains, as well as exploring midwives' experiences of managing this stage.

## BACKGROUND

### The third stage of labour

The third stage of labour starts immediately after the baby is born, includes detachment of the placenta from the uterine wall and ends with the complete expulsion of the placenta and membranes. It usually lasts 5–15 minutes but any period of up to one hour may be within normal limits (McDonald et al., 2009). The contractions during the third stage of labour are generated by higher levels of oxytocin than before delivery, levels that remain significantly increased up to 45 minutes after delivery, coinciding with the expulsion of placenta (Nissen et al., 1995).

The detachment of the placenta occurs in two different ways; in the majority of cases separation starts in the centre of the placenta which descends foremost. The fetal surface emerges initially, with the membranes following, and there is very little or no visible bleeding. Less common is separation starting at the lower edge of the placenta that slips down sideways, the maternal surface visible first in the vagina. The latter is a slower separation and haemorrhage is also likely to be more abundant (McDonald, 2009) .

Prolonged third stage of labour, requiring manual placenta removal, increases the risk of PPH more than three-fold and is more common in preterm labour, augmented labour and nulliparity (Dombrowski et al., 1995). Retained placenta is a major cause of PPH, although the definition of prolonged third stage remains controversial. Some authors suggest that if the placenta is not delivered within 30-60 minutes, as in 2-3% of all deliveries, the third stage is prolonged (Combs and Laros, 1991).

### Postpartum haemorrhage

PPH is one of the complications of childbirth, causing concern among health care providers because of the rapidity of its onset and the danger it can pose to women giving birth. As described earlier, PPH is defined as blood loss of  $\geq 500$  mL and severe PPH is defined as blood loss  $\geq 1000$  mL. Early PPH occurs within the first 24 hours post partum and late PPH from 24 hours to six weeks after childbirth. Field studies on the prevalence of PPH have demonstrated ranges of 10–20%, predominantly caused by uterine atony and retained placenta (Stones et al., 1993, Maughan et al., 2006, Breathnach and Geary, 2009).

Known risk factors associated with major PPH are distended uterus, prolonged labour, previous PPH and multiparity (Fuchs et al., 1985, Begley, 1991, Ford et al., 2007, Sosa et al., 2009). Nulliparity has also been identified as a high-risk factor (Bais et al., 2004), as have hypertension, oxytocin augmentation, vacuum extraction and high birth weight (Sheiner et al., 2005). Pre-pregnancy high maternal body mass index (BMI) has been reported to increase the risk of PPH (Doherty et al., 2006). A significant proportion of women without any identified risk factors may develop complications during labour that cause severe PPH (McLintock, 2005). Causative factors for PPH can be summarised with the mnemonic of the four Ts: tone (uterine atony), tissue (retained placenta or placental tissues), trauma (perineal tears or episiotomy) and thrombin (coagulopathy) (Lynch et al., 2006).

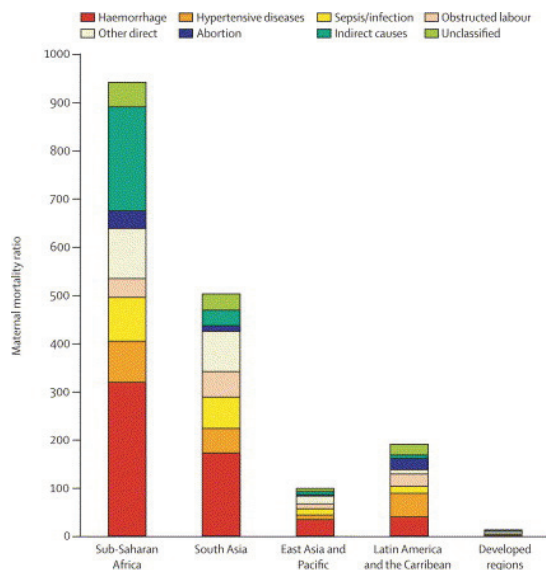
It has been shown that there has been a trend toward increased frequency of PPH in high-income countries, such as Canada, Australia and the USA, between 1991 and 2006 (Knight et al., 2009). One nationwide study performed in the USA demonstrated that the rate of PPH increased by 27.5% from 1995 to 2004, primarily due to an increase in the incidence of uterine atony (Bateman et al. 2010). The same trend holds true for Sahlgrenska University Hospital in Gothenburg, Sweden, where the number of women with blood loss >1000 mL after vaginal birth increased from 3.4% to 6.7% between 2000 and 2006 (Sahlgrenska university hospital Department of Obstetrics, 2007). A recently published Norwegian study reports that the incidence of blood loss >1000 mL has increased over a 10-year period and that the frequency of obstetric interventions has also increased during the same period (Rossen et al., 2010).

Maternal blood volume increases during pregnancy and the average increase is about 40-45% at term. Some women nearly double their blood volume, whereas others only have a modest increase. This hypervolaemia has several important functions, among which are safeguarding the mother against adverse effects of blood loss during the third stage of labour (Pritchard, 1965, Whittaker et al., 1996, Bernstein et al., 2001). Although the blood volume increase compensates for third-stage blood loss, action should be taken when a woman has lost more than one third of her estimated blood volume or 1000 mL, or when there is a change in vital signs. According to a literature review, it is important to recognise the clinical symptoms of various degrees of hypovolaemia and rapidly identify the cause of PPH. The clinical findings in hypovolaemia and various degrees of shock are listed in Table 1 (Ramanathan and Arulkumaran, 2006).

**Table 1.** Clinical findings in hypovolaemia and shock (from Ramanathan & Arulkumar 2006, p. 969)

Blood volume loss	BP (systolic change)	Symptoms and signs	Degree of shock
500–1000 mL (10–15%)	Normal	Palpitation, tachycardia, dizziness	Compensated
1000–1500 mL (15–25%)	Slight fall (80–100 mm Hg)	Weakness, tachycardia, sweating	Mild
1500–2000 mL (25–30%)	Moderate fall (70–80 mm Hg)	Restlessness, pallor, oliguria	Moderate
2000–3000 mL (35–45%)	Marked fall (50–70 mm Hg)	Collapse, air hunger, anuria	Severe

One-quarter of annual maternal deaths are probably caused by PPH which, together with pre-eclampsia and sepsis, is the most frequent cause of maternal death. Direct and indirect causes of maternal death are demonstrated in Figure 1 (Ronsmans and Graham, 2006). Almost all of these maternal deaths are preventable as the medical remedies to avoid fatalities are well known. PPH is also connected with severe morbidity and long-lasting health problems such as anaemia. Women living in an affluent setting with access to high-quality medical care will probably survive a major haemorrhage. This is not the case for poor, malnourished and unhealthy women living in areas with risks for delay in recognition of PPH, delay in transport to hospital and insufficient treatment at the health facility (Lynch et al., 2006).



**Figure 1.** MMR in 2000 by medical cause and region. (From Ronsmans et al. 2006, p. 1193).

### **Assessment of blood loss**

It is well known that visual estimation of blood loss in the third stage of labour and post partum is inaccurate and inconsistent. However, it is the most rapid and easiest way to judge the quantity of bleeding. Several studies have reported that care providers underestimate blood loss by 30 – 50% and it has also been stated that the greater the loss, the greater the underestimation (Razvi et al., 1996, Glover, 2003, Kavle et al., 2006, Maslovitz et al., 2008). It has been suggested that blood loss during the third stage should be assumed to be double the visual estimate if the latter exceeds 500 mL (Levy and Moore, 1985).

Direct measurement by collecting blood in buckets, sanitary pads and towels is the oldest method for attempting to determine the quantity; however, the amount of other, intermingled fluids cannot be distinguished, rendering the estimate uncertain (Schorn, 2010).

Patel et al reported that visual estimation was less accurate than estimation by placing a plastic drape under the mother's buttocks immediately after the birth of the neonate (Patel et al., 2006).

Laboratory methods such as photometry yield a more precise measure of blood loss and have been used in the post partum period. Photometry involves different technologies, one of which is converting blood pigment to alkaline haematin. This method is the most precise one, albeit too difficult and expensive to use in clinical practise (Chua et al., 1998, Schorn, 2010).

An estimate of blood loss can also be derived by multiplying the calculated pregnancy blood volume by percent of blood volume lost and comparing the visual estimated blood loss with the calculated estimated blood loss and the pre- and post-delivery haematocrit (HCT) (Stafford et al., 2008).

An appropriate method for calculating blood loss by traditional birth attendants in Africa is the use of a kanga, a piece of cloth women use for different purposes, e.g. carrying their children. Two soaked kangas are assessed as containing approximately 500 mL of blood, which has been regarded as an indication to refer the woman to a health facility with access to medical treatment and skilled care providers (Prata et al., 2005). Another appropriate alternative for measuring blood loss, used in Africa, is to place mothers in cholera beds after delivery with a bucket under the bed collecting the blood (Strand et al., 2003).

Some authors have declared that the actual quantity of blood loss is less important and suggested that the classification of PPH should instead be related to whether the haemorrhage has physiological effects or threatens the woman's life (Lynch et al., 2006).

## Management of the third stage of labour

The approach to management of the third stage of labour should minimise serious negative effects; the main issue is the choice between EMTSL and AMTSL (Enkin, 2000).

EMTSL requires waiting for the signs of placental separation: a uterine contraction, a little blood from the vagina or the mother feeling an urge to push. When the woman feels the placenta in her vagina she should be encouraged to bear down and push it out by her own effort. The umbilical cord should be left unclamped until the pulsations have ceased or the placenta is expelled (McDonald S, 2009).

AMTSL (previously abbreviated as AML or AMTL) includes 1) clamping of the umbilical cord shortly after the birth of the baby, 2) administration of a uterotonic, also called oxytocic, agent and 3) controlled cord traction (CCT) for delivery of the placenta. CCT entails waiting for a uterine contraction and then placing one hand just above the symphysis pubis. Firm backward counter-pressure is applied with the purpose of preventing inversion of the uterus. The midwife continues to “guard” the uterus with one hand while applying gentle and steady traction on the umbilical cord with the other hand, following the birth canal axis (McDonald, 2009). CCT is believed to reduce blood loss, shorten the third stage of labour and thus reduce the risk of PPH (Chong et al., 2004, Mathai et al., 2007).

The discussion concerning whether AMTSL or EMTSL should be recommended started in the mid-18<sup>th</sup> century when Crede’s manoeuvre was introduced with the objective of accelerating the third stage. Crede’s manoeuvre includes grasping the fundus and squeezing out the placenta. However, the risk of placenta products remaining in utero associated with this method was discussed and the opponents proposed, “Hands off the uterus”. One of the first published articles on the management of the third stage of labour was written by Dr Smyly at Rotunda Hospital in Dublin in 1885. He promoted a mixture of ‘active’ and ‘expectant’ management and suggested generating a permanent uterine contraction by holding one hand on the fundus, never letting the uterus relax before the placenta was expelled. He objected to pulling on the cord but did suggest strong downward pressure on the uterus to drive out the placenta (Smyly, 1885). In 1932 the ‘Brand Andrew’s manoeuvre’ was introduced to shorten the third stage and facilitate placenta expulsion; this later became the CCT concept (Spencer, 1962, Gulmezoglu and Souza, 2009).

Management of the third stage of labour is often undertaken as a mixture of the active and expectant versions. In an attempt to describe the various methods that they use during the third stage of labour, Featherstone asked 86 midwives to complete a questionnaire concerning the components of EMTSL,

revealing considerable variation in the methods described. A total of 57 different combinations were identified and divided into nine categories (Featherstone, 1999), as shown in Table 2.

**Table 2.** An overview of midwives’ different actions in EMTSL, divided into nine categories, according to featherstone (1999)

Actions	1	2	3	4	5	6	7	8	9
Administer oxytocic agent	X	X							
Omit oxytocic agent			X	X	X	X	X	X	X
Palpate for contracted uterus	X		X		X		X		
Do not palpate for contracted uterus						X		X	X
Clamp and cut the cord soon after birth				X					
Clamp and cut the cord once pulsations cease					X		X	X	
Release clamp on maternal end of the cord							X		
Apply CCT to deliver the placenta	X		X						
Placenta delivered by maternal effort		X		X	X	X	X	X	X

A European survey of policies for management of the third stage of labour in 14 countries demonstrated that between 72% and 100% of all maternity units used uterotonics as prophylaxis; administration of oxytocin, unaccompanied by other medications, was common. But guidelines concerning timing, cord clamping and CCT varied greatly, as can be seen in Table 3 (Winter et al., 2007).

Sweden was not included in this European study but a Swedish randomised controlled trial (RCT) in 1996 compared intravenous administration of 10 IU oxytocin with saline solution. Although the whole AMTSL package was not implemented, oxytocin administration was associated with a 22% reduction in mean blood loss (Nordstrom et al., 1997). Swedish recommendations include the prophylactic use of oxytocin, administered intravenously as soon as possible after the baby is born, but not the entire AMTSL package (State of the Art, 2001).

The transmission of AMTSL to low-income countries for prevention of PPH has been studied. Seven countries were selected and the researchers undertook observation of vaginal births and a review of national policy documents. It was found that the use of oxytocic agents, but not the correct implementation of AMTSL, is almost universal. Table 4 demonstrates the correct implementation of AMTSL in different areas and countries (Stanton et al, 2009).



**Table 3.** Policies for management of the third stage of labour after vaginal birth in maternity units in 14 European countries (From Winter et al. 2007, p. 848)

	All units replying, <i>n</i>	Timing of cutting and clamping cord			Controlled cord traction, <i>n</i> (%)	Administration of prophylactic uterotonics, <i>n</i> (%)	Active management, ** <i>n</i> (%)	Draining the placenta, <i>n</i> (%)
		Immediately after birth, <i>n</i> (%)	After the cord stops pulsating, <i>n</i> (%)	Other and not stated, * <i>n</i> (%)				
Austria	33	5 (15)	23 (70)	5 (15)	7 (21)	18 (55)	1 (3)	1 (3)
Belgium	105	92 (88)	11 (10)	2 (2)	45 (43)	93 (89)	36 (34)	34 (32)
Denmark	23	4 (17)	17 (74)	2 (9)	5 (22)	13 (57)	2 (9)	1 (4)
Finland	33	9 (27)	23 (70)	1 (3)	7 (21)	29 (88)	4 (12)	2 (6)
France	109	98 (90)	7 (6)	4 (4)	24 (22)	104 (95)	22 (20)	7 (6)
Hungary	98	20 (20)	66 (67)	12 (12)	12 (12)	89 (91)	5 (5)	3 (3)
Ireland	22	16 (73)	5 (23)	1 (5)	21 (95)	22 (100)	17 (77)	3 (14)
Italy	215	142 (66)	43 (20)	30 (14)	28 (13)	197 (92)	20 (9)	14 (7)
Netherlands	91	67 (74)	21 (23)	3 (3)	41 (45)	86 (95)	33 (36)	0 (0)
Norway	46	11 (24)	30 (65)	5 (11)	18 (39)	33 (72)	5 (11)	7 (15)
Portugal	37	33 (89)	1 (3)	3 (8)	19 (51)	31 (84)	13 (35)	9 (24)
Spain	53	40 (75)	7 (13)	6 (11)	13 (25)	45 (85)	7 (13)	8 (15)
Switzerland	68	47 (69)	10 (15)	11 (16)	31 (46)	60 (88)	25 (37)	2 (3)
UK	242	186 (77)	31 (13)	25 (10)	210 (87)	232 (96)	182 (75)	8 (3)

\*A few units had more than one 'usual' policy or had a policy of cutting the cord 'at another time'.

\*\*Usually cut the cord immediately after birth or after the cord stops pulsating, perform 'controlled cord traction' and administer prophylactic uterotonics

**Table 4.** Correct implementation of individual components of AMTSL in seven developing countries, 2005 and 2006 (From Stanton et al. 2009, p. 210)

Practice	Observed deliveries with correct use of AMTSL <sup>b</sup>						
	Africa			Asia	Central America		
	Benin	Ethiopia	United Republic of Tanzania	Indonesia	El Salvador	Honduras	Nicaragua
<b>Components of correct use of a uterotonic drug</b>							
Correct stage (i.e. after fetal delivery) (%)	88.6	69.7	37.6	91.5	44.2	51.4	43.9
Correct dose (%)	91.5	73.3	68.9 <sup>c</sup>	77.3	48.5	87.3	91.7
Correct mode of administration (%)	95.9	95.8	84.7	86.3	43.7	95.2	96.6
Correct timing of administration (%)	63.2	40.8	10.4	67.3	13.9	25.1	15.6
Controlled cord traction (%)	65.3	67.8	68.8	80.3	26.4	44.4	17.9
Fundal massage immediately after placental delivery (%)	81.8	72.1	87.6	77.8	61.2	38.7	54.0
mediate fundal massage, plus palpation of uterus at least twice in 30 min after placental delivery (%)	34.6	8.7	10.4	70.8	23.2	6.1	10.2
Observed deliveries	250	310	249	408	198	221	180
<b>Any use of uterotonic during the 3rd or 4th stage of labour (%)</b>	<b>96.2</b>	<b>99.8</b>	<b>96.8</b>	<b>99.7</b>	<b>60.1</b>	<b>95.7</b>	<b>100.0</b>
<b>Overall correct use of uterotonic for AMTSL purposes (%)</b>	<b>61.3</b>	<b>38.6</b>	<b>6.5</b>	<b>52.6</b>	<b>13.4</b>	<b>20.1</b>	<b>11.5</b>

AMTSL, active management of the third stage of labour.

<sup>a</sup> Data collected from October to December 2005 for Ethiopia and the United Republic of Tanzania, and from July to December 2006 for the remaining countries. <sup>b</sup> According to the FIGO-ICM definition of the AMTSL.

<sup>c</sup> Correct dose for ergometrine is defined as 0.5 mg only for the United Republic of Tanzania.

## Uterotonic drugs

Uterotonics have been known for more than a century. In the early twentieth century, there was a breakthrough in research on the pituitary gland, leading to the isolation and synthesis of oxytocin, for which Du Vignaud was awarded the Nobel prize in 1953 (Gulmezoglu and Souza, 2009). Several studies have shown that administration of uterotonic drugs, especially as part of AMTSL, reduces the incidence of PPH. A meta-analysis of five RCT (four were of good quality) by the Cochrane Collaboration showed that AMTSL contributes to a reduction of prolonged third stage as well as reducing the incidence of PPH. Different types of oxytocic drugs were used in the studies. Intramuscularly administered oxytocin was exclusively used in one of the included studies, Syntometrine® (a combination of 5 IU oxytocin and 0, 5 mg of ergot alkaloids) was used in two studies and ergot alkaloids were administered in one study. Nausea, vomiting and high blood pressure were reported when ergot alkaloids were used; this medication was also associated with more afterpains (Begley et al., 2010).

An earlier Cochrane review of the prophylactic use of oxytocics in the third stage of labour identified reduced blood loss and reduced need for further uterotonic drugs as benefits. There was a non - significant trend towards more manual removal of the placenta as well as an association with more raised blood pressure when ergot alkaloids were used, compared with oxytocin (Elbourne et al., 2001). It has been emphasised that once a uterotonic has been administered, it is important to deliver the placenta quickly in order to prevent retention. While oxytocin appears to be beneficial for prevention of PPH, there is not enough information about its side effects (Cotter et al., 2010). A Swedish study reported signs of myocardial ischemia within one minute after administration of an i.v bolus of 10 IU oxytocin although this effect appears to be transient (Svanstrom et al., 2008).

An Australian RCT compared AMTSL versions entailing intramuscular Syntometrine® and 10 IU intramuscular oxytocin, finding that the PPH rate was similar in both groups but that the disadvantages of Syntometrine® justify the use of oxytocin (McDonald et al., 1993).

Intramuscular carbetocin (a long-acting oxytocic agonist) was compared with 10 IU intravenous oxytocin in a double-blind RCT. There was no significant difference in PPH or the need for additional uterotonics between the two groups (Boucher et al., 2004).

Misoprostol (a prostaglandin E1 analogue), originally designed to treat gastric ulcers, has been proven to be effective in medical abortions and induction of labour by initiating contractions. It has also been recognised as a safe and efficacious drug for controlling PPH, as well as having undergone ex-

tensive testing for prophylactic use in the third stage of labour. Several RCT of AMTSL demonstrate a decrease in blood loss but this drug is significantly associated with shivering, pyrexia and diarrhoea and is not recommended for routine use (Villar et al., 2002, Chong et al., 2004). However, the advantages of misoprostol are greater than the risks (Patted et al., 2009). In low-income countries, where most births take place outside hospital settings, oral misoprostol has been shown to be inexpensive, stable in tropical climates and easily used by care providers, saving maternal lives (Hoj et al., 2005, Bradley et al., 2007, Prata et al., 2009).

### ***Cord clamping***

Early cord clamping, meaning clamping the umbilical cord immediately or within one minute after the birth of the baby, was first included in the AMTSL concept (Prendiville et al., 2000). Delayed cord clamping, defined as waiting 2-3 minutes after birth or for the pulsations to cease, has been reported as both harmful and beneficial to babies (Arca et al., 2010). Studies have demonstrated significantly lower ferritin levels at age six months after early cord clamping (Chaparro et al., 2006). Delayed cord clamping is preferred at less than 37 weeks' gestation since it is associated with less intraventricular haemorrhage and less need for transfusion (Leduc et al., 2009). Delayed cord clamping increases infants' need of phototherapy for jaundice, which should be weighed against the benefit of higher haemoglobin and iron levels at up to six months of age, especially in areas with poor nutritional status (Ceriani Cernadas et al., 2006, Hutton and Hassan, 2007, Neilson, 2008).

Recently, it has also been pointed out that cord blood contains stem cells that should be transferred to the newborn, a natural phenomenon after birth which may be beneficial for age-related diseases (Sanberg et al., 2009, Tolosa et al., 2010). An updated Cochrane meta-analysis of cord clamping indicates that there is no risk for increasing PPH if cord clamping is delayed by two to three minutes after birth, which is thus recommended by the reviewers (McDonald and Middleton, 2008).

### ***Uterine massage and cord drainage***

Routine uterine massage after expulsion of the placenta can be valuable in decreasing blood loss, particularly where uterotonics are not available. One study demonstrated a reduction in blood loss and less use of additional uterotonics after AMTSL combined with persistent uterine massage, compared to AMTSL without uterine massage (Abdel-Aleem et al., 2006).

It has been suggested that the umbilical cord should be left unclamped after it is cut, allowing the blood to drain out. However, study results show neither an associated decreased duration of the third stage (Soltani et al., 2005) nor a reduced risk of feto-maternal transfusion (Navaneethkrishnan et al., 2010).

### ***Promotion of the normal childbirth process***

Midwives have been characterised as protectors of normal childbirth. This includes not disturbing the first contact between the mother and her newborn or the physiological process (WHO, 1996, Enkin, 2000). Recommending AMTSL for healthy women in high-income countries, at low risk of PPH, has been criticised (Fahy, 2009). Recent decades have brought a rapid expansion in the development and use of a range of practices designed to regulate or monitor the physiological process of labour, with the aim of improving outcomes for mothers and babies. In high-income countries where rationalisation and institutionalisation of obstetric care is widespread, questions have been raised about the value and desirability of such a high prevalence of interventions (WHO/FRH/MSM, 1996). The attempt to normalise childbirth, appears to be decreasing, due to increasing resistance to offering individualised care in large obstetrician-led units with a high-tech approach (O'Connell and Downe, 2009).

Focus group discussions with Swedish midwives have shown that they feel their professional identity is becoming altered and constrained due to the increasing use of technology and written guidelines in modern obstetrics. Midwifery skills and techniques, taking many years to develop, are becoming less valued. In addition, doctors have gradually increased monitoring of women undergoing normal deliveries, giving midwives more of an assisting role (Larsson et al., 2007).

A cross-sectional survey of practitioners in maternity care in British Columbia demonstrated a major difference between doctors and midwives in the management of the third stage of labour. Although midwives had good knowledge of the evidence underlying AMTSL, they preferred EMTSL, according to birthing women's wishes. They also delayed the clamping of the umbilical cord to a great extent. No differences in the rates of PPH between the respective professionals' parturients were detected (Tan et al., 2008).

Hastie et al have developed a theoretical framework of management of the third stage of labour, based on Midwifery Guardianship. They use the concept 'psycho- physiological' in referring to a holistic approach to the third stage of labour, which they describe as more refined than 'expectant management'. They point out that the environment has an impact on the autonomic nervous system and hormonal regulation, which can affect the third stage of labour (Hastie and Fahy, 2009).

Furthermore, midwives state that it is easier to create the requisite conditions for natural labour in a permissive and safe environment with a continuity of care from a familiar midwife. A 'natural' third stage of labour promotes skin-to-skin contact which strengthens the loving bonds; reproductive hormones are released and the level of oxytocin increases as the mother feels and touches her newborn. The high level of oxytocin provokes uterine contractions which enable the placenta to detach from the uterine wall and yield sus-

tained haemostasis. A woman is still in labour before the placenta is delivered and she should not be disturbed by voices, phone calls, activities like cleaning the room or anything that can interfere with her attention. Exogenous oxytocin can not cross the blood – brain barrier and interrupts the release of natural oxytocin. Disturbed, the woman may not benefit from brain-based oxytocin and its behavioural effects (Hastie and Fahy, 2009, Fahy, 2009) .

Michel Odent is a French obstetrician at the maternity unit at Pithiviers Hospital. He introduced birthing pools and home-like rooms in hospital; his unit had fine statistics with low rates of intervention. Odent believes that the way we are born has long-term consequences in life, suggesting that the third stage should not be managed because manipulating the uterus disturbs the normal process (Odent, 1998).

Although AMTSL decreases the risk of PPH, some women may prefer physiological or EMTSL. Therefore, it is the responsibility of midwives to be skilled in both AMTSL and EMTSL techniques (Bair and Williams, 2007).

### **Safe Motherhood**

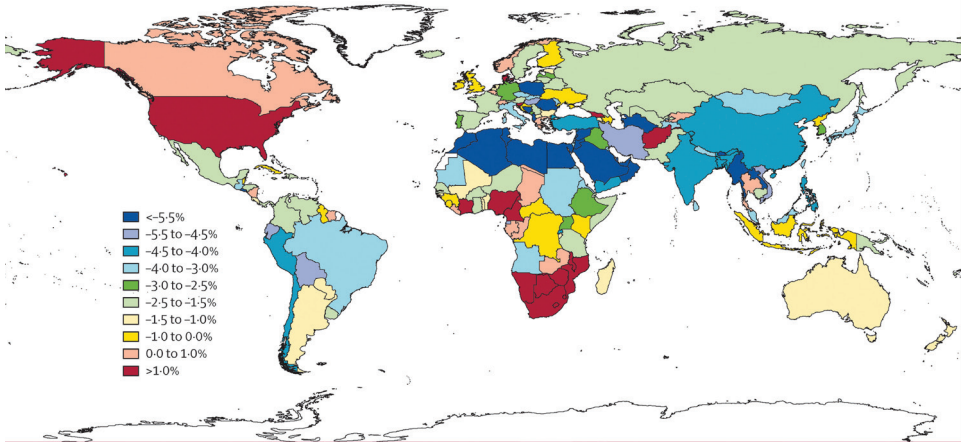
It is estimated that approximately 343,000 maternal deaths occurred around the world in 2008, a decline from half a million in 1980. PPH is one of the leading causes of maternal mortality, underlying an estimated 25% of maternal deaths (Khan 2006). Half a million women in the world, a majority of whom live in low-income countries, die every year related to pregnancy and childbirth. For every 100,000 live births in Africa, it is estimated that there are about 1 000 maternal deaths, compared to 10 in Europe. In addition, it is estimated that for each maternal death, approximately 30 women suffer from severe injuries (Koblinsky, 1995, Rosenfield et al., 2007). Pregnancy is a normal physiological process, not a disease, but it does carry increased risks. Lack of action to prevent maternal deaths constitutes discrimination and social injustice, as only women face the risk of maternal death (AbouZahr, 2003). It has been demonstrated that the life expectancy of females is longer than that of males in many countries. However, in low-income countries the opposite is true, indicating that women are less valued than men. For instance, illiteracy among women in Sub-Saharan Africa exceeds 50% and maternal mortality is higher in illiterate than in literate women (Bergström S, 1994, Harrison, 2001).

Although socio-economic conditions are the prominent cause of maternal mortality, it is not reasonable to simply wait for poverty to disappear; in the meantime, health care improvements are important. Better health care can make a difference in reducing maternal deaths but resources alone are not enough (Lerberghe, 2001).

The Safe Motherhood Initiative was introduced at a conference in Nairobi in 1987 when the global problem of maternal mortality was brought into focus, after attention having mainly been devoted to children's health and survival.

Rosenfield and Maine attracted attention in an article by asking, ‘Where is the M in MCH (Maternal and Child Health)?’. Their conclusion was that maternal mortality was not a priority for health practitioners and they called for investment in maternity care. Their recommendations included constructing maternity health care centres in rural areas, provision of equipment and drugs, recruitment of skilled birth attendants (SBA) and referral systems for women at high risk or with serious complications. The conference was an effective beginning; since then, the problem of safe motherhood has received global attention (Rosenfield and Maine, 1985, AbouZahr, 2003).

In September 2000, 189 members of the United Nations adopted the Millennium Declaration and Goals aimed at improving the health of the world’s people by 2015. Goal number five is specifically addressed at improving maternal health: ‘Reduce the maternal mortality ratio (MMR) by three quarters before 2015’ (Goal 5A) (Mittelmark, 2009). There are no simple ways to reduce maternal mortality. Until now, progress has been too slow and it is therefore predicted that this Millennium Goal will not be achieved. The estimated reduction in maternal mortality and the global MMR was 1.3% in 2008. To achieve a 75% decrease would require a 5.5% reduction in maternal deaths per year. Figure 2 shows the annual decline in the MMR worldwide in 1990 – 2008 (Hogan et al., 2010).



**Figure 2.** Annual rate of decline in the maternal mortality ratio, 1990-2008 (from Hogan et al. 2010, p. 1620).

## **Pain during the third stage of labour and afterpains**

The third stage of labour is often experienced as unpleasant and uncomfortable but pain during the third stage may be perceived as minor, compared to the previous stages. While pain during the first and second stages of labour is the object of extensive scientific attention (Lowe, 1987, Fridh et al., 1988, Hodnett et al., 2007), this is not the case for pain during the third stage and the post partum period.

Pain after childbirth is seldom referred to as afterpains; it is instead often related to pain in a caesarean section scar or perineal pain (Declercq et al., 2008). In this thesis, the definition of afterpains is '*painful contractions of the uterus occurring after delivery*'. One study from England interviewing 100 primiparous and 100 multiparous women 48 hours after delivery showed that abdominal pain was significantly worse in multiparas than in primiparas (Murray and Holdcroft, 1989). This paper did not provide any details about management of the third stage of labour.

Different factors affect women's perception of pain in labour. For most women, childbirth is a positive experience, but there are women who express dissatisfaction and for some it can constitute a dramatic and painful event (Waldenstrom and Nilsson, 1994). Childbirth education and pain relief have been shown to improve women's birth experience. However, support during labour and listening to woman may be even more important in reducing their need for pain relief (Hodnett, 2002b).

Perception of pain has a tendency to decrease with age. It has also been reported that primiparous women experience more pain than multiparous women (Hamilton, 2003). It is likely that higher age increases the probability of having undergone more deliveries; women generally state that afterpains exacerbate with each delivery and with breastfeeding (Holdcroft et al., 2003).

### **Assessments of pain**

When studying pain and pain relief, the intensity and type of pain must be assessed. Different methods have been developed with the aim of obtaining information from patients' own assessments.

The Verbal Rating Scale (VRS) is a common and easy method for health professionals to assess an individual's perception of pain by asking him/her to rate pain intensity. It consists of a four-point scale: 1) no pain at all, 2) a little pain, 3) intense pain and 4) intolerable pain (Seymour, 1982, Fridh and Gaston-Johansson, 1990).

The Visual Analogue Scale (VAS) is the most frequently used self-assessment scale for pain intensity in clinical settings. It is a plastic, hand-held instrument consisting of a line from zero to 100 mm, where zero means no pain and 100 means the worst conceivable pain. The patients rate their pain by plac-

ing a marker on the line (Jensen et al., 1986). The VAS has been evaluated as easy and suitable to assess pain and the degree of relaxation during childbirth (Martensson et al., 2008).

The Verbal Numeric Rating Scale (VNRS) is often used instead of the VAS for convenience. The patients are asked to rate their pain verbally on a scale between zero and ten, with zero corresponding to no pain and ten to the worst imaginable pain (Hartrick, 2001). The VNRS has a strong correlation with the VAS and is suitable for use in clinical practice (Holdgate et al., 2003)

The Pain-o-Meter (POM) is another self-administered pain assessment tool, partly based on a simplified version of the McGill Pain Questionnaire and the VAS, and was developed for clinical use. It is a plastic tool similar to the VAS instrument. The POM consists of two components, a 10-cm VAS (POM –VAS) and a list of 12 sensory and 11 affective word descriptors (POM – WDS) from which the woman may choose any number to describe her pain (Gaston-Johansson, 1996).

### **Evidence-based practice in the third stage of labour**

In the 1970s, controlled trials evaluating various aspects of the third stage of labour started appearing in the medical literature. The two main concepts for management of the third stage, as well as different components of these two packages, were compared in RCT. Unfortunately, most of the comparative trials differed in some aspect of management, such as the dose, route, timing and choice of the uterotonic. According to several researchers, there is sufficient evidence to indicate that AMTSL should be implemented in preventing PPH (Hofmeyr, 2005, Mathai et al., 2007). This leads to a reflection on what is meant by ‘evidence’.

The word ‘evidence’ is rooted in the concept of experience, relating to what is manifest and obvious. In health care, the concept of evidence has been interpreted in relation to ideas of proof and rationality. Clinical practice guidelines have been proposed to reduce the gap between available scientific evidence and clinical practice. The definition of evidence-based practice, according to Sackett (Sackett et al., 1996), is:

*‘the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients’*

Most research on the third stage of labour has been centred on determining which approach, AMTSL or EMTSL, is superior for prevention of PPH. As mentioned above, the ICM and FIGO (Joint Statement, 2004) recommend that AMTSL be offered to women since it reduces the incidence of PPH and this recommendation has been questioned by midwives and other supporters of normal childbirth who recommend that there should be a valid reason to interfere with the normal physiological childbirth process (WHO/FRH/MSM, 1996).



The discourse concerning best care of women during childbirth comprises variations, including evidence-based medicine evidence-based practice, evidence-based guidelines and evidence-based care (Rycroft-Malone et al., 2004, Berg et al., 2008). RCT have been regarded as the top of the scientific hierarchy and labelled 'the gold standard' in evaluating the effect of treatments. One shortcoming of RCT is that 'how-questions' are not answered; complementary research methods must thus also be applied in order to develop comprehensive knowledge (Berg et al., 2008).

### **What remains to be studied?**

Previous studies of the management of the third stage of labour, all conducted in high-income countries, have compared different uterotonic drugs, in conjunction with AMTSL or EMTSL, with blood loss as the main outcome variable (Elbourne et al., 2001, Begley et al., 2010). The variations observed in these trials also exist in clinical practice and there is thus still a need to identify the effective components of AMTSL (Gulmezoglu and Souza, 2009).

Women's experiences of afterpains related to different managements of the third stage of labour have not been investigated to any great extent. AMTSL, implemented in all women, might be considered to be a harmless intervention, albeit not in accordance with the core of midwifery; however, studies exploring midwives' experiences in relation to management are limited (Begley et al., 2010). Studies regarding women's experience of afterpains and management of the third stage are also needed.

The literature review identified three main research questions:

- How does management influence blood loss during the third stage of labour?
- How does management of the third stage of labour influence birthing women's experience of pain and discomfort during the third stage and the early post partum period?
- What are Swedish midwives' experiences of the management of the third stage of labour?

## AIMS OF THE THESIS

The overall aim of this thesis was to investigate management of the third stage of labour, focusing on its influence on women's blood loss and experience of afterpains in hospital settings, in both a low- and a high-income country, as well as on midwives' experience of third-stage management.

The principal issues were:

- To compare blood loss in women in a Angolan hospital setting before and after introduction of AMTSL, using a new device for oxytocin administration (Uniject™) (Paper I).
- To compare perceptions of pain and discomfort among birthing women in Angola managed with AMTSL with those of women managed with EMTSL (Paper II).
- To explore Swedish midwives' reflections on management of the third stage of labour (Paper III).
- To compare PPH in women randomised to AMTSL or EMTSL in a Swedish university hospital setting (Paper IV).
- To compare women's afterpains when randomised to either AMTSL or EMTSL in a Swedish university hospital setting (Paper V).

## MATERIAL AND METHODS

### Design

This thesis is based on five empirical studies, of which two were performed in Angola, representing a low-income country, and three were conducted in Sweden, representing a high-income country. An overview of the research design is presented in Table 5.

**Table 5.** Overview of research design

Study	Design	Data Collection	Participants	Data Analysis
I	Explorative, prospective, intervention	March1998 - May 2000	Women giving birth in Angola	$\chi^2$ test, Student's t-test
II	Semi-structured interviews	Three weeks in May 2000 in Angola	Mothers at postnatal ward analysis	Qualitative content
III	Focus group discussions	May 2006 – August 2007	Experienced midwives at Swedish delivery wards	Qualitative content analysis
IV+V	Randomised controlled trial	November 2006 -April 2008	Women giving birth in Sweden	Mann Whitney U-test, $\chi^2$ test, regression

In Angola, an interventional, comparative study was conducted, comparing blood loss before and after the introduction of AMTSL including a new disposable device, Uniject™, a plastic cushion-like tube prefilled with 10 IU of oxytocin with a sterile needle attached (Paper I). Mothers' experiences of afterpains after EMTSL and AMTSL were also compared (Paper II).

In Sweden, a qualitative, focus-group study was conducted, with the aim of describing Swedish midwives' experience of management of the third stage of labour (Paper III). Furthermore, a RCT (Papers IV-V) was performed at a university hospital. The participants were randomised to either AMTSL or EMTSL with the aims of comparing blood loss and identifying risk factors related to blood loss (Paper IV) as well as exploring women's experiences of afterpains (Paper V).

### Settings

#### **Angola**

Angola is situated in south-western Africa and gained its independence in 1975 after almost 500 years as a Portuguese colony and 15 years of struggle for independence. Soon after independence, a civil war started between the Popular Movement for the Liberation of Angola (MPLA) and the National

Union for the Total Independence of Angola (UNITA). This civil war ended in February 2002 after having ruined the country and starved a great number of its people. One and a half million lives may have been lost and four million people may have been displaced. Less than one third of the population has access to health services and one in three children dies before the age of five. The estimated population is 13 million inhabitants (July 2009), of which one third live in Luanda, the capital. The life expectancy for women is 39 years and the total fertility rate is 6. The infant mortality rate is 18 / 1000 live births. The MMR is 1 400 (WHO, 2008), one of the highest in the world, and it is estimated that 45% of the births are assisted by SBA. Expenditure on healthcare in 2003 was US\$ 26 per person. When it comes to age structure, 43.5% of the population is aged under 15 (WHO, 2008, The Swedish Institute of International Affairs, 2010).

Quantifying Angola's progress is not easy as health statistics are scarce and unreliable, but approximately 100,000–125,000 deliveries occur per year in Luanda, of which about 50% take place at the central maternity hospital and peripheral midwifery-led birth units. In an attempt to improve maternal health and decrease maternal mortality, the Angolan Ministry of Health created a programme entitled Co-ordination of Obstetric Attention in Luanda (CAOL), one of the aims of which was to authorise midwives after providing them with training.

The largest maternity hospital in Luanda is Maternidade Lucrecia Paím (MLP), which is also a referral hospital and where about 18 000 deliveries occur annually. The staff of the obstetric units consists of four to five midwives per shift. The wards are crowded and the number of beds is insufficient. A woman in labour must often share a bed with another woman and there is almost no privacy (See Figure 3). Family members are not permitted to support women during labour at the delivery ward, but are allowed to bring them food during



**Figure 3.** Delivery ward at Maternidade Lucrecia Paím, 2000. Photo E. Jangsten

visiting hours. If a woman needs a blood transfusion after childbirth, family members are requested to donate blood as replacement. Discharge from hospital after normal birth takes place at six hours at the earliest (CAOL, 1998).

### **Sweden**

Sweden is the largest of the Scandinavian countries and has 9.1 million inhabitants. The life expectancy at birth for women in Sweden is 83 years and the total fertility rate is 1.67. The infant mortality rate is 2.75 /1000 live births. In 2003 the health care expenditure was US\$ 3 149 per person. When it comes to age structure, 15% of the population is aged under 15 ; (WHO, 2008, The Swedish Institute of International Affairs, 2010). Almost 100,000 deliveries occur annually and 99% of them are assisted by midwives at 46 hospital-based obstetric units. Sweden has the lowest MMR worldwide; there were three maternal deaths in 2008 (WHO, 2008). The decline in MMR started as early as in the mid-18<sup>th</sup> century, long before the emergence of modern technologies, e.g. caesarean section, blood transfusions and antibiotics (Lerberghe, 2001). Between 1751 and 1900 the MMR in Sweden declined from 900 to 230 per 100,000 live births and it has been claimed that the introduction of midwifery education is one of the major reasons for this reduction in maternal deaths (Hogberg, 2004).

Gothenburg is the second largest city in Sweden, situated on the west coast and with nearly 500,000 inhabitants. There are three delivery units at Sahlgrenska University Hospital, handling about 10 000 deliveries annually. Women undergoing normal childbirth are assisted by midwives. All women in labour have a single room and most of the time their partner or a relative provides support throughout labour (See Figure 4). After a normal childbirth, the mother and her newborn (and usually the father) stay at the postnatal ward for 1-3 days, but discharge can take place six hours after childbirth at the earliest.



**Figure 4.** Delivery ward at Sahlgrenska University Hospital, 2005. Photo A-K Larsson

## DATA COLLECTION AND ANALYSIS

### Paper I (Angola)

Data was collected between March 1998 and May 2000 at the MLP. Due to the intensive workload, all women in labour could not participate in the study. It was necessary to limit the study to the period between 8 am and 3 pm for practical reasons. Twelve midwives and four doctors were selected for the study, trained and instructed in the practical methods and introduced to the study protocols. Participants were consecutively enrolled in the trial by the selected staff.

The study consisted of three parts. The first part comprised assessment of vaginal bleeding (n=782) immediately after birth and two hours post partum. The blood was collected using a plastic sheet during labour and a bucket placed under a cholera bed for two hours postpartum. The management of the third stage of labour was in accordance with hospital routines at the time, which did not include prophylactic oxytocin, and the placenta was expelled by maternal effort. The second part consisted of an implementation course for the selected staff on how to perform AMTSL, including administration of 10 IU oxytocin with the Uniject™ device. The third part entailed assessment of vaginal bleeding (n=814) immediately after birth and two hours post partum in women managed according to the principles of AMTSL.

Student's t-test was used for statistical analysis of the comparison of blood loss as well as of the interval between the birth of the neonate and placenta expulsion, before and after introduction of AMTSL with Uniject™. The Chi square test was used for comparison between proportions.

### Paper II (Angola)

An interview study was carried out during three weeks in May 2000 at the postnatal ward at MLP. A semi-structured questionnaire was created for data collection, translated into Portuguese and responses were analysed with the content analysis method.

Women (n=102) were included in Group A (n=51) if they were managed with AMTSL and in Group B (n=51) if they were managed with EMTSL. An arbitrary selection of participants was performed by the postnatal ward staff. The interviewer arrived at the postnatal ward in the afternoons and was not informed of whether the parturients belonged to Group A or Group B. The interviews lasted for about 10 minutes and were performed 2-12 hours post partum.

The VRS was considered to be the best alternative in this study setting, and a four-point scale was used to distinguish between no pain, a little pain, intense pain and intolerable pain. The interview also included questions about locali-

sation of the pain, satisfaction with provided care and breastfeeding. The Chi square test was used to compare pain. Due to the significant proportion of illiterate women and the fact that some of them did not understand Portuguese, it was not possible for the women to fill in the questionnaire unassisted.

### **Paper III (Sweden)**

A qualitative study, based on focus group discussions with experienced midwives about the management of the third stage of labour, was performed at six Swedish hospitals, three university hospitals and three provincial hospitals. Data was collected between May 2006 and August 2007. The focus groups consisted of three to eight participants, with an average of 24 years of professional experience. The focus group discussions lasted between 40 and 70 minutes and were tape-recorded and transcribed verbatim by the moderator.

Qualitative content analysis was used to elicit the meaning of the text and categorise the midwives' statements and conclusions (Krippendorf and 2004). During the analysis the meaning units, i.e. words or sentences, were related to each other. In the next step the meaning units were condensed, which entails reducing the text while retaining the core. The condensed meaning units were coded and merged into sub-categories and, finally, into categories (Graneheim and Lundman, 2004).

### **Paper IV and Paper V (Sweden)**

A trial was conducted at two delivery wards at Sahlgrenska University Hospital in Gothenburg between November 2006 and April 2008. Healthy women with normal, singleton pregnancies, a gestational age of 34+0 – 43+0 weeks, cephalic presentation and expected vaginal birth were eligible for the study. Exclusion criteria were: non Swedish-speaking, previous PPH, elective caesarean section, pre-eclampsia, grand multiparity or intrauterine fetal death.

Women were randomly assigned to either AMTSL or EMTSL (see Appendix 1). After birth of the neonate, a dry sanitary towel was placed under the mother's bottom and all blood loss was measured by auxiliary staff weighing these towels.

In order to improve the comparison of women's pain in the two groups, an injection of saline solution was added to the study protocol for women in the EMTSL group after the first 158 recruited participants.

The study protocol consisted of two sections, of which the first contained questions specific for the management of the third stage of labour and the second consisted of self - assessment tools, the VAS and the POM. The women assessed their pain two hours after childbirth, just before transfer to the post-natal ward. The participants also received a questionnaire including questions about pain, breastfeeding and support during the third stage of labour, to be filled out one day after childbirth.

The primary outcome was the incidence of blood loss >1000 mL during the third stage of labour (Paper IV). The secondary outcome was the women's experiences of post partum pain (afterpains) during the third stage of labour and in the early post partum period (Paper V). In order to detect a 5% difference (15% vs 10% ) in blood loss >1000 mL between the two groups with Fisher's exact test with 80% power ( $\alpha=0.05$ ), at least 726 subjects were required in each group.

All analyses were based on the intention-to-treat principle. For comparison between the two groups, the Mann-Whitney U test was used for non-normally distributed continuous variables and Student's t-test was used for normally distributed data. Fisher's exact test was used for dichotomous variables and the Chi-square test for categorical variables. A stepwise multiple logistic regression was undertaken to identify independent risk factors for blood loss >1000 mL. In order to identify independent risk factors for total blood loss and blood loss prior to expulsion of the placenta, a stepwise multiple linear regression analysis was performed. All tests were two-tailed and conducted at the 5% significance level. The data were analysed with the SAS-system, version 9.2 and SPSS software, version 15.0 SPSS Inc., Chicago, Illinois, USA). (Pallant, 2005).



## **ETHICAL APPROVALS**

The first two studies (Papers I and II) were granted ethical approval by the Ethics Committee at the Karolinska Institute, Stockholm, Sweden and by Agostino Neto University, Luanda, Angola (Dnr 98-092). Ethical approval was not mandatory according to Swedish law for the third study (Paper III), but the Helsinki Declaration rules were followed and the participants gave informed consent before the interview. For the last study (Papers IV and V), ethical approval was granted in June 2006 (Dnr.245/06) by the Regional Ethics Board in Gothenburg and an amendment to the application was approved in March 2007 (T 153-07).

## RESULTS

The results from each of the five papers are presented separately, followed by a comparison of some variables between Angola and Sweden.

### Paper I

The main result was a significant reduction of blood loss  $\geq 500$  mL, from 40.4% to 8.2%, and a decrease in blood loss  $>1000$  mL, from 7.5% to 1%, in the AMTSL group. The duration of the third stage was reduced from 16 minutes to 4 minutes after introduction of AMTSL. Blood loss was also significantly lower among both primiparous and grand multiparous women after the introduction of AMTSL. There was no difference between the two groups in age, parity or prolonged labour. There were 262 (34%) primiparas among the participating women before introduction of AMTSL and 304 (37%) after introduction of AMTSL. The proportion of grand multiparas, defined as  $\geq 4$  deliveries, was 241 (31%) and 222 (27%), respectively. The prevalence of PPH in primiparous women was 38%, and 46% in grand multiparous women ( $\geq 4$  deliveries), before the introduction of AMTSL. In both groups the prevalence was reduced to 9.5% after the introduction of AMTSL. The mean birth weight was 3064 g, although the birth weight was significantly higher (130 g) in the AMTSL group. No maternal deaths caused by PPH were observed during the study period.

### Paper II

Afterpains were experienced by 45% of the women in Group A (AMTSL), of whom 10 women reported intense or intolerable pain. In Group B, managed with EMTSL, 37% felt pain after delivery, classified by five women as intense or intolerable. However, we found no significant difference between the two groups. Multiparous women experienced more postpartum pain than primiparous women, irrespective of management during the third stage. Only six of 40 primiparous women experienced afterpains, compared with 36 of the 62 multiparous and grand multiparous women, a statistically significant difference ( $p=0.002$ ). Fifteen women in both groups ranked the pain as intense or intolerable; only two of these were primiparous. The pain was mostly described by the parturients in both groups as localised in the lower abdomen. The women also answered questions about their perceptions of the provided care and the staff. The majority (75%) were satisfied with the care they had received. However, 21 women were not fully satisfied and five women were disappointed. The last question was open-ended and 57 women made comments, the content of which generated five themes.

### Paper III

The focus groups consisted of three to eight midwives, in total 32, aged between 32 and 65. Their working experience ranged between six and 40 years. None of the units had specific written guidelines for the management of the

third stage of labour, but this issue was addressed indirectly in policies regarding manual placenta removal. To a large extent, prophylactic oxytocin was administered to all women. The midwives described major variations in the management of the third stage of labour. The analysis generated three categories: 'bring the process under control', 'protect normality and women's birthing experiences' and 'maintain midwives' autonomy'.

The midwives regarded childbirth as a natural and normal process requiring intervention only in a few cases. They were used to working independently and guiding women through childbirth and their self-confidence in making decisions had been developed by assisting many deliveries. Their ambition was to promote the normal birthing process, at the same time adapting management to follow hospital routines and evidence-based medicine. The importance of trusting in nature and promoting the normal physiological childbirth process, including during the third stage, was emphasised by almost all midwives. This attitude comprised not disturbing the process and avoiding the intervention of prophylactic oxytocin administration. However, some followed the guidelines despite disagreeing with the idea that all women require this intervention.

#### **Paper IV**

A total of 1 802 women were randomly assigned to AMTSL (n=903) or EMTSL (n=899). In total, 810 actively managed women and 821 expectantly managed women were analysed. AMTSL was correctly implemented in 96% of that group while 2.3% of the women in the EMTSL group received oxytocin instead of saline. Age, gestation, parity, BMI, mode of delivery, oxytocin augmentation and pain relief were equal at baseline. Induced labour was significantly more frequent in the AMTSL group. Furthermore, birth weight, placenta weight, total labour duration, perineal tears and episiotomies were also equal. Blood loss >1000 mL occurred in 10% in the AMTSL, compared to 16.8% in the EMTSL, group and the mean blood loss was lower in the AMTSL than in the EMTSL group. Irrespective of management during the third stage of labour, more primiparous than multiparous women bled >1000 mL: 17% compared to 9.3% ( $p<0.001$ ). Haemoglobin levels were the same at inclusion in both groups but the day after delivery they were significantly lower in expectantly managed women. The number of blood transfusions was equally distributed between the groups, although more primiparous (n=35) than multiparous (n=6) women were given blood transfusions. The study group consisted of 57% primiparous women, a slight overrepresentation of primiparity, in comparison with 48% in the ordinary parturient population.

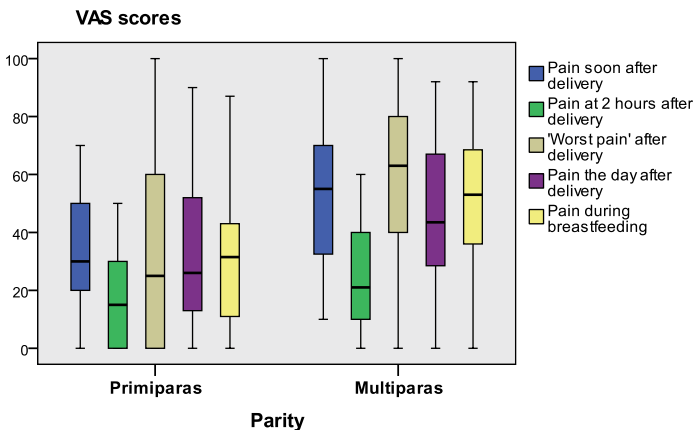
The number of women with retained placenta and retained placental tissue was similar in both groups. Additional oxytocin treatment after placenta expulsion was given to women in both groups, but more frequently in the EMTSL group: 37 (4.6%) and 145 (17.7%), respectively. In total, 154 women, 57 actively managed and 77 expectantly managed required additional treatment with ergometrine. We failed to confirm any association between obesity (BMI

≥30) and increased blood loss in either the AMTSL or EMTSL group. However, the number of obese women was low in the study population. The risk factors for PPH were primiparity, increased duration of the third stage and high placenta weight. It was demonstrated that for each 100 g in increased placenta weight, blood loss increased by 44 mL ( $p < 0.0001$ ), and for every five minutes duration before delivery of the placenta, bleeding increased by 40 mL. These results indicate convincingly that post partum blood loss decreases when the third stage is managed actively, especially in primiparous women.

**Paper V**

Women scored higher on the VAS in the EMTSL group at the two-hour follow-up, compared to women in the AMTSL group. There were no significant differences in ‘worst afterpains’ between the two groups. Some women ( $n=95$ ) experienced intense afterpains that required analgesia *before* the two-hour follow-up: 35 in the AMTSL group and 60 in the EMTSL group. No difference in pain intensity was found between the two groups. Irrespective of management, no difference in afterpains was detected between women with blood loss exceeding 1000 mL and those with blood loss less than 1000 mL. The number of uterine palpations after placental expulsion was equally distributed between the groups.

Women given epidural analgesia during labour scored less intense pain at the two-hour follow-up, compared to women who were not. Afterpains the day after delivery were VAS -scored 26 mm by mothers in the AMTSL group and 29 mm in the EMTSL group. VAS scores for afterpains did not differ between the management groups when it came to breastfeeding mothers.



**Figure 5.** A comparison of afterpains between primiparous and multiparous women.

The most commonly used POM words for describing afterpains were ‘grinding’ (45% AMTSL and 50% EMTSL), followed by ‘aching’, ‘irritating’, ‘troublesome’ and ‘tiring’. Words such as ‘excruciating’ and ‘torturing’ were not very common; they were used by 76 women in total. Women’s scores regarding perceived support during labour were high: VAS >90 mm in both groups. A few women 33 (5%) AMTSL and 46 (7%) EMTSL) stated that the management of the third stage of labour influenced their overall experience of labour negatively. There was no difference between the groups concerning satisfaction with pain relief during the third stage of labour. Irrespective of management, multiparous women scored significantly higher in all pain assessments (see Figure 5).

The POM describes the pain from both a sensory and an affective perspective. The most frequently used words on the POM-WDS in the two groups are presented in Table 6. There were some women that chose the words terrible, excruciating or torturing.

**Table 6.** The most frequently used POM-WDS words on all pain assessment occasions. More than one word could be chosen.

	Active management	Expectant management
Grinding	852 (31%)	1020 (36%)
Cramping	419 (15%)	431 (15%)
Aching	503 (18%)	522 (19%)
Troublesome	463 (17%)	548 (20%)
Irritating	408 (15%)	408 (15%)
Sore	359 (13%)	360 (13%)
Tiring	332 (12%)	294 (11%)

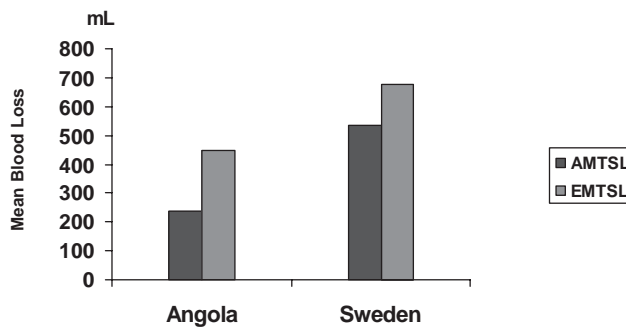
### Comparison of Angola and Sweden

When participants in Angola and Sweden were compared, the age variable was similar while all other compared variables differed (see Table 7).

**Table 7.** Demographic and outcome variables in both total study populations

ANGOLA and SWEDEN		N	Min	Max	Mean	SD
<b>Angola</b>	Age	1596	17	46	30.63	4.573
	Gestation	1592	1	22	2.94	2.202
	Parity	1596	0	12	1.75	1.988
	Birth weight	1586	550	4900	3064	534.741
	Blood loss	1596	0	2500	341	274.054
	Duration third stage (min)	1594	1	102	10.32	8.653
<b>Sweden</b>	Age	1631	17	46	30.61	4.562
	Gestation	1631	1	8	2.05	1.169
	Parity	1631	0	4	.54	.717
	Birth weight	1631	2165	5150	3592	451.923
	Blood loss	1629	56	4700	608	457.997
	Duration third stage (min)	1629	0	115	15.41	15.311

A comparison of blood loss between AMTSL and EMTSL in the Angolan and the Swedish study demonstrated that the Angolan women, both AMTSL and EMTSL, had less blood loss. See Figure 6.



**Figure 6.** A comparison of blood loss in Angola and Sweden and between AMTSL and EMTSL.

## DISCUSSION

The studies in this thesis demonstrate that AMTSL is related to significantly less blood loss, compared to EMTSL (Papers I & IV), and that women's experiences of afterpains do not differ based on how the third stage is managed (Papers II & V).

This thesis also generates knowledge of how midwives (in Sweden) experience and manage the third stage of labour. Different managements were described by the midwives who exhibited self-confidence in evaluating the physiological process and endeavouring to manage expectantly if no risks were apparent. Not all midwives are convinced that prophylactic oxytocin in the third stage of labour is always the best alternative for all women with normal labour (Paper III).

### Blood loss

The main finding in both the Angolan and the Swedish studies was that mean blood loss and the number of women with blood loss  $\geq 1000$  mL was significantly lower when the third stage of labour was actively managed. This is in accordance with previous studies comparing AMTSL and EMTSL (Begley et al., 2010); however, our results demonstrate a greater disparity than previously found (Begley, 1990, Prendiville et al., 1988, Rogers et al., 1998). In the Swedish trial mean blood loss was higher and blood loss  $\geq 1000$  mL was more frequent than in the Angolan study, both in the EMTSL and the AMTSL groups. This discrepancy can be explained by the fact that the neonates in the Swedish trial weighed more than those in Angola (see Table 7). According to earlier research, high birth weight has significant influence on PPH (Hofmeyr, 2005).

Our Swedish trial is, to our knowledge, the first trial to test whether placenta weight influences PPH. We found that the higher the placenta weight, the greater the blood loss. However, it is well known that birth weight and placenta weight are strongly correlated. We also found that primiparous women bled more than multiparous women (Paper IV), which has also been reported by others (Tsu, 1993, Bais et al., 2004). In the Angolan trial, however, the multiparous women with  $\geq 4$  deliveries had more blood loss, compared to primiparous women (Paper I).

It has been claimed that a high pre-pregnancy BMI influences PPH rates (Doherty et al., 2006). An English study reported that the risk of PPH  $>1000$  mL rose with increasing BMI. Women with moderately increased BMI (25-29.9) had a 30% higher frequency of blood loss  $>1000$  mL and obese women (BMI  $\geq 30$ ) had a 70% higher frequency of blood loss  $>1000$  mL, compared to women with normal BMI (20-24.9) (Sebire et al., 2001). Our results (Paper IV) did not confirm this association; however, only 7% of the total study population were obese.

When interpreting the results it is also important to discuss how studies in both Angola and Sweden influence assessment of blood loss. In the Swedish study, the number of women losing > 1000 mL increased from 6.7% to 7.5% during the study period. This might indicate that blood loss was measured more accurately during the study. Another explanation for this increase might be an effect of reports that estimation of blood loss by care providers is inaccurate; awareness of this may have led providers to overestimate rather than underestimate. Measurement bias cannot be excluded as a possible explanation of this observed effect on PPH.

Nevertheless, it is remarkable that the number of women with blood loss >1000 mL in the Angolan study declined to 1% after introduction of AMTSL (Paper I). Our conclusion, also put forward by others (Razvi et al., 1996), is that this lack of accuracy is even more obvious in low-income countries, where time and staff constraints frequently impede accurate assessment of post partum blood loss.

The clinical relevance of blood loss depends on each individual's health status. It should be emphasised that reduction of blood loss has a much greater impact on women's health in low-income than in high-income countries (Mathai et al., 2007). Loss of 500 mL, equivalent to the amount withdrawn at routine blood donation, does not generally affect a healthy woman. Moreover, haemodilution in pregnancy prepares women for a certain amount of blood loss. Even if the woman tolerates blood loss after delivery well, rapid detection of and response to PPH is important.

Uterotonic drugs for the treatment of PPH are an enduring success, although PPH is still the most common reason for blood transfusion after delivery (El-Refaey and Rodeck, 2003) as well as the most common cause of maternal mortality (Khan et al., 2006).

## **Afterpains**

The results of both the Angolan study (Paper II) and the Swedish study (Paper V) demonstrated that AMTSL does not increase women's experiences of afterpains, compared to EMTSL. Surprisingly, we found that expectantly managed women scored higher on the VAS in the Swedish study. However, the difference (3 mm) has no clinical relevance, albeit statistically significant.

Pain in labour is considered to be normal even though many women describe it as the most severe pain they have ever experienced (Melzack et al., 1981).

Afterpains have not been the focus of investigations before, probably because they are less severe than the pain in the first and second stages of labour. One previous study reported that actively managed women required more analgesia, compared to expectantly managed women (Begley, 1990). To our knowledge, this study (Paper V) is the first RCT comparing AMTSL and EMTSL and their effects on mothers' experiences of afterpains.



Perception of pain has a tendency to decrease with age (Melzack et al., 1981). However, this is not the case for the third stage of labour since age and parity are concomitant, which implies that afterpains are aggravated with every delivery. No differences in oxytocin release or uterine oxytocin receptor function between primiparous and multiparous women have been reported, but the possibility of increased oxytocin release in multiparous women was discussed in one paper (Uvnas-Moberg and Eriksson, 1996).

Ethical considerations regarding the timing of pain assessment led to the decision to let women assess their pain at the post-natal ward in the Angolan study. They were interviewed by a local midwife (Paper II). In the Swedish study, the chosen times for assessment of afterpains were the two-hour follow-up and the day after childbirth (Paper V). The women in the Angolan trial reported less intense pain soon after delivery, compared to several hours later (Paper II). Women in the Swedish study scored less pain and 'worst pain' scores were less frequent at two hours, compared to the day after delivery (Paper V). The accuracy of women's assessment of 'worst pain' after the birth of the baby in this study seems to be reliable since it is similar to the results of a study using the Brief Pain Inventory which included the item 'pain at its worst in the last 24 hours' (Atkinson et al., 2010).

It has previously been reported by Stainton that mothers have intense afterpains one day after birth (Stainton et al., 1999). Irrespective of management, mothers scored afterpains higher the day after delivery, compared to two hours after delivery (Paper V). Some of the mothers were still under the influence of epidural analgesia two hours after birth. The mothers in the Angolan study did not breastfeed until they were transferred to the post-natal ward (Paper II).

We found that multiparous women scored afterpains higher than primiparous women, irrespective of the management of the third stage of labour (Papers II and V). This is in accordance with the findings in a study of multiparous women who were asked if they could remember having afterpains after their previous deliveries. Half of the women with one previous delivery remembered having afterpains and almost all women with two or more deliveries could recall their afterpains, reporting a tendency toward increased intensity after each delivery (Murray and Holdcroft, 1989). These findings agree with a study comparing assessment of pain during breastfeeding, showing that both the mean duration and the number of uterine contractions increased significantly with parity. The number of painful sites also increased with parity, especially during breastfeeding (Holdcroft et al., 2003).

Perception of pain is an individual experience spanning a wide range of intensity. People's capacity to handle pain differs depending on when it occurs as well as on the situation and the reason for the pain. Support has been shown to be valued and women seem to require less pain relief if given good support (Hodnett, 2002a). In our studies (Papers II and V), no relationship between afterpains and support could be demonstrated.

## Management

Both our Angolan and our Swedish studies (Papers I and IV) showed that AMTSL was the best alternative for decreasing PPH in women undergoing vaginal delivery in hospital. When comparing results and studies in two countries, especially a low- income and a high-income country, it should be kept in mind that socio-economic, nutritional and health care improvements are the most important reasons for the decrease in maternal complications. Promoting the routine implementation of AMTSL in women with generally good health status has been claimed to be unnecessary (Soltani, 2008). The aims of care are that mother and child remain healthy and to undertake as few interventions as possible without jeopardising either party. One could claim, as does Hofmeyr (Hofmeyr, 2005), that the safest way to help labouring women is to respect nature and not to interfere with spontaneous events unless there is clear evidence that to do so would be beneficial .

However, on the basis of current evidence, if a decrease in PPH or avoidance of manual removal is desired, an active approach to the third stage should be adopted until and unless contradictory findings are published (Brucker, 2001). When a large obstetric unit in the USA changed from EMTSL to EMTSL, there was a resulting decrease in PPH and in additional administration of uterotonics (Burke, 2010).

Midwives are key in the management of the third stage of labour, including prevention of PPH and identifying women at higher risk for PPH. In order to promote physiological childbirth, they must find a balance between EMTSL and AMTSL, taking women's social, cultural and psychological well-being into account. Furthermore, some midwives practise where facilities for AMTSL are not available. The ICM states that it is therefore essential for all midwives to be skilled in managing the third stage of labour without the aid of uterotonics (ICM, 2008).

Although AMTSL decreases the risk of PPH, there are women who may prefer physiological or expectant management (Bair and Williams, 2007). Some women may prefer to take the small risk of PPH and avoid interventions during otherwise normal labour, whereas others may wish to take all measures to reduce the risk of PPH (Rogers et al., 1998). Women who want natural childbirth, including the third stage, may prefer EMTSL and should be supported and guaranteed appropriate management by midwives and obstetricians. It is important that midwives are skilled in both EMTSL and AMTSL techniques (Vivio and Williams, 2004).

None of the midwives in the Swedish focus group study (Paper III) followed the entire AMTSL procedure recommended by WHO (WHO 2006). However, the majority were aware of the current Swedish recommendations to administer prophylactic oxytocin after the birth of the baby (State of the Art, 2001). The midwives preferred not to administer prophylactic oxytocin immediately,

awaiting the normal physiological process instead. According to the respondents, this hesitation to follow the prophylactic oxytocin routine was related to the risk of retained placenta. It is a common opinion that uterotonics given as prophylaxis in the third stage of labour increase the risk of retained placenta, which must therefore be delivered quickly (Fry, 2007). Studies comparing the benefits of early (before placenta delivery) and late (after placenta delivery) administration of prophylactic oxytocin report different results.

One study reported that early administration did not increase the risk of manual removal of the placenta and that PPH was prevented equally effectively; the uterotonic agent can thus be administered either before or after delivery of the placenta (Jackson et al., 2001). Another study showed less frequent PPH when oxytocin was administered after placenta delivery (Huh et al., 2004). The authors of a Swedish study conclude that oxytocin should be used with caution when given as an intravenous injection and recommend slow administration of low doses, especially to hypovolaemic patients (Svanstrom et al., 2008).

Expectantly managed mothers have described a prolonged third stage of labour as a negative experience (Harding et al., 1989). However, this was not confirmed in our studies in Angola (Paper II) or Sweden (Paper V). The majority of women in the Swedish study reported that management of the third stage did not influence their childbirth experience negatively and no difference was found between the actively managed and the expectantly managed women in this regard (Paper V).

In the Angolan study the majority were found to be satisfied with the care and treatment provided during labour and no differences between the groups were detected. Although satisfaction and empathy were given positive assessment scores, many of the women's own comments indicated that the care providers' behaviour was negligent and that they had demanded money from parturients. This was also found in a focus group study with women living in suburban areas in Luanda, Angola, who avoided seeking institutional care during labour because of low quality (Pettersson et al., 2004).

## **Methodological considerations**

The purpose of this thesis was to explore management of the third stage of labour and the respective outcomes of AMTSL and EMTSL. In order to obtain holistic knowledge, both qualitative and quantitative methods were used to answer the research questions.

Evidence-based care has become the standard in the clinical disciplines. RCT provide the strongest evidence for a treatment or intervention by creating comparable study groups at baseline with respect to both known and unknown risk factors, i.e. by removing confounding factors. Concealment of allocation and blinding are considered the most important methodological

factors to ensure high validity of a RCT. However, RCT have limitations and cannot address all important clinical questions. Research based on observational, descriptive and qualitative methods is also important in generating evidence for practice (Albers, 2001). Balancing the needs of individual women against what is learned from research is a challenge for midwives.

The implications of RCT for studying health care interventions have been discussed since RCT probably increase individuals' being subjected to interventions that might not necessarily be the best option for them (Soltani, 2008). Even if RCT are preferable in most cases, the results might have certain limitations due to selection bias and the generalisability of RCT results can always be questioned. The staff performing the RCT in our Swedish study could not be blinded to the group allocation because of the nature of the intervention, which might have created a bias concerning blood loss assessment. We attempted to minimise bias by having the auxiliary staff weigh the bed linen and sanitary towels, before and after delivery. The women's haemoglobin was also measured before delivery and the day after birth.

Due to the heavy workload in the Angolan study setting, it was not possible for the care providers to conduct a RCT. Instead, a prospective, comparative study including the studied intervention was conducted (Paper I). The staff that collected data was selected by hospital authorities who considered them to be experienced and dedicated to the task. The study design was feasible and the staff enrolled participants consecutively as they arrived at the maternity ward. However, the enrolment procedure might have been a source of bias, which might in turn have influenced the results.

Oxytocin has become available in the single-use Uniject™ system, making it possible to administer it more easily than with ampoules and standard syringes. The device is appropriate for intramuscular and subcutaneous injections and can be used in the community by health care providers with appropriate training (Gulmezoglu and Souza, 2009). Midwives in Vietnam stated that the Uniject™ may increase the acceptability of implementing AMTSL (Tsu et al., 2008).

The VRS was considered an appropriate tool for the Angolan mothers to assess their afterpains (Paper II). It was simple for the interviewer to mark the box of the mothers' selected rating, but this instrument can also be criticised. The VRS is not as sensitive in assessing pain intensity as the VAS or the VNRS (Breivik et al., 2000) but it was an available method for this study. Illiteracy is widespread in Angola, which made a questionnaire meaningless, and the results might reflect any inhibitions women felt in expressing their opinions to an interviewer. It has previously been found that dependence on the provider may mute criticism of the service (Bernhart et al., 1999). This problem was foreseen and we attempted to counteract it by choosing as the interviewer a local midwife, not involved in care, speaking the local dialect and dressed in her own clothes rather than a uniform (Paper II).

The VAS was considered to be the best alternative for assessing afterpains in the Swedish RCT (Paper V). Our results demonstrate that mothers were acquainted with the VAS and could easily distinguish between afterpains and other sources of pain. When evaluating the effect of paracetamol versus placebo in mothers with post partum pain using the VAS, Skovlund et al. reported that women easily distinguished between 'uterine cramping' and episiotomy pain (Skovlund et al., 1991). Taking into account the fact that many women experience a great deal of pain after delivery and during breastfeeding, use of the VAS may improve communication between care providers and patients regarding the need for pain alleviation.

Focus group discussion and content analysis were ideal for exploring and analysing midwives' experiences of the third stage of labour (Paper III). However, focus group interviews can be criticised for yielding superficial content. In contrast to the tradition of replicable assessment as a necessary condition in quantitative studies, the trustworthiness of results based on focus groups must be considered in a different light. The information obtained can be considered to be an accurate representation of the group members' perceptions of reality and therefore valid. The participating midwives were all experienced and they worked at both small and large obstetric units. In accordance with Kreuger (Kreuger, 1994), since no more variations or new information emerged after six focus groups had been conducted, these respondents' experiences can be generalised to similar groups.

AMTSL involves early clamping of the umbilical cord, an intervention that has been the object of criticism. However, if an oxytocic agent is administered intravenously before cord clamping, resulting in a strong uterine contraction, this may force an excessive volume of blood into the neonate. The time between administration of an oxytocic agent and cord clamping may thus be critical (Kinmond et al., 1993) and the cord should be clamped before the plasma oxytocin concentration rises.

Conflicting results have been demonstrated regarding the timing and effects of early and delayed cord clamping for the mother and neonate; this issue thus requires further study. If CCT is practised, as is the case in many delivery units, early cord clamping is mandatory, resulting in the neonates having lower blood volume than if clamping is delayed (Mercer et al., 2005). Delayed clamping (or not clamping at all) is the normal mode of management and Jahazi et al. have reported that delayed cord clamping does not lead to any difference in the HCT level or polycythemia rate, but it is associated with an increase in neonatal blood volume (Jahazi et al., 2008).

The Cochrane analysis reports that there are no studies evaluating the transfusion of oxytocic drugs through the placenta but neither is there any reported evidence of any harmful effects on the baby, which may be a concern for some women. Administering the uterotonic drug after delivery of the placenta will eliminate any risk to the baby from excessive transfer of placental blood (Soltani et al., 2010)

It has been argued that it is unclear whether CCT is one of the components of AMTSL that reduces blood loss. In a ongoing multi-centre RCT in low-income countries, the principal aim is to ascertain whether the CCT procedure has significant influence on the PPH rate or if prophylactic administration of 10 IU oxytocin without CCT has equally good effects (Gulmezoglu et al., 2009).

## CONCLUSIONS

- The mean blood loss and the number of women with blood loss of  $\geq 1000$  mL were lower in the AMTSL group, in comparison to the EMTSL group. Furthermore, primiparous women are at higher risk of PPH. Additional treatment with uterotonics was less frequent in actively managed than in expectantly managed women. Retained placenta and blood transfusions were equally distributed between the two groups.
- The AMTSL and EMTSL groups' experiences of afterpains and general experiences of childbirth differed, but were probably of minor clinical relevance. Multiparous women had higher VAS scores in all pain assessments.
- In focus group discussions of their experiences of third stage management, Swedish midwives demonstrated self-confidence in evaluating the normal process and endeavouring to leave it undisturbed if no risks were apparent.

## CLINICAL IMPLICATIONS

- AMTSL is appropriate for women giving birth vaginally in hospital settings, both in Angola and Sweden, i.e. in both low- and high-income settings. However, it may also be important to evaluate risk factors for PPH to achieve a balance between treating birth as a normal process and as a biomedical event.
- All women should, during pregnancy, have access to reliable information on management of the third stage of labour.
- Blood loss should be accurately measured during labour in order to evaluate women's health status.



## SVENSK SAMMANFATTNING

### Efterbördsskedet – studier om handläggning, blodförlust och smärta i Angola och Sverige

Efterbördsskedet är förlossningens tredje och sista stadium och inleds omedelbart efter barnets framfödande. Under detta skede släpper moderkakan från livmoderväggen och avgår tillsammans med fosterhinnorna, vilket tar mellan 5 och 30 minuter i ett naturalförlopp. Tredje stadiet anses vara förlossningens mest riskfyllda för kvinnan p.g.a. risken för stora blödningar.

Vid bedömning av betydelsen av blödningsmängd för den enskilda kvinnan behöver man ta hänsyn till anamnes, hälsotillstånd och kliniska symtom. Enligt WHO:s klassificering bedöms en blödning på  $\leq 500$  ml som en normal efterbördsblödning medan man i Sverige har satt gränsen vid  $\leq 1000$  ml.

Efterbördsskedet kan av barnmorskan hanteras med aktiv eller avvaktande handläggning. I den aktiva handläggningen klampas och klipps navelsträngen inom 2 minuter efter barnets framfödande och livmodersammandragande medel ges till mamman intramuskulärt eller intravenöst. Vid utskaffandet av moderkakan används kontrollerad dragning i navelsträngen, som innebär att man trycker med en hand strax ovan blygdbenet när livmodern är sammandragen, och samtidigt drar försiktigt i navelsträngen med andra handen i bäckenaxelns riktning. Avvaktande handläggning innebär att man avstår från att ingripa i det naturligt fysiologiska förloppet. Mamman uppmuntras att själv krysta ut moderkakan när hon känner en stark sammandragning och/eller känner att "det trycker på".

Aktiv handläggning har rapporterats medföra mindre blödning jämfört med avvaktande och rekommenderas av WHO. Det internationella barnmorskeförbundet (ICM) tillsammans med internationella föreningen för obstetrik och gynekologi (FIGO) har i ett gemensamt dokument angett att alla kvinnor som föder barn bör behandlas med aktiv handläggning under efterbördsskedet. I Sverige rekommenderas att alla födande kvinnor bör ges livmodersammandragande medel omedelbart efter barnets framfödande. Dock rekommenderas inte alla steg i aktiv handläggning.

I denna avhandling studeras handläggning av efterbördsskedet samt hur aktiv och avvaktande handläggning påverkar blodförlust och kvinnors upplevelse av eftervärkar. Avhandlingen består av fem delarbeten; två har utförts i Angola och tre i Sverige.

Studierna i Angola utfördes på universitetssjukhuset i Luanda i en s.k. "före-efter studie" där kvinnors blodförlust under tredje stadiet jämfördes vid avvaktande och aktiv handläggning. Dessutom studerades kvinnors upplevelser av eftervärkar kopplat till de två handlingssätten. Resultatet visade lägre blodförlust hos kvinnor med aktiv handläggning; och andelen kvinnor med

blodförlust på >1000 ml sjönk från 7.5% till 1% efter introduktion av aktiv handläggning (delarbete I). Man fann ingen signifikant skillnad mellan grupperna avseende eftervärkar (delarbete II).

I Sverige undersöktes erfarna barnmorskors erfarenheter av handläggningen av efterbördsskedet genom sex fokusgrupps diskussioner vid tre större och tre mindre förlossningskliniker. Barnmorskorna uttryckte självförtroende att bedöma efterbördsskedets fysiologiska process och de strävade efter att intervensera så lite som möjligt. Deras beslut grundades på erfarenhet, riktlinjer, riskbedömning samt kvinnans behov. Vissa uttryckte tveksamhet att ge livmodersammandragande medel rutinmässigt till alla kvinnor (delarbete III).

Vidare genomfördes i Sverige en randomiserad kontrollerad studie vid normalförlossningsenheterna vid Sahlgrenska Universitetssjukhuset i Göteborg och Mölndal. Efter informerat samtycke blev kvinnorna lottade till aktiv eller avvaktande handläggning av efterbördsskedet. Resultatet visade att blodförlust >1000 ml i gruppen kvinnor som handlagts aktivt var 10% jämfört med 16,8% i gruppen som fått avvaktande handläggning (delarbete 4). Eftervärkar skattades med VAS (visuell analog skala) skiljde sig inte åt på ett kliniskt betydelsefullt sätt mellan de båda grupperna. Flerfödorskor skattade eftervärkarna högre än förstfödorskor vid samtliga fyra smärtskattningstillfällen (delarbete 5).

## **Konklusion**

Avhandlingen visar att aktiv handläggning av efterbördsskedet ger en mindre mängd blodförlust och det ökar inte kvinnornas upplevelse av eftervärkar. Barnmorskor i Sverige uttrycker självförtroende i att bedöma efterbördsskedet som fysiologisk process samt strävar efter att intervensera så lite som möjligt. Detta kan innebära att de inte alltid ger oxytocin innan moderkakan kommit ut.

## **Klinisk användbarhet**

AMTSL bör rekommenderas alla kvinnor med vaginal förlossning på sjukhus i Angola och Sverige. Det är också viktigt att bedöma riskfaktorer för stor postpartumblödning hos den enskilda kvinnan.

Mätning av blodförlust i samband med förlossning bör förbättras genom val av lämplig metod beroende på kontext. I ett land med engångsmaterial bör ett vägt och torrt hygienunderlägg läggas under mamman omedelbart efter barnets födelse. Allt använt material skall vägas efter förlossningen. Vi avsaknad av engångsmaterial kan en bit plast läggas under mamman för att leda ner blodet i en spann. Därefter kan blödningsmängden mätas.

Vid efterfrågan bör kvinnor under graviditeten få adekvat information om för- och nackdelar med olika handläggningssätt av tredje stadiet dvs. att aktiv handläggning minskar blödningsmängden utan att ge mer smärta.

## ACKNOWLEDGEMENTS

First, I would like to express my greatest gratitude to all women and midwives at the Obstetric Units at Sahlgrenska University Hospital; you have all contributed to this thesis.

I would particularly like to thank the following people who have been more extensively involved in the creation of the thesis:

*Marie Berg*

I appreciate your always having been available and prompt with comments and advice, as well as for your encouragement especially during the periods when I was in despair. Your enthusiasm and effort in helping me finish my thesis gave me strength.

*Anna-Lena Hellström*

You encouraged and supported my research project from the start by accepting my application to begin doctoral studies. I appreciate you sharing your wisdom and experience with calm and reassurance.

*Lars-Åke Mattsson*

Your extensive experience in research has been invaluable. I am glad that you accepted to be my co-supervisor. You have patiently shared your knowledge on how to write a scientific paper.

*Staffan Bergström*

As my mentor and friend from the years in Mozambique and Angola who made me interested in research, your vast experience and your endless fight for women's survival inspired me to take up the challenge and write this thesis. I am forever grateful to you!

*Ida Lyckestam –Thelin*

I appreciate your enthusiasm and positive attitude to the RCT. You did a great job in recruiting participants and your effort was invaluable in preparing the trial and the data collection.

*Ingrid Berg*

Your knowledge and experience in the area of pain and pain assessment were important when analysing and writing the fifth manuscript.

*Joy Ellis*

You have done a brilliant job in checking my English. I greatly appreciate your always having been nice and positive when I asked you for help.

*Nils-Gunnar Pehrsson*

Your competence in statistics helped me to make sense of the data.

*Åsa, Anna, and Malin*

I am very glad for our friendship during these years on the fourth floor. I will miss you and our productive discussions, lunches and chocolates that energised our brains.

*Lena, Lennart, Marie and Per*

For our long lasting friendship

*Berit*

My dear sister, you have always supported me and with whom I can share everything that matters in life. I appreciate your wisdom and goodness.

*Kent*

I am very happy that you managed to get through all these years: first, the journeys to Angola and then all these years of studies. You are my best friend and supporter and I appreciate that you reminds me that there is more to life than research.

*Maria and Gustav*

You are my greatest joys in life, the ones of whom I am the proudest!

Last but not least, I would like to express my gratitude for the financial support from the Institute of Health and Care Sciences at the University of Gothenburg, grants from FoUU in Göteborg & Södra Bohuslän, and research grants from Sahlgrenska University Hospital.

## REFERENCES

- ABDEL-ALEEM, H., HOFMEYR, G. J., SHOKRY, M. & EL-SONOOSY, E. (2006) Uterine massage and postpartum blood loss. *Int J Gynaecol Obstet*, 93, 238-9.
- ABOUZAHAR, C. (2003) Safe motherhood: a brief history of the global movement 1947-2002. *Br Med Bull*, 67, 13-25.
- ALBERS, L. L. (2001) "Evidence" and midwifery practice. *J Midwifery Womens Health*, 46, 130-6.
- ARCA, G., BOTET, F., PALACIO, M. & CARBONELL-ESTRANY, X. (2010) Timing of umbilical cord clamping: New thoughts on an old discussion. *J Matern Fetal Neonatal Med*.
- ATKINSON, T. M., MENDOZA, T. R., SIT, L., PASSIK, S., SCHER, H. I., CLEELAND, C. & BASCH, E. (2010) The Brief Pain Inventory and its "pain at its worst in the last 24 hours" item: clinical trial endpoint considerations. *Pain Med*, 11, 337-46.
- BAIR, M. E. & WILLIAMS, J. (2007) Management of the third stage of labor. *J Midwifery Womens Health*, 52, 412-4.
- BAIS, J. M., ESKES, M., PEL, M., BONSEL, G. J. & BLEKER, O. P. (2004) Postpartum haemorrhage in nulliparous women: incidence and risk factors in low and high risk women. A Dutch population-based cohort study on standard (> or = 500 ml) and severe (> or = 1000 ml) postpartum haemorrhage. *Eur J Obstet Gynecol Reprod Biol*, 115, 166-72.
- BATEMAN, B. T., BERMAN, M. F., RILEY, L. E. & LEFFERT, L. R. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. *Anesth Analg*, 110, 1368-73.
- BEGLEY, C. M. (1990) A comparison of 'active' and 'physiological' management of the third stage of labour. *Midwifery*, 6, 3-17.
- BEGLEY, C. M. (1991) Postpartum haemorrhage--who is at risk? *Midwives Chron*, 104, 102-6.
- BEGLEY, C. M., GYTE, G. M., MURPHY, D. J., DEVANE, D., MCDONALD, S. J. & MCGUIRE, W. (2010) Active versus expectant management for women in the third stage of labour. *Cochrane Database Syst Rev*, 7, CD007412.
- BERG, M., BONDAS, T., BRINCHMANN, B. S. R., LUNDGREN, I., ÅLAFSDÅTTIR, Å. L. F. Å. S., VEHVILÄINEN-JULKUNEN, K. & HALL, E. O. C. (2008) Evidence-based care and childbearing—a critical approach. *International Journal of Qualitative Studies on Health and Well-being*, 3, 239-247.
- BERGSTRÖM S (1994) The pathology of poverty. IN LANKINEN SK, B. S., MÄKELÄ PH, PELTOMAA M, (Ed.) *Health and disease in developing countries*. Basingstoke, Macmillan.
- BERNHART, M. H., WIADNYANA, I. G., WIHARDJO, H. & POHAN, I. (1999) Patient satisfaction in developing countries. *Soc Sci Med*, 48, 989-96.
- BERNSTEIN, I. M., ZIEGLER, W. & BADGER, G. J. (2001) Plasma volume expansion in early pregnancy. *Obstet Gynecol*, 97, 669-72.

- BOUCHER, M., NIMROD, C. A., TAWAGI, G. F., MEEKER, T. A., RENNICKS WHITE, R. E. & VARIN, J. (2004) Comparison of carbetocin and oxytocin for the prevention of postpartum hemorrhage following vaginal delivery: a double-blind randomized trial. *J Obstet Gynaecol Can*, 26, 481-8.
- BRADLEY, S. E., PRATA, N., YOUNG-LIN, N. & BISHAI, D. M. (2007) Cost-effectiveness of misoprostol to control postpartum hemorrhage in low-resource settings. *Int J Gynaecol Obstet*, 97, 52-6.
- BREATHNACH, F. & GEARY, M. (2009) Uterine atony: definition, prevention, nonsurgical management, and uterine tamponade. *Semin Perinatol*, 33, 82-7.
- BREIVIK, E. K., BJORNSSON, G. A. & SKOVLUND, E. (2000) A comparison of pain rating scales by sampling from clinical trial data. *Clin J Pain*, 16, 22-8.
- BRUCKER, M. C. (2001) Management of the third stage of labor: an evidence-based approach. *J Midwifery Womens Health*, 46, 381-92.
- BURKE, C. (2010) Active versus expectant management of the third stage of labor and implementation of a protocol. *J Perinat Neonatal Nurs*, 24, 215-28; quiz 229-30.
- CAOL (1998) Estatística Annual. IN SAÚDE, M. D. (Ed.) Luanda, Maternidade Lucrecia Paím.
- CERIANI CERNADAS, J. M., CARROLI, G., PELLEGRINI, L., OTANO, L., FERREIRA, M., RICCI, C., CASAS, O., GIORDANO, D. & LARDIZABAL, J. (2006) The effect of timing of cord clamping on neonatal venous hematocrit values and clinical outcome at term: a randomized, controlled trial. *Pediatrics*, 117, e779-86.
- CHAPARRO, C. M., NEUFELD, L. M., TENA ALAVEZ, G., EGUIA-LIZ CEDILLO, R. & DEWEY, K. G. (2006) Effect of timing of umbilical cord clamping on iron status in Mexican infants: a randomised controlled trial. *Lancet*, 367, 1997-2004.
- CHONG, Y. S., SU, L. L. & ARULKUMARAN, S. (2004) Current strategies for the prevention of postpartum haemorrhage in the third stage of labour. *Curr Opin Obstet Gynecol*, 16, 143-50.
- CHUA, S., HO, L. M., VANAJA, K., NORDSTROM, L., ROY, A. C. & ARULKUMARAN, S. (1998) Validation of a laboratory method of measuring postpartum blood loss. *Gynecol Obstet Invest*, 46, 31-3.
- COMBS, C. A. & LAROS, R. K., JR. (1991) Prolonged third stage of labor: morbidity and risk factors. *Obstet Gynecol*, 77, 863-7.
- COTTER, A., NESS, A. & TOLOSA, J. (2010) Prophylactic oxytocin for the third stage of labour. *Cochrane Database Syst Rev* CD007412.
- DECLERCQ, E., CUNNINGHAM, D. K., JOHNSON, C. & SAKALA, C. (2008) Mothers' reports of postpartum pain associated with vaginal and cesarean deliveries: results of a national survey. *Birth*, 35, 16-24.
- DOHERTY, D. A., MAGANN, E. F., FRANCIS, J., MORRISON, J. C. & NEWNHAM, J. P. (2006) Pre-pregnancy body mass index and pregnancy outcomes. *Int J Gynaecol Obstet*, 95, 242-7.
- DOMBROWSKI, M. P., BOTTOMS, S. F., SALEH, A. A., HURD, W. W. & ROMERO, R. (1995) Third stage of labor: analysis of duration and clinical practice. *Am J Obstet Gynecol*, 172, 1279-84.

- EL-REFAEY, H. & RODECK, C. (2003) Post-partum haemorrhage: definitions, medical and surgical management. A time for change. *Br Med Bull*, 67, 205-17.
- ELBOURNE, D. R., PRENDIVILLE, W. J., CARROLI, G., WOOD, J. & MCDONALD, S. (2001) Prophylactic use of oxytocin in the third stage of labour. *Cochrane Database Syst Rev*, CD001808.
- ENKIN, M. (2000) *A guide to effective care in pregnancy and childbirth [Elektronisk resurs]*, Oxford, Oxford University.
- FAHY, K. M. (2009) Third stage of labour care for women at low risk of postpartum haemorrhage. *J Midwifery Womens Health*, 54, 380-6.
- FEATHERSTONE, I. E. (1999) Physiological third stage of labour. *British Journal of midwifery*, 7, 216-221.
- FORD, J. B., ROBERTS, C. L., BELL, J. C., ALGERT, C. S. & MORRIS, J. M. (2007) Postpartum haemorrhage occurrence and recurrence: a population-based study. *Med J Aust*, 187, 391-3.
- FRASER, D., COOPER, M. A. & MYLES, M. F. (2009) *Myles textbook for midwives*, Edinburgh; New York, Churchill Livingstone.
- FRIDH, G. & GASTON-JOHANSSON, F. (1990) Do primiparas and multiparas have realistic expectations of labor. *Acta Obstet Gynecol Scand*, 69, 103-9.
- FRIDH, G., KOPARE, T., GASTON-JOHANSSON, F. & NORVELL, K. T. (1988) Factors associated with more intense labor pain. *Res Nurs Health*, 11, 117-24.
- FRY, J. (2007) Physiological third stage of labour: Support it or lose it. *Br J Midwifery*, 15.
- FUCHS, K., PERETZ, B. A., MARCOVICI, R., PALDI, E. & TIMOR-TRITSH, I. (1985) The "grand multipara"--is it a problem? A review of 5785 cases. *Int J Gynaecol Obstet*, 23, 321-6.
- GASTON-JOHANSSON, F. (1996) Measurement of pain: the psychometric properties of the Pain-O-Meter, a simple, inexpensive pain assessment tool that could change health care practices. *J Pain Symptom Manage*, 12, 172-81.
- GLOVER, P. (2003) Blood loss at delivery: how accurate is your estimation? *Aust J Midwifery*, 16, 21-4.
- GRANEHEIM, U. H. & LUNDMAN, B. (2004) Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*, 24, 105-12.
- GULMEZOGLU, A. M. & SOUZA, J. P. (2009) The evolving management of the third stage of labour. *Bjog*, 116 Suppl 1, 26-8.
- GULMEZOGLU, A. M., WIDMER, M., MERIALDI, M., QURESHI, Z., PIAGGIO, G., ELBOURNE, D., ABDEL-ALEEM, H., CARROLI, G., HOFMEYR, G. J., LUMBIGANON, P., DERMAN, R., OKONG, P., GOUDAR, S., FESTIN, M., ALTHABE, F. & ARMBRUSTER, D. (2009) Active management of the third stage of labour without controlled cord traction: a randomized non-inferiority controlled trial. *Reprod Health*, 6, 2.
- HAMILTON, A. (2003) Comfort and support in labour. In FRASER, D. A. C. (Ed.) *Myles textbook for midwives*. 14th ed. Edinburgh; New York, Churchill Livingstone.

- HARDING, J. E., ELBOURNE, D. R. & PRENDIVILLE, W. J. (1989) Views of mothers and midwives participating in the Bristol randomized, controlled trial of active management of the third stage of labor. *Birth*, 16, 1-6.
- HARRISON, K. A., BERGSTRÖM S (2001) Poverty, deprivation and unsafe motherhood. IN LAWSON, J. B., HARRISON, K. A. & BERGSTRÖM, S. (Eds.) *Maternity care in developing countries*. London, RCOG Press.
- HARTRICK, C. T. (2001) A four-category verbal rating scale (VRS-4), an 11-point numeric rating scale (NRS-11), and a 100-mm visual analog scale (VAS) were compared in the assessment of acute pain after oral surgery. *Clin J Pain*, 17, 104-5.
- HASTIE, C. & FAHY, K. M. (2009) Optimising psychophysiology in third stage of labour: Theory applied to practice. *Women Birth*, 22, 89-96.
- HODNETT, E. D. (2002a) Caregiver support for women during childbirth. *Cochrane Database Syst Rev*, CD000199.
- HODNETT, E. D. (2002b) Pain and women's satisfaction with the experience of childbirth: a systematic review. *Am J Obstet Gynecol*, 186, S160-72.
- HODNETT, E. D., GATES, S., HOFMEYR, G. J. & SAKALA, C. (2007) Continuous support for women during childbirth. *Cochrane Database Syst Rev*, CD003766.
- HOFMEYR, G. J. (2005) Evidence-based intrapartum care. *Best Pract Res Clin Obstet Gynaecol*, 19, 103-15.
- HOGAN, M. C., FOREMAN, K. J., NAGHAVI, M., AHN, S. Y., WANG, M., MAKELA, S. M., LOPEZ, A. D., LOZANO, R. & MURRAY, C. J. (2010) Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet*, 375, 1609-23.
- HOGBERG, U. (2004) The decline in maternal mortality in Sweden: the role of community midwifery. *Am J Public Health*, 94, 1312-20.
- HOJ, L., CARDOSO, P., NIELSEN, B. B., HVIDMAN, L., NIELSEN, J. & AABY, P. (2005) Effect of sublingual misoprostol on severe postpartum haemorrhage in a primary health centre in Guinea-Bissau: randomised double blind clinical trial. *Bmj*, 331, 723.
- HOLDCROFT, A., SNIDVONGS, S., CASON, A., DORE, C. J. & BERKLEY, K. J. (2003) Pain and uterine contractions during breast feeding in the immediate post-partum period increase with parity. *Pain*, 104, 589-96.
- HOLDGATE, A., ASHA, S., CRAIG, J. & THOMPSON, J. (2003) Comparison of a verbal numeric rating scale with the visual analogue scale for the measurement of acute pain. *Emerg Med (Fremantle)*, 15, 441-6.
- HUH, W. K., CHELMOW, D. & MALONE, F. D. (2004) A double-blinded, randomized controlled trial of oxytocin at the beginning versus the end of the third stage of labor for prevention of postpartum hemorrhage. *Gynecol Obstet Invest*, 58, 72-6.
- HUTTON, E. K. & HASSAN, E. S. (2007) Late vs early clamping of the umbilical cord in full-term neonates: systematic review and meta-analysis of controlled trials. *Jama*, 297, 1241-52.
- ICM (2008) ROLE OF THE MIDWIFE IN PHYSIOLOGICAL THIRD STAGE LABOUR. *Council meeting*. Glasgow, International confederation for midwives.



- JACKSON, K. W., JR., ALLBERT, J. R., SCHEMMER, G. K., ELLIOT, M., HUMPHREY, A. & TAYLOR, J. (2001) A randomized controlled trial comparing oxytocin administration before and after placental delivery in the prevention of postpartum hemorrhage. *Am J Obstet Gynecol*, 185, 873-7.
- JAHAZI, A., KORDI, M., MIRBEHBAHANI, N. B. & MAZLOOM, S. R. (2008) The effect of early and late umbilical cord clamping on neonatal hematocrit. *J Perinatol*, 28, 523-5.
- JENSEN, M. P., KAROLY, P. & BRAVER, S. (1986) The measurement of clinical pain intensity: a comparison of six methods. *Pain*, 27, 117-26.
- JOINT STATEMENT (2004) Joint statement: management of the third stage of labour to prevent post-partum haemorrhage. *J Midwifery Womens Health*, 49, 76-7.
- KAVLE, J. A., KHALFAN, S. S., STOLTZFUS, R. J., WITTER, F., TIELSCH, J. M. & CAULFIELD, L. E. (2006) Measurement of blood loss at childbirth and postpartum. *Int J Gynaecol Obstet*, 95, 24-8.
- KENNEDY, H. P. & SHANNON, M. T. (2004) Keeping birth normal: research findings on midwifery care during childbirth. *J Obstet Gynecol Neonatal Nurs*, 33, 554-60.
- KHAN, K. S., WOJDYLA, D., SAY, L., GULMEZOGLU, A. M. & VAN LOOK, P. F. (2006) WHO analysis of causes of maternal death: a systematic review. *Lancet*, 367, 1066-74.
- KINMOND, S., AITCHISON, T. C., HOLLAND, B. M., JONES, J. G., TURNER, T. L. & WARDROP, C. A. (1993) Umbilical cord clamping and preterm infants: a randomised trial. *Bmj*, 306, 172-5.
- KNIGHT, M., CALLAGHAN, W. M., BERG, C., ALEXANDER, S., BOUVIER-COLLE, M. H., FORD, J. B., JOSEPH, K. S., LEWIS, G., LISTON, R. M., ROBERTS, C. L., OATS, J. & WALKER, J. (2009) Trends in postpartum hemorrhage in high resource countries: a review and recommendations from the International Postpartum Hemorrhage Collaborative Group. *BMC Pregnancy Childbirth*, 9, 55.
- KOBLINSKY, M. A. (1995) Beyond maternal mortality--magnitude, interrelationship, and consequences of women's health, pregnancy-related complications and nutritional status on pregnancy outcomes. *Int J Gynaecol Obstet*, 48 Suppl, S21-32.
- KREUGER, R. A. (1994) *Focus groups: The process of conducting focus groups*, Sage, Thousand Oaks, CA.
- KRIPPENDORF, K. & (2004) *Content analysis, an introduction to its methodology*, Sage, Thousand Oaks, CA.
- LARSSON, M., ALDEGARMANN, U. & AARTS, C. (2007) Professional role and identity in a changing society: Three paradoxes in Swedish midwives' experiences. *Midwifery*.
- LEDUC, D., SENIKAS, V., LALONDE, A. B., BALLERMAN, C., BIRINGER, A., DELANEY, M., DUPERRON, L., GIRARD, I., JONES, D., LEE, L. S., SHEPHERD, D. & WILSON, K. (2009) Active management of the third stage of labour: prevention and treatment of postpartum hemorrhage. *J Obstet Gynaecol Can*, 31, 980-93.
- LERBERGHE, V. B. D. (Ed.) (2001) *Studies in health services organisation & policy*, Antwerp, ITGPress.
- LEVY, V. & MOORE, J. (1985) The midwife's management of the third stage of labour. *Nurs Times*, 81, 47-50.

- LOWE, N. K. (1987) Parity and pain during parturition. *J Obstet Gynecol Neonatal Nurs*, 16, 340-6.
- LYNCH, KEITH, LALONDE, A. B. & KAROSHI (2006) A Textbook of POSTPARTUM HEMORRHAGE. *PPH*. [http://www.glowm.com/?p=glowm.cml/david\\_bloomer](http://www.glowm.com/?p=glowm.cml/david_bloomer).
- MARTENSSON, L., STENER-VICTORIN, E. & WALLIN, G. (2008) Acupuncture versus subcutaneous injections of sterile water as treatment for labour pain. *Acta Obstet Gynecol Scand*, 87, 171-7.
- MASLOVITZ, S., BARKAI, G., LESSING, J. B., ZIV, A. & MANY, A. (2008) Improved accuracy of postpartum blood loss estimation as assessed by simulation. *Acta Obstet Gynecol Scand*, 87, 929-34.
- MATHAI, M., GULMEZOGLU, A. M. & HILL, S. (2007) Saving womens lives: evidence-based recommendations for the prevention of postpartum haemorrhage. *Bull World Health Organ*, 85, 322-3.
- MAUGHAN, K. L., HEIM, S. W. & GALAZKA, S. S. (2006) Preventing postpartum hemorrhage: managing the third stage of labor. *Am Fam Physician*, 73, 1025-8.
- MCDONALD, S. (2007) Management of the third stage of labor. *J Midwifery Womens Health*, 52, 254-61.
- MCDONALD S (2003) *Myles Textbook for Midwives*.
- MCDONALD, S. J. (2009) Physiology and management of the third stage of labour. IN FRASER, D. A. C. M. (Ed.) *Myles textbook for midwives*. 15th ed. Edinburgh; New York, Churchill Livingstone.
- MCDONALD, S. J. & MIDDLETON, P. (2008) Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. *Cochrane Database Syst Rev*, CD004074.
- MCDONALD, S. J., PRENDIVILLE, W. J. & BLAIR, E. (1993) Randomised controlled trial of oxytocin alone versus oxytocin and ergometrine in active management of third stage of labour. *Bmj*, 307, 1167-71.
- MCLINTOCK, C. (2005) Postpartum haemorrhage. *Thromb Res*, 115 Suppl 1, 65-8.
- MELZACK, R., TAENZER, P., FELDMAN, P. & KINCH, R. A. (1981) Labour is still painful after prepared childbirth training. *Can Med Assoc J*, 125, 357-63.
- MERCER, J. S., SKOVGAARD, R. L., PEAREARA-EAVES, J. & BOWMAN, T. A. (2005) Nuchal cord management and nurse-midwifery practice. *J Midwifery Womens Health*, 50, 373-9.
- MITTELMARK, M. B. (2009) Millenium Development Goals. *Glob Health Promot*, 16, 3-4, 73-4, 88-9.
- MURRAY, A. & HOLDCROFT, A. (1989) Incidence and intensity of postpartum lower abdominal pain. *Bmj*, 298, 1619.
- NAVANEETHAKRISHNAN, R., ANDERSON, A., HOLDING, S., ATKINSON, C. & LINDOW, S. W. (2010) A randomised controlled trial of placental cord drainage to reduce fetomaternal transfusion. *Eur J Obstet Gynecol Reprod Biol*, 149, 27-30.
- NEILSON, J. P. (2008) Cochrane Update: Effect of timing of umbilical cord clamping at birth of term infants on mother and baby outcomes. *Obstet Gynecol*, 112, 177-8.

- NISSEN, E., LILJA, G., WIDSTROM, A. M. & UVNAS-MOBERG, K. (1995) Elevation of oxytocin levels early post partum in women. *Acta Obstet Gynecol Scand*, 74, 530-3.
- NORDSTROM, L., FOGELSTAM, K., FRIDMAN, G., LARSSON, A. & RYDHSTROEM, H. (1997) Routine oxytocin in the third stage of labour: a placebo controlled randomised trial. *Br J Obstet Gynaecol*, 104, 781-6.
- O'CONNELL, R. & DOWNE, S. (2009) A metasynthesis of midwives' experience of hospital practice in publicly funded settings: compliance, resistance and authenticity. *Health (London)*, 13, 589-609.
- ODENT, M. (1998) Don't manage the third stage of labour! *Pract Midwife*, 1, 31-3.
- PALLANT, J. (2005) *SPSS survival manual : a step by step guide to data analysis using SPSS for Windows (Version 12)*, Buckingham, Open University Press.
- PATEL, A., GOUDAR, S. S., GELLER, S. E., KODKANY, B. S., EDLAVITCH, S. A., WAGH, K., PATTED, S. S., NAIK, V. A., MOSS, N. & DERMAN, R. J. (2006) Drape estimation vs. visual assessment for estimating postpartum hemorrhage. *Int J Gynaecol Obstet*, 93, 220-4.
- PATTED, S. S., GOUDAR, S. S., NAIK, V. A., BELLAD, M. B., EDLAVITCH, S. A., KODKANY, B. S., PATEL, A., CHAKRABORTY, H., DERMAN, R. J. & GELLER, S. E. (2009) Side effects of oral misoprostol for the prevention of postpartum hemorrhage: results of a community-based randomised controlled trial in rural India. *J Matern Fetal Neonatal Med*, 22, 24-8.
- PETTERSSON, K. O., CHRISTENSSON, K., DE FREITAS EDA, G. & JOHANSSON, E. (2004) Adaptation of health care seeking behavior during childbirth: focus group discussions with women living in the suburban areas of Luanda, Angola. *Health Care Women Int*, 25, 255-80.
- PRATA, N., MBARUKU, G. & CAMPBELL, M. (2005) Using the kanga to measure postpartum blood loss. *Int J Gynaecol Obstet*, 89, 49-50.
- PRATA, N., SREENIVAS, A., VAHIDNIA, F. & POTTS, M. (2009) Saving maternal lives in resource-poor settings: facing reality. *Health Policy*, 89, 131-48.
- PRENDIVILLE, W. J., ELBOURNE, D. & MCDONALD, S. (2000) Active versus expectant management in the third stage of labour. *Cochrane Database Syst Rev*, CD000007.
- PRENDIVILLE, W. J., HARDING, J. E., ELBOURNE, D. R. & STIRRAT, G. M. (1988) The Bristol third stage trial: active versus physiological management of third stage of labour. *Bmj*, 297, 1295-300.
- PRITCHARD, J. A. (1965) Blood Volume Changes in Pregnancy and the Puerperium. Iv. Anemia Associated with Hydatidiform Mole. *Am J Obstet Gynecol*, 91, 621-9.
- RAMANATHAN, G. & ARULKUMARAN, S. (2006) Postpartum hemorrhage. *J Obstet Gynaecol Can*, 28, 967-73.
- RAZVI, K., CHUA, S., ARULKUMARAN, S. & RATNAM, S. S. (1996) A comparison between visual estimation and laboratory determination of blood loss during the third stage of labour. *Aust N Z J Obstet Gynaecol*, 36, 152-4.
- ROGERS, J., WOOD, J., MCCANDLISH, R., AYERS, S., TRUESDALE, A. & ELBOURNE, D. (1998) Active versus expectant management of third stage of labour: the Hinchingbrooke randomised controlled trial. *Lancet*, 351, 693-9.

- RONSMANS, C. & GRAHAM, W. J. (2006) Maternal mortality: who, when, where, and why. *Lancet*, 368, 1189-200.
- ROSENFELD, A. & MAINE, D. (1985) Maternal mortality--a neglected tragedy. Where is the M in MCH? *Lancet*, 2, 83-5.
- ROSENFELD, A., MIN, C. J. & FREEDMAN, L. P. (2007) Making motherhood safe in developing countries. *N Engl J Med*, 356, 1395-7.
- ROSSEN, J., OKLAND, I., NILSEN, O. B. & EGGEBO, T. M. (2010) Is there an increase of postpartum hemorrhage, and is severe hemorrhage associated with more frequent use of obstetric interventions? *Acta Obstet Gynecol Scand*, 89, 1248-55.
- RYCROFT-MALONE, J., SEERS, K., TITCHEN, A., HARVEY, G., KITSON, A. & MCCORMACK, B. (2004) What counts as evidence in evidence-based practice? *J Adv Nurs*, 47, 81-90.
- SACKETT, D. L., ROSENBERG, W. M., GRAY, J. A., HAYNES, R. B. & RICHARDSON, W. S. (1996) Evidence based medicine: what it is and what it isn't. *Bmj*, 312, 71-2.
- SAHLGRENSKA UNIVERSITY HOSPITAL DEPARTMENT OF OBSTETRICS (2007) Annual statistics.
- SANBERG, P. R., PARK, D. H. & BORLONGAN, C. V. (2009) Stem Cell Transplants at Childbirth. *Stem Cell Rev*.
- SCHORN, M. N. (2010) Measurement of blood loss: review of the literature. *J Midwifery Womens Health*, 55, 20-7.
- SEBIRE, N. J., JOLLY, M., HARRIS, J. P., WADSWORTH, J., JOFFE, M., BEARD, R. W., REGAN, L. & ROBINSON, S. (2001) Maternal obesity and pregnancy outcome: a study of 287,213 pregnancies in London. *Int J Obes Relat Metab Disord*, 25, 1175-82.
- SEYMOUR, R. A. (1982) The use of pain scales in assessing the efficacy of analgesics in post-operative dental pain. *Eur J Clin Pharmacol*, 23, 441-4.
- SHEINER, E., SARID, L., LEVY, A., SEIDMAN, D. S. & HALLAK, M. (2005) Obstetric risk factors and outcome of pregnancies complicated with early postpartum hemorrhage: a population-based study. *J Matern Fetal Neonatal Med*, 18, 149-54.
- SKOVLUND, E., FYLLINGEN, G., LANDRE, H. & NESHEIM, B. I. (1991) Comparison of postpartum pain treatments using a sequential trial design. I. Paracetamol versus placebo. *Eur J Clin Pharmacol*, 40, 343-7.
- SMYLY, J. (1885 ) The Management Of The Third Stage Of Labour *The British Medical Journal*, .
- SOLTANI, H. (2008) Global implications of evidence 'biased' practice: management of the third stage of labour. *Midwifery*, 24, 138-42.
- SOLTANI, H., DICKINSON, F. & SYMONDS, I. (2005) Placental cord drainage after spontaneous vaginal delivery as part of the management of the third stage of labour. *Cochrane Database Syst Rev*, CD004665.
- SOLTANI, H., HUTCHON, D. R. & POULOSE, T. A. (2010) Timing of prophylactic uterotonics for the third stage of labour after vaginal birth. *Cochrane Database Syst Rev*, 8, CD006173.

- SOSA, C. G., ALTHABE, F., BELIZAN, J. M. & BUEKENS, P. (2009) Risk factors for postpartum hemorrhage in vaginal deliveries in a Latin-American population. *Obstet Gynecol*, 113, 1313-9.
- SPENCER, P. M. (1962) Controlled cord traction in management of the third stage of labour. *Br Med J*, 1, 1728-32.
- STAFFORD, I., DILDY, G. A., CLARK, S. L. & BELFORT, M. A. (2008) Visually estimated and calculated blood loss in vaginal and cesarean delivery. *Am J Obstet Gynecol*, 199, 519 e1-7.
- STANTON, M. C., EDWARDS, S., JONES, B. & SWITONSKI, C. (1999) The nature of maternal postnatal pain. *Journal of Perinatal Education*, 8, 1-10.
- STANTON, C., ARMBRUSTER, D., KNIGHT, R., ARIAWAN, I., GBANGBADE, S., GETACHEW, A., PORTILLO, J. A., JARQUIN, D., MARIN, F., MFINANGA, S., VALLECILLO, J., JOHNSON, H. & SINTASATH, D. (2009) Use of active management of the third stage of labour in seven developing countries. *Bull World Health Organ*, 87, 207-15.
- STATE OF THE ART (2001) Care in Normal Birth- State of the art, *SFOG*. NHBW report Stockholm. [www.SFOG.se/pdf/2001-123-1.PDF](http://www.SFOG.se/pdf/2001-123-1.PDF)
- STONES, R. W., PATERSON, C. M. & SAUNDERS, N. J. (1993) Risk factors for major obstetric haemorrhage. *Eur J Obstet Gynecol Reprod Biol*, 48, 15-8.
- STRAND, R. T., DA SILVA, F. & BERGSTROM, S. (2003) Use of cholera beds in the delivery room: a simple and appropriate method for direct measurement of postpartum bleeding. *Trop Doct*, 33, 215-6.
- SVANSTROM, M. C., BIBER, B., HANES, M., JOHANSSON, G., NASLUND, U. & BALFORS, E. M. (2008) Signs of myocardial ischaemia after injection of oxytocin: a randomized double-blind comparison of oxytocin and methylethylergometrine during Caesarean section. *Br J Anaesth*, 100, 683-9.
- TAN, W. M., KLEIN, M. C., SAXELL, L., SHIRKOOHY, S. E. & ASRAT, G. (2008) How do physicians and midwives manage the third stage of labor? *Birth*, 35, 220-9.
- THE SWEDISH INSTITUTE OF INTERNATIONAL AFFAIRS (2010) *Landguiden, länder i fickformat*
- TOLOSA, J. N., PARK, D. H., EVE, D. J., KLASKO, S. K., BORLONGAN, C. V. & SANBERG, P. R. (2010) Mankind's first natural stem cell transplant. *J Cell Mol Med*, 14, 488-95.
- TSU, V. D. (1993) Postpartum haemorrhage in Zimbabwe: a risk factor analysis. *Br J Obstet Gynaecol*, 100, 327-33.
- TSU, V. D., LUU, H. T. & MAI, T. T. (2008) Does a novel prefilled injection device make postpartum oxytocin easier to administer? Results from midwives in Vietnam. *Midwifery*.
- UVNAS-MOBERG, K. & ERIKSSON, M. (1996) Breastfeeding: physiological, endocrine and behavioural adaptations caused by oxytocin and local neurogenic activity in the nipple and mammary gland. *Acta Paediatr*, 85, 525-30.

- WALDENSTROM, U. & NILSSON, C. A. (1994) Experience of childbirth in birth center care. A randomized controlled study. *Acta Obstet Gynecol Scand*, 73, 547-54.
- WHITTAKER, P. G., MACPHAIL, S. & LIND, T. (1996) Serial hematologic changes and pregnancy outcome. *Obstet Gynecol*, 88, 33-9.
- WHO (2006) *Recommendations for the prevention of postpartum haemorrhage*, Geneva, Switzerland, WHO.
- WHO (2008) World health statistics 2008.
- WHO/FRH/MSM (1996) *Care in normal birth: a practical guide*, Geneva, WHO/FRH/MSM/96.24.
- VILLAR, J., GULMEZOGLU, A. M., HOFMEYR, G. J. & FORNA, F. (2002) Systematic review of randomized controlled trials of misoprostol to prevent postpartum hemorrhage. *Obstet Gynecol*, 100, 1301-12.
- WINTER, C., MACFARLANE, A., DENEUX-THARAUX, C., ZHANG, W. H., ALEXANDER, S., BROCKLEHURST, P., BOUVIER-COLLE, M. H., PRENDIVILLE, W., CARARACH, V., VAN ROOSMALEN, J., BERBIK, I., KLEIN, M., AYRES-DE-CAMPOS, D., ERKKOLA, R., CHIECHI, L. M., LANGHOFF-ROOS, J., STRAY-PEDERSEN, B. & TROEGER, C. (2007) Variations in policies for management of the third stage of labour and the immediate management of postpartum haemorrhage in Europe. *Bjog*, 114, 845-54.
- VIVIO, D. & WILLIAMS, D. (2004) Active management of the third stage of labor: why is it controversial? *J Midwifery Womens Health*, 49, 2-3.

### Instructions

This patient has been randomised to the **ACTIVE** group

- Test capillary haemoglobin and note in record that patient is participating in the study
- Clamp umbilical cord
- Stop oxytocin drip, if ongoing
- Administer 10 units oxytocin i. v. within 2 minutes after birth (Rule out multiple pregnancy prior to injection)
- Do not remove umbilical cord clamps
- During contraction- place your hand on the lower part of the uterus, above the pubic bone, and apply light pressure. Firmly grip umbilical cord, ask woman to push and apply gentle traction
- Massage uterus immediately after delivery of placenta
- Palpate uterus repeatedly during following two hours

If placenta has *not* been delivered after 30 minutes follow department guidelines

This patient has been randomised to the **EXPECTANT** group

- Test capillary haemoglobin and note in record that patient is participating in the study
- Clamp umbilical cord
- Stop oxytocin drip, if ongoing
- Administer 2 ml NaCl i. v. within 2 minutes after birth
- Do not
- If visible gush of blood, or a contraction or woman feels an urge to push, ask her to push

If no visible gush of blood:

- Wait 10 minutes, ask woman to push again
- Massage uterus immediately after delivery of placenta
- If bleeding occurs, administer 10 units oxytocin i.v.
- Palpate uterus repeatedly during following two hours

If placenta has *not* been delivered after 30 minutes follow department guidelines

