

**Reduction of perineal trauma and improved perineal comfort
during and after childbirth: the Perineal Warm Pack Trial**

Hannah G. Dahlen

**A thesis submitted in accordance with the requirements for admission to
the Degree Doctor of Philosophy**

Centre for Midwifery, Child and Family Health, Faculty of Nursing, Midwifery and Health,
University of Technology, Sydney

September 2007

Certificate of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of the requirements for a degree, except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

Production Note:
Signature removed prior to publication.

“Don’t wait for the light to appear at the end of the tunnel—stride down there and light the
bloody thing yourself”
(Sara Henderson, 1993)

Dedicated to my partner Malcolm, my rock, and our four beautiful children: Lydia, Luke,
Ethan and Bronte – all of whom were born during the writing of this thesis. It is these
beautiful little souls who have taught me the most important lessons in life:
Live today; love today and laugh today.

Table of Contents

<i>List of Tables</i>	<i>xii</i>
<i>List of Figures</i>	<i>xiv</i>
<i>Acknowledgements</i>	<i>xv</i>
<i>Publications and conference presentations from this research</i>	<i>xix</i>
<i>Abbreviations and glossary</i>	<i>xxii</i>
<i>Abstract</i>	<i>xxvii</i>
<i>Chapter 1: Introduction to the thesis</i>	<i>1</i>
1.1 Introduction	<i>1</i>
1.2 Background to the study – a personal story	<i>4</i>
1.3 Choice of study design	<i>6</i>
1.4 Characteristics of the population	<i>7</i>
1.5 Aims and research questions	<i>10</i>
1.6 Organisation of the thesis	<i>11</i>
1.7 Summary	<i>13</i>
<i>Chapter 2: From social to surgical: historical perspectives on perineal care during labour and birth</i>	<i>14</i>
2.1 Introduction	<i>14</i>
2.2 Historical perspectives on perineal care during labour and birth	<i>14</i>
2.2.1 The Ancient Greeks	<i>15</i>
2.2.2 Ancient Ephesus and Salerno	<i>16</i>
2.2.3 Writings from the sixteenth to eighteenth century in Europe	<i>18</i>
2.2.4 The ‘first voice’ and the ‘other voice’	<i>19</i>
2.2.5 Lost literature during the Dark Ages	<i>19</i>
2.2.6 Humeral theory of disease	<i>20</i>
2.2.7 The works of Aristotle?	<i>20</i>
2.3 The writings of midwives	<i>23</i>

2.4 The writings of Man-Midwives	27
2.5 Upright birth to supine birth	28
2.6 The pathological perineum	30
2.7 The perineum as a surgical site.....	33
2.8 Pain relief and perineal care	37
2.9 Epidural anaesthesia and the perineum	39
2.10 Anthropology.....	40
2.10.1 Birth rituals.....	42
2.11 ‘Old wives’ tales’ and midwifery knowledge	43
2.11.1 Lessons from Freud.....	45
2.11.2 Authoritative Knowledge	46
2.11.3 Reclaiming women’s knowledge.....	47
2.11.4 The politics of knowledge	49
2.11.5 Women’s knowledge of the second stage.....	50
2.12 Summary	51
<i>Chapter 3: Contemporary literature on perineal warm packs and the physiological effects of heat</i>	<i>53</i>
3.1 Introduction.....	53
3.2 Perineal warm packs in contemporary midwifery literature.....	53
3.3 Information on perineal warm packs/compresses on the internet.....	58
3.4 Evidence-based practice	59
3.5 The physiological effects of heat	60
3.5.1 Mechanical effects of heat.....	61
3.5.2 Effect of heat on the anal sphincter	66
3.6 Effects of heat on pain	68
3.7 Summary	70
<i>Chapter 4: Literature review of factors that influence perineal trauma and maternal comfort during the late second stage of labour.....</i>	<i>72</i>
4.1 Introduction.....	72

4.2 Background	72
4.3 Morbidity associated with perineal trauma.....	74
4.4 Factors that contribute to perineal trauma	75
4.5 Review methods.....	76
4.6 Perineal massage	77
4.6.1 Antenatal digital perineal massage.....	77
4.6.2 Antenatal perineal massage using a massaging device.....	79
4.6.3 Perineal massage in the second stage by a midwife	80
4.6.4 Summary of the section	81
4.7 Pelvic floor muscle training.....	82
4.7.1 Summary of the section	82
4.8 Warm packs.....	83
4.8.1 Summary of the section	85
4.9 Cold packs	85
4.10 Immersion in water	86
4.10.1 Summary of the section	87
4.11 Local anaesthetic spray	87
4.11.1 Summary of the section	88
4.12 Maternal position in the second stage of labour	88
4.12.1 Summary of the section	92
4.13 Coached vs uncoached pushing.....	93
4.13.1 Birth of baby's head between contractions.....	95
4.13.2 Summary of the section	96
4.14 Hand manoeuvres.....	96
4.14.1 Summary of the section	98
4.15 Episiotomy	98
4.15.1 Summary of the section	100
4.16 Vacuum versus forceps delivery	101
4.16.1 Summary of the section	101
4.17 Epidural anaesthesia and perineal trauma.....	101
4.17.1 Summary of the section	103

4.18 Support during labour	103
4.18.1 Summary of the section	104
4.19 Place of birth and perineal trauma	104
4.19.1 Home-like environment versus conventional institutional setting.....	104
4.19.2 Home birth versus hospital birth	105
4.19.3 Stand-alone midwifery-led unit versus consultant-led unit	106
4.19.4 Summary of the section	107
4.20 Midwives and obstetricians' impact on perineal outcomes.....	107
4.20.1 Summary of the section	109
4.21 Key findings.....	110
4.22 The 'virtual' birth	112
4.23 Summary	112
<i>Chapter 5: Methods.....</i>	<i>114</i>
5.1 Introduction.....	114
5.2 Study Design.....	114
5.3 Ethics approval.....	114
5.4 The setting	115
5.4.1 Site One: The RPA Hospital.....	115
5.4.2 Site Two: The Canterbury Hospital.....	116
5.4.3 Non-inclusion of Birth Centre	116
5.5 Study population	117
5.5.1 A culturally diverse area.....	117
5.5.2 Definition of ethnicity	117
5.6 Time frame of the study	118
5.7 Funding.....	118
5.8 Study participants	118
5.8.1 Eligibility criteria.....	118
5.8.2 Decision not to include privately insured women	119
5.8.3 Decision to only include primiparous women	119
5.9 Recruitment.....	120

5.10 Exclusion criteria.....	121
5.11 Power and sample size projection.....	121
5.12 Randomisation process.....	122
5.12.1 Randomly generated group assignment.....	122
5.12.2 Stratification.....	122
5.12.3 Remote allocation concealment.....	123
5.13 Protocols.....	124
5.14 Training midwives in the Perineal Warm Pack Trial procedure.....	124
5.15 Study protocol.....	125
5.16 Defining perineal trauma.....	126
5.17 Repairing perineal trauma.....	127
5.18 Blinding.....	128
5.19 Intention to treat.....	128
5.20 Statistical analysis.....	129
5.21 Monitoring and adverse events.....	130
5.22 Data storage.....	131
5.23 Ethical considerations.....	131
5.24 Issues in recruitment and consent.....	132
5.25 Issues in obtaining consent.....	134
5.26 Sample.....	134
5.27 Baseline maternal characteristics.....	136
5.27.1 Ethnicity.....	137
5.28 Data-collection instruments.....	137
5.28.1 Intrapartum data collection.....	138
5.28.2 Questionnaires.....	138
5.28.3 Immediate postnatal data collection.....	139
5.28.4 Six-weeks and three-months data collection.....	140
5.29 Choice of outcome measure.....	141
5.29.1 Primary outcome measure.....	141

5.29.2 Secondary outcome measure	142
5.30 Data entry	143
5.31 Summary	144
<i>Chapter 6: Clinical outcomes of labour and birth.....</i>	<i>145</i>
6.1 Introduction.....	145
6.2 Perineal trauma.....	145
6.3 Research questions of the study	147
6.4 Method.....	148
6.5 Results.....	148
6.5.1 Baseline maternal characteristics.....	148
6.6 Outcomes of labour and birth.....	150
6.7 Perineal outcomes.....	152
6.7.1 Perineal suturing.....	152
6.7.2 Logistic regression model.....	153
6.7.3 Episiotomy.....	154
6.7.4 Severe perineal trauma and mode of birth.....	155
6.7.5 Severe perineal trauma and ethnicity.....	155
6.8 Discussion of clinical outcomes of labour and birth.....	156
6.8.1 Severe perineal trauma	157
6.8.2 Severe perineal trauma in Asian women	159
6.9 Summary	162
<i>Chapter 7: Women’s evaluations of perineal pain during and after birth</i>	<i>163</i>
7.1 Introduction.....	163
7.2 Perineal comfort during and following birth.....	163
7.3 Research questions of the study	167
7.4 Method.....	167
7.5 Perineal pain scores at birth	167
7.5.1 Analgesia use and pain scores while giving birth.....	169
7.5.2 Pain and perineal trauma	171

7.5.3 Pain scores at birth and Asian ethnicity.....	173
7.5.4 Birth position and pain experienced whilst giving birth.....	173
7.6 Perineal pain scores on day one and two	174
7.6.1 Pain scores and suturing	175
7.6.2 Pain scores and degree of perineal trauma.....	176
7.6.3 Pain scores and Asian ethnicity	177
7.7 Discussion	178
7.8 Summary	181
<i>Chapter 8: “Soothing the ring of fire:” women and midwives evaluate perineal warm packs used in the second stage of labour</i>	<i>182</i>
8.1 Introduction.....	182
8.2 Women’s experiences of the second stage.....	182
8.3 Research questions of the study	184
8.4 Methods	184
8.5 Women’s experiences of perineal warm packs.....	185
8.6 Midwives’ experiences.....	188
8.7 Discussion	191
8.8 Summary	194
<i>Chapter 9: Postpartum follow-up of women</i>	<i>195</i>
9.1 Introduction.....	195
9.2 Postpartum maternal health	195
9.3 Research questions of the study	198
9.4 Methods	198
9.5 In-hospital postpartum data collection.....	199
9.6 Six weeks and twelve weeks postpartum data collection.....	199
9.6.1 Perineal pain scores	200
9.6.2 Everyday activities	201
9.6.3 Resumption of sexual intercourse.....	202
9.6.4 Pain with sexual intercourse	204

9.6.5 Method of infant feeding	206
9.6.6 Urinary incontinence	208
9.7 Discussion	210
9.7.1 Urinary incontinence	213
9.8 Summary	216
<i>Chapter 10: Overview and discussion of the implications for second-stage care.....</i>	<i>217</i>
10.1 Introduction.....	217
10.2 Overview of the questions and findings	217
10.2.1 Will applying warm packs to the perineum in the second stage of labour reduce perineal trauma?	217
10.2.2 Will applying warm packs to the perineum in the second stage of labour increase maternal comfort?	218
10.2.3 Unexpected findings.....	219
10.2.4 Findings from historical and scientific literature review	220
10.3 Limitations of the study.....	221
10.4 Implications for second-stage care.....	225
10.5. Future research	226
10.6 Conclusion	227
<i>References.....</i>	<i>228</i>
<i>Appendix 1: Risk factors for severe perineal trauma during childbirth. An Australian prospective cohort study.....</i>	<i>247</i>
<i>Appendix 2: Obstetric-induced incontinence: A black hole of preventable morbidity? An 'alternative' opinion.....</i>	<i>248</i>
<i>Appendix 3: Information for participants.....</i>	<i>249</i>
<i>Appendix 4: Participant consent form</i>	<i>251</i>
<i>Appendix 5: Data collection form.....</i>	<i>252</i>
<i>Appendix 6: Postnatal data-collection form.....</i>	<i>254</i>
<i>Appendix 7: Six weeks data-collection form</i>	<i>256</i>

<i>Appendix 8 Twelve weeks data-collection form</i>	<i>258</i>
<i>Appendix 9: Maternal questionnaire: warm pack</i>	<i>260</i>
<i>Appendix 10: Maternal questionnaire: standard care group.....</i>	<i>262</i>
<i>Appendix 11: Midwives' questionnaire: warm pack group.....</i>	<i>263</i>

List of Tables

Table 4.1: Summary of practices thought to influence perineal trauma and/or maternal comfort during the second stage of labour.....	110
Table 5.1: Temperature ranges used in the Perineal Warm Pack Trial, as determined by repeated electronic thermometer readings	126
Table 5.2: Degrees of perineal trauma	127
Table 5.3: Baseline maternal characteristics of women, by allocated group.....	136
Table 5.4: Ethnicity of women, by allocated group.....	137
Table 5.5: Perineal trauma and suturing, by allocated group.....	142
Table 6.1: Baseline maternal characteristics of women, by allocated group.....	149
Table 6.2: Distribution of clinical outcomes during labour and birth for women and babies	151
Table 6.3: Perineal tract trauma, by allocated group	153
Table 6.4: Logistic regression model for primary outcome of requirement for perineal suturing and influencing variables	154
Table 6.5: Episiotomy and mode of birth, excluding caesarean section.....	155
Table 6.6: Severe perineal trauma and mode of birth, excluding caesarean section.	155
Table 6.7: Severe perineal trauma and ethnicity.....	156
Table 7.1: Pain experienced when giving birth, by group	168
Table 7.2: Pain experienced giving birth, by use of analgesia.....	170
Table 7.3: Pain experienced giving birth, by use and type of analgesia/anaesthesia.....	171
Table 7.4: Pain scores experienced during birth, by perineal trauma severity	172
Table 7.5: Pain scores experienced during birth, by severe vs other perineal trauma	172
Table 7.6: Pain scores at birth, by Asian vs non-Asian women.....	173
Table 7.7: Pain experienced giving birth, by birth position.....	174
Table 8.1: Maternal questionnaire: warm pack group only.	186
Table 8.2: Midwives' questionnaire: warm pack group only.	189
Table 9.1: Method of infant feeding on discharge from hospital, by allocated group.....	199

Table 9.2: Pain with everyday activities at six weeks following the birth, by allocated group	201
Table 9.3: Pain with everyday activities at twelve weeks following the birth, by allocated group	202
Table 9.4: Resumption of sexual intercourse by six and twelve weeks following the birth, by allocated group	203
Table 9.5: Resumption of sexual intercourse by six and twelve weeks following the birth, by Asian and non-Asian women	206
Table 9.6: Method of infant feeding at six weeks, by allocated group	206
Table 9.7: Method of infant feeding at twelve weeks, by allocated group	207
Table 9.8: Urinary incontinence at 6 weeks by allocated group	209
Table 9.9: Urinary incontinence at twelve weeks by allocated group	210

List of Figures

Figure 3.1: Diagram depicting the female genitalia and perineal body where the warm packs are applied	66
Figure 5.1: Flow chart describing progress of women in the study.....	135
Figure 7.1: Pain reported by women when giving birth by group	169
Figure 7.2: Mean perineal pain scores by allocated group reported by women at day one, day two, six and twelve weeks using a visual analogue scale (0-10)	175
Figure 7.3: Pain scores on day one by suturing	176
Figure 7.4: Pain scores on day two by suturing	176
Figure 7.5: Pain scores on day one by intact or minor trauma vs major trauma.....	177
Figure 7.6: Pain scores on day two by intact or minor trauma vs major trauma	177
Figure 7.7: Non-Asian and Asian women by pain scores on day one	178
Figure 9.1: Perineal pain scores at six weeks postpartum by allocated group.....	200
Figure 9.2: Perineal pain scores at twelve weeks postpartum by allocated group.....	201
Figure 9.3: Weeks following birth of first sexual encounter at three-month interview.....	204
Figure 9.4: Pain with sexual intercourse at six weeks by group	205
Figure 9.5: Pain with sexual intercourse at twelve weeks by group	205
Figure 9.6: Method of infant feeding on discharge, at six weeks and twelve weeks for the combined groups	207
Figure 9.7: Method of infant feeding for Asian and Non-Asian women on discharge from hospital, at six and twelve weeks following the birth	208

Acknowledgements

I have learnt many things during the researching and writing of this thesis, but the greatest lesson has been that of perseverance. People often remark that obtaining a PhD is a measure of intelligence. In all reality it is more a measure of perseverance. This perseverance is only possible because of a large group of supportive people around you – those who have blazed the trail before you, those who blaze the trail alongside you and those who have no desire to blaze any trail but love and support you all the way. One does not write a thesis without a great deal of support and assistance, and these people deserve special thanks.

I am especially grateful to my principal supervisor, Professor Caroline Homer, and the Centre for Midwifery, Child and Family Health, Faculty of Nursing, Midwifery and Health, University of Technology, Sydney for giving me the opportunity to spend several months focused on completing this PhD. Without this assistance no doubt I would have ‘persevered’ for much longer. I am also grateful to Caroline for her unwavering support and belief in my abilities, which motivated me to cross the finish line. Her editing skills were of invaluable help, if not at times humbling. Where I wanted more words, she wanted fewer and fewer were inevitably better. Caroline has destroyed forever for me the myth of supervisors who take months to read and return students’ work. Barely a week went past between a chapter being sent to her and having it promptly returned, always with a ‘wonderful’ or ‘great work’ scrawled across the bottom. This made the writing of this thesis truly a joy. She will never know how grateful I am to her, not only for improving the quality of this thesis but also for making the whole experience an exciting adventure.

I want to also thank my co-supervisor, Dr Margaret Cooke, who, in her quiet manner, saw things no one else did and inevitably improved the final product. Margaret’s knowledge of statistics was of great help and inspires me to know more. She had a great way of knowing where everything sat best in the thesis.

Pat Skinner also enhanced this thesis immensely by providing her excellent editing skills and by managing to sit down and read this thesis for 14 hours, inserting commas and spotting missing words no one else had seen.

Heather Musgrove inspired me to commence The Perineal Warm Pack study after hearing her present her research at a conference in 1997. I was able to build on many of her wonderful ideas. We all stand on the shoulders of giants.

I am extremely grateful to the midwives at Royal Prince Alfred (RPA) Mothers and Babies and The Canterbury Hospital for their enthusiastic support and participation, for without them this study would never have been completed. They filled in countless forms and made countless phone calls. They went outside their zone of comfort and were brave enough to try something they had never tried before. All this was squeezed into an already heavy workload. There were some shining souls in all of this who kept the enthusiasm up until the end – you know who you are. I particularly want to thank those wonderful midwives in charge of the Antenatal, Delivery Wards and Neonatal Intensive Care Nursery in both hospitals who supported me all the way: Alexis Upton, Rosalie Nunn, Belinda Brodrick and Janet Outlaw. My special thanks to Maureen Ryan, Senior Nurse Educator, who was always willing to listen to my gigantic dreams and supported me in so many ways. My thanks go also to Valerie Smith, Women's and Children's Coordinator, SSWAHS and Vicki Manning, Director of Nursing, the Canterbury Hospital, who have always given me great scope and trust in carrying out this research and performing my role as Clinical Midwifery Consultant in the Sydney South Western Area Health Service.

I would like to thank the women who participated in the Perineal Warm Pack Trial, for without this willingness to be a part of research, we could never add to knowledge that improves care for other childbearing women. These women were the ones who finally convinced many reluctant midwives that this 'old midwives' tale' was in fact an evidence-based practice. When they started coming back to have subsequent babies and requesting the warm packs again, we knew we needed to firstly, finish the study and secondly, incorporate the practice into second-stage care.

I am grateful to the National Health and Medical Research Clinical Trials Centre, which attended to the randomisation at no cost. This was a great help and gave us extra assurance as to the rigour of the research. To the wonderful staff of the RPA Neonatal Nursery who kindly took phone calls day and night to randomise women for us, our thanks.

Special thanks go to Johnson and Johnson Medical, in particular Fran MacAlister, who gave us \$2,000 towards the study; enabling us to translate all the information sheets, consent forms, data-collection forms and questionnaires. This meant we could include women from Culturally and Linguistically Diverse (CALD) backgrounds in the research, something I was passionate about.

I want to also thank Nicky Leap for letting me read all her wonderful old history books. She inspired me so much when I wrote the historical chapter in this thesis. It was she who suggested the social-to-surgical model (Chapter 2), which fitted what I was writing so well. I love Nicky's enthusiasm for history. We are kindred spirits in recognising the need to understand the past in order to inform the present and better plan for the future.

My thanks go also to Sally Tracy who supplied me with those old journal articles that she lovingly called her 'old delicious papers.' Sally likewise has inspired me in so many ways with her passion, commitment and delightfully curious mind. Together we fuel each other's thoughts and dream up ways of getting the profession of midwifery recognised for the valuable, evidence based profession that we know it is.

To my midwives Shea Caplice and Sheryl Sidery, who walked the journey of pregnancy and birth with me four times, thank you for showing me that as midwives we have magic in our fingertips and healing in our voices. They have laughed and cried with me and we will forever be welded together in this wonderful relationship of woman and midwife. It is the incredible empowerment I gained through my journey with these amazing women that made me determined to validate what we do as midwives. The science of midwifery is only possible because of the art of midwifery and we have a responsibility to women and our

profession to bring the two together. The Perineal Warm Pack Trial is about the validation of the art through science, turning 'old wives' tales' into midwifery knowledge.

My family has always been so supportive of my achievements and to them go my ultimate thanks. My mother died during the writing of this thesis, so will never get to see me cross the finish line. She knew, however, beyond a shadow of a doubt that I would finish. Being the only one in my family to have ever gone to university has given me more reason to be humble than proud. My mother, in particular, had a wisdom I can only dream of.

My little family at home is my universe—Malcolm my rock, Lydia my lighthouse, Luke and Ethan my angels and Bronte my miracle. These people hold me in their amazing magnetic force and let me know that they above all are my life. The four little babies I birthed during the long gestation of this thesis are and always will be my penultimate achievement. My two sons Luke and Ethan, who both died shortly after their births, gave me reason not to give up but to go on. I would have given it all up for each one of them but they never once asked this of me. From the 'aren't you finished yet?' to the, 'are you trying to be smarter than Daddy?' they put it all in perspective. I now respond, 'I am finished, but I was always smarter than Daddy!'

Publications and conference presentations from this research

A number of publications and conference presentations have arisen from this work or have been associated with this work. I have been the first or second author on these papers.

Peer-reviewed publications

Dahlen, H. G., Homer, C. S. E., Cooke, M., Upton, A. M., Nunn, R. A., & Brodrick, B. S. (2007). Perineal outcomes and maternal comfort related to the application of perineal warm packs in the second stage of labor. A randomized controlled trial. *Birth* (Accepted for publication May 9th.)

Dahlen, H. G., Homer, C. S. E., Cooke, M., Upton, A. M., Nunn, R. A., & Brodrick, B. S. (2007). "Soothing the ring of fire:" Australian women and midwives evaluate perineal warm packs used in the second stage of labour. *Midwifery*. (Accepted for publication August 8th 2007.)

Dahlen, H. G., Homer, C. S. E. & Leap, N. (2007). From social to surgical: historical perspectives on perineal care during labour and birth. (Submitted to *Journal of Women's History* September 2007.)

Dahlen, H., Ryan, M., Homer, C., & Cooke, M. (2007). An Australian prospective cohort study of risk factors for severe perineal trauma during childbirth. *Midwifery*, 23 (2), 196–203. (Appendix 1.)

Homer, C., & Dahlen, H. (2007). Obstetric-induced incontinence: A black hole of preventable morbidity? *The Australian and New Zealand Journal of Obstetrics and Gynaecology*, 47, 86–90. (Appendix 2.)

Non-refereed journals

Dahlen, H. (2005). Perfecting the perineum. *Australian Parents*, June/July, 30–32.

Dahlen, H. (2001). A midwife's guide to perineal care and repair: Part Two. *Midwifery Matters*, December.

Dahlen, H. (2001). A midwife's guide to perineal care and repair: Part One. *Midwifery Matters*, September.

Conference presentations

Dahlen, H. G. (2007, July). *Perineal Warm Packs: 'Old Wives' Tales' or evidence-based practice?* Working with risk in midwifery practice. Conference, Sydney, NSW, Australia, (invited speaker).

Dahlen, H. G. (2007, May). *Perineal trauma. Can we prevent it?* Seminar, Perusing the perineum: evidence, experience and education, University of Technology, Sydney, NSW, Australia (invited speaker).

Dahlen, H. G. (2006, August). 'Soothing the ring of fire.' Paper (published in proceedings) presented at the *Australian Society for Psychosocial Obstetrics and Gynaecology (ASPOG) 33rd Annual scientific meeting* Sydney, NSW, Australia (invited speaker).

Dahlen, H. G. (2006, March). *The Perineal Warm Pack Trial*. Paper presented at The Nepean Midwives' Conference, Hawkesbury, NSW, Australia (invited speaker).

Dahlen, H. G. (2005, July). *The Perineal Warm Pack Trial*. Paper (published in proceedings) presented at the 27th Congress of the International Confederation of Midwives, Brisbane, Queensland, Australia.

Dahlen, H. G. (2002, April) (presented by C. Adams and J. Matthews). *Giving third degrees the third degree*. Paper (published in proceedings) presented at the 26th Congress of the International Confederation of Midwives, Vienna, Austria.

Dahlen, H. G. (2001, September). *Giving third degrees the third degree*. Paper (published in proceedings) presented at the Australian College of Midwives Inc. 12th Biennial National Conference, Brisbane, Queensland, Australia

Abbreviations and glossary

Abbreviations

RPA	Royal Prince Alfred Hospital
KGV	King George V Hospital
TCH	The Canterbury Hospital
CALD	Culturally and Linguistically Diverse
NICU	Neonatal Intensive Care Unit
NHMRC	National Health and Medical Research Centre
NSW	New South Wales is the state in Australia in which this study took place

Glossary

Antenatal period	Period of time before birth occurs (the pregnancy)
Antenatal card	A pregnancy record card given to every pregnant woman that she carries with her at all times. Health workers document care given, pathology and ultrasound reports on the card as well as in the antenatal record kept by the hospital.
Area Health Service	A unit of health system administration in NSW. There are eight Area Health Services in NSW and they are each accountable to the NSW Health Department for the management of public hospitals and community health services in the areas.
Asian	China, Vietnam, Hong Kong, Indonesia,

	Japan, Laos, Cambodia, Taiwan, North Korea, South Korea, Thailand, Philippines, Burma and Malaysia.
Birth weight	The first weight of the newborn, obtained as soon as possible after birth.
Elective caesarean	A caesarean section performed before the onset of labour.
Emergency caesarean	A caesarean section performed after the onset of labour.
Epidural anaesthesia	Injection of an anaesthetic agent outside the dura matter, which covers the spinal canal, causing loss of sensation to the lower part of the body.
Episiotomy	A surgical incision of the perineum and vagina to enlarge the vulval orifice.
Ethnic Obstetric Liaison Officers	Usually midwives employed from designated ethnic and cultural backgrounds to provide care, education and support for women from the same background.
Forceps delivery	A hard metal instrument used to grasp the baby's head and deliver the baby vaginally.
Gestation age	The duration of pregnancy in completed weeks from the first day of the last normal menstrual period.

Level Six Maternity Service	In NSW each maternity service has a designated Level (1–6). This thesis included Level Four and Six services. A Level Six maternity service provides a range of services from low risk to the most complex cases. They have 24-hour onsite access to specialist obstetricians and anaesthetists.
Level Four Maternity Service	Level Four maternity service cares for women and babies of low to moderate risk, transferring to a Level Six maternity service all women in preterm labour with pregnancies less than 33 weeks gestation or with complex health problems such as heart disease. They have a 24-hour onsite obstetric registrar and anaesthetic registrar.
Level Three Neonatal Intensive Care	In NSW Levels (1–3) are given to neonatal intensive care units. A Level Three Neonatal Intensive Care unit is the highest level of neonatal care involving 24-hour onsite specialist neonatology support.
Multipara (adjective multiparous)	A woman who has had two or more pregnancies resulting in viable offspring.
NHMRC Clinical Trials Centre	A clinical research organisation that undertakes large multicentre clinical trials and takes part in national and international collaborative trial groups and contributes expertise to trials run by others.
Nullipara (adjective nulliparous)	A woman who has not produced a viable offspring.

Obstetric registrar	Doctor undergoing obstetric training in order to qualify as an obstetrician.
Parity	The total number of live births before the pregnancy or birth under consideration.
Perineal body	A triangular shaped wedge of tissue based on the perineum, separating the lower one third of the posterior vaginal wall from the anal canal.
Postpartum	Occurring after childbirth.
Primigravida	A woman pregnant for the first time.
Primipara (adjective primiparous)	A woman who has had one pregnancy that resulted in viable offspring.
Primiparity	The state of being a Primipara.
Second stage of labour	Time from full dilation of the cervix to the birth of the baby.
Severe perineal trauma	Includes both third and fourth-degree perineal trauma.
Sydney South Western Area Health Service	The Area Health Service in which this research was conducted.
Tertiary referral hospital	Hospital that provides the highest level of care, specialisation and functions as a university teaching hospital. The same as a Level Six Maternity Service.
Vacuum extraction	A form of instrumental delivery in which the baby is delivered vaginally with the aid of a shallow rubber cup fixed to the baby's head, using suction.

Definition of perineal trauma

Degree	Trauma
First	Injury to the skin only.
Second	Injury to the perineum involving perineal muscles but not involving the anal sphincter.
Third	Injury to the perineum involving the anal sphincter complex (classifications of 3a, 3b, 3c not used).
Fourth	Injury to perineum involving the anal sphincter complex and anal epithelium.

RCOG (2004)

Definition of terms used to describe perineal trauma in this thesis

Minor perineal trauma	Minor perineal trauma is defined for the purpose of this thesis as intact, first-degree, vaginal or labial tear
Major perineal trauma	Major perineal trauma is defined for the purpose of this thesis as second, third- and fourth-degree tear and episiotomy
Severe Perineal trauma	Includes both third- and fourth-degree perineal trauma

Abstract

The Perineal Warm Pack Trial investigated the effects of applying warm packs to the perineum during the late second stage of labour on perineal trauma and maternal comfort. A randomised controlled method was used. In the late second stage of labour, primiparous¹ women (n = 717) giving birth were randomly allocated to having warm packs (n = 360) applied to their perineum or standard care (n = 357). Analysis was on an intention-to-treat basis. The primary outcome measure was the requirement for perineal suturing and the secondary outcome measure was maternal comfort.

There was no statistically significant difference in the number of women who required suturing following birth. There were significantly fewer third- and fourth-degree tears in the warm pack group. However, the study was underpowered to assess the uncommon outcome of severe perineal trauma. Women in the warm pack group had significantly lower perineal pain scores when giving birth, on day one and day two following the birth. At twelve weeks, women in the warm pack group were significantly less likely to have urinary incontinence compared to the women in the standard care group.

Warm packs were highly acceptable to both women and midwives as a means to relieve pain during the late second stage of labour. Almost the same number of women (79.7%) and midwives (80.4%) felt that the warm packs reduced perineal pain during the birth. Both women and midwives were positive about using warm packs in the future. The majority of women (85.7%) said they would like to use perineal warm packs again for their next birth and similarly would recommend them to friends (86.1%). Likewise, 91% of midwives were positive about using the warm packs, with 92.6% considering using them in the future as part of care in the second stage of labour.

¹ The term primiparous will be used to refer to first-time mothers who are about to give birth and who have given birth (definition: a woman who has had one pregnancy that resulted in viable offspring) when describing women in the Perineal Warm Pack Trial, to avoid confusion that could occur when moving between the terms nulliparous and primiparous.

Both women and health professionals place a high value on minimising perineal trauma during childbirth and the potential associated morbidity. Perineal warm packs are widely used in the belief that they reduce perineal trauma and increase comfort during the late second stage of labour. This study demonstrated that the application of perineal warm packs in the late second stage does not reduce the likelihood of primiparous women requiring perineal suturing but significantly reduces perineal pain during the birth and on day one and two following the birth. Urinary incontinence also appears reduced at twelve weeks postpartum, though it is unclear as to the reason for this. The practice of applying perineal warm packs in the late second stage was highly acceptable to mothers and midwives in helping to relieve perineal pain and increase comfort and should be incorporated into second-stage pain relief options available to women during childbirth.